Forest Service

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Pacific Northwest Region

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WHITE PASS EXPANSION MASTER DEVELOPMENT PLAN PROPOSAL

Final Environmental Impact Statement

Volume 2: Appendices and Figures

Okanogan and Wenatchee National Forests,

and Gifford Pinchot National Forest

FEIS ORGANIZATION

The White Pass MDP Proposal FEIS is presented in three volumes, namely: Volume 1 presents Chapters 1-8, Volume 2 presents the Appendices and Figures, and Volume 3 presents the Response to Comments provided by the public. Each of these elements provides an essential element of the environmental impact analysis as required by CEQ and NEPA guidelines. A summary of this document has also been prepared as required by CEQ/NEPA guidelines and is provided below.

Volume 1: Chapters 1-8

Executive Summary

Describes and summarizes the EIS. Stresses the major conclusions, areas of controversy (including issues raised by agencies and the public), and issues to be resolved (including the choice among alternatives.

Chapter 1 - Purpose and Need for Action

Chapter 1 describes the Proposed Action, project background, purpose and need for the Proposed Action, the decision to be made, management direction, the scope of the Proposed Action, scoping process and issues, government and agency coordination, and required permits.

Chapter 2 - Alternatives

Chapter 2 identifies and compares a range of alternatives, including a No Action alternative, as well as the alternatives considered but eliminated before specific detailed analysis in the DEIS or FEIS. The chapter also describes in detail, and compares the six alternatives considered in this FEIS document. This also includes the No Action alternative, as well as the methodology of evaluation and the selection of alternatives. The proposed design features and monitoring measures are also listed in this chapter.

Chapter 3 - The Affected Environment / Environmental Consequences

Chapter 3 describes the existing physical, biological, economic, and social environment that may be affected by the alternatives. These existing conditions are described according to broad categories. The Physical Environment includes natural resource factors such as watershed resources, wildlife, and scenic quality. The Human Environment includes factors such as recreation, socioeconomics, and transportation.

Chapter 3 also describes in detail the physical, biological, economic, and social effects of the alternatives by resource area. Direct, indirect, and cumulative environmental consequences of implementing the alternatives are described. This chapter also identifies adverse environmental effects that cannot be avoided, the relationship between short-term uses of the environment and long-term productivity, and any irreversible and irretrievable commitments of resources.

Chapter 4 - References

Provides a list of references that were used this FEIS.

Chapter 5 - Distribution List

Chapter 5 provides the list of individuals, organizations, and agencies that have requested, or were identified as being interested in receiving this FEIS for review.

Chapter 6 - List of Preparers

Chapter 6 provides a list of the preparers of this FEIS.

Chapter 7 - Glossary

Chapter 7 provides definitions for key terms used in this FEIS.

Chapter 8 – Index

Chapter 8 provides an index of key terms and page numbers found in the FEIS.

Volume 2: Appendices and Figures

Appendices

Figures

Volume 3: Response to Comments

Volume three provides a summary of the comment procedure, comment tracking method, and displays the substantive comments and their respective responses submitted by the community (individuals, organizations, and agencies) and received by the U. S. Forest Service (USFS). Additionally, Section 2.2 contains full copies of the comment letters received from Indian tribes and all governmental agencies per FSH 24.1.3.

APPENDIX LIST

FIGURE LIST

Appendices

Appendix A
Forest Plan Management Direction

APPENDIX A - FOREST PLAN MANAGEMENT DIRECTION

1.0 RIPARIAN RESERVES

The following Standards and Guidelines for Riparian Reserves are presented in the Northwest Forest Plan (USDA and USDI 1994) and apply to the White Pass Expansion proposal.[1]

- RF-2 – "For each existing or planned road, meet Aquatic Conservation Strategy (ACS) objectives by: a) minimizing road and landing locations in Riparian Reserves (RR), b) completing watershed analyses prior to construction of new roads or landings in RRs, c) preparing road design criteria, elements, and standards that govern construction and reconstruction, d) preparing operation and maintenance criteria that govern road operation, maintenance, and management, e) minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow, f) restricting side casting as necessary to prevent the introduction of sediment to streams, and g) avoiding wetland entirely when constructing new roads."

- RF-3 – "Determine the influence of each road on the ACS objectives through watershed analysis. Meet ACS objectives by: a) reconstructing roads and associated drainage features that pose a substantial risk, b) prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected, and c) closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to the ACS objectives and considering short-term and long-term transportation needs."

- RF-4 – "New culverts, bridges and other stream crossings shall be constructed, and existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resource affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of a crossing failure."

- RF-5 – "Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping in unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes."

[1] The Northwest Forest Plan includes Standards and Guidelines for Riparian Reserves that do not apply to the types of activities proposed in the White Pass expansion (i.e., Watershed Restoration, Grazing Management, Minerals Management, Lands, and Research). These Standards and Guidelines are not evaluated in the White Pass expansion FEIS.

- RM-1 – "New recreational facilities within RRs, including trails and dispersed sites, should be designed to not prevent meeting ACS objectives. Construction of these facilities should not prevent future attainment of these objectives. For existing recreation facilities within RRs, evaluate and mitigate impact to ensure that these do not prevent, and to the extent practicable contribute to, attainment of ACS objectives."

- RM-2 – "Adjust dispersed and developed recreation practices that retard or prevent attainment of ACS objectives. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities and/or specific site closures are not effective, eliminate the practice or occupancy."

- FM-1 – "Design fuel treatment and fire suppression strategies, practices, and activities to meet ACS objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuels management activities could be damaging to long-term ecosystem function."

- RA-1 – "Identify and attempt to secure in-stream flows needed to maintain riparian resources, channel conditions, and aquatic habitat."

- RA-2 – "Fell trees in RRs when they pose a safety risk. Keep felled trees on-site when needed to meet coarse woody debris objectives."

- WR-3 – "Do not use mitigation or planned restoration as a substitute for preventing habitat degradation."

- FW-4 – "Cooperate with federal, tribal, and state fish management agencies to identify and eliminate impacts associated with habitat manipulation, fish-stocking, harvest and poaching that threaten the continued existence and distribution of native fish stocks occurring on federal lands."

2.0 WENATCHEE FOREST PLAN - DEVELOPED RECREATION

Forest-wide Standards and Guidelines state the bounds or constraints within which all practices will be carried out in achieving the planned objectives (USDA 1990b). Specifically, the Forest-wide Standards and Guidelines for Recreation Planning and Inventory state that practices on the WNF must:

> "12. Evaluate existing developed and dispersed recreation sites to determine if they meet present and future public expectations, needs, and desires, and if they have the resource capability of sustaining present or future levels of visitor use…
>
> 15. Plan new or developed and dispersed winter recreation opportunities in response to the growing demand for winter sports areas and developed facilities. Seek maximum

opportunities for partnerships and joint ventures with private developers and other agencies in providing recreation development." (WNF Forest Plan, IV-65)

Furthermore, Standards and Guidelines for Recreation Facility Site Management include the following:

"1. Manage recreation sites to provide a high degree of security, safety, and sanitary conditions for recreation visitors.

2. Provide high quality maintenance of facilities that assures a positive public image and a high degree of visitor satisfaction.

3. Keep abreast of visitor's needs and desires at recreation sites and adjust management programs to meet these needs." (WNF Forest Plan, IV-68).

In addition, the Standards and Guidelines specific to Management Prescription RE-1 provide that:

"1. Visual Quality Objective: Retention.

2. Plan recreation activities and facilities to provide a diverse range of recreation opportunities in Recreation Opportunity Spectrum (ROS) classes, semi-primitive to urban.

3. Develop partnerships and encourage recreation development through permits, joint ventures, and cooperative agreements.

4. Encourage development of recreation opportunities by the private providers.

5. Employ marketing strategies to determine wants and needs of recreation visitors. Incorporate these wishes in recreation planning and development." (WNF Forest Plan, IV-159).

3.0 GIFFORD PINCHOT FOREST PLAN - DEVELOPED RECREATION

The Standards and Guidelines for developed recreation (Management Area 2L) include the following:

Recreation - Planning and Inventory

"2. On selected sites, special facilities needed for the convenience of visitors, including the elderly, young and handicapped, should be provided." (GPNF Forest Plan, IV-101).

Recreation - Facility and Site Reconstruction, Construction, and Management Administration

"2. Operation and maintenance plans should be prepared…

4. Every site will be surveyed for hazard trees annually. Trees determined to be dangerous will be removed.” (GPNF Forest Plan, IV-101).

Timber - Planning and Inventory and Intermediate Harvest

“2. Trees should be removed when they may be a hazard to life or property. Methods least likely to produce lasting visual impacts should be employed. Trees may be removed to improve a ski area, provide a scenic view, or accomplish other recreational enhancements. Ordinary timber salvage should not be permitted. (GPNF Forest Plan, IV-102).

Appendix B
Mountain Plan Specifications

APPENDIX B - MOUNTAIN PLAN SPECIFICATIONS

1.0 DESIGN CRITERIA

The upgrading and expansion of a ski area would be influenced by a variety of ski facility design criteria that help create a quality ski experience.

Trail System

Each trail must have a generally consistent grade within a given ability level to provide an interesting and challenging ski experience for the ability level for which the trail would be designed. Optimum trail widths should vary depending upon topographic conditions and the caliber of the skier being served.[1] The trail network must minimize cross-traffic and should provide the full range of ability levels consistent with market demand. The trails must be designed and constructed to minimize off fall-line conditions and avoid bottlenecks and convergence zones, which might produce skier congestion.

Lift Design

Ski lifts should be placed to serve the available ski terrain in the most efficient manner, while considering a myriad of factors such as wind conditions, round-trip skiing and access needs, skier connectivity between other lifts and trails, and the need for circulatory space at the lower and upper terminal sites. Additionally, it should be understood that the vertical rise and length of ski lifts for a particular mountain are the primary measures of overall attractiveness and marketability of a ski area.

Capacity Analysis and Design

Comfortable Carrying Capacity (CCC) is defined as an optimal level of utilization for the ski area (the number of visitors that can be accommodated at any given time) which guarantees a pleasant recreational experience, while at the same time preserving the quality of the environment. The accurate estimation of the CCC of a mountain is a complex issue and is the single most important planning criterion for the resort. Given proper identification of the mountain's true capacity, all other related skier service facilities can be planned, such as base lodge seating, mountain restaurant requirements, sanitary facilities, parking, and other skier services. The CCC figure is based on a comparison of the uphill hourly capacity of the lift system to the downhill capacity of the trail system, taking into account the typical amount of vertical terrain desired by skiers of varying ability levels.

Balance of Facilities and Limiting Factors

The mountain master planning process emphasizes the importance of balancing recreational facility development. The size of the skier service functions must be adequate for the CCC of the mountain. The

[1] For the purposes of this FEIS, the terms "skiing" and "skier" refer to all snow sliding sports typically associated with ski area facilities, such as snowboarding, telemark skiing, cross-country, alpine skiing, etc.

true capacity of the overall ski area is determined by the lowest of the limiting factors. The limiting factor of the ski area can either be trail capacity, lift capacity, support facility capacity, or parking capacity.

The future development of a ski area should be designed and coordinated to maintain a balance between skier demand, ski area capacity (lifts and trails), and the supporting equipment and facilities (e.g., grooming machines, day lodge services and facilities, utility infrastructure, access, and parking).

2.0 EXISTING SKI RESORT FACILITIES

The overall balance of the existing ski area is evaluated by calculating the skier capacities of White Pass' various facility components, and, in turn, comparing these capacities to the ski area's CCC. This examination of capacities helps to identify the ski resort's strengths and weaknesses or surpluses and deficiencies. With an understanding of the ski area's strengths and weaknesses, the next step is to identify improvements that would both help bring the existing ski area into better equilibrium, and help the resort meet the ever-changing needs of their skier marketplace.

Lifts

A total of five primary lifts service the skiable terrain at White Pass. Specifications for the existing lifts are set forth in Table 1. In addition, there is a 76-foot long Magic Carpet conveyor located near the base lodge which is used for teaching beginner skiers.

Table 1:
Lift Specifications – Existing Conditions

Map Ref.	Lift Name, Lift Type	Top Elev.	Bot. Elev.	Vert. Rise	Plan. Length	Slope Length	Avg. Grade	Hourly Cap.	Rope Speed	Carrier Spacing	Lift Maker/ Year Installed
		(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(%)	(per./hr.)	(fpm)	(ft.)	
1	Great White Express/DC4	5,999	4,477	1,521	4,814	5,125	32%	2,100	1,000	114	Doppelmayr/1994
2	Pigtail/C2	5,978	4,485	1,493	4,628	4,987	32%	900	450	60	Riblet/1958
3	Lower Cascade/C3	5,024	4,514	510	2,166	2,232	24%	1,800	450	45	Doppelmayr/2000
4	Paradise/C2	5,961	5,249	712	2,675	2,804	27%	1,200	450	45	Riblet/1984
5	Platter/S	4,545	4,479	66	512	517	13%	400	400	60	Doppelmayr/2000

KEY: "S" is Surface Lift, "C-2" is Fixed-Grip Double, "C-3" is Fixed-Grip Triple, "C-4" is Fixed-Grip Quad, "DC4" is Detachable Quad

- **Top Elevation** – The elevation of the lift's top terminal.
- **Bottom Elevation** – The elevation of the lift's bottom terminal.
- **Vertical Rise** – The difference in elevation between the top and bottom terminals.

- **Plan Length** – The length of the lift, from top terminal to bottom terminal, as measured on the mapping (i.e., a two-dimensional measurement).

- **Slope Length** – The length of the lift, from top terminal to bottom terminal, as measured on the ground (i.e., a three-dimensional measurement).

- **Slope Area** – The total number of acres of terrain occurring within a trail boundary. This may be determined by GIS measurement, or by calculation utilizing the slope length and average width.

- **Average Grade** – The average slope gradient (in percent) of the terrain under the length of the lift, from top terminal to bottom terminal.

- **Hourly Capacity** – The number of guests trips (one ride for one guest = one guest trip) per hour that a lift can accommodate in each hour.

- **Rope Speed** – The speed that a lift can transport guests, as expressed in number of feet per minute.

- **Carrier Spacing** – The distance in feet between each guest carrier (chair, gondola cabin).

Terrain

Specifications for the existing terrain are set forth in Table 2. The most significant terrain feature of White Pass is a prominent cliff band that crosses the area at about mid-mountain level. This cliff band makes repeat skiing from the top to the bottom of the mountain challenging, and can make egress to the bottom of the mountain at the end of the day difficult and crowded. There are several trails that drop over the cliff band, but all skiers below an expert ability level must use one of three routes to transition from the upper mountain to the lower mountain. These routes are either: the western route, from the bottom of the *Paradise* lift, of the Main Street/Paradise trails, which an upper level intermediate skier or higher can ski; the Holiday trail, which has enough long, flat sections and short, steep sections that it would be an undesirable route and should be rated as an intermediate trail; or the Cascade cat track, which was constructed to help with the circulation problem. Based on reported ski area observations, a majority of skiers use the Cascade cat track to both repeat ski and egress the mountain. The fact that almost all trails go over or through this cliff band limits the desirability of the resort’s ski terrain and reduces the overall quality of the skiing experience.

Table 2:
Terrain Specifications – Existing Conditions

Map Ref	Trail/Area Name	Top Elev. (ft.)	Bot. Elev. (ft.)	Vert. Drop (ft.)	Plan Length (ft.)	Slope Length (ft.)	Avg. Width (ft.)	Slope Area (ac.)	Avg. Grade (%)	Max. Grade (%)	Ability Level
1	Beginner no-name Trail	4,547	4,478	68	584	589	104	1.4	12%	17%	Novice
2	Cascade	5,967	4,971	996	4,989	5,131	170	20.1	20%	43%	Intermediate
3	Cascade Cliff	5,266	5,050	216	849	896	206	4.2	25%	64%	Expert
4	Chair Trail	5,688	5,466	222	768	817	147	2.8	29%	57%	Expert
5	Elevator Shaft	5,206	5,087	119	354	380	150	1.3	34%	48%	Expert
6	Execution	5,415	5,027	388	593	723	162	2.7	65%	99%	Expert
7	Far Side	5,023	4,517	506	2,573	2,631	270	16.3	20%	35%	Low Intermediate
8	Grouse	5,851	5,339	513	3,056	3,113	80	5.7	17%	33%	Low Intermediate
9	Holicade	5,704	5,544	160	842	862	68	1.3	19%	35%	Intermediate
10	Holiday	5,975	4,816	1,159	8,539	8,713	106	21.3	14%	39%	Intermediate
11	Holiday Cliff	5,487	5,132	355	1,300	1,372	100	3.2	27%	65%	Expert
12	Jaw Breaker	5,518	5,388	129	1,432	1,444	83	2.8	9%	20%	Intermediate
13	Lower Holiday	4,816	4,509	306	2,185	2,213	208	10.5	14%	25%	Low Intermediate
14	Lower Hour Glass	5,139	4,918	221	765	802	131	2.4	29%	45%	Intermediate
15	Lower Paradise	4,766	4,475	291	3,516	3,548	60	4.9	8%	23%	Expert
16	Lower Roller	4,972	4,504	468	1,357	1,445	303	10.0	34%	53%	Advanced Intermediate
17	Mach V	5,943	5,635	308	1,036	1,102	109	2.8	30%	66%	Expert
18	Main Street	5,286	4,771	514	3,123	3,204	84	6.1	16%	56%	Expert
19	Midway	5,725	5,318	408	1,370	1,448	79	2.6	30%	53%	Expert
20	Near Side	5,038	4,475	562	2,479	2,549	309	18.1	23%	35%	Low Intermediate
21	Noname Trail	5,170	4,854	317	1,196	1,241	225	6.4	26%	38%	Intermediate
22	North Peak	5,905	5,632	272	1,183	1,264	78	2.3	23%	73%	Expert
23	Outhouse	5,979	5,812	167	304	353	195	1.6	55%	76%	Expert
24	Paradise Cliff	5,163	4,766	397	2,031	2,105	77	3.7	20%	55%	Expert
25	Poma Bowl	5,063	4,486	577	1,908	2,005	218	10.0	30%	45%	Intermediate
26	Poma Face	4,966	4,483	483	1,621	1,698	261	10.2	30%	41%	Intermediate
27	Ptarmigan	5,683	5,359	325	1,504	1,541	147	5.2	22%	29%	Low Intermediate
28	Quail	5,748	5,163	585	3,115	3,194	87	6.4	19%	33%	Low Intermediate
29	Raven's Haven	5,921	5,756	166	309	354	147	1.2	54%	59%	Expert
30	Roller Cattrac	5,975	5,670	305	1,544	1,589	83	3.0	20%	41%	Expert
31	Roller Cliff	5,318	4,972	346	655	748	106	1.8	53%	69%	Expert
32	Tucker	5,829	5,487	342	2,238	2,282	84	4.4	15%	36%	Intermediate

Table 2:
Terrain Specifications – Existing Conditions

Map Ref	Trail/Area Name	Top Elev. (ft.)	Bot. Elev. (ft.)	Vert. Drop (ft.)	Plan Length (ft.)	Slope Length (ft.)	Avg. Width (ft.)	Slope Area (ac.)	Avg. Grade (%)	Max. Grade (%)	Ability Level
33	Upper Hour Glass	5,635	5,210	424	981	1,104	141	3.6	43%	97%	Expert
34	Upper Paradise	5,736	5,286	450	2,183	2,240	117	6.0	21%	33%	Low Intermediate
35	Upper Roller	5,670	5,364	306	996	1,047	114	2.7	31%	43%	Expert
36	Water Fall	4,833	4,681	152	347	384	140	1.2	44%	55%	Expert
37	What	5,648	5,398	250	1,266	1,297	68	2.0	20%	39%	Intermediate
	Total					67,430		212.3			

Note: Half an acre of beginner terrain would be located within the boundaries of the Near Side trail, which would be accessed by the Magic Carpet conveyor.

- **Top Elevation** – The elevation at the beginning (top) of the trail.
- **Bottom Elevation** – The elevation at the end (bottom) of the trail.
- **Vertical Drop** – The difference in elevation between the beginning and end of the trail.
- **Plan Length** – The length of the trail centerline, from beginning of the trail to the end, as measured on the mapping (i.e., a two-dimensional measurement). A trail centerline is an imaginary line drawn down the middle of a trail.
- **Slope Length** – The three-dimensional length of the trail centerline, from beginning of the trail to the end, as measured on the ground or by use of three-dimensional mapping technology (i.e., AutoCADD, ArcMap).
- **Average Width** – The average width of the entire trail, from top to bottom. This may be determined by field measurements, or by calculation utilizing the given trail acreage and slope length (i.e., acreage x 43,560ft/slope length).
- **Slope Area** – The total number of acres of terrain occurring within a trail boundary. This may be determined by GIS measurement, or by calculation utilizing the slope length and average width.
- **Average Grade** – The average slope gradient (in percent) of the trail's centerline, from the beginning of the trail to the end.
- **Maximum Grade** – The maximum gradient (in percent) occurring anywhere on the trail.
- **Skier Ability Level** – The following gradients were used to determine the skier ability level of the mountain terrain:

Skier Ability	Slope Gradient
Beginner	8 to 12%
Novice	to 25% (short pitches to 30%)
Low Intermediate	to 30% (short pitches to 35%)
Intermediate	to 40% (short pitches to 45%)
Advanced Intermediate	to 50% (short pitches to 55%)
Expert	over 50% (maximum of 80%)

Source: SE Group

Exceptions to these standards occur when access to a trail is limited to a higher ability level. For example, if a novice trail can only be accessed by a low intermediate trail, then it will be designated as a low intermediate trail rather than novice because it would be not readily accessible to the novice skier. Alternatively, if an otherwise intermediate trail contains a substantial pitch of 50 percent terrain, then the trail will be designated expert because only expert skiers can easily navigate the entire trail.

Skier Distribution

For purposes of this analysis, the distribution of available ski terrain would be evaluated based on two parameters. First, the distribution of skiers would be discussed as a percentage of skiers on the varying levels of terrain. This approach looks at both the acreage of terrain of each ability level and the acceptable skier density on that terrain (as a general rule, higher ability level terrain supports a lower density of skiers). Second, the acreage of terrain would be evaluated as a percentage of the total ski terrain at White Pass.

Specifications for the existing skier distribution are set forth in Table 3 and Illustrations 1 and 2.

Table 3:
Skier Distribution by Ability Levels – Existing Conditions

Skier Ability Level	Trail Area	Skier Capacity	Skier Distribution	Skier Market
	(acres)	(guests)	(%)	(%)
Beginner	0.5	15.0	1%	5%
Novice	1.4	25.4	1%	15%
Low Intermediate	67.7	947.8	47%	25%
Intermediate	80.9	809.3	40%	35%
Adv. Intermediate	10.0	70.3	3%	15%
Expert	51.7	155.1	8%	5%
Total	212.3	2,023	100%	100%

Illustration 1:
Skier Distribution by Ability Levels – Existing Conditions

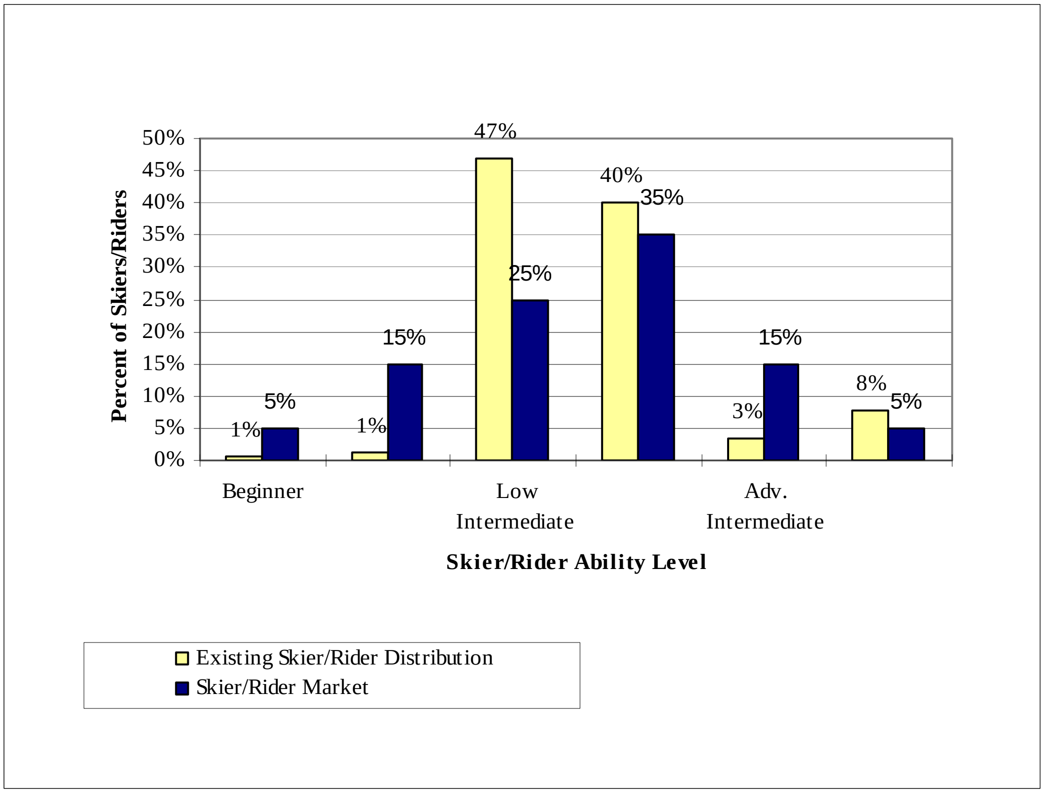


Table 3 and Illustration 1 compare White Pass' 'skier distribution' (expressed as percent of skiers) with the market demand for each ability level. Skier distribution would be determined as follows:

- Each trail would be designated by ability level, as listed in Table 2. Each ability level has a standard design density for the ideal number of skiers occupying each acre of terrain at one time. The widely accepted density criteria for ski areas in western North America are listed below.

Skier Ability	Design Density
Beginner	25-35 skiers/acre
Novice	12-25 skiers/acre
Low Intermediate	8-20 skiers/acre
Intermediate	6-15 skiers/acre
Advanced Intermediate	4-10 skiers/acre
Expert	2-5 skiers/acre

Source: SE Group

- The number of acres of terrain designated to each ability level would be multiplied by the standard design density for each ability level.

- This total for each ability level would be expressed as a percentage of the total number of skiers.
- This percentage – or skier distribution – would then be compared with the market demand for each ability level.

The available ski terrain should be capable of accommodating the full range of ability levels consistent with market demand. As shown in Illustration 1, the configuration of White Pass currently provides an abundance of low intermediate terrain, an abundance of intermediate and expert terrain, and a deficit of beginner, novice, and advanced intermediate terrain, measured as a percentage of skiers at White Pass.

Illustration 2
Acreage Distribution by Ability Levels – Existing Conditions

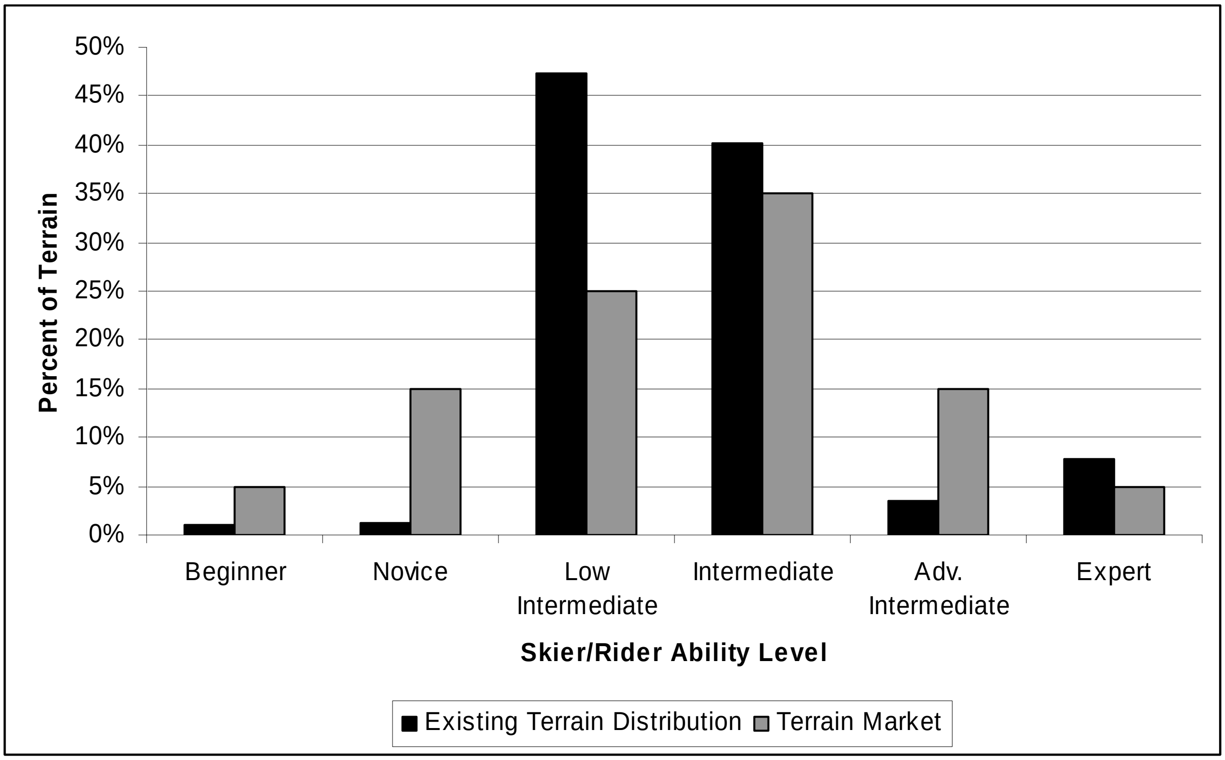


Illustration 2 compares the White Pass' 'acreage distribution' by ability level with the market demand (as expressed in acres) for each ability level. This would be determined as follows:

- The market demand (in acres) would be determined by dividing the market demand (percentage displayed in Illustration 1) of each ability level by the standard design density (per acre) for each ability level. This number for each ability level would be expressed as a percentage of the total acreage of terrain.

- The terrain distribution (in acres) would be determined by dividing the number of acres of terrain in each ability level by the total acreage of terrain.

Consistent with the previous analysis comparing skier distribution by ability levels, the acreage distribution by ability levels comparison shows the same abundance of low intermediate, intermediate, and expert terrain; and significant lack of true novice and advanced intermediate terrain.

Illustration 2 provides an analysis of terrain at White Pass, as measured in acres (without consideration of skier density).

Comfortable Carrying Capacity

CCC would be derived from the resort's supply of vertical transport (i.e., the combined uphill hourly capacities of the lifts) and demand for vertical transport (i.e., the aggregate number of trails demanded multiplied by the vertical rise associated with those trails). CCC would be calculated by dividing vertical supply (VTF/Day) by Vertical Demand. The calculation of White Pass' current CCC would be described in Table 4. The CCC of the existing lift and trail network at White Pass would be calculated at 2,670 guests per day. It would not be uncommon for ski areas to experience peak days during which skier visitation exceeds the CCC by as much as 25 percent. However, it would not be recommended to consistently exceed the CCC due to the resulting decrease in the quality of the recreational experience.

Table 4:
Classification of Comfortable Carrying Capacity – Existing Conditions

Map Ref.	Lift Name / Lift Type	Slope Length	Vert. Rise	Hourly Cap.	Oper. Hours	Up-Mtn. Access Role	Load Eff.	Adj. Hourly Cap.	VTF/Day	Vertical Demand	CCC
		(ft.)	(ft.)	(PPH)	(hrs.)	(%)	(%)	(PPH)	(000)	(ft.)	(skiers)
1	Great White Express/DC4	5,125	1,521	2,100	7.00	10	5	1,785	19,008	18,154	1,050
2	Pigtail/C2	4,987	1,493	900	7.00	10	10	720	7,524	18,750	400
3	Lower Cascade/C3	2,232	510	1,800	7.00	0	10	1,620	5,784	9,074	640
4	Paradise/C2	2,804	712	1,200	7.00	0	10	1,080	5,380	10,647	510
5	Platters	517	66	400	7.00	0	10	360	167	2,421	70
Total		15,666		6,400				5,565	37,863		2,670

- **Oper. Hours** – The number of hours per day that the lift operates (not including night skiing).
- **Up-Mtn Access Role (%)** – The percentage of lift ridership used to access up-mountain facilities, as opposed to repeat-skiing the lift.

- **Load Eff. (%)** – The lift loading efficiency, for example, when lift has to stop due to a mis-load or unload.

- **Adj. Hourly Cap (PPH)** – The hourly capacity adjusted by reducing up-mountain access percentage and loading efficiency percentage.

- **Vertical Transport Feet per Day** – The number of persons a lift is able to transport in a day. VTF/day is derived by multiplying a lift's uphill capacity (measured in persons per hour) by the lift's vertical rise (measured in feet), then by the number of hours the lift operates in a day.

- **Vertical Demand (ft)** – The aggregate number of trails demanded on the resort's lifts multiplied by the vertical rise associated with those trails.

- **Comfortable Carrying Capacity (CCC)** – An optimal level of utilization for the ski area (the number of visitors that can be accommodated at any given time) which guarantees a pleasant recreational experience, while at the same time preserving the quality of the environment.

Density Analysis

Specifications for the existing density analysis are set forth in Table 5.

Table 5:
Ski Trail Density Analysis – Existing Conditions

Map Ref.	Daily Lift CCC	Guest Dispersement				Density Analysis				
		Support Fac./ Milling	Lift Lines	On Lift	On Trails	Trail Area	Actual Trail Density	Target Trail Density	Diff.	Density Index
		(guests)	(guests)	(guests)	(guests)	(acres)	(guest/ac.)	(guest/ac.)	(+/-)	(%)
1	1,050	263	298	152	337	108.0	3	8	-5	38%
2	400	100	36	133	131	30.8	4	6	-2	67%
3	640	160	86	134	260	44.7	6	13	-7	46%
4	510	128	54	112	216	27.4	8	13	-5	62%
5	70	18	18	8	26	1.4	18	18	0	100%
Total	2,670	669	492	539	970	212.3	5	10	-5	52%

- **Daily Lift Comfortable Carrying Capacity (CCC)** – An optimal level of utilization for the ski area (the number of visitors that can be accommodated at any given time) which guarantees a pleasant recreational experience, while at the same time preserving the quality of the environment.

- **Support Fac./Milling (guests)** – The number of aggregate skier population using guest facilities and milling areas.

- **Lift Lines (guests)** – The number of aggregate skier population actively waiting in lift lines.
- **On Lift (guests)** – The number of aggregate skier population actively riding a lift.
- **On Trails (guests)** – The number of aggregate skier population actively skiing.
- **Trail Area (acres)** – Acreage of trails servicing the referred lift.
- **Actual Trail Density (guest/ac.)** – Calculated on-trail density; calculated by dividing the number of guests on the trails by the amount of trail area available.
- **Target Trail Density (guest/ac.)** – The product of the target density and the lift's trail distribution by ability level.
- **Diff. (+/-)** – Calculated trail density comparing actual trail density to target trail density; a negative number indicates an actual trail density lower than target density, a positive number indicates an actual trail density higher than target density.
- **Density Index (%)** – The density comparison stated as a percentage. A 100 percent density index represents a balance between actual density and target density, a percentage less than 100 indicates an actual trail density lower than target density, and a percentage higher than 100 indicates an actual trail density higher than target density.

The calculation of capacity for a ski area would be based in part on the target number of skiers that can be accommodated on each acre of ski terrain at any one given time. The widely accepted density criteria for ski areas in western North America are listed in the previous discussions regarding terrain and skier distribution.

These criteria assume that on an average day, approximately 33 percent of the total number of skiers in the area will be on the trails at any one time. The remainder of the skiers are either in lift lines, riding the lifts, or utilizing skier support services. The densities listed above have been used in the analysis of trail densities at White Pass.

The density index would be a percentage comparison of the actual trail density with the target trail density. A 100 percent index represents a balance between the actual and target trail density. An index under 100 percent indicates that the actual trail density would be lower than the target trail density (i.e., uncrowded). An index above 100 percent indicates that the actual trail density would be higher than the target trail density (i.e., crowded). Table 5 indicates that all White Pass trails are at or below the target trail density. The overall density index score shows that, as a whole, White Pass' trails are about half of target densities. This would be a desirable situation, indicating that none of White Pass' trails are typically over-crowded.

The exception to this situation would be the return trails. An analysis done as part of the 1999 Master Development Plan, and attached as Appendix B to that plan, showed that potential skier densities on the Cascade Track are roughly two times that of the recommended standard design criteria. The high density would be compounded by the fact that this route would be the primary way for skiers to transition from the top to the bottom of the mountain. Skiers ranging from novice to expert ability levels use the trail concurrently and at differing rates of speed.

Resort Balance and Limiting Factors

The overall balance of the existing ski area would be evaluated by calculating the capacities of the resort's various facilities, as compared to the resort's CCC. In this case, only lift network and ski terrain capacities were evaluated. The lift network capacity would be at 2,670 people, while the ski terrain capacity would be 5,548 people. This discrepancy would be attributable to the large amount of terrain as compared to the lift capacities. This situation would be reflected in the low skier densities. The overall balance of the ski area, however, would be limited by the cliff band. Since most of the trails are routed so that skiers must transition over the cliff band, and most of those skiers are limited to one or two routes through the cliff band by their ability level, the overall skier capacity of the resort would be likely constrained by the circulation challenge created by that topographic feature. The only ways to alleviate that problem are to create more terrain that would be not constrained by the cliff band, and/or to improve the capacity of routes across the cliff band.

3.0 PROPOSED UPGRADING PLAN – ALTERNATIVE 2

Summary

Under Alternative 2, two new lifts are proposed; both in the Hogback Basin area. New terrain would be developed to service these proposed lifts (the *Basin* and *Hogback Express* lifts), but no modifications to the existing lifts or terrain would occur. The two proposed lifts would be built at maximum capacity for quad chairlifts. Under Alternative 2, the CCC of White Pass would increase to 4,250. Alternative 2 does not address the need for improved circulation as it proposes no modifications to the existing egress trails. Alternative 2 addresses the need for skier dispersal, as it provides new lifts, terrain, and facilities away from the base area. This would reduce the crowding in the existing part of the ski area by allowing a significant number of skiers to remain on the upper mountain for much of the skiing day. However, since the egress trail circulation problems would not be addressed, it would be likely that the existing high densities on the egress trails would increase during the afternoon and lunchtime egress periods. Alternative 2 does not fully address the need for increased novice and advanced intermediate terrain. While Alternative 2 does add some advanced intermediate terrain, it does not add any novice terrain. Alternative 2 addresses the need for improved skiing during the early season, in warm periods during the regular season, and in low snow years. By providing additional skiing at higher elevations, the quality of the skiing during these times would be improved.

Lifts

Under Alternative 2, White Pass would add two additional lifts to their existing lift system. Therefore, White Pass would operate seven lifts, including the proposed *Basin* and *Hogback Express* chairlifts. The lifts would extend to the south-west of the existing ski area, into the Hogback Basin.

Under Alternative 2, the C-6 (*Basin*) would access advanced intermediate to low intermediate level terrain. The bottom terminal would be located approximately 1,500 feet upslope (south) from the existing Quail ski trail at approximately 5,552 feet elevation. The upper terminal would be located adjacent to western boundary of the proposed SUP, at approximately 6,169 feet elevation, and approximately 240 feet (i.e., the closest distance) from the Wilderness boundary. The *Basin* chairlift would be proposed as a bottom drive, fixed-grip quad chairlift. The proposed lift would accommodate 2,400 intermediate and expert level skiers per hour.

Under Alternative 2, the *Hogback Express* chairlift would access advanced intermediate to low intermediate level terrain. The bottom terminal would be located at approximately 5,605 feet elevation, southwest of the existing SUP boundary. The upper terminal would be located at approximately 6,473 feet elevation, approximately 430 feet (i.e., the closest distance) from the Wilderness boundary. The proposed lift would accommodate 2,400 intermediate and expert level skiers per hour.

The *Basin* lift, a fixed-grip quad, would primarily act as a transport lift to the *Hogback Express* lift, a high-speed detachable quad that would service the majority of ski terrain in Hogback Basin.

Specifications for the proposed lifts are set forth in Table 6.

Table 6:
Lift Specifications – Proposed Upgrading – Alternative 2

Map Ref.	Lift Name / Lift Type	Top Elev.	Bot. Elev.	Vert. Rise	Plan. Length	Slope Length	Avg. Grade	Hourly Cap.	Rope Speed	Carrier Spacing	Lift Maker/ Year Installed
		(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(%)	(per./hr.)	(fpm)	(ft.)	
1	Great White Express/DC4	5,999	4,477	1,521	4,814	5,125	32%	2,100	1,000	114	Doppelmayr/1994
2	Pigtail/C2	5,978	4,485	1,493	4,628	4,987	32%	900	450	60	Riblet/1958
3	Lower Cascade/C3	5,024	4,514	510	2,166	2,232	24%	1,800	450	45	Doppelmayr/2000
4	Paradise/C2	5,961	5,249	712	2,675	2,804	27%	1,200	450	45	Riblet/1984
5	Platters	4,545	4,479	66	512	517	13%	400	400	60	Doppelmayr/2000
6	Basin/C4	6,169	5,552	617	3,497	3,560	18%	2,400	400	40	*Proposed*
7	Hogback Express/DC4	6,473	5,605	867	4,041	4,162	21%	2,400	1,000	100	*Proposed*

KEY: "S" is Surface Lift, "C-2" is Fixed-GripDouble, "C-3" is Fixed-Grip Triple, "C-4" is Fixed-Grip Quad, "DC4" is Detachable Quad

Terrain

Under Alternative 2, White Pass would add approximately 70 acres of terrain on 15 new trails, all of which would be accessed from the two new lifts. The trail network under Alternative 2 would increase from the existing 37 named trails on approximately 212 acres to 52 trails on approximately 282 acres. The proposed trails are situated so that none cross the cliff band, and would provide desirable low intermediate through advanced intermediate skiing. The trails are mostly in the fall-line and provide enough variations in width and slope to provide good terrain variety. Traversing would be required on trails 2-1 and 2-2, which would be used to access and egress the new terrain. Throughout the terrain, there are flat areas of less than 10 percent slope extending 150 or more feet. In these areas, skiers would have to maintain speed to successfully navigate the low-gradient portions of the trails.

Table 7:
Terrain Specifications – Proposed Upgrading – Alternative 2

Map Ref	Trail/Area Name	Top Elev. (ft.)	Bottom Elev. (ft.)	Vert Drop (ft.)	Plan Length (ft.)	Slope Length (ft.)	Avg. Width (ft.)	Slope Area (ac.)	Avg. Grade (%)	Max. Grade (%)	Ability Level
1	Beginner no-name Trail	4,547	4,478	68	584	589	104	1.4	12%	17%	Novice
2	Cascade	5,967	4,971	996	4,989	5,131	170	20.1	20%	43%	Intermediate
3	Cascade Cliff	5,266	5,050	216	849	896	206	4.2	25%	64%	Expert
4	Chair Trail	5,688	5,466	222	768	817	147	2.8	29%	57%	Expert
5	Elevator Shaft	5,206	5,087	119	354	380	150	1.3	34%	48%	Expert
6	Execution	5,415	5,027	388	593	723	162	2.7	65%	99%	Expert
7	Far Side	5,023	4,517	506	2,573	2,631	270	16.3	20%	35%	Low Intermediate
8	Grouse	5,851	5,339	513	3,056	3,113	80	5.7	17%	33%	Low Intermediate
9	Holicade	5,704	5,544	160	842	862	68	1.3	19%	35%	Intermediate
10	Holiday	5,975	4,816	1,159	8,539	8,713	106	21.3	14%	39%	Intermediate
11	Holiday Cliff	5,487	5,132	355	1,300	1,372	100	3.2	27%	65%	Expert
12	Jaw Breaker	5,518	5,388	129	1,432	1,444	83	2.8	9%	20%	Intermediate
13	Lower Holiday	4,816	4,509	306	2,185	2,213	208	10.5	14%	25%	Low Intermediate
14	Lower Hour Glass	5,139	4,918	221	765	802	13.	2.4	29%	45%	Intermediate
15	Lower Paradise	4,766	4,475	291	3,516	3,548	60	4.9	8%	23%	Expert
16	Lower Roller	4,972	4,504	468	1,357	1,445	303	10.0	34%	53%	Advanced Intermediate
17	Mach V	5,943	5,635	308	1,036	1,102	109	2.8	30%	66%	Expert
18	Main Street	5,286	4,771	514	3,123	3,204	84	6.1	16%	56%	Expert
19	Midway	5,725	5,318	408	1,370	1,448	79	2.6	30%	53%	Expert
20	Near Side	5,038	4,475	562	2,479	2,549	309	18.1	23%	35%	Low Intermediate
21	Noname Trail	5,170	4,854	317	1,196	1,241	225	6.4	26%	38%	Intermediate
22	North Peak	5,905	5,632	272	1,183	1,264	78	2.3	23%	73%	Expert
23	Outhouse	5,979	5,812	167	304	353	195	1.6	55%	76%	Expert
24	Paradise Cliff	5,163	4,766	397	2,031	2,105	77	3.7	20%	55%	Expert
25	Poma Bowl	5,063	4,486	577	1,908	2,005	218	10.0	30%	45%	Intermediate

Table 7:
Terrain Specifications – Proposed Upgrading – Alternative 2

Map Ref	Trail/Area Name	Top Elev. (ft.)	Bottom Elev. (ft.)	Vert Drop (ft.)	Plan Length (ft.)	Slope Length (ft.)	Avg. Width (ft.)	Slope Area (ac.)	Avg. Grade (%)	Max. Grade (%)	Ability Level
26	Poma Face	4,966	4,483	483	1,621	1,698	261	10.2	30%	41%	Intermediate
27	Ptarmigan	5,683	5,359	325	1,504	1,541	147	5.2	22%	29%	Low Intermediate
28	Quail	5,748	5,163	585	3,115	3,194	87	6.4	19%	33%	Low Intermediate
29	Raven's Haven	5,921	5,756	166	309	354	147	1.2	54%	59%	Expert
30	Roller Cattrac	5,975	5,670	305	1,544	1,589	83	3.0	20%	41%	Expert
31	Roller Cliff	5,318	4,972	346	655	748	106	1.8	53%	69%	Expert
32	Tucker	5,829	5,487	342	2,238	2,282	84	4.4	15%	36%	Intermediate
33	Upper Hour Glass	5,635	5,210	424	981	1,104	141	3.6	43%	97%	Expert
34	Upper Paradise	5,736	5,286	450	2,183	2,240	117	6.0	21%	33%	Low Intermediate
35	Upper Roller	5,670	5,364	306	996	1,047	114	2.7	31%	43%	Expert
36	Water Fall	4,833	4,681	152	347	384	140	1.2	44%	55%	Expert
37	What	5,648	5,398	250	1,266	1,297	68	2.0	20%	39%	Intermediate
38	Alt 2-1	5,547	5,442	105	1,739	1,747	34	1.4	6%	17%	Low Intermediate
39	Alt 2-2	5,833	5,554	279	3,286	3,309	39	2.9	9%	19%	Low Intermediate
40	Alt 2-3	5,820	5,558	262	1,492	1,518	90	3.1	18%	25%	Low Intermediate
41	Alt 2-4	6,190	5,554	636	3,603	3,668	105	8.8	18%	28%	Low Intermediate
42	Alt 2-5	6,069	5,653	416	2,448	2,493	82	4.7	17%	33%	Low Intermediate
43	Alt 2-6	6,150	5,776	374	2,210	2,249	103	5.3	17%	30%	Low Intermediate
44	Alt 2-7	6,153	5,974	180	1,125	1,146	39	1.0	16%	27%	Low Intermediate
45	Alt 2-8	6,120	5,889	232	2,292	2,315	67	3.6	10%	28%	Advanced Intermediate
46	Alt 2-9	5,960	5,618	342	1,965	2,008	76	3.5	17%	31%	Advanced Intermediate
47	Alt 2-10	6,038	5,741	296	1,465	1,508	118	4.1	20%	39%	Advanced Intermediate
48	Alt 2-11	6,465	6,120	345	1,482	1,532	81	2.9	23%	50%	Advanced Intermediate
49	Alt 2-12	6,484	5,621	862	4,081	4,198	114	11.0	21%	42%	Advanced Intermediate
50	Alt 2-13	6,264	5,618	646	3,693	3,797	96	8.3	17%	43%	Advanced Intermediate
51	Alt 2-14	6,297	5,741	556	2,434	2,521	95	5.5	23%	52%	Advanced Intermediate
52	Alt 2-15	6,463	6,000	463	2,535	2,592	63	3.7	18%	41%	Advanced Intermediate
Total						104,032		282.3			

Skier Distribution

Specifications for the proposed skier distribution under Alternative 2 are set forth in Table 8 and Illustrations 3 and 4.

Table 8:
Skier Distribution by Ability Levels – Proposed Upgrading – Alternative 2

Skier Ability Level	Trail Area	Skier Capacity	Skier Distribution	Skier Market
	(acres)	(guests)	(%)	(%)
Beginner	0.5	15.0	1%	5%
Novice	1.4	25.4	1%	15%
Low Intermediate	95.1	1331.4	49%	25%
Intermediate	80.9	809.3	30%	35%
Adv. Intermediate	52.6	368.3	14%	15%
Expert	51.7	155.1	6%	5%
Total	282.3	2,705	100%	100%

Illustration 3:
Skier Distribution by Ability Levels – Proposed Upgrading – Alternative 2

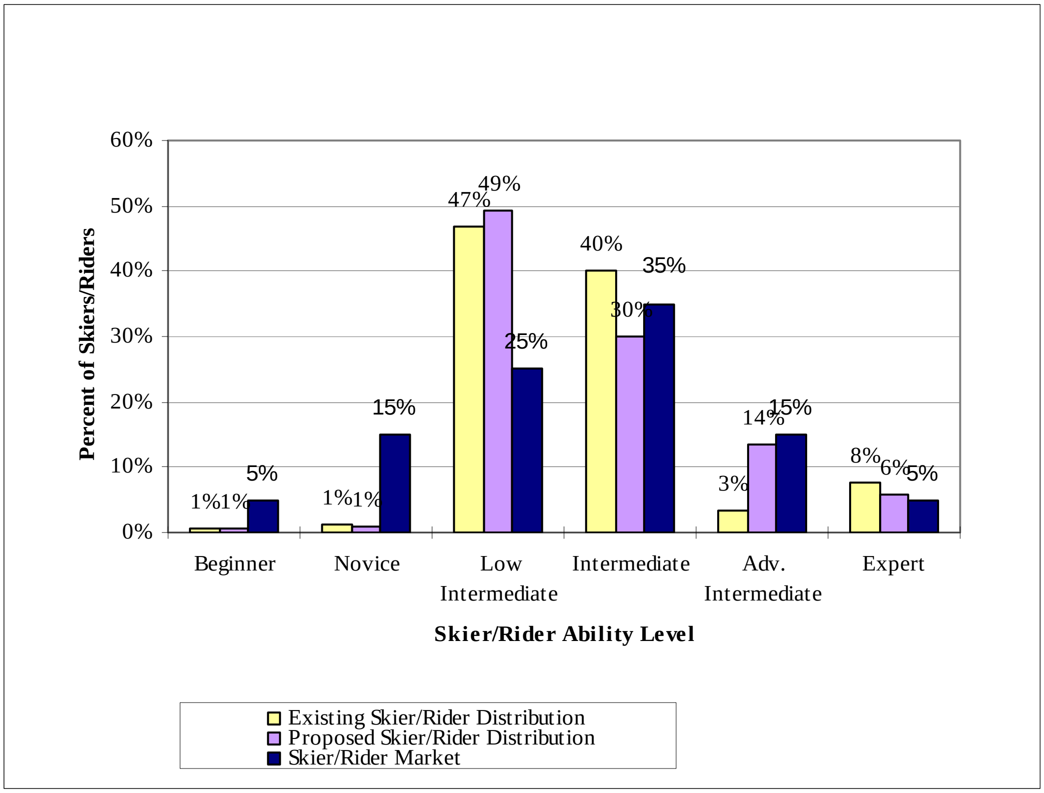


Table 8 and Illustration 3 compare the White Pass skier distribution with the market demand for each ability level. Skier distribution would be determined as follows:

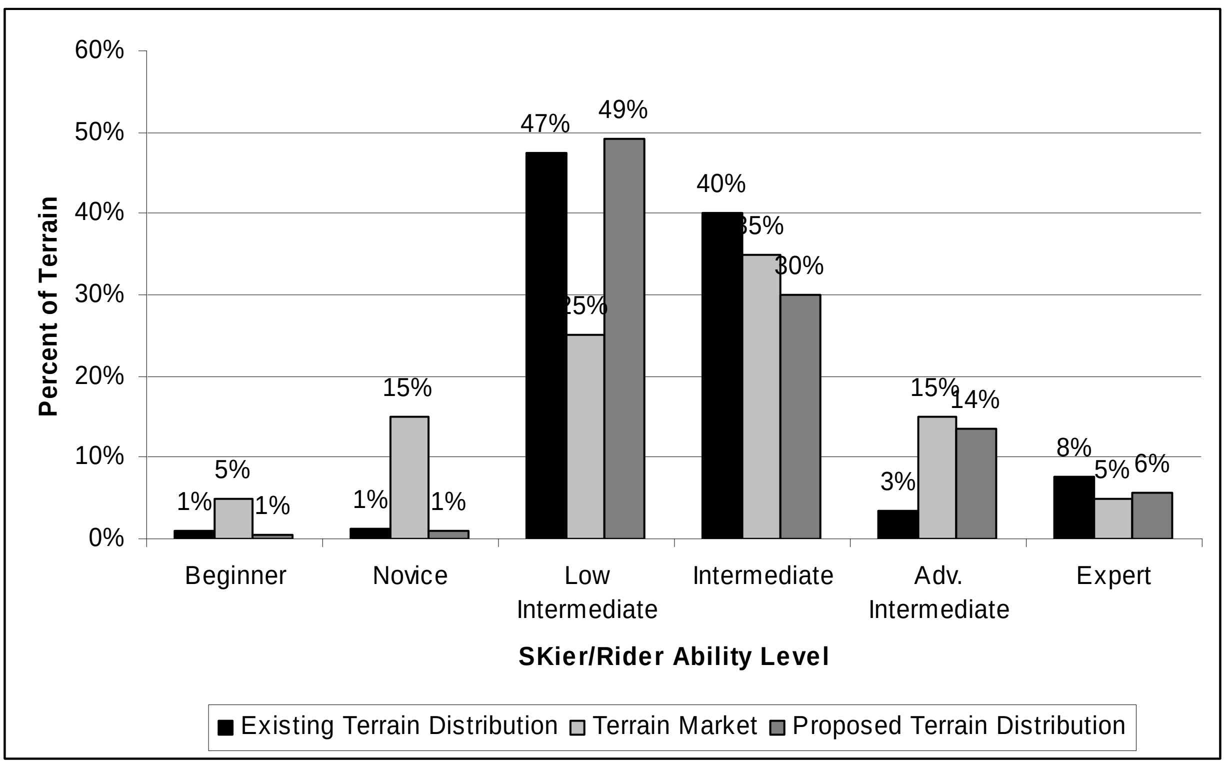
- Each trail would be designated by ability level, as listed in Table 7.

- The number of acres of terrain designated to each ability level would be multiplied by the standard design density for each ability level.
- This total for each ability level would be expressed as a percentage of the total number of skiers.
- This percentage – or skier distribution – would then be compared with the market demand for each ability level.

As shown in Table 8 and Illustration 3, Alternative 2 would improve the advanced intermediate terrain distribution by bringing it closer to the skier market goals, and would also add additional low intermediate terrain, which White Pass already has in surplus. As a result of increasing acreage in these two categories, the percentages for the other categories drop. The increase in low intermediate terrain would not be a desired objective of Alternative 2, however the lift and trail alignments that are required to access the Hogback Basin area (advanced intermediate terrain) results in increased low intermediate terrain.

Illustration 4 compares White Pass' terrain distribution with the market demand.

Illustration 4:
Acreage Distribution by Ability Levels – Proposed Upgrading – Alternative 2



Consistent with the skier distribution in Illustration 3, the acreage distribution by ability levels comparison also indicates an increase in both advanced and low intermediate terrain acreages.

Comfortable Carrying Capacity

The calculation of White Pass' CCC, under Alternative 2, would be described in Table 9. As illustrated, the proposed expansion would increase the CCC of the lift and trail network at White Pass to 4,250 guests per day (an increase of 59 percent).

Table 9:
Classification of Comfortable Carrying Capacity – Proposed Upgrading – Alternative 2

Map Ref.	Lift Name / Lift Type	Slope Length	Vert. Rise	Hourly Cap.	Oper. Hours	Up-Mtn. Access Role	Load Eff.	Adj. Hourly Cap.	VTF/Day	Vertical Demand	CCC
		(ft.)	(ft.)	(PPH)	(hrs.)	(%)	(%)	(PPH)	(000)	(ft.)	(skiers)
1	Great White Express/DC4	5,125	1,521	2,100	7.00	10	5	1,785	19,008	18,154	1,050
2	Pigtail/C2	4,987	1,493	900	7.00	10	10	720	7,524	18,750	400
3	Lower Cascade/C3	2,232	510	1,800	7.00	0	10	1,620	5,784	9,074	640
4	Paradise/C2	2,804	712	1,200	7.00	0	10	1,080	5,380	10,647	510
5	Platters	517	66	400	7.00	0	10	360	167	2,421	70
6	Basin/C4	3,560	617	2,400	6.50	30	10	1,440	5,777	7,218	800
7	Hogback Express/DC4	4,162	867	2,400	6.50	0	5	2,280	12,850	16,507	780
Total		23,388		11,200				9,285	56,490		4,250

Density Analysis

Specifications for the Alternative 2 density analysis are set forth in Table 10.

Table 10:
Ski Trail Density Analysis – Proposed Upgrading – Alternative 2

Map Ref.	Daily Lift CCC	Guest Dispersement				Density Analysis				
		Support Fac./ Milling	Lift Lines	On Lift	On Trails	Trail Area	Actual Trail Density	Target Trail Density	Diff.	Density Index
		(guests)	(guests)	(guests)	(guests)	(acres)	(guest/ac.)	(guest/ac.)	(+/-)	(%)
1	1,050	263	298	152	337	108.7	3	8	-5	38%
2	400	100	36	133	131	30.8	4	6	-2	67%
3	640	160	86	134	260	44.7	6	13	-7	46%
4	510	128	54	112	216	28.1	8	13	-5	62%
5	70	18	18	8	26	1.4	18	18	0	100%
6	800	200	72	214	314	22.8	14	14	0	100%
7	780	195	114	158	313	45.7	7	7	0	100%
Total	4,250	1,064	678	911	1,597	282.3	7	10	-3	70%

Table 10 indicates that under Alternative 2, as a whole, White Pass' trails would remain in the desirable situation of being at or below target trail densities. The exception to this would be the existing return trails to the bottom of the ski area, as described for the existing condition. Under Alternative 2, that situation could become worse during the egress time, especially the last hour and a half of ski area operation. Since there would be an increase of skiers on the upper mountain, the densities on those egress routes would increase to over the target densities during the time of day when those skiers are returning to the base area.

Resort Balance and Limiting Factors

Under Alternative 2, the overall capacity would increase and the balance of the ski resort would improve. Both the lift network and ski terrain capacities would increase. The lift network capacity would increase to 4,250 people, while the ski terrain capacity would increase to 7,178 people. This would create a better balance between the lift and trail networks, without creating over-crowding on the majority of the formal terrain. All of the capacity added would be in areas that are situated away from the cliff band, thereby addressing the problem of the cliff band restricting skier capacity. However, as stated above, all of the additional skiers in the new terrain would have to cross the cliff band to return to the base of the mountain at the end of the day. Since there are no upgrades in Alternative 2 for the trails that transition from the top of the mountain to the bottom of the mountain across the cliff band, the densities on those trails would increase from their already high levels.

4.0 PROPOSED UPGRADING PLAN – MODIFIED ALTERNATIVE 4

Summary

Modified Alternative 4 would be based on DEIS Alternative 4, with modifications. Under Modified Alternative 4, two new lifts, *Basin* and *Hogback Express*, are proposed; both in the Hogback Basin area. New terrain would be developed to service these lifts, new trails would be developed in the current SUP area and existing trails within the SUP area would be improved. These improvements include a new advanced intermediate trail off the *Paradise* lift and an additional egress trail off the Main Street trail, as well as grading on the Holiday trail. There would be no modifications to the existing lifts. Both new lifts would have lower hourly capacities than under Alternative 2. The *Basin* lift would be a triple instead of a quad, and the *Hogback Express* lift would be built at a reduced capacity. Under Modified Alternative 4, White Pass' CCC would increase to 3,800, resulting in an increase of approximately 42 percent, or 1,130 additional skiers. Modified Alternative 4 addresses the need for improved circulation as it proposes the above stated modifications and additions to the existing egress trails. Modified Alternative 4 addresses the need for skier dispersal, as it provides new lifts, terrain, and facilities away from the base area. In addition, this would reduce the crowding in the existing portion of the ski area by allowing a significant number of skiers to remain on the upper mountain for much of the skiing day. By addressing the existing circulation issues as described above, and by allowing for reduced lift capacities on the proposed lifts, Modified Alternative 4 addresses high egress densities that are identified in Alternative 2.

Additionally, Modified Alternative 4 addresses the need for increased novice and advanced intermediate terrain by adding new advanced intermediate terrain and creating novice terrain through the proposed grading on the Holiday trail, enabling that trail to be classified as novice. These improvements to the terrain distribution would result in an almost exact match between the amount of terrain available in those categories and the skier market, as discussed below. Modified Alternative 4 addresses the need for improved skiing during the early season, in warm periods during the regular season, and in low snow years. By providing additional skiing at higher elevations, the quality of skiing during these times would be significantly improved.

Lifts

As in Alternative 2, White Pass would add two additional lifts to their existing lift system under Modified Alternative 4. White Pass would operate a total of seven lifts, including the proposed *Basin* and *Hogback Express* chairlifts. The lifts would extend to the south-west of the existing SUP area, into the Hogback Basin. The bottom terminal of the proposed *Basin* chairlift would be located approximately 1,500 feet upslope (south) from the existing Quail trail at 5,522 feet elevation. The upper terminal would be located at 6,169 feet elevation, approximately 240 feet from the Wilderness/SUP area boundary. The bottom terminal of *Hogback Express* would be located approximately 3,600 feet east of the *Basin* lift at an elevation of 5,605 feet. The top terminal would be located at an elevation of approximately 6,473 feet.

As in Alternative 2, under Modified Alternative 4, the *Basin* lift, a fixed-grip, would primarily act as a transport lift to the *Hogback Express* lift, a high-speed detachable quad that would service primarily advanced intermediate terrain. The *Basin* lift would be a fixed-grip triple under Modified Alternative 4, allowing for faster rope speeds and lower ride times than in Alternative 2. Both of the lifts proposed under Modified Alternative 4 would operate at a lower hourly capacity than in Alternative 2.

Table 11 provides lift specification data for the lifts under Modified Alternative 4.

Table 11:
Lift Specifications – Proposed Upgrading – Modified Alternative 4

Map Ref.	Lift Name / Lift Type	Top Elev.	Bot. Elev.	Vert. Rise	Plan. Length	Slope Length	Avg. Grade	Hourly Cap.	Rope Speed	Carrier Spacing	Lift Maker/ Year Installed
		(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(%)	(per./hr.)	(fpm)	(ft.)	
1	Great White Express/DC4	5,999	4,477	1,521	4,814	5,125	32%	2,100	1,000	114	Doppelmayr/1994
2	Pigtail/C2	5,978	4,485	1,493	4,628	4,987	32%	900	450	60	Riblet/1958
3	Lower Cascade/C3	5,024	4,514	510	2,166	2,232	24%	1,800	450	45	Doppelmayr/2000
4	Paradise/C2	5,961	5,249	712	2,675	2,804	27%	1,200	450	45	Riblet/1984
5	Platters	4,545	4,479	66	512	517	13%	400	400	60	Doppelmayr/2000
6	Basin/C4	6,169	5,552	617	3,497	3,560	18%	1,800	500	50	*Proposed*
7	Hogback Express/DC4	6,473	5,605	867	4,041	4,162	21%	1,800	1,000	133	*Proposed*

KEY: "S" is Surface Lift, "C-2" is Fixed-GripDouble, "C-3" is Fixed-Grip Triple, "C-4" is Fixed-Grip Quad, "DC4" is Detachable Quad

Terrain

Under Modified Alternative 4, White Pass would add approximately 90 acres of terrain on 18 new trails, and restore and revegetate 5.4 acres of terrain within the existing ski area, for a net increase of about 85 acres of terrain. The trail network under Modified Alternative 4 would increase from the existing 37 named trails on approximately 212 acres to 55 trails on approximately 298 acres. The proposed trails in Hogback Basin are similar to those in Alternative 2, although narrower in many places to reduce riparian impacts. The proposed trails are situated so that none cross the cliff band. The trails would provide desirable low intermediate through advanced intermediate skiing. The trails are mostly in the fall-line and provide enough variations in width and slope to provide good terrain variety. Traversing would be required on trails 4-1, 4-2, and 4-16, which would be used to access and egress the new terrain. Trail 4-16, an egress trail that runs from the bottom of the *Hogback Express* lift back to the existing ski area, providing better circulation than Alternative 2. Throughout the terrain, there are flat areas of less than 10 percent slope extending 150 feet or more. Similar to Alternative 2, skiers would have to maintain speed to navigate these low-gradient areas.

The new trail in the *Paradise* pod would provide consistent, advanced intermediate terrain within the current SUP area. The additional egress trail off Main Street, above Lower Paradise, would help distribute the afternoon egress skiers, resulting in lower densities on both Lower Paradise and Cascade. This new trail also positions skiers higher on Lower Roller, which would allow skiers to traverse to the proposed parking lot; whereas the existing Lower Paradise trail exits at the elevation of the base area. The revegetated tree islands on the lower mountain would provide better separation of ability levels and enhance the visual quality of the area. Additionally, the quality of skiing on other terrain would be improved by widening and re-grading existing trails. Most notably, grading would be done on the Holiday trail to reduce the slope gradient and an uphill pitch, so that it could be truly classified as a novice trail. Specifications for the proposed trails are set forth in Table 12.

Table 12:
Terrain Specifications – Proposed Upgrading – Modified Alternative 4

Map Ref	Trail/Area Name	Top Elev.	Bottom Elev.	Vert Drop	Plan Length	Slope Length	Avg. Width	Slope Area	Avg. Grade	Max. Grade	Ability Level
		(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(ac.)	(%)	(%)	
1	Beginner no-name Trail	4,547	4,478	68	584	589	104	1.4	12%	17%	Novice
2	Cascade	5,967	4,971	996	4,989	5,131	170	20.1	20%	43%	Intermediate
3	Cascade Cliff	5,266	5,050	216	849	896	206	4.2	25%	64%	Expert
4	Chair Trail	5,688	5,466	222	768	817	147	2.8	29%	57%	Expert
5	Elevator Shaft	5,206	5,087	119	354	380	150	1.3	34%	48%	Expert
6	Execution	5,415	5,027	388	593	723	162	2.7	65%	99%	Expert
7	Far Side	5,023	4,517	506	2,573	2,631	249	15.0	20%	35%	Low Intermediate
8	Grouse	5,851	5,339	513	3,056	3,113	80	5.7	17%	33%	Low Intermediate
9	Holicade	5,704	5,544	160	842	862	68	1.3	19%	35%	Intermediate
10	Holiday	5,975	4,816	1,159	8,539	8,713	106	21.3	14%	25%	Novice
11	Holiday Cliff	5,487	5,132	355	1,300	1,372	100	3.2	27%	65%	Expert
12	Jaw Breaker	5,518	5,388	129	1,432	1,444	83	2.8	9%	20%	Intermediate
13	Lower Holiday	4,816	4,509	306	2,185	2,213	185	9.4	14%	25%	Low Intermediate
14	Lower Hour Glass	5,139	4,918	221	765	802	131	2.4	29%	45%	Intermediate
15	Lower Paradise	4,766	4,475	291	3,516	3,548	60	4.9	8%	23%	Expert
16	Lower Roller	4,972	4,504	468	1,357	1,445	303	10.0	34%	53%	Advanced Intermediate
17	Mach V	5,943	5,635	308	1,036	1,102	109	2.8	30%	66%	Expert
18	Main Street	5,286	4,771	514	3,123	3,204	84	6.1	16%	56%	Expert
19	Midway	5,725	5,318	408	1,370	1,448	79	2.6	30%	53%	Expert
20	Near Side	5,038	4,475	562	2,479	2,549	272	15.9	23%	35%	Low Intermediate
21	Noname Trail	5,170	4,854	317	1,196	1,241	225	6.4	26%	38%	Intermediate
22	North Peak	5,905	5,632	272	1,183	1,264	78	2.3	23%	73%	Expert
23	Outhouse	5,979	5,812	167	304	353	195	1.6	55%	76%	Expert
24	Paradise Cliff	5,163	4,766	397	2,031	2,105	77	3.7	20%	55%	Expert
25	Poma Bowl	5,063	4,486	577	1,908	2,005	218	10.0	30%	45%	Intermediate
26	Poma Face	4,966	4,483	483	1,621	1,698	261	10.2	30%	41%	Intermediate
27	Ptarmigan	5,683	5,359	325	1,504	1,541	147	5.2	22%	29%	Low Intermediate
28	Quail	5,748	5,163	585	3,115	3,194	87	6.4	19%	33%	Low Intermediate
29	Raven's Haven	5,921	5,756	166	309	354	147	1.2	54%	59%	Expert
30	Roller Cattrac	5,975	5,670	305	1,544	1,589	83	3.0	20%	41%	Expert
31	Roller Cliff	5,318	4,972	346	655	748	106	1.8	53%	69%	Expert
32	Tucker	5,829	5,487	342	2,238	2,282	84	4.4	15%	36%	Intermediate
33	Upper Hour Glass	5,635	5,210	424	981	1,104	141	3.6	43%	97%	Expert
34	Upper Paradise	5,736	5,286	450	2,183	2,240	117	6.0	21%	33%	Low Intermediate
35	Upper Roller	5,670	5,364	306	996	1,047	114	2.7	31%	43%	Expert

Table 12:
Terrain Specifications – Proposed Upgrading – Modified Alternative 4

Map Ref	Trail/Area Name	Top Elev. (ft.)	Bottom Elev. (ft.)	Vert Drop (ft.)	Plan Length (ft.)	Slope Length (ft.)	Avg. Width (ft.)	Slope Area (ac.)	Avg. Grade (%)	Max. Grade (%)	Ability Level
36	Water Fall	4,833	4,681	152	347	384	140	1.2	44%	55%	Expert
37	What	5,648	5,398	250	1,266	1,297	68	2.0	20%	39%	Intermediate
38	Alt 4-1	5,547	5,442	105	1,739	1,747	34	1.4	6%	17%	Low Intermediate
39	Alt 4-2	5,833	5,554	279	3,286	3,309	39	2.9	9%	19%	Low Intermediate
40	Alt 4-3	5,820	5,558	262	1,492	1,518	90	3.1	18%	25%	Low Intermediate
41	Alt 4-4	6,190	5,554	636	3,603	3,668	105	8.8	18%	28%	Low Intermediate
42	Alt 4-5	6,069	5,653	416	2,448	2,493	82	4.7	17%	33%	Low Intermediate
43	Alt 4-6	6,150	5,776	374	2,210	2,249	103	5.3	17%	30%	Low Intermediate
44	Alt 4-7	6,153	5,974	180	1,125	1,146	39	1.0	16%	27%	Low Intermediate
45	Alt 4-8	6,120	5,889	232	2,292	2,315	67	3.6	10%	28%	Advanced Intermediate
46	Alt 4-9	5,960	5,618	342	1,965	2,008	76	3.5	17%	31%	Advanced Intermediate
47	Alt 4-10	6,038	5,741	296	1,465	1,508	118	4.1	20%	39%	Advanced Intermediate
48	Alt 4-11	6,465	6,120	345	1,482	1,532	81	2.9	23%	50%	Advanced Intermediate
49	Alt 4-12	6,484	5,621	862	4,081	4,198	114	11.0	21%	42%	Advanced Intermediate
50	Alt 4-13	6,264	5,618	646	3,693	3,797	96	8.3	17%	43%	Advanced Intermediate
51	Alt 4-14	6,297	5,741	556	2,434	2,521	95	5.5	23%	52%	Advanced Intermediate
52	Alt 4-15	6,463	6,000	463	2,535	2,592	63	3.7	18%	41%	Advanced Intermediate
53	Alt 4-16	5,608	5,270	337	4,483	4,563	39	4.1	8%	12%	Advanced Intermediate
54	Alt 4-17	5,851	5,315	536	2,250	2,326	219	11.7	24%	45%	Advanced Intermediate
55	Alt 4-18	4,974	4,637	337	3,108	3,138	56	4.0	11%	22%	Low Intermediate
Total						114,060		297.6			

Skier Distribution

Specifications for proposed skier distribution under Modified Alternative 4 are set forth in Table 13 and Illustration 5.

Table 13:
Skier Distribution by Ability Levels – Proposed Upgrading – Modified Alternative 4

Skier Ability Level	Trail Area	Skier Capacity	Skier Distribution	Skier Market
	(acres)	(guests)	(%)	(%)
Beginner	0.5	15.0	1%	5%
Novice	22.7	408.3	14%	15%
Low Intermediate	94.6	1324.4	44%	25%
Intermediate	59.7	596.5	20%	35%
Adv. Intermediate	68.5	479.2	16%	15%
Expert	51.7	155.1	5%	5%
Total	297.6	2,979	100%	100%

Illustration 5:
Skier Distribution by Ability Levels – Proposed Upgrading – Modified Alternative 4

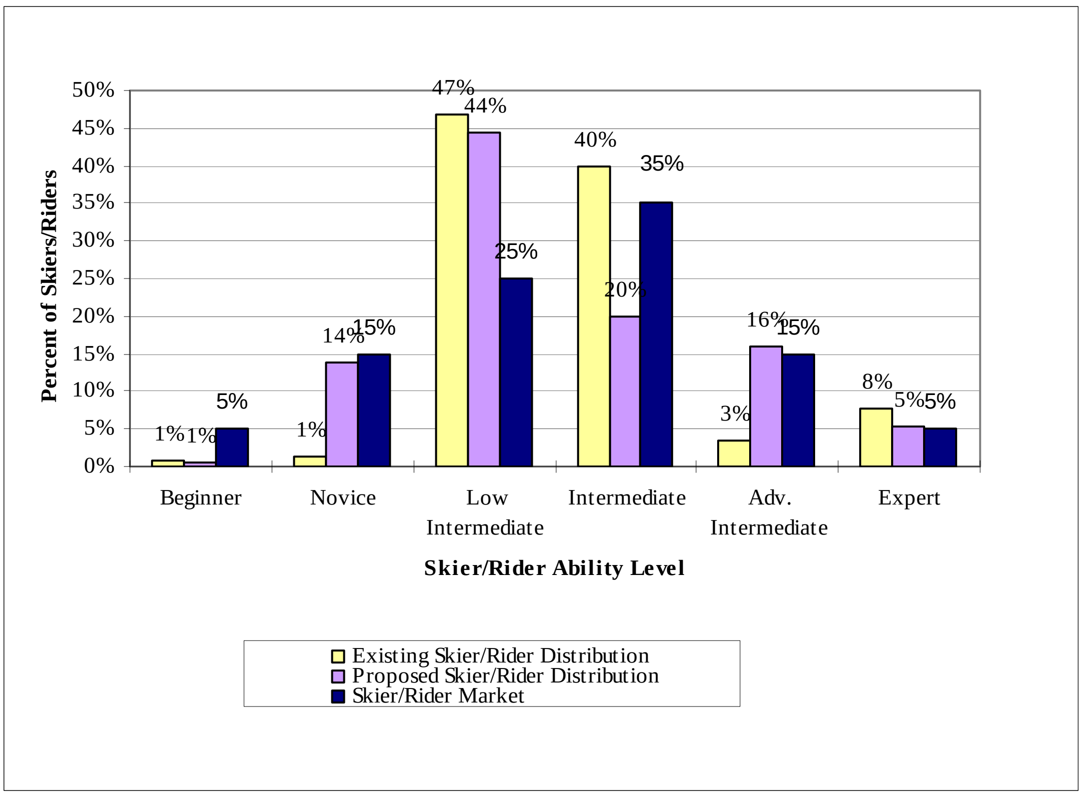


Table 13 and Illustration 5 compare White Pass' skier distribution with the market demand for each ability level. Skier distribution would be determined as follows:

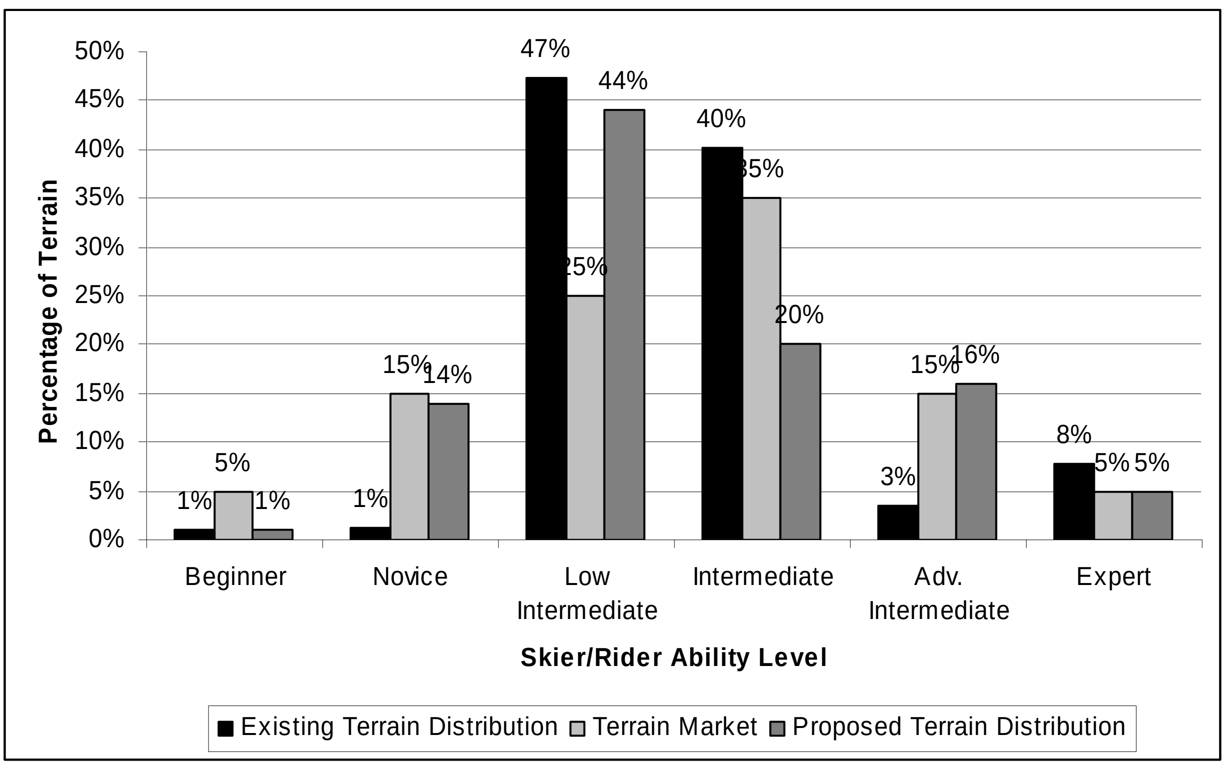
- Each trail would be designated by ability level, as listed in Table 12.

- The number of acres of terrain designated to each ability level would be multiplied by the standard design density for each ability level.
- This total for each ability level would be expressed as a percentage of the total number of skiers.
- This percentage – or skier distribution – would then be compared with the market demand for each ability level (Skier Market [%]).

As shown in Table 13 and Illustration 5, Modified Alternative 4 would improve the overall terrain distribution better than the other Action Alternatives. The novice and advanced intermediate terrain distribution would be brought to the skier market goals. Low intermediate terrain would be reduced in percentage, and expert would be reduced in percentage, bringing those categories closer to the market goal. The only category that would be moved farther away from the market goals would be intermediate, and this would be simply a matter of increases in other categories. There would be no reduction in the actual quantity of intermediate terrain.

Illustration 6 compares the White Pass terrain distribution to the market demand.

Illustration 6:
Acreage Distribution by Ability Levels – Proposed Upgrading – Modified Alternative 4



Consistent with the skier distribution in Illustration 5, the acreage distribution by ability levels comparison also indicates that the proposed upgrades would improve the overall distribution, particularly with the increase of novice and advanced intermediate terrain.

Comfortable Carrying Capacity

The calculation of White Pass' CCC for Modified Alternative 4 is described in Table 14. As illustrated, the proposed expansion would increase the CCC of the lift and trail network at White Pass to 3,800 guests per day (an increase of 42 percent).

Table 14:
Classification of Comfortable Carrying Capacity – Proposed Upgrading – Modified Alternative 4

Map Ref.	Lift Name/ Lift Type	Slope Length	Vert. Rise	Hourly Cap.	Oper. Hours	Up-Mtn. Access Role	Load Eff.	Adj. Hourly Cap.	VTF/Day	Vertical Demand	CCC
		(ft.)	(ft.)	(PPH)	(hrs.)	(%)	(%)	(PPH)	(000)	(ft.)	(skiers)
1	Great White Express/DC4	5,125	1,521	2,100	7.00	10	5	1,785	19,008	18,154	1,050
2	Pigtail/C2	4,987	1,493	900	7.00	10	10	720	7,524	18,750	400
3	Lower Cascade/C3	2,232	510	1,800	7.00	0	10	1,620	5,784	9,074	640
4	Paradise/C2	2,804	712	1,200	7.00	0	10	1,080	5,380	10,647	510
5	Platters	517	66	400	7.00	0	10	360	167	2,421	70
6	Basin/C4	3,560	617	1,800	6.50	30	10	1,080	4,333	7,820	550
7	Hogback Express/DC4	4,162	867	1,800	6.50	0	5	1,710	9,638	16,507	580
Total		23,388		10,000				8,355	51,834		3,800

Although the proposed Hogback Basin lift alignments would be the same under Modified Alternative 4 and Alternative 2, the CCC under Modified Alternative 4 would be lower than under Alternative 2. The two proposed lifts have lower capacities under Modified Alternative 4, and the *Basin* lift would be proposed to be faster under Modified Alternative 4 than under Alternative 2. The lower capacities are proposed in an effort to address the issue of high densities on the egress trails.

Density Analysis

Specifications for the Modified Alternative 4 density analysis are set forth in Table 15.

Table 15:
Ski Trail Density Analysis – Proposed Upgrading – Modified Alternative 4

Map Ref.	Daily Lift CCC	Guest Dispersement				Density Analysis				
		Support Fac./ Milling	Lift Lines	On Lift	On Trails	Trail Area	Actual Trail Density	Target Trail Density	Diff.	Density Index
		(guests)	(guests)	(guests)	(guests)	(acres)	(guest/ac.)	(guest/ac.)	(+/-)	(%)
1	1,050	263	298	152	337	113.5	3	9	-6	33%
2	400	100	36	133	131	33.2	4	7	-3	57%
3	640	160	86	134	260	42.2	6	14	-8	43%
4	510	128	54	112	216	38.6	6	11	-5	55%
5	70	18	18	8	26	1.4	18	18	0	100%
6	550	138	54	128	230	22.8	10	14	-4	71%
7	580	145	86	119	230	45.7	5	7	-2	71%
Total	3,800	952	632	786	1,430	297.6	6	10	-5	53%

Table 15 indicates that under the proposed upgrading plan for Modified Alternative 4, all of White Pass' trails will remain in the desirable situation of being at or below target trail densities. Overall density would be 17 percent less than that proposed for Alternative 2.

Under Modified Alternative 4, the high densities that occur under the existing condition and that would occur under Alternative 2, would be mitigated by these improvements. Specifically, operating the expansion area lifts at a lower capacity than Alternative 2 would reduce the total number of skiers in the area. Also, modifications to the Holiday trail would allow for the novice and low-intermediate skiers to make a choice on a route back to the base area. Where these skiers would have to ski Main Street under the existing condition or Alternative 2, they would have the choice to ride up the *Paradise* lift and ski down Holiday trail. Finally, the addition of the new egress trail above Main Street provides an optimal egress for all skiers leaving the expansion area or the *Paradise* pod.

Resort Balance and Limiting Factors

Under Modified Alternative 4, the overall capacity would increase and the balance of the ski resort would improve. Both the lift network and ski terrain capacities would increase. The lift network capacity would increase to 3,800 people, while the ski terrain capacity would increase to 7,766 people. This would create a better balance between the lift and trail networks, without creating over-crowding. All of the capacity added would be in areas that situated away from the cliff band, thereby addressing the problem of the cliff band restricting skier capacity. Further, Modified Alternative 4 would address the existing issues of the capacity restrictions that result from the high densities on the existing egress trails.

5.0 PROPOSED UPGRADING PLAN – ALTERNATIVE 6

Summary

Under Alternative 6, one new lift would be proposed in the Hogback Basin area. New terrain would be developed to service this lift, but there would be no modifications to the existing lifts or terrain. The new lift (*Basin*) would be built at maximum capacity for a high speed, detachable quad chairlift, as described in Alternative 2. Alternative 6 does not address the need for improved circulation as it proposes no modifications to the existing egress trails or trails that cross the cliff band. Alternative 6 somewhat addresses the need for skier dispersal, as it provides a new lift, terrain, and facilities away from the base area. This would somewhat reduce the crowding in the existing ski area by allowing some skiers to remain on the upper mountain for much of the skiing day. However, since the existing circulation problems would not be addressed, it would be likely that the existing high densities on the egress trails would be increased during the afternoon and lunchtime egress periods. Alternative 6 does not address the need for increased novice and advanced intermediate terrain. It does not add any advanced intermediate or novice terrain. Alternative 6 addresses the need for improved skiing during the early season, warm periods during the regular season, or low snow years. By providing additional skiing at higher elevations, the quality of the skiing during these times would be significantly improved.

Lifts

Under Alternative 6, White Pass would add one additional lift to their existing lift system, bringing the total number of lifts to six. The *Basin* lift would extend to the south-west of the existing ski area, into the western Hogback Basin (known also as Pigtail Basin). The lift alignment proposed for the *Basin* lift under Alternative 6 would be the same as under Alternative 2. The bottom terminal of the proposed *Basin* chairlift would be approximately 5,552 feet elevation. The upper terminal would be located at approximately 6,169 feet elevation, approximately 240 feet from the Wilderness/SUP area boundary. Under Alternative 6, the *Basin* lift would be the only lift proposed and would be installed as a high-speed detachable quad to provide round-trip skiing, as opposed to a transportation role, as in Alternative 2.

Specifications for the proposed lifts under Alternative 6 are set forth in Table 16.

Table 16:
Lift Specifications – Proposed Upgrading – Alternative 6

Map Ref.	Lift Name / Lift Type	Top Elev.	Bot. Elev.	Vert. Rise	Plan. Length	Slope Length	Avg. Grade	Hourly Cap.	Rope Speed	Carrier Spacing	Lift Maker/ Year Installed
		(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(%)	(per./hr.)	(fpm)	(ft.)	
1	Great White Express/DC4	5,999	4,477	1,521	4,814	5,125	32%	2,100	1,000	114	Doppelmayr/1994
2	Pigtail/C2	5,978	4,485	1,493	4,628	4,987	32%	900	450	60	Riblet/1958
3	Lower Cascade/C3	5,024	4,514	510	2,166	2,232	24%	1,800	450	45	Doppelmayr/2000
4	Paradise/C2	5,961	5,249	712	2,675	2,804	27%	1,200	450	45	Riblet/1984
5	Platters	4,545	4,479	66	512	517	13%	400	400	60	Doppelmayr/2000
6	Basin/DC4	6,169	5,552	617	3,497	3,560	18%	2,400	1,000	100	*Proposed*

KEY: "S" is Surface Lift, "C-2" is Fixed-GripDouble, "C-3" is Fixed-Grip Triple, "C-4" is Fixed-Grip Quad, "DC4" is Detachable Quad

Terrain

Under Alternative 6, White Pass would add approximately 29 acres of terrain on seven new trails, all of which would be accessed from the proposed *Basin* lift. The trail network under Alternative 6 would increase from the existing 37 named trails on approximately 212 acres to 44 trails on approximately 241 acres. None of the proposed trails are situated so that they cross the cliff band. Specifications for the proposed trails are set forth in Table 17. The new terrain would provide low intermediate skiing, a category that White Pass already has in abundance. The trails are mostly in the fall-line and provide enough variations in width and slope to provide good terrain variety. Traversing would be required on trails 6-1 and 6-2, which are the trails that would be used to access and egress the new terrain. Throughout the terrain, there are flat areas of less than 10 percent slope extending 150 feet or more. As described for Alternative 2 and Modified Alternative 4, skiers would have to maintain speed to navigate these flatter areas.

Table 17:
Terrain Specifications – Proposed Upgrading – Alternative 6

Map Ref	Trail/Area Name	Top Elev.	Bottom Elev.	Vert. Drop	Plan Length	Slope Length	Avg. Width	Slope Area	Avg. Grade	Max. Grade	Ability Level
		(ft.)	(ft.)	(ft.)	(ft.)	(ft.	(ft.)	(ac.)	(%)	(%)	
1	Beginner no-name Trail	4,547	4,478	68	584	589	104	1.4	12%	17%	Novice
2	Cascade	5,967	4,971	996	4,989	5,131	170	20.1	20%	43%	Intermediate
3	Cascade Cliff	5,266	5,050	216	849	896	206	4.2	25%	64%	Expert
4	Chair Trail	5,688	5,466	222	768	817	147	2.8	29%	57%	Expert
5	Elevator Shaft	5,206	5,087	119	354	380	150	1.3	34%	48%	Expert
6	Execution	5,415	5,027	388	593	723	162	2.7	65%	99%	Expert
7	Far Side	5,023	4,517	506	2,573	2,631	270	16.3	20%	35%	Low Intermediate

Table 17:
Terrain Specifications – Proposed Upgrading – Alternative 6

Map Ref	Trail/Area Name	Top Elev. (ft.)	Bottom Elev. (ft.)	Vert. Drop (ft.)	Plan Length (ft.)	Slope Length (ft.	Avg. Width (ft.)	Slope Area (ac.)	Avg. Grade (%)	Max. Grade (%)	Ability Level
8	Grouse	5,851	5,339	513	3,056	3,113	80	5.7	17%	33%	Low Intermediate
9	Holicade	5,704	5,544	160	842	862	68	1.3	19%	35%	Intermediate
10	Holiday	5,975	4,816	1,159	8,539	8,713	106	21.3	14%	39%	Intermediate
11	Holiday Cliff	5,487	5,132	355	1,300	1,372	100	3.2	27%	65%	Expert
12	Jaw Breaker	5,518	5,388	129	1,432	1,444	83	2.8	9%	20%	Intermediate
13	Lower Holiday	4,816	4,509	306	2,185	2,213	208	10.5	14%	25%	Low Intermediate
14	Lower Hour Glass	5,139	4,918	221	765	802	131	2.4	29%	45%	Intermediate
15	Lower Paradise	4,766	4,475	291	3,516	3,548	60	4.9	8%	23%	Expert
16	Lower Roller	4,972	4,504	468	1,357	1,445	303	10.0	34%	53%	Advanced Intermediate
17	Mach V	5,943	5,635	308	1,036	1,102	109	2.8	30%	66%	Expert
18	Main Street	5,286	4,771	514	3,123	3,204	84	6.1	16%	56%	Expert
19	Midway	5,725	5,318	408	1,370	1,448	79	2.6	30%	53%	Expert
20	Near Side	5,038	4,475	562	2,479	2,549	309	18.1	23%	35%	Low Intermediate
21	Noname Trail	5,170	4,854	317	1,196	1,241	225	6.4	26%	38%	Intermediate
22	North Peak	5,905	5,632	272	1,183	1,264	78	2.3	23%	73%	Expert
23	Outhouse	5,979	5,812	167	304	353	195	1.6	55%	76%	Expert
24	Paradise Cliff	5,163	4,766	397	2,031	2,105	77	3.7	20%	55%	Expert
25	Poma Bowl	5,063	4,486	577	1,908	2,005	218	10.0	30%	45%	Intermediate
26	Poma Face	4,966	4,483	483	1,621	1,698	261	10.2	30%	41%	Intermediate
27	Ptarmigan	5,683	5,359	325	1,504	1,541	147	5.2	22%	29%	Low Intermediate
28	Quail	5,748	5,163	585	3,115	3,194	87	6.4	19%	33%	Low Intermediate
29	Raven's Haven	5,921	5,756	166	309	354	147	1.2	54%	59%	Expert
30	Roller Cattrac	5,975	5,670	305	1,544	1,589	83	3.0	20%	41%	Expert
31	Roller Cliff	5,318	4,972	346	655	748	106	1.8	53%	69%	Expert
32	Tucker	5,829	5,487	342	2,238	2,282	84	4.4	15%	36%	Intermediate
33	Upper Hour Glass	5,635	5,210	424	981	1,104	141	3.6	43%	97%	Expert
34	Upper Paradise	5,736	5,286	450	2,183	2,240	117	6.0	21%	33%	Low Intermediate
35	Upper Roller	5,670	5,364	306	996	1,047	114	2.7	31%	43%	Expert
36	Water Fall	4,833	4,681	152	347	384	140	1.2	44%	55%	Expert
37	What	5,648	5,398	250	1,266	1,297	68	2.0	20%	39%	Intermediate
38	Alt 6-1	5,833	5,559	274	3,049	3,071	36	2.5	9%	19%	Low Intermediate
39	Alt 6-2	5,546	5,443	103	1,730	1,738	34	1.4	6%	18%	Low Intermediate
40	Alt 6-3	5,817	5,553	264	1,635	1,662	87	3.3	16%	25%	Low Intermediate
41	Alt 6-4	6,187	5,551	636	3,707	3,772	109	9.4	17%	28%	Low Intermediate
42	Alt 6-5	6,055	5,772	284	1,461	1,496	94	3.2	19%	33%	Low Intermediate
43	Alt 6-6	6,142	5,883	259	1,472	1,499	127	4.4	18%	29%	Low Intermediate
44	Alt 6-7	6,153	5,656	497	3,633	3,684	54	4.5	14%	27%	Low Intermediate
Total						84,351		241.1			

Skier Distribution

Specifications for the proposed skier distribution under Alternative 6 are set forth in Table 18 and Illustration 7.

Table 18:
Skier Distribution by Ability Levels – Proposed Upgrading – Alternative 6

Skier Ability Level	Trail Area	Skier Capacity	Skier Distribution	Skier Market
	(acres)	(guests)	(%)	(%)
Beginner	0.5	15.0	1%	5%
Novice	1.4	25.4	1%	15%
Low Intermediate	96.5	1351.0	56%	25%
Intermediate	80.9	809.3	33%	35%
Adv. Intermediate	10.0	70.3	3%	15%
Expert	51.7	155.1	6%	5%
Total:	241.1	2,426	100%	100%

Illustration 7:
Skier Distribution by Ability Levels – Proposed Upgrading – Alternative 6

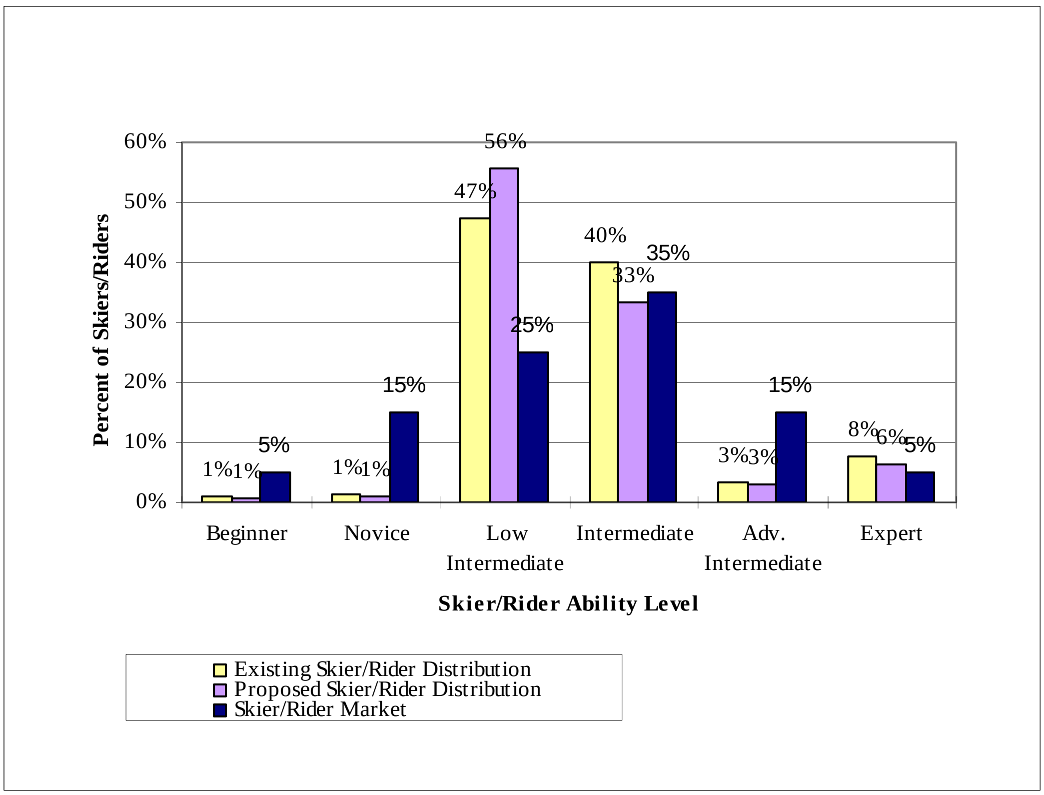


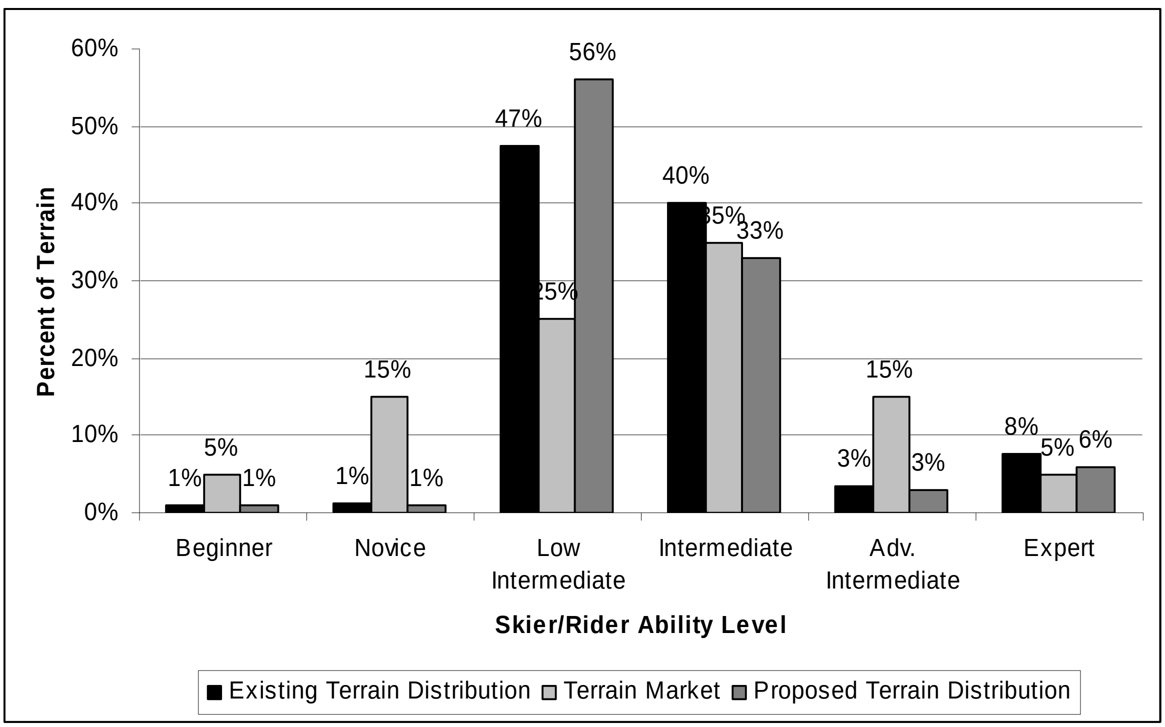
Table 18 and Illustration 7 compare White Pass' skier distribution with the market demand for each ability level. Skier distribution would be determined as follows:

- Each trail would be designated by ability level, as listed in Table 17.
- The number of acres of terrain designated to each ability level would be multiplied by the standard design density for each ability level.
- This total for each ability level would be expressed as a percentage of the total number of skiers.
- This percentage – or skier distribution – would then be compared with the market demand for each ability level (Skier Market [%]).

As shown in Table 18 and illustration 7, Alternative 6 would not improve the overall terrain distribution. Under the existing conditions, White Pass has a significant surplus of low intermediate terrain, and this alternative would increase that imbalance by providing 29 acres of new low intermediate terrain, without providing terrain of any other ability level type. A primary goal of the new lift and associated trails would be to provide advanced intermediate terrain, but this alternative would not meet that goal.

Illustration 8 compares the White Pass terrain distribution to the market demand.

Illustration 8:
Acreage Distribution by Ability Levels – Proposed Upgrading – Alternative 6



Consistent with the skier distribution in Illustration 7, the acreage distribution by ability levels comparison also shows that the proposed upgrades would not improve the overall distribution, but instead would only add low intermediate terrain, which White Pass already has in surplus.

Comfortable Carrying Capacity

The calculation of White Pass' CCC under Alternative 6 would be described in Table 19. The proposed upgrading program would increase the CCC of the lift and trail network at White Pass to 3,640 guests per day (an increase of 33 percent).

Table 19:
Classification of Comfortable Carrying Capacity – Proposed Upgrading – Alternative 6

Map Ref.	Lift Name / Lift Type	Slope Length	Vert. Rise	Hourly Cap.	Oper. Hours	Up-Mtn. Access Role	Load Eff.	Adj. Hourly Cap.	VTF/Day	Vertical Demand	CCC
		(ft.)	(ft.)	(PPH)	(hrs.)	(%)	(%)	(PPH)	(000)	(ft.)	(skiers)
1	Great White Express/DC4	5,125	1,521	2,100	7.00	10	5	1,785	19,008	18,154	1,050
2	Pigtail/C2	4,987	1,493	900	7.00	10	10	720	7,524	18,750	400
3	Lower Cascade/C3	2,232	510	1,800	7.00	0	10	1,620	5,784	9,074	640
4	Paradise/C2	2,804	712	1,200	7.00	0	10	1,080	5,380	10,647	510
5	Platters	517	66	400	7.00	0	10	360	167	2,421	70
6	Basin/C4	3,560	617	2,400	6.50	0	5	2,280	9,147	9,389	970
Total		19,226		8,800				7,845	47,010		3,640

Density Analysis

Specifications for the density analysis under Alternative 6 are set forth in Table 20.

Table 20:
Ski Trail Density Analysis – Proposed Upgrading – Alternative 6

Map Ref.	Daily Lift CCC	Guest Dispersement				Density Analysis				
		Support Fac./ Milling	Lift Lines	On Lift	On Trails	Trail Area	Actual Trail Density	Target Trail Density	Diff.	Density Index
		(guests)	(guests)	(guests)	(guests)	(acres)	(guest/ac.)	(guest/ac.)	(+/-)	(%)
1	1,050	263	298	152	337	108.7	3	8	-5	38%
2	400	100	36	133	131	30.8	4	6	-2	67%
3	640	160	86	134	260	44.7	6	13	-7	46%
4	510	128	54	112	216	28.1	8	13	-5	62%
5	70	18	18	8	26	1.4	18	18	0	100%
6	970	243	114	135	478	27.4	17	14	3	121%
Total	3,640	912	606	674	1,448	241.1	8	11	-3	75%

Table 20 indicates that under Alternative 6, the terrain associated with the proposed lift would be well above target trail densities. This is due to the relatively small amount of terrain available from this lift. In addition, since there would be no other lift for skiers to access from this lift under this alternative, all of the skiers in the expansion area would be using this terrain. Since a significant percentage of skiers using this lift under Alternative 2 and Modified Alternative 4 would be using it to access another lift, the terrain densities on the trails proposed for this lift would be kept at acceptable levels under Alternative 2 and Modified Alternative 4. However, since that would not be the case under Alternative 6, the terrain densities would be high.

In addition to this, as with Alternative 2 the existing return trails to the bottom of the ski area would also have problems with high densities. Under Alternative 6, skier densities would become worse during the egress time, typically the last hour and a half of ski area operation (refer to Table 20). Since there would be an increased number of skiers on the upper mountain, the densities on those egress routes would increase during the time of day when those skiers are returning to the base area. While there would be fewer skiers using the upper mountain under Alternative 6, as compared to Alternative 2 and Modified Alternative 4, there would still be an increase in skier densities on the egress trails.

Resort Balance and Limiting Factors

Under Alternative 6, the lift network and ski terrain capacities would both increase. The lift network capacity would increase to 3,640 people, while the ski terrain capacity would increase to 6,079 people. However, the overall balance of the ski resort would not be significantly improved. This is because only low intermediate terrain would be added, which would be an ability level class of terrain that White Pass already has in abundance. Also, as discussed in the density analysis above, if the new terrain would be utilized to its capacity, the terrain would be over crowded, creating an undesirable situation. Furthermore, the effect of the new lift and terrain on utilization of the resort would be uncertain. The addition of this terrain would increase total acreage and change the character of the mountain, since the new terrain located more remote from the base area and in a subalpine parkland environment would be more desirable than much of the existing lower end terrain, which is closer to the base area and is largely comprised of cleared trails through dense forest stands. However, as a result of the above discussions of terrain distribution and density, this alternative would be less desirable than others.

All of the capacity added would be in areas that are situated away from the cliff band, thereby addressing the problem of the cliff band restricting skier capacity. However, as stated above, all of the additional skiers in the new terrain would have to cross the cliff band to return to the base of the mountain at the end of the day. Since there are no upgrades proposed in Alternative 6 for the trails that transition from the top of the mountain to the bottom of the mountain across the cliff band, the densities on those trails would increase from their already high levels.

6.0 PROPOSED UPGRADING PLAN – ALTERNATIVE 9

Summary

Under Alternative 9, one new lift would be proposed, located within the existing ski area boundary, to the east of the existing lifts. New terrain would be developed to service this lift, and grading would occur on existing trails within the existing part of the ski area. There would be a new advanced intermediate trail off the *Paradise* lift and an additional egress trail off the Main Street trail, as well as grading on the Holiday trail. There would be no modifications to the existing lifts. Alternative 9 addresses the need for improved circulation with the above-stated modifications and additions to the existing egress trails. Alternative 9 does not address the need for skier dispersal, as it does not provide any new lifts or terrain away from the existing base area. This would increase the crowding in the existing part of the ski area by increasing the number of skiers using the existing terrain and facilities. Aside from the mountain-top lodge, there would be no ski terrain related provision in Alternative 9 to allow skiers to remain on the upper mountain for much of the skiing day. Alternative 9 addresses the need for increased novice and advanced intermediate terrain by proposing grading on the Holiday trail, allowing it to be classified as a novice trail, and building two new advanced intermediate trails. However, while these changes would somewhat improve the terrain distribution percentages, there would be relatively little overall increase to the advanced intermediate acreage in particular, as discussed below. Further, there would not be much improvement to the variety of terrain offered, as all the proposed terrain lies within the existing resort boundaries. Alternative 9 does not address the need for improved skiing during the early season, in warm periods during the regular season, and during low snow years. By not providing any additional skiing at higher elevations, there would be no improvement to the quality of the skiing during these times.

Lifts

Under Alternative 9, White Pass would add some additional terrain and an additional lift within the existing resort boundaries. The *PCT* lift, a fixed-grip triple, would be to the east of the existing Holiday trail and would have five trails associated with it. The bottom terminal of the *PCT* lift would be located at approximately 4,573 feet elevation. The upper terminal would be located at approximately 5,100 feet elevation. The intent of the lift would be to improve the skiing product below the cliff band and provide access to more intermediate level terrain.

Specifications for the proposed lifts are set forth in Table 21.

Table 21:
Lift Specifications – Proposed Upgrading – Alternative 9

Map Ref.	Lift Name / Lift Type	Top Elev. (ft.)	Bot. Elev. (ft.)	Vert. Rise (ft.)	Plan. Length (ft.)	Slope Length (ft.)	Avg. Grade (%)	Hourly Cap. (per./hr.)	Rope Speed (fpm)	Carrier Spacing (ft.)	Lift Maker/ Year Installed
1	Great White Express/DC4	5,999	4,477	1,521	4,814	5,125	32%	2,100	1,000	114	Doppelmayr/1994
2	Pigtail/C2	5,978	4,485	1,493	4,628	4,987	32%	900	450	60	Riblet/1958
3	Lower Cascade/C3	5,024	4,514	510	2,166	2,232	24%	1,800	450	45	Unknown
4	Paradise/C2	5,961	5,249	712	2,675	2,804	27%	1,200	450	45	Riblet/1984
5	Platters	4,545	4,479	66	512	517	13%	400	400	60	Unknown
6	PCT Lift/C3	5,092	4,573	519	2,855	2,919	18%	1,800	450	45	*Proposed*

KEY: "S" is Surface Lift, "C-2" is Fixed-GripDouble, "C-3" is Fixed-Grip Triple, "C-4" is Fixed-Grip Quad, "DC4" is Detachable Quad

Terrain

Under Alternative 9, White Pass would add approximately 53 acres of terrain and restore and revegetate 5.4 acres of existing terrain, for a total increase of about 48 acres of terrain. The trail network under Alternative 9 would increase from the existing 37 named trails on approximately 212 acres to 44 trails on approximately 260 acres. The new terrain would include seven new trails, five of which would be accessed from the new lift, one off the *Paradise* lift, and one from the bottom of the *Paradise* lift back to the base of the resort. Only the trail from the bottom of the *Paradise* lift would be situated so that it crosses the cliff band. The primary reason for this trail would be to increase capacity across the cliff band, and egress off the mountain, particularly to provide a novice level egress route. Additionally, the quality of skiing on other terrain would be improved by widening and re-grading existing trails. Most notably, grading would be done on the Holiday trail so that it could be truly classified as a novice trail, and hopefully make that a more desirable route across the cliff band. Also, the beginner trail off the *Platters* lift would be regraded to make it consistent beginner terrain. Specifications for the proposed trails are set forth in Table 22. The new terrain as proposed would provide primarily intermediate and advanced intermediate terrain, of which White Pass has a shortage. Several of the trails are in the fall-line and provide enough variations in width and slope to provide good terrain variety. The presence of several dry stream gullies in the terrain along the *PCT* lift creates a challenge to the layout of the pod. Four skier bridges, approximately 40 feet in width, would be required for the trails to cross these gullies. As a result, ski trails that include these skier bridges would decrease in width from 150-200 feet to 40 feet at the bridge. In addition, the bridges would be lower in slope gradient than the trails to provide for a perpendicular crossing, resulting in bridge lengths that could exceed 100 feet. The trail would widen to 150-200 feet again down slope of the bridges. As a result, the terrain in the *PCT* pod would not provide consistent, full-line skiing due to the narrow, low-gradient bridge crossings.

Table 22:
Terrain Specifications – Proposed Upgrading – Alternative 9

Map Ref	Trail/Area Name	Top Elev. (ft.)	Bottom Elev. (ft.)	Vert Drop (ft.)	Plan Length (ft.)	Slope Length (ft.)	Avg. Width (ft.)	Slope Area (ac.)	Avg. Grade (%)	Max. Grade (%)	Ability Level
1	Beginner no-name Trail	4,547	4,478	68	584	589	142	1.9	12%	17%	Beginner
2	Cascade	5,967	4,971	996	4,989	5,131	170	20.1	20%	43%	Intermediate
3	Cascade Cliff	5,266	5,050	216	849	896	206	4.2	25%	64%	Expert
4	Chair Trail	5,688	5,466	222	768	817	147	2.8	29%	57%	Expert
5	Elevator Shaft	5,206	5,087	119	354	380	150	1.3	34%	48%	Expert
6	Execution	5,415	5,027	388	593	723	162	2.7	65%	99%	Expert
7	Far Side	5,023	4,517	506	2,573	2,631	241	14.6	20%	35%	Novice
8	Grouse	5,851	5,339	513	3,056	3,113	80	5.7	17%	33%	Low Intermediate
9	Holicade	5,704	5,544	160	842	862	68	1.3	19%	35%	Intermediate
10	Holiday	5,975	4,816	1,159	8,539	8,713	106	21.3	14%	25%	Novice
11	Holiday Cliff	5,487	5,132	355	1,300	1,372	100	3.2	27%	65%	Expert
12	Jaw Breaker	5,518	5,388	129	1,432	1,444	83	2.8	9%	20%	Intermediate
13	Lower Holiday	4,816	4,509	306	2,185	2,213	185	9.4	14%	25%	Low Intermediate
14	Lower Hour Glass	5,139	4,918	221	765	802	131	2.4	29%	45%	Intermediate
15	Lower Paradise	4,766	4,475	291	3,516	3,548	60	4.9	8%	23%	Expert
16	Lower Roller	4,972	4,504	468	1,357	1,445	303	10.0	34%	53%	Advanced Intermediate
17	Mach V	5,943	5,635	308	1,036	1,102	109	2.8	30%	66%	Expert
18	Main Street	5,286	4,771	514	3,123	3,204	84	6.1	16%	56%	Expert
19	Midway	5,725	5,318	408	1,370	1,448	79	2.6	30%	53%	Expert
20	Near Side	5,038	4,475	562	2,479	2,549	257	15.0	23%	35%	Low Intermediate
21	Noname Trail	5,170	4,854	317	1,196	1,241	225	6.4	26%	38%	Intermediate
22	North Peak	5,905	5,632	272	1,183	1,264	78	2.3	23%	73%	Expert
23	Outhouse	5,979	5,812	167	304	353	195	1.6	55%	76%	Expert
24	Paradise Cliff	5,163	4,766	397	2,031	2,105	77	3.7	20%	55%	Expert
25	Poma Bowl	5,063	4,486	577	1,908	2,005	218	10.0	30%	45%	Intermediate
26	Poma Face	4,966	4,483	483	1,621	1,698	261	10.2	30%	41%	Intermediate
27	Ptarmigan	5,683	5,359	325	1,504	1,541	147	5.2	22%	29%	Low Intermediate
28	Quail	5,748	5,163	585	3,115	3,194	87	6.4	19%	33%	Low Intermediate
29	Raven's Haven	5,921	5,756	166	309	354	147	1.2	54%	59%	Expert

Table 22:
Terrain Specifications – Proposed Upgrading – Alternative 9

Map Ref	Trail/Area Name	Top Elev.	Bottom Elev.	Vert Drop	Plan Length	Slope Length	Avg. Width	Slope Area	Avg. Grade	Max. Grade	Ability Level
		(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(ac.)	(%)	(%)	
30	Roller Cattrac	5,975	5,670	305	1,544	1,589	83	3.0	20%	41%	Expert
31	Roller Cliff	5,318	4,972	346	655	748	106	1.8	53%	69%	Expert
32	Tucker	5,829	5,487	342	2,238	2,282	84	4.4	15%	36%	Intermediate
33	Upper Hour Glass	5,635	5,210	424	981	1,104	141	3.6	43%	97%	Expert
34	Upper Paradise	5,736	5,286	450	2,183	2,240	117	6.0	21%	33%	Low Intermediate
35	Upper Roller	5,670	5,364	306	996	1,047	114	2.7	31%	43%	Expert
36	Water Fall	4,833	4,681	152	347	384	140	1.2	44%	55%	Expert
37	What	5,648	5,398	250	1,266	1,297	68	2.0	20%	39%	Intermediate
38	Alt 9-1	5,202	4,920	281	818	871	199	4.0	34%	49%	Advanced Intermediate
39	Alt 9-2	5,089	4,573	517	3,400	3,455	168	13.3	15%	35%	Intermediate
40	Alt 9-3	5,090	4,684	406	1,964	2,015	172	8.0	21%	36%	Intermediate
41	Alt 9-4	5,067	4,813	254	1,091	1,126	179	4.6	23%	36%	Intermediate
42	Alt 9-5	5,012	4,664	348	1,472	1,519	205	7.2	24%	34%	Low Intermediate
43	Alt 9-6	4,974	4,637	337	3,108	3,138	56	4.0	11%	22%	Low Intermediate
44	Alt 9-7	5,851	5,315	536	2,250	2,326	219	11.7	24%	45%	Advanced Intermediate
Total						81,881		259.70			

Skier Distribution

Specifications for the proposed skier distribution under Alternative 9 are set forth in Table 23 and Illustration 9.

Table 23:
Skier Distribution by Ability Levels – Proposed Upgrading – Alternative 9

Skier Ability Level	Trail Area	Skier Capacity	Skier Distribution	Skier Market
	(acres)	(guests)	(%)	(%)
Beginner	1.9	57.5	2%	5%
Novice	35.8	645.2	24%	15%
Low Intermediate	58.9	824.6	30%	25%
Intermediate	85.6	856.0	31%	35%
Adv. Intermediate	25.7	180.1	7%	15%
Expert	51.7	155.1	6%	5%
Total	259.7	2,718	100%	100%

Illustration 9:
Skier Distribution by Ability Levels – Proposed Upgrading – Alternative 9

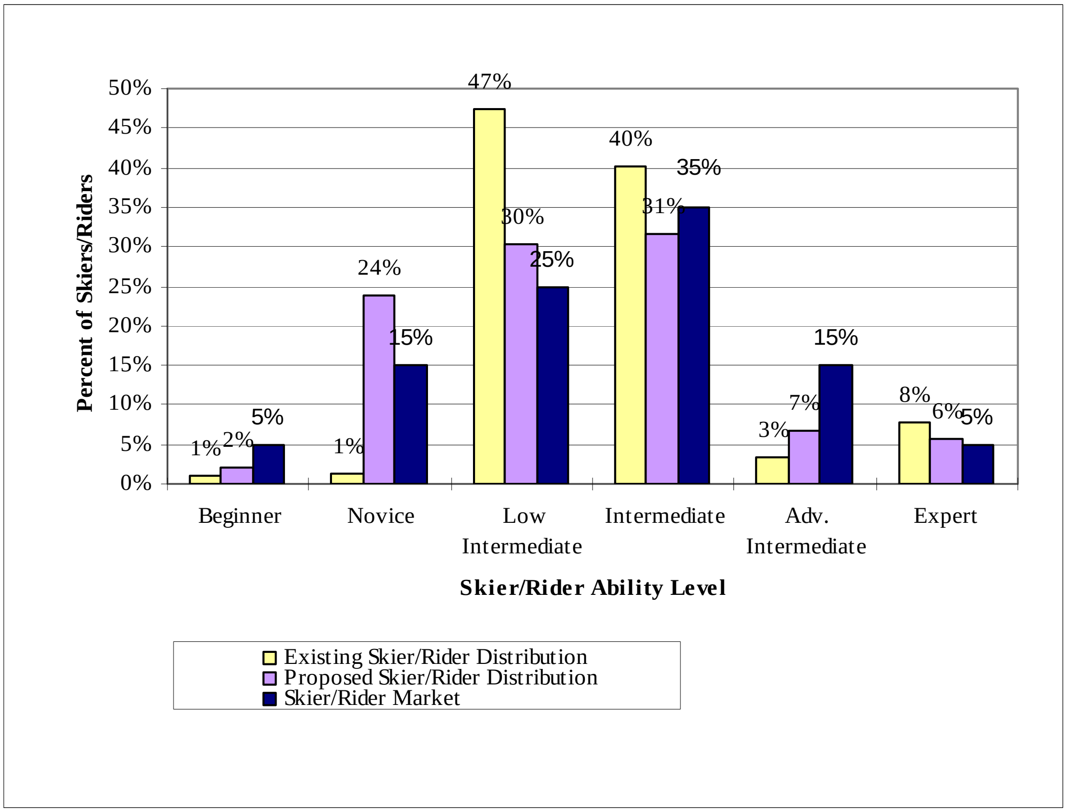


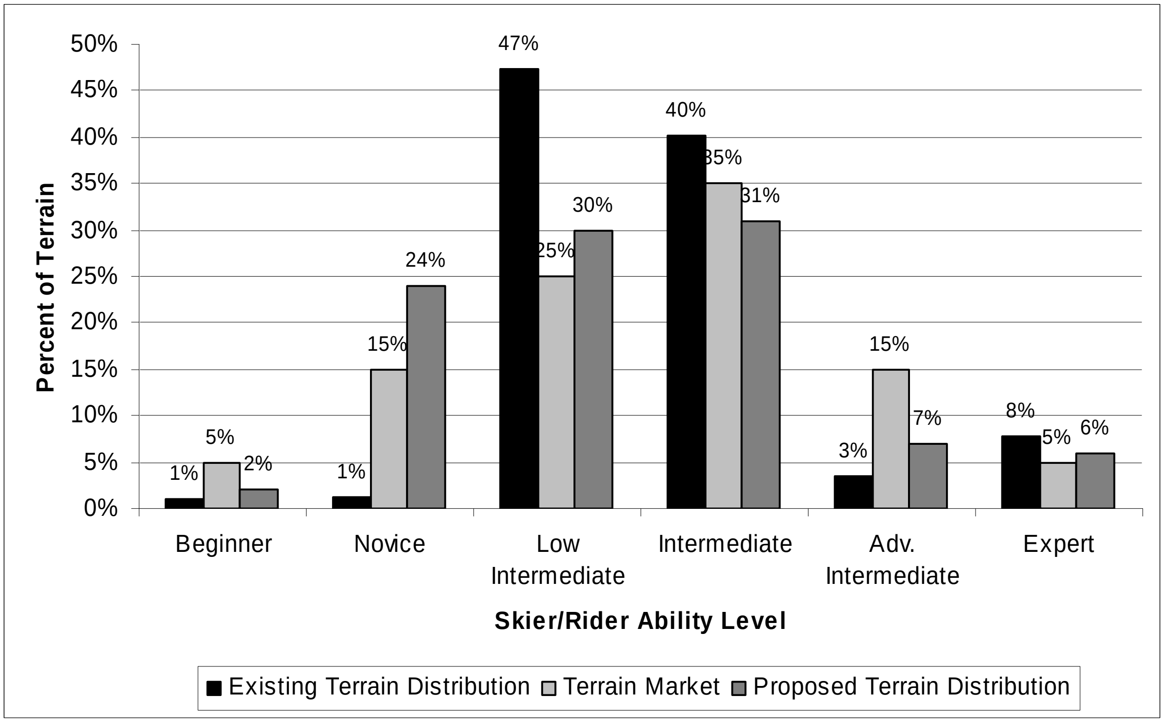
Table 23 and Illustration 9 compare White Pass' skier distribution with the market demand for each ability level. Skier distribution would be determined as follows:

- Each trail would be designated by ability level, as listed in Table 22.
- The number of acres of terrain designated to each ability level would be multiplied by the standard design density for each ability level.
- This total for each ability level would be expressed as a percentage of the total number of skiers.
- This percentage – or skier distribution – would then be compared with the market demand for each ability level.

As shown in Table 23 and Illustration 9, Alternative 9 would improve the overall terrain distribution. Under the existing conditions, White Pass has a significant surplus of low intermediate terrain, and a deficit of novice and advanced intermediate terrain. Through the grading in this alternative, terrain would be re-classified from low intermediate to novice terrain, which greatly helps with the distribution. A small amount of advanced intermediate terrain would be added, which slightly helps with that imbalance.

Illustration 10 presents White Pass' terrain distribution under Alternative 9.

Illustration 10:
Acreage Distribution by Ability Levels – Proposed Upgrading – Alternative 9



Consistent with the skier distribution in Illustration 10, the acreage distribution by ability levels comparison also indicates that Alternative 9 would improve the overall distribution, but not add much advanced intermediate terrain, which is what the resort would be primarily lacking.

Comfortable Carrying Capacity

The calculation of White Pass' CCC under Alternative 9 is described in Table 24. As illustrated, Alternative 9 would increase the CCC of the lift and trail network at White Pass to 3,280 guests per day (an increase of 23 percent).

Table 24:
Classification of Comfortable Carrying Capacity – Proposed Upgrading – Alternative 9

Map Ref.	Lift Name / Lift Type	Slope Length	Vert. Rise	Hourly Cap.	Oper. Hours	Up-Mtn. Access Role	Load Eff.	Adj. Hourly Cap.	VTF/Day	Vertical Demand	CCC
		(ft.)	(ft.)	(PPH)	(hrs.)	(%)	(%)	(PPH)	(000)	(ft.)	(skiers)
1	Great White Express/DC4	5,125	1,521	2,100	7.00	10	5	1,785	19,008	18,154	1,050
2	Pigtail/C2	4,987	1,493	900	7.00	10	10	720	7,524	18,750	400
3	Lower Cascade/C3	2,232	510	1,800	7.00	0	10	1,620	5,784	9,074	640
4	Paradise/C2	2,804	712	1,200	7.00	0	10	1,080	5,380	10,647	510
5	Platters	517	66	400	7.00	0	10	360	167	2,421	70
6	PCT Lift/C3	2,919	519	1,800	6.50	0	10	1,620	5,467	8,892	610
Total		18,585		8,200				7,185	43,330		3,280

Density Analysis

Specifications for the density analysis under Alternative 6 are set forth in Table 25.

Table 25:
Ski Trail Density Analysis – Proposed Upgrading – Alternative 9

Map Ref.	Daily Lift CCC	Guest Dispersement				Density Analysis				
		Support Fac./ Milling	Lift Lines	On Lift	On Trails	Trail Area	Actual Trail Density	Target Trail Density	Diff.	Density Index
		(guests)	(guests)	(guests)	(guests)	(acres)	(guest/ac.)	(guest/ac.)	(+/-)	(%)
1	1,050	263	298	152	337	109.6	3	9	-6	33%
2	400	100	36	133	131	32.0	4	7	-3	57%
3	640	160	86	134	260	40.0	6	16	-10	38%
4	510	128	54	112	216	39.1	6	11	-5	55%
5	70	18	18	8	26	1.9	14	30	-16	47%
6	610	153	81	175	201	37.1	5	10	-5	50%
Total	3,280	822	573	714	1,171	259.7	5	11	-6	43%

Table 25 indicates that under Alternative 9, all of White Pass' trails would remain in the desirable situation of being well below target trail densities. The overall density index improves under Alternative 9, primarily as a result of the grading that would be proposed to reclassify several trails down to their intended ability level ratings.

The creation of the novice route on the west side, from the bottom of the *Paradise* lift to the base of the resort, and the regrading of the Holiday trail, would drop skier densities on the Cascade cat track as well as increasing egress capacity.

Resort Balance and Limiting Factors

Under Alternative 9, the overall capacity would increase and the balance of the ski resort would improve. Both the lift network and ski terrain capacities would increase. The lift network capacity would increase to 3,280 people, while the ski terrain capacity would increase to 7,562 people. This would create a better balance between the lift and trail networks, without creating over-crowding. However, the most significant benefit of Alternative 9 would be the improvement of the skiing experience of the existing mountain by providing for better circulation and flow of skiers, increasing egress capacity (and therefore helping to alleviate the crowding on the existing Cascade cat track), and providing more, and more varied, terrain below the cliff band. However, this alternative would not add to the quantity of advanced intermediate terrain, or terrain at high elevations. Also, the quality of the terrain in the *PCT* pod would be limited by the interruptions provided by the skier bridges.

Appendix C
Wetland and Stream Survey

Wetland and Stream Survey for the White Pass Expansion FEIS

September, 2004

SE GROUP

1.0 INTRODUCTION

This report presents the results of SE Group's delineation of wetlands and other waters of the U.S., subject to the jurisdiction of the U.S. Army Corps of Engineers (ACOE) under Section 404 of the Clean Water Act of 1975, as amended in 1977 (hereafter referred to as "wetlands and streams"), within the Special Use Permit (SUP) area and proposed expansion area of the White Pass Ski Area (White Pass). White Pass is located on the Okanogan-Wenatchee and Gifford Pinchot National Forests, approximately 20 miles east of the town of Packwood, Washington and 55 miles west of the town of Yakima, Washington (Figure 1). The White Pass SUP area is approximately 710 acres in size and the proposed expansion area is approximately 770 acres in size. White Pass Co., Inc. is the operator of the White Pass Ski Area and is the holder of a SUP on both the Naches Ranger District of the Wenatchee-Okanogan National Forest (WONF) and the Cowlitz Valley Ranger District of the Gifford Pinchot National Forest (GPNF). It is important to note that the WONF administers the SUP for the White Pass Ski Area.

The areas of proposed development within the current SUP area and the proposed SUP expansion area that were surveyed by SE Group at White Pass are depicted in Sheet 1 in Appendix F and hereafter will be referred to as the White Pass Study Area. SE Group delineated the jurisdictional wetlands and streams within the White Pass Study Area identified on Sheet 1 in Appendix F in August and September of 2002 and June of 2004. The wetlands and streams were delineated consistently with protocols identified in the *Corps of Engineers Wetlands Delineation Manual* (hereafter referred to as the "*1987 Manual*") (Environmental Library, 1987).

1.1 Project Background

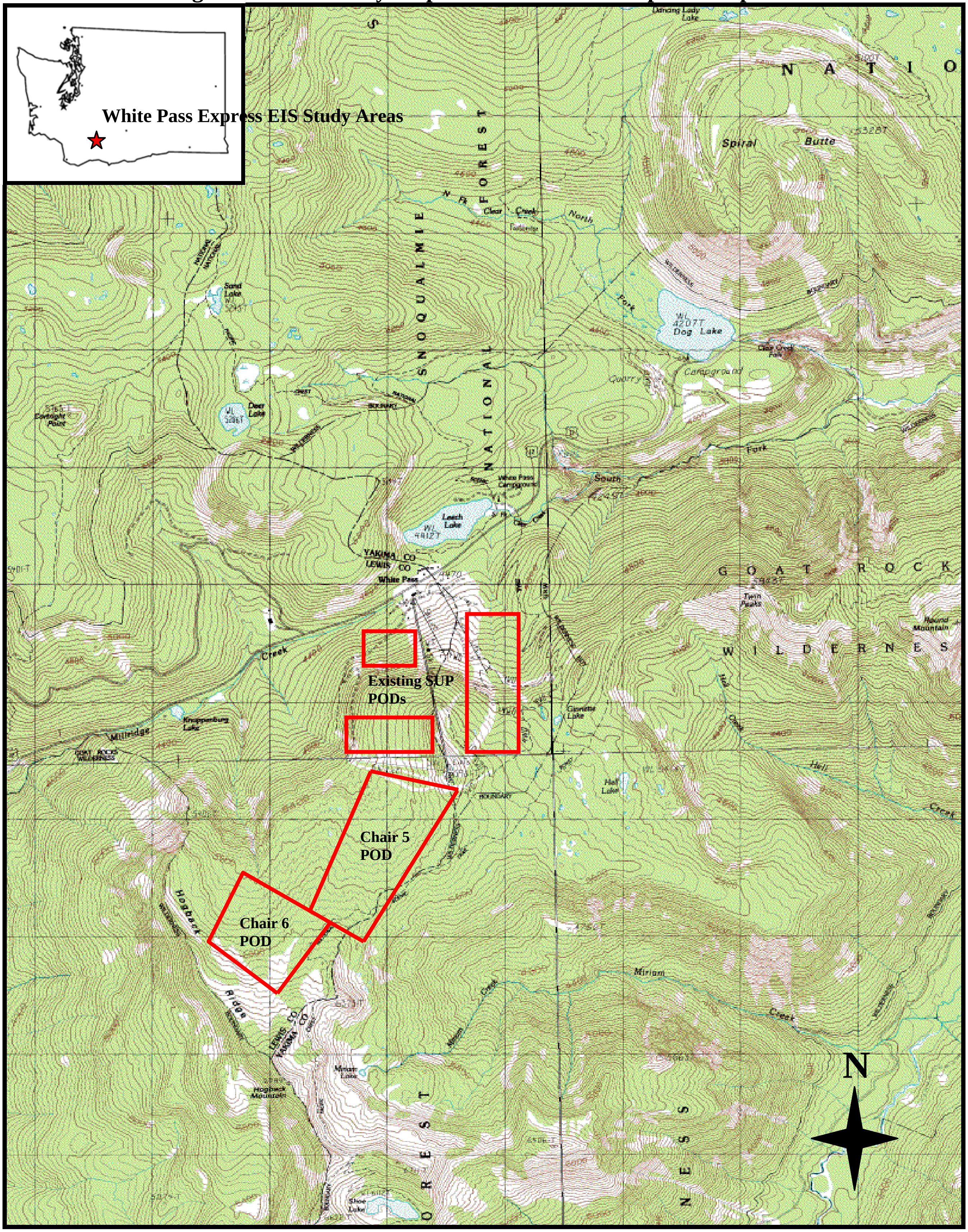
White Pass is currently operating under their existing Master Development Plan, which was approved by the United States Forest Service (USFS) in 1977. White Pass is currently proposing a permit amendment to install two new chairlifts, clearing for gladed skiing/trails and off-highway parking, and the development of a small mid-mountain skier support facility. The permit amendment includes an expansion of the existing SUP boundary by approximately 770 acres in Hogback Basin and Pigtail Basin. The wetland and stream delineation was performed in conjunction with the Environmental Impact Statement (EIS) that is being prepared for the proposed White Pass Mountain Facilities Expansion Proposal, as required by the National Environmental Policy Act (NEPA) of 1970.

1.2 Delineation Objectives

The primary objectives of the wetland and stream delineation performed by the SE GROUP at White Pass include the following:

1) Delineate the geographic extent of jurisdictional wetlands and streams within the proposed disturbance areas under the White Pass Mountain Expansion FEIS (henceforth referred to as the White Pass Study Area) consistent with protocols identified in the *Corps of Engineers Wetlands Delineation Manual* (*1987 Manual*) (Environmental Laboratory, 1987) and pertinent regional guidance letters and public notices.

Figure 1. Vicinity Map of the White Pass Express Proposal.



Source: USGS, 1980. Combination of Old Snowy Mountain, Spiral Butte, and White Pass Quadrangles. Scale: Not to Scale

2) Produce an accurate map and associated Geographic Information System (GIS) files that depict the location of the jurisdictional wetlands and streams within the White Pass Study Area in relation to the White Pass Mountain Expansion FEIS, existing roads, existing lifts and facilities, and other map elements.

2.0 METHODS

2.1 Wetland Delineation Protocol

To ensure consistency with U. S. Federal, Washington State, Lewis County and Yakima County regulations, SE GROUP delineated the jurisdictional wetlands (as defined in 33 CFR 328.3 (a)(1-8) and 328.3 (b-c)) in the White Pass Study Area consistent with the methodology outlined in the *1987 Manual*. The methodology found in the *1987 Manual* was implemented with the benefit of current regulations and Regulatory Guidance Letters (RGL) and memoranda ((ACOE), RGL 82-2 and 86-9) (USACE, Memorandum 3-92). According to the *1987 Manual*, a three parameter approach is used when making jurisdictional wetland determinations, wherein positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation all must be present in order to determine that an area is a jurisdictional wetland (Environmental Laboratory, 1987).

2.1.1 Wetland Hydrology Parameter

The presence of wetland hydrology can be determined using a variety of direct and indirect indicators, consistent with the *1987 Manual*. Direct hydrology indicators, such as stream gauging station data or historical records pertaining to the White Pass Study Area can be used to satisfy the wetland hydrology parameter. The wetland hydrology parameter can also be determined using indirect field indicators, which include, but are not limited to: visual observation of inundation or soil saturation, sediment deposition, drainage patterns in wetlands, water stained leaves, watermarks, oxidized root channels (*i.e.*, rhizospheres), and drift lines (ACOE, 1991 and Environmental Laboratory, 1987).

2.1.2 Hydric Soils Parameter

The USDA, National Technical Committee on Hydric Soils (NTCHS) developed a set of four technical criteria for identifying hydric soils (see Table 1). Meeting the hydric soils parameter for wetland determinations requires fulfillment of at least one of the four technical criteria in Table 1. Fulfillment of the hydric soils parameter can also be satisfied by using published soils information and field indicators. Field indicators for determining whether a soil meets the hydric soils parameter are listed in the document, *Field Indicators of Hydric Soils in the United States* (USDA NRCS, 1998). Field indicators include, but are not limited to the presence of: a histosol or histic epipedon, hydrogen sulfide odor, organic bodies, stratified layers, muck, gleyed matrix colors, and redox dark surface. Field indicators contained in the above-referenced document are intended to supersede guidance provided in the *1987 Manual*. Soil colors were determined in the field using standard NRCS sampling techniques and Munsell Soil Color Charts (Munsell, 1990).

Table 1.
Technical Criteria for Identification of Hydric Soils in the United States

1	All Histosols except Folists, or
2	Soils in Aquic suborders, great groups, or subgroups, Abolls suborder, Aquisalids, Pachic subgroup, or Cumulic subgroups that are: a. somewhat poorly drained with a water table equal to 0.0 feet from the surface during the growing season, or b. poorly drained or very poorly drained and have either: (1) a water table at 0.0 feet during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches, or for other soils (2) a water table at less than or equal 0.5 feet from the surface during the growing season if permeability is equal to or greater than 6.0 inches/hour in all layers within 20 inches, or (3) a water table at less than or equal to 1.0 feet from the surface during the growing season if permeability is less than 6.0 inches/hour in any layer within 20 inches, or
3	Soils that are frequently ponded for long duration or very long duration during the growing season, or
4	Soils that are frequently flooded for long duration or very long duration during the growing season.

Source: USDA, NTCHS, 1994

2.1.3 Hydrophytic Vegetation Parameter

According the *1987 Manual*, an area meets the hydrophytic vegetation parameter when more than 50% of the dominant species from each stratum have an assigned indicator status of obligate wetland (OBL), facultative wetland (FACW), and/or facultative (FAC). The indicator status of each species was assigned using regionally specific plant taxonomy texts and the *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)* (Reed, 1988). An indicator status refers to the relative frequency with which a particular species occurs in jurisdictional wetlands (see Table 2). Dominant species in each of four strata (*i.e.*, tree, sapling/shrub, herb, and woody vine) were identified as the most abundant species that immediately exceed 50% of the total aerial cover for that stratum, plus any additional species that comprise 20% or more the total aerial cover for that stratum.

Table 2.
Plant Indicator Status Categories

Indicator Status[a]	Definition
Obligate Wetland (OBL)	Occur almost always in wetlands under natural conditions (probability >99%).
Facultative Wetland (FACW)	Usually occur in wetlands (probability >67% to 99%), but occasionally found in non-wetlands.
Facultative (FAC)	Equally likely to occur in wetlands or non-wetlands (probability 33% to 67%).
Facultative Upland (FACU)	Usually occur in non-wetlands, but occasionally found in wetlands (probability 1% to <33%).
Obligate Upland (UPL)	Occur rarely in wetlands under natural conditions (probability <1%).
No Indicator Status (NI)	Insufficient information exists to assign an indicator status.

Source: United States Fish and Wildlife Service, 1988

[a]The three facultative categories are sometimes modified by plus (+) and minus (-) signs for the purpose of designating a higher or lower level of the indicator status. A FAC- indicator status is not considered to be an indicator of hydrophytic vegetation.

2.2 Waters of the United States Delineation Protocol

SE GROUP delineated the jurisdictional streams consistent with the definitions provided in 33 CFR 328.3 (a)(1-5) within the White Pass Study Area. The applicable portions of the streams definition are as follows, "all other waters such as intrastate lakes, rivers, streams (including intermittent streams)...the use, degradation, or destruction of which could affect interstate or foreign commerce..." and "tributaries of waters identified in paragraphs (a)(1)-(4) of this section" (33 CFR 328.3 (a)(3 and 5)). In applying this definition to conditions encountered in the White Pass Study Area, SE GROUP used the following criteria for identifying jurisdictional streams: (1) continuous and distinct bed and bank features must be present, (2) evidence of annual scour must be present, and (3) the landforms near the stream must exhibit morphology that is indicative of stream processes (i.e., an identifiable concave swale or gully, not a planer or convex surface). In the White Pass Study Area, SE GROUP observed swales (concave landforms), small rivulets, and other erosional features that were not identified as waters of the U.S. because these features did not have the fluvial morphology (bed and bank features or scour marks) necessary to meet the criteria introduced above. The erosional features were generally located on high gradient, convex, and sparsely vegetated surfaces, where spring snowmelt was the dominant hydrology source.

2.3 Field Methodology

The fieldwork necessary for the delineation of the jurisdictional wetlands and streams within the White Pass Study Area was performed during August and September of 2002 and June 2004 by SE GROUP. The White Pass Study Area was limited to encompass only the proposed disturbance areas associated with the proposed White Pass Expansion FEIS. The geographic extent of the White Pass Study Area was limited because potential wetland and stream impacts would only occur where development activities have been proposed. The White Pass Study Area extended approximately 75 feet outside of all proposed development areas (e.g., ski trails and lifts) to prevent potential impacts to wetlands and streams that are adjacent to proposed development areas.

The wetlands and streams that were flagged in the White Pass Study Area were mapped using a Trimble Pro XRS GPS unit with a TSCI data-logger. This GPS unit is reported by the manufacturer to have sub-meter accuracy. Ideal conditions for this GPS unit are locations that receive the most satellite coverage, such as a low amount of canopy cover, and use during times when the most satellites are available. Sub-optimal conditions occur when one or more of the "ideal conditions" requirements above are not met. Most of the wetlands and streams delineated by SE GROUP within the White Pass Study Area were mapped under optimal conditions. When sub-optimal conditions occurred for using the GPS unit, wetland and stream mapping was also done by obtaining either a center point or a control point with the GPS unit and then using ground mapping or aerial photo interpretation to extrapolate the boundaries of the wetland or stream to their correct dimensions.

3.0 RESULTS

3.1 White Pass Ski Area Topography

The developed ski area facilities at White Pass are located at the crest of White Pass off Route 12 at approximately 4500 feet elevation. The ski area is situated on the northern slope of Tieton Peak in the Cascade mountain range. Numerous snowmelt fed streams have partially dissected the convex interfluves between the glacial valleys on the north side of Tieton Peak. The streams have formed many gulleys and swales that generally trend southeast to northwest. Elevations of the proposed White Pass Expansion range from 5420 feet above sea level at the lower terminal of the proposed Chair 5 chairlift to 6820 feet above sea level at the upper terminal of the proposed Chair 6 chairlift. Slopes in the proposed White Pass Express area typically range from approximately 5 to 40 percent.

3.2 Wetland Delineation Findings

SE GROUP has determined that the total area of the 114 wetlands identified within the White Pass Study Area is 5.28 acres (229,890 square feet, see Appendix D). The findings of SE GROUP's wetland delineation are best presented by grouping wetlands based on their geomorphologic characteristics: (1) slope wetlands, (2) riverine wetlands, and (3) depression wetlands (ACOE, 1995). Table 3 provides a summary by wetland type of the morphology and calculated area of the wetlands that were delineated by SE GROUP in the White Pass Expansion FEIS. The complete wetland delineation log is given in Appendix D. This wetland and stream delineation is conditional upon field review and final jurisdictional determination by the USACOE.

Table 3.
Summary of Wetlands Delineated within the White Pass Expansion Study Area

Wetland Type	Vegetation Type	Number of Wetlands	Total Acres	Total Square Feet
Depression	Emergent	4	0.569	24,788
Slope	Emergent	17	2.841	123,764
Riverine	Emergent	93	1.867	81,337
	Total	**114**	**5.278**	**229,890**

3.2.1 Depression Wetlands

SE GROUP delineated a total of 4 depression wetlands, which are located in the general areas of level to gently inclined topography (see Sheet 1 in Appendix F). The depression wetlands usually occur in topographic depressions where accumulation of surface water can occur. Dominant hydrologic input into depression wetlands is from precipitation, groundwater discharge, and interflow from adjacent uplands. The depression wetlands generally had a hydrology indicator such as saturated soils within 12 inches or open water conditions. The following indirect field indicators were used to determine the presence of wetland hydrology for the depression wetlands; visual observation of soil saturation in the upper 12 inches, sediment deposition, drainage patterns in wetlands, water stained leaves, and oxidized root channels (See wetland datasheets in Appendix C).

The composition of the soils observed in the depression wetlands ranged from mucky organic soils (i.e., histic epipedons) to mineral soils with sandy loam texture classes. Soil profiles observed in a depression wetland is recorded on a data sheet in Appendix C. A typical profile of the soils observed in the depression wetlands is summarized below. The surface (O) horizon averages 2 inches thick and has a gray colored gley (Munsell color (MC) GLEY 1 6/5 GY). The sub-surface (A) horizon averages 16 inches thick and is characterized by a dark brown loamy sand (MC 10YR 3/2), with distinct redox. The hydric soil field indicators that were observed in the depression wetlands and used to meet the hydric soil parameter include; A2-histic epipedon, F1-loamy mucky minerals, F2-loamy gleyed matrix, F6-redox dark surface, reducing conditions, and gleyed or low-chroma colors (see Appendices B and C).

Vegetation in the depression wetlands is dominated by Douglas fir (*Pseudotsuga menziesil*), Mountain hemlock (*Tsuga mertensiana*), and Pacific silver fir (*Abies amabilis*) in the tree layer, Salix species (*Salix sp.*), Sitka alder (*Alnus sinuate*), and Subalpine spirea (*Spirea denisifolia*) in the shrub layer, and Black alpine sedge (*Carex nigricans*), Falkland island sedge (*Carex macloviana*), and Showy sedge (*Carex spectabilis*) in the herb layer. Other species that were commonly found in the depression wetlands in the White Pass Study Area include Bearded fescue (*Festuca subulata*) and Fan-leaved cinqfoil (*Potentilla flabellifolia*). The plant communities in all of the depression wetlands met the hydrophytic vegetation parameter, where more than 50 % of the dominant plant species within each stratum are Obligate (OBL), Facultative Wetland (FACW), or Facultative (FAC). Dominant plant species identified in the depression wetlands are included on the data sheets in Appendix C and in the list of plant species in Appendix A.

3.2.2 Slope Wetlands

SE GROUP delineated a total of 17 slope wetlands, which are throughout the White Pass Study Area (see Sheet 1 in Appendix F). The slope wetlands usually occur on sloping land where groundwater discharges at the soil surface. The primary hydrologic input to the slope wetlands in the White Pass Study Area is shallow sub-surface flow that discharges at or near the surface in response to breaks in slope and/or soil texture changes. The following indirect field indicators were used to determine the presence of wetland hydrology for the slope wetlands; visual observation of soil saturation in the upper 12 inches, sediment deposition, drainage patterns in wetlands, water stained leaves, and oxidized root channels (see wetland datasheets in Appendix C).

The composition of the soils observed in the slope wetlands ranged from mucky organic soils (i.e., histic epipedons) to mineral soils with sandy loam texture classes. The slope wetlands can be divided into two subgroups based on whether or not there was a presence of gleyed material. A soil profiles observed in a slope wetland is recorded on a data sheet in Appendix C. A typical profile of the soils observed in the gleyed slope wetlands is summarized below. The surface (O) horizon averages 6 inches thick and is a gray colored gley (MC GLEY 1 5/10 Y). The sub-surface (A) horizon averages 16 inches thick and is characterized by a dark brown fibric loamy sand (MC 10YR 2/2), with distinct redox. The non-gleyed slope wetlands possessed a similar soil profile composition but lacked the gleyed component. The hydric soil field indicators that were observed in the slope wetlands and used to meet the hydric soil parameter include; A2-histic epipedon, A5-stratified layers, F1-loamy mucky minerals, F2-loamy gleyed matrix, F6-redox dark surface, reducing conditions, and gleyed or low-chroma colors (see Appendices B and C).

Vegetation in the slope wetlands is dominated by Douglas fir, Mountain hemlock, and Pacific silver fir in the tree layer, Salix species, Sitka alder, and Subalpine spirea in the shrub layer, and Black alpine sedge, Falkland island sedge, and Brown bog sedge (*Carex buxbaumii*) in the herb layer. Other species that were commonly found in slope wetlands in the White Pass Study Area include Bearded fescue, Fan-leaved cinquefoil, Showy sedge, Partridge-foot (*Luetkea pectinata*), and Avalanche lily (*Erythonium montanum*). The plant communities in all of the slope wetlands met the hydrophytic vegetation parameter, where more than 50 % of the dominant plant species within each stratum are Obligate (OBL), Facultative Wetland (FACW), or Facultative (FAC). Dominant plant species identified in the slope wetlands are included on the data sheets in Appendix C and in the list of plant species in Appendix A.

3.2.3 Riverine Wetlands

The 93 riverine wetlands that were delineated by SE GROUP are generally located throughout the White Pass Study Area (see Sheet 2 in Appendix F). Riverine wetlands are differentiated from slope wetlands for this study by their association with a stream channel or a stream channel's floodplain/terrace. The primary hydrologic input to the riverine wetlands is surface water that flows from streams onto adjacent floodplains during high flow events (e.g., spring melt). Secondary hydrologic inputs include shallow sub-surface flow from up-gradient source areas (e.g., valley walls), and from direct precipitation. The indirect field indicators that were used to determine the presence of wetland hydrology for the riverine wetlands included; visual observation of soil saturation in the upper 12 inches, sediment deposition, and drainage patterns in wetlands (see Appendix C).

The soils observed in the riverine wetlands were similar to the slope wetlands and ranged from mucky organic soils (i.e., histic epipedons) to mineral soils with sandy loam texture classes. The majority of the riverine wetlands exhibited gleyed soils. A soil profile observed in a riverine wetland is recorded on a data sheet in Appendix C, and a typical profile of the soils observed in the riverine wetlands is summarized below. The surface (O) horizon averages 6 inches thick and is characterized as a gray colored gleyed loam (MC GLEY 1 5/10 Y). The sub-surface (A) horizon averages 16 inches thick and is characterized by a dark brown loamy sand (MC 10YR 2/2), with distinct redox. The non-gleyed riverine wetlands possessed a similar soil profile composition but lacked the gleyed component. The hydric soil field indicators that were observed in the riverine wetlands and used to meet the hydric soil parameter include; A2-histic epipedon, A5-stratified layers, F1-loamy mucky minerals, F2-loamy gleyed matrix, F6-redox dark surface, reducing conditions, and gleyed or low-chroma colors (see Appendices B and C).

Vegetation in the riverine wetlands is dominated by Douglas fir, Mountain hemlock, and Pacific silver fir in the tree layer, Salix species, Sitka alder, and Subalpine spirea in the shrub layer, Black alpine sedge, Fan-leaved cinqufoil, and Showy sedge in the herb layer. Other species that were commonly found in slope wetlands in the White Pass Study Area include Falkland island sedge, Bearded fescue, Partridge-foot, Avalanche lily, Western Indian paintbrush (*Castilleja occidentalis*), Broadleaf lupine (*Lupinus latifolius*), and Ducksbill lousewart (*Pedicularis ornithorhyncha*). The plant communities in all of the riverine wetlands met the hydrophytic vegetation parameter, where more than 50 % of the dominant plant species within each stratum are Obligate (OBL), Facultative Wetland (FACW), or Facultative (FAC). Dominant plant species identified in the riverine wetlands are included on the data sheets in Appendix C and in the list of plant species in Appendix A.

3.2.4 Isolated Wetlands

On January 9, 2001, the U.S. Supreme Court ruled that the ACOE could no longer use the "Migratory Bird Rule" to extend its regulation over "waters of the U. S." to include isolated, non-navigable, intrastate waters (Solid Waste Agency of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers, No. 99-1178 [January 9, 2001]). This recent court decision, referred to as the SWANCC decision, clarified the definition of "isolated waters" by stating that they are waters that lack a hydrologic connection to other waters that are part of or adjacent to interstate waters, a tributary system, or traditionally navigable waters. The SWANCC decision will affect any federal, state, or tribe implementing provisions of the Clean Water Act that apply the definition of "waters of the U. S.". The following subsections of the regulatory definition of "waters of the U. S." are, or potentially are, affected by SWANCC: intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds.

In light of SWANCC, ACOE field staff should seek formal project-specific headquarters approval prior to asserting jurisdiction over isolated non-navigable intrastate waters based on other types of interstate commerce links listed in current regulatory definitions of "waters of the U. S."

3.3 Waters of the U. S. Delineation Findings

SE GROUP determined that the total length of waters of the U.S. within the White Pass Study Area is 15.28 miles (80,675 linear feet). The stream length calculation is based on field observations and analysis of GPS and air-photo mapping by SE GROUP using ARCVIEW GIS software. Areas such as upland swales and rivulets were not flagged during the delineation because they did not meet the criteria that SE GROUP used for identifying waters of the U. S. (see Section 2.2). This waters of the U.S. delineation is conditional upon field review and final jurisdictional determination by the ACOE.

Streams can be classified into three different types: perennial, intermittent, and ephemeral. Perennial streams have continuous flow during years of normal precipitation. Intermittent streams also have well defined channels, but do not flow continuously, and are typically fed by groundwater sources. Ephemeral streams have water flowing in them normally only after precipitation events and their hydrologic source is usually from overland surface flow. One hundred and sixty-two (162) streams were delineated by SE GROUP at the White Pass Study Area, of which 122 were ephemeral, 24 were intermittent, and 16 were perennial. Table 4 presents a summary of the streams identified at the White Pass Facilities Expansion Study Area, summarized by stream type. See Appendix F for a data log of all streams flagged in the White Pass Expansion Study Area.

Table 4.
Type and Length of the Streams Delineated within the White Pass Expansion Study Area

Stream Type	Number of Streams	Slope Range	Total Length (Feet)	Total Length (Miles)
CHAIR 5 POD				
Ephemeral	54	3-40	14167.3	2.683
Intermittent	6	-	6008.7	1.138
CHAIR 6 POD				
Ephemeral	67	10-40	21418.4	4.057
Intermittent	5	-	2676.4	0.507
EXISTING SUP POD				
Ephemeral	1	10-40	1697.3	0.321
Intermittent	13		17175.8	3.253
Perennial	16	-	17531.4	3.320
TOTAL	**162**	**-**	**80675.3**	**15.279**

3.4 Riparian Reserves

Riparian Reserves are U.S. Forest Service land allocations that are defined as "lands along wetlands and streams as well as along potentially unstable areas where special standards and guidelines direct land use." (USDA, USFS, 1994). The 5 categories of Riparian Reserves have been classified as follows:

1) permanently flowing nonfish-bearing streams
2) seasonally flowing or intermittent streams
3) wetlands greater than 1 acre
4) wetlands less than 1 acre
5) lakes and natural ponds

In the White Pass Study Area, SE Group determined the width of the Riparian Reserves for wetlands and streams based on the rationale presented in Table 5. The width of Riparian Reserves for the wetlands and streams within the White Pass Study Area are also displayed graphically in Appendix F, Sheet 2.

Table 5.
Riparian Reserve Categories, Reserves, and Rationale for Wetland, Stream, and Lake Classification.

Classification Rationale	Reserve Width	Riparian Reserve Width Rationale
Permanently flowing, non-fish bearing streams	150 feet	The default 150 feet slope distance is greater than the distance equal to the height of one site-potential tree (100 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation (USFS, 1998b; USFS, 1998c; and USDA, USDI, 1994).
Seasonally flowing or intermittent streams	100 feet	The distance equal to the height of one site-potential tree (100 ft.) is equal to the default 100 feet slope distance, and larger than the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge (USFS, 1998b; USFS, 1998c; and USDA, USDI, 1994).
Wetland greater than 1 acre	150 feet	The wetland boundary is defined, in part, as the outer edge of riparian vegetation and saturated soil, so the riparian reserve includes the wetland plus the default 150 feet slope distance which is greater than the one site potential tree height (100 ft.) (USFS, 1998b; USFS, 1998c; and USDA, USDI, 1994).
Wetland less than 1 acre	300 feet	The GPNF *Land and Resource Management Plan – Amendment 11* states that the Riparian Reserve boundary for wetlands less than 1 acre is 300 ft., which is greater than the extent of the riparian vegetation, saturated soil, and one site potential tree height (100 ft.) (USFS, 1998b; USFS, 1998c; and USDA, USDI, 1994).
Natural Lakes and Ponds	300 feet	The default 300 feet slope distance is greater than the distance equal to the height of one site-potential tree (100 ft.), the outer edges of riparian vegetation, and the extent of saturated soil (USFS, 1998b; USFS, 1998c; and USDA, USDI, 1994).

5.0 CONCLUSION

SE GROUP determined that the White Pass Study Area contains 15.28 miles of waters of the U.S., and that the White Pass Study Area contains 5.28 acres of wetlands. It is SE GROUP's recommendation that a field verification be scheduled with the ACOE prior to construction of the White Pass Expansion, if approved. In addition, all of the pertinent permits and approvals will need to be acquired from the appropriate federal, state, and local agencies prior to implementation of the White Pass FEIS. It is also important to note that delineation of the streams and wetlands within the White Pass Study Area is conditional upon final jurisdictional determination by the ACOE.

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APPENDIX A

List of Plants Identified during the Delineation of the White Pass Express Proposal

Plant Species Identified by SE GROUP within the White Pass Study Area

STRATUM	COMMON NAME	SCIENTIFIC NAME	INDICATOR STATUS
Tree	Douglas fir	*Pseudotsuga menziesil*	FACU
	Mountain hemlock	*Tsuga mertensiana*	FACU
	Pacific silver fir	*Abies amabilis*	FACU
	Ponderosa pine	*Pinus ponderosa*	FACU-
	Subalpine fir	*Abies lasiocarpa*	FACU
	Western red cedar	*Thuja plicata*	FAC
Shrub	Beargrass	*Xerophyllum*	FACU
	Big huckleberry	*Vaccinium membranaceum*	FACU+
	Dwarf bramble	*Rubus lasiococcus*	FACU+
	False azelia	*Menziesia ferruginea*	FACU+
	Low huckleberry	*Vaccinium myrtillus*	NI
	Mountain ash	*Sorbus scopulina*	FACU
	Salix species	*Salix sp.*	FACW
	Sidebells pyrola	*Pyrola secunda*	FACU
	Sitka alder	*Alnus sinuate*	FACW
	Subalpine spirea	*Spirea denisifolia*	FACU-
Herb	Avalanche lily	*Erythonium montanum*	FACU
	Bearded fescue	*Festuca subulata*	FAC
	Black alpine sedge	*Carex nigricans*	FACW
	Broadleaf lupine	*Lupinus latifolius*	NI
	Brown bog sedge	*Carex buxbaumii*	OBL
	Ducksbill lousewart	*Pedicularis ornithorhyncha*	FACW
	Falkland island sedge	*Carex macloviana*	NI
	Fan-leaved cinqufoil	*Potentilla flabellifolia*	FAC
	Partridge-foot	*Luetkea pectinata*	FACU-
	Showy sedge	*Carex spectabilis*	FACW
	Smooth woodrush	*Luzula hitchockii*	FAC-
	Western indian paintbrush	*Castilleja occidentalis*	FAC+
	Western rattlesnake plantain	*Goodyera oblongifolia*	FACU-

APPENDIX B

List of Hydric Soil Indicators used in the Delineation of the White Pass Mountain Facilities Expansion Proposal

List of Hydric Soil Indicators used in the Delineation of the White Pass Mountain Facilities Expansion Proposal

INDICATOR NAME	DESCRIPTION OF CRITERIA
A2 – Histic Epipedon	Surface organic soil material 20 cm (8 in.) or more thick.
F1 – Loamy Mucky Mineral	A mucky modified mineral layer 10 cm (4 in.) or more thick starting within 15 cm (6 in.) of the soil surface.
F2 - Loamy gleyed matrix	A gleyed matrix that occupies 60% or more of a layer starting within 30 cm (12 in.) of the soil surface.
F6 – Redox Dark Surface	A layer at least 10 cm (4 in.) thick entirely within the upper 30 cm (12 in.) of the mineral soil that has: a. matrix value 3 or less and chroma 1 or less and 2% or more distinct or prominent redox concentrations as soft masses or pore linings, or b. matrix value 3 or less and chroma 2 or less and 5% or more distinct or prominent redox concentrations as soft masses or pore linings.
A5 – Stratified Layers	Several stratified layers starting within the upper 15 cm (6 in.) of the soil surface. One or more of the layers has value 3 or less with chroma 1 or less and/or it is muck, mucky peat, peat or mucky modified mineral texture. The remaining layers have value 4 or more and chroma 2 or less.

Source: Field Indicators of Hydric Soils in the United States (USDA NRCS, 1998)

APPENDIX C

Wetland Delineation Data Forms of Representative Wetland Types (Depression, Slope, Riverine) for the Delineation of the White Pass Mountain Facilities Expansion Proposal

SE Group DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: *White Pass Expansion*
Applicant/Owner: *White Pass Co., Inc.*
Investigator: *TS, AW, LG, BE*

Date: *8/26 - 9/16/02*
County or City: *Lewis, Yakima*
State: *Washington*

Do Normal Circumstances exist on the site? Yes X No 0
Is the site significantly disturbed (Atypical Situation)? Yes 0 No X
Is the area a potential Problem Area? Yes 0 No X
(If needed, explain in remarks.)

Community ID: *Depression*
Transect ID: *Pod 5*
Plot ID: *P5 - W1*

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
Carex nigricans	*Herb*	*FACW*	*0*	*0*	*0*
Festuca subulata	*Herb*	*FAC*	*0*	*0*	*0*
Potentilla flabellifolia	*Herb*	*NI*	*0*	*0*	*0*
Carex spectabilis	*Herb*	*FACW*	*0*	*0*	*0*
Carex macloviana	*Herb*	*NI*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 60

Remarks: *0*

HYDROLOGY

Recorded Data (Describe in Remarks:)
0 Stream, Lake or Tide Gauge
0 Aerial Photographs
0 Other
X No Recorded Data Available

Field Observations:

Depth of Surface Water: *3 to 12* (in.)

Depth to Free Water in Pit *0 to 12* (in.)

Depth to Saturated Soil: *9* (in.)

Wetland Hydrology Indicators:
Primary Indicators:
X Inundated
X Saturated in Upper 12 inches
X Water Marks
X Drift Lines
X Sediment Deposits
0 Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
X Oxidized Root Channels in upper 12 in.
X Water-Stained Leaves
0 Local Soil Survey Data
0 FAC-Neutral Test
0 Other (Explain in Remarks)

Remarks: *0*
0
0

Community *Depression*
Transect ID: *Pod 5*
Plot ID: *P5 - W1*

SOILS

Map Unit Name
(Series and Phase): *0*

Taxonomy Subgroup: *0*

Drainage Class: *0*
Confirm Mapped Type?
0 Yes
X No

Profile Description: 0

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 to 2	*Ag*	*GLEY 1 6/5 GY*	*5 YR 4/6*	*NA*	*loam*
2 to 8	*A2*	*10 YR 3/2*	*5 YR 4/6*	*few, distinct*	*v. sandy loam*
8 to 17	*B*	*10 YR 3/1*	*2.5 YR 5/6*	*common, prominent*	*silt loam*
0	*0*	*0*	*0*	*0%*	*0*
0	*0*	*0*	*0*	*0%*	*0*

Hydric Soil Indicators:

0 Histosol
X Histic Epipedon
0 Sulfidic Odor
X Aquic Moisture Regime
X Reducing Conditions
X Gleyed or Low-Chroma Colors
0 Concretions
0 High Organic Content in Surface Layer in Sandy Soils
0 Organic Streaking in Sandy Soils
0 Listed on Local Hydric Soils List
0 Listed on National Hydric Soils List
0 Other (Explain in Remarks)

Remarks: *F1: loamy mucky minerals, F2: loamy gleyed matrix, F6: redox dark surface*
0
0

WETLAND DETERMINATION

Hydrophytic Vegetation Present? X Yes 0 No
Wetland Hydrology Present? X Yes 0 No
Hydric Soils Present? X Yes 0 No
Is this Sampling Point Within a Wetland? X Yes 0 No

Remarks: *0*
0
0
0
0
0

SE Group DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: *White Pass Expansion*
Applicant/Owner: *White Pass Co., Inc.*
Investigator: *TS, AW, LG, BE*

Date: *8/26 - 9/16/02*
County or City: *Lewis, Yakima*
State: *Washington*

Do Normal Circumstances exist on the site? Yes X No 0
Is the site significantly disturbed (Atypical Situation)? Yes 0 No X
Is the area a potential Problem Area? Yes 0 No X
(If needed, explain in remarks.)

Community ID: *Slope*
Transect ID: *Pod 5*
Plot ID: *P5 - W7*

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
Carex nigricans	*Herb*	*FACW*	*0*	*0*	*0*
Carex buxbaumii	*Herb*	*OBL*	*0*	*0*	*0*
Carex spectabilis	*Herb*	*FACW*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 100

Remarks: *0*

HYDROLOGY

Recorded Data (Describe in Remarks:)
- 0 Stream, Lake or Tide Gauge
- 0 Aerial Photographs
- 0 Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water: *0* (in.)

Depth to Free Water in Pit *0* (in.)

Depth to Saturated Soil: *12 to 24* (in.)

Wetland Hydrology Indicators:
Primary Indicators:
- X Inundated
- X Saturated in Upper 12 inches
- X Water Marks
- X Drift Lines
- X Sediment Deposits
- 0 Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in upper 12 in.
- X Water-Stained Leaves
- 0 Local Soil Survey Data
- 0 FAC-Neutral Test
- 0 Other (Explain in Remarks)

Remarks: *0*
0
0

Community *Slope*
Transect ID: *Pod 5*
Plot ID: *P5 - W7*

SOILS

Map Unit Name
(Series and Phase): *0*

Taxonomy Subgroup: *0*

Drainage Class: *0*
Confirm Mapped Type?
0 Yes
X No

Profile Description: 0

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 to 5	*Ag*	*GLEY 1 6/5 GY*	*5 YR 4/6*	*NA*	*coarse sand*
5 to 11	*B*	*10 YR 2/2*	*5 YR 4/6*	*few, distinct*	*fibric, loam*
11 to 18	*B2*	*10 YR 2/1*	*2.5 YR 5/6*	*moderate, distinct*	*clay, mucky mineral*
0	*0*	*0*	*0*	*0%*	*0*
0	*0*	*0*	*0*	*0%*	*0*

Hydric Soil Indicators:
- 0 Histosol
- X Histic Epipedon
- 0 Sulfidic Odor
- X Aquic Moisture Regime
- X Reducing Conditions
- X Gleyed or Low-Chroma Colors
- 0 Concretions
- 0 High Organic Content in Surface Layer in Sandy Soils
- 0 Organic Streaking in Sandy Soils
- 0 Listed on Local Hydric Soils List
- 0 Listed on National Hydric Soils List
- 0 Other (Explain in Remarks)

Remarks: *F1: loamy mucky minerals, F2: loamy gleyed matrix, F6: redox dark surface*
0
0

WETLAND DETERMINATION

Hydrophytic Vegetation Present? X Yes 0 No
Wetland Hydrology Present? X Yes 0 No
Hydric Soils Present? X Yes 0 No
Is this Sampling Point Within a Wetland? X Yes 0 No

Remarks: *0*
0
0
0
0
0

SE Group DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: *White Pass Expansion* — Date: *8/26 - 9/16/02*
Applicant/Owner: *White Pass Co., Inc.* — County or City: *Lewis, Yakima*
Investigator: *TS, AW, LG, BE* — State: *Washington*

Do Normal Circumstances exist on the site? Yes X No 0 — Community ID: *Riverine*
Is the site significantly disturbed (Atypical Situation)? Yes 0 No X — Transect ID: *Pod 5*
Is the area a potential Problem Area? Yes 0 No X — Plot ID: *P5 - W4*
(If needed, explain in remarks.)

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
Carex nigricans	*Herb*	*FACW*	*0*	*0*	*0*
Festuca subulata	*Herb*	*FAC*	*0*	*0*	*0*
Potentilla flabellifolia	*Herb*	*NI*	*0*	*0*	*0*
Carex spectabilis	*Herb*	*FACW*	*0*	*0*	*0*
Carex macloviana	*Herb*	*NI*	*0*	*0*	*0*
Castilleja occidentalis	*Herb*	*FAC+*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*
0	*0*	*0*	*0*	*0*	*0*

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 67

Remarks: *0*

HYDROLOGY

Recorded Data (Describe in Remarks:)
0 Stream, Lake or Tide Gauge
0 Aerial Photographs
0 Other
X No Recorded Data Available

Field Observations:

Depth of Surface Water: *0* (in.)

Depth to Free Water in Pit *0* (in.)

Depth to Saturated Soil: *12+* (in.)

Wetland Hydrology Indicators:
Primary Indicators:
X Inundated
X Saturated in Upper 12 inches
X Water Marks
X Drift Lines
X Sediment Deposits
0 Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
X Oxidized Root Channels in upper 12 in.
X Water-Stained Leaves
0 Local Soil Survey Data
0 FAC-Neutral Test
0 Other (Explain in Remarks)

Remarks: *0*
0
0

Community *Riverine*
Transect ID: *Pod 5*
Plot ID: *P5 - W4*

SOILS

Map Unit Name
(Series and Phase): *0*

Taxonomy Subgroup: *0*

Drainage Class: *0*
Confirm Mapped Type?
0 Yes
X No

Profile Description: 0

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0 to 2	*Ag*	*GLEY 1 6/10Y*	*5 YR 4/6*	*NA*	*loam*
2 to 7	*B*	*7.5 YR 6/4*	*5 YR 4/6*	*few, distinct*	*sand*
7 to 16+	*B2*	*10 YR 2/2*	*2.5 YR 5/6*	*common, prominent*	*mucky mineral*
0	*0*	*0*	*0*	*0%*	*0*
0	*0*	*0*	*0*	*0%*	*0*

Hydric Soil Indicators:

0 Histosol
X Histic Epipedon
0 Sulfidic Odor
X Aquic Moisture Regime
X Reducing Conditions
X Gleyed or Low-Chroma Colors

0 Concretions
0 High Organic Content in Surface Layer in Sandy Soils
0 Organic Streaking in Sandy Soils
0 Listed on Local Hydric Soils List
0 Listed on National Hydric Soils List
0 Other (Explain in Remarks)

Remarks: *F1: loamy mucky minerals, F2: loamy gleyed matrix, F6: redox dark surface*
0
0

WETLAND DETERMINATION

Hydrophytic Vegetation Present? X Yes 0 No
Wetland Hydrology Present? X Yes 0 No
Hydric Soils Present? X Yes 0 No
Is this Sampling Point Within a Wetland? X Yes 0 No

Remarks: *0*
0
0
0
0
0

APPENDIX D

Wetland Data Log for the Delineation of the White Pass Mountain Facilities Expansion Proposal

Wetlands Delineated within the White Pass Expansion Study Area

CHAIR 5 POD			
Wetland ID	**Wetland Type**	**Acres**	**Square Feet**
W-1	Depressional	0.01384	602.8
W-10	Riverine	0.01029	448.1
W-11	Riverine	0.02103	915.9
W-117	Riverine	0.00569	247.9
W-119	Riverine	0.00496	215.9
W-12	Riverine	0.01471	640.7
W-120	Riverine	0.03373	1,469.3
W-121	Riverine	0.04968	2,164.3
W-122	Riverine	0.00329	143.5
W-123	Riverine	0.02430	1,058.5
W-124	Riverine	0.01430	623.1
W-125	Riverine	0.02620	1,141.2
W-127	Riverine	0.03095	1,348.1
W-128	Riverine	0.02170	945.1
W-13	Riverine	0.02150	936.4
W-130	Depressional	0.11396	4,964.0
W-132	Riverine	0.01790	779.8
W-134	Riverine	0.00758	330.4
W-136	Riverine	0.00251	109.5
W-138	Riverine	0.06670	2,905.5
W-14	Riverine	0.02391	1,041.3
W-140	Riverine	0.09813	4,274.6
W-142	Riverine	0.01959	853.1
W-144	Riverine	0.19709	8,585.4
W-15	Riverine	0.00763	332.2
W-16	Riverine	0.00735	320.3
W-17	Riverine	0.01299	565.8
W-18	Riverine	0.01450	631.8
W-19	Riverine	0.01382	601.9
W-2	Depressional	0.18574	8,090.7
W-20	Riverine	0.00847	368.8
W-21	Riverine	0.02975	1,295.8
W-22	Riverine	0.01241	540.8
W-23	Riverine	0.03332	1,451.3
W-24	Riverine	0.00448	195.0
W-25	Riverine	0.00828	360.6
W-26	Riverine	0.01818	791.8
W-27	Riverine	0.01865	812.3
W-28	Riverine	0.01047	456.1
W-29	Riverine	0.02000	871.2
W-3	Riverine	0.02026	882.4
W-30	Riverine	0.00939	408.9
W-31	Riverine	0.01758	765.7
W-33	Riverine	0.00716	312.0

W-35	Riverine	0.01208	526.2
W-37	Riverine	0.01622	706.7
W-39	Riverine	0.00104	45.5
W-4	Riverine	0.04311	1,877.8
W-41	Riverine	0.01958	853.0
W-43	Riverine	0.00208	90.4
W-46	Riverine	0.00338	147.1
W-5	Riverine	0.00122	53.0
W-6	Riverine	0.00768	334.7
W-7	Riverine	0.00580	252.6
W-8	Riverine	0.00898	391.2
W-9	Riverine	0.00397	172.7
Chair 6 POD			
Wetland ID	**Wetland Type**	**Acres**	**Square Feet**
W-1	Riverine	0.06043	2,632.4
W-10	Riverine	0.00852	371.3
W-101	Riverine	0.00449	195.8
W-102	Riverine	0.05996	2,611.8
W-103	Depressional	0.25553	11,130.8
W-105	Riverine	0.00436	189.7
W-106	Riverine	0.01520	662.3
W-107	Riverine	0.00491	213.7
W-108	Riverine	0.00371	161.6
W-109	Riverine	0.02436	1,061.0
W-11	Riverine	0.02867	1,248.7
W-110	Riverine	0.01143	498.1
W-111	Riverine	0.02798	1,218.9
W-112	Riverine	0.01299	565.7
W-113	Riverine	0.00906	394.6
W-114	Riverine	0.00361	157.1
W-115	Riverine	0.01220	531.3
W-116	Riverine	0.01165	507.6
W-117	Riverine	0.00837	364.6
W-118	Riverine	0.02576	1,122.2
W-12	Riverine	0.00160	69.6
W-13	Riverine	0.00619	269.4
W-14	Riverine	0.00690	300.7
W-15	Riverine	0.00222	96.6
W-16	Riverine	0.01795	782.0
W-17	Riverine	0.00668	290.9
W-18	Riverine	0.02290	997.4
W-2	Riverine	0.01087	473.3
W-20	Riverine	0.01018	443.4
W-22	Riverine	0.00451	196.6
W-24	Riverine	0.00790	344.0
W-26	Riverine	0.00772	336.3
W-28	Riverine	0.01593	694.0

W-3	Riverine	0.00546	237.8
W-4	Riverine	0.00236	102.7
W-45	Riverine	0.01250	544.4
W-5	Riverine	0.00548	238.9
W-6	Riverine	0.00501	218.1
W-7	Riverine	0.00688	299.7
W-8	Riverine	0.01758	765.6
Existing SUP POD			
Wetland ID	**Wetland Type**	**Acres**	**Square Feet**
W-201	Slope	0.11206	4,881.3
W-202	Slope	0.02042	889.3
W-203	Slope	0.14549	6,337.7
W-204	Slope	0.02356	1,026.4
W-205	Slope	0.17294	7,533.1
W-206	Slope	0.01396	608.2
W-207	Slope	0.80715	35,159.6
W-208	Slope	0.01137	495.1
W-210	Slope	0.01751	762.9
W-211	Slope	0.09589	4,177.1
W-213	Slope	0.10796	4,702.9
W-215	Slope	0.29571	12,881.2
W-217	Slope	0.78284	34,100.5
W-220	Slope	0.08080	3,519.7
W-221	Riverine	0.23724	10,334.2
W-222	Slope	0.05467	2,381.4
W-223	Slope	0.05710	2,487.3
W-224	Slope	0.04180	1,820.9
White Pass Study Area Total		**5.27755**	**229,890.1**

APPENDIX E

Stream Data Log for the White Pass Mountain Facilities Expansion Proposal

Streams Delineated within the White Pass Expansion Study Area

Chair 5 POD				
Stream ID	**Flow Regime**	**Slope (%)**	**Length (Feet)**	**Length (Miles)**
S-1	Intermittent	3	66.9	0.01266
S-10	Ephemeral	40	60.3	0.01142
S-11	Ephemeral	20	199.3	0.03774
S-114	Ephemeral	<10	47.2	0.00893
S-116	Ephemeral	<10	463.3	0.08775
S-116	Ephemeral	>10	215.7	0.04084
S-118	Ephemeral	>10	87.2	0.01651
S-120	Ephemeral	>10	69.7	0.01319
S-122	Ephemeral	>10	65.5	0.01240
S-124	Ephemeral	<10	103.1	0.01953
S-126	Ephemeral	<10	175.5	0.03324
S-128	Ephemeral	<10	119.6	0.02265
S-13	Ephemeral	4	452.8	0.08575
S-130	Ephemeral	<10	132.3	0.02505
S-131	Ephemeral	>10	62.3	0.01180
S-133	Ephemeral	>10	715.1	0.13544
S-135	Ephemeral	>10	765.8	0.14503
S-137	Ephemeral	>10	61.4	0.01163
S-139	Ephemeral	>10	437.9	0.08294
S-14	Ephemeral	25	171.4	0.03246
S-141	Ephemeral	<10	159.6	0.03024
S-143	Ephemeral	<10	62.3	0.01179
S-145	Ephemeral	>10	42.7	0.00809
S-147	Ephemeral	>10	87.7	0.01660
S-149	Ephemeral	>10	86.2	0.01633
S-15	Ephemeral	15	48.7	0.00922
S-153	Ephemeral	<10	517.1	0.09794
S-155	Ephemeral	<10	325.7	0.06169
S-16	Ephemeral	20	98.2	0.01860
S-17	Ephemeral	>10	145.6	0.02758
S-18	Ephemeral	>10	74.0	0.01401
S-19	Ephemeral	>10	563.1	0.10664
S-2	Intermittent	3	924.9	0.17517
S-20	Ephemeral	20	120.1	0.02274
S-200	Ephemeral	>10	139.2	0.02636
S-201	Ephemeral	>10	47.2	0.00894
S202	Ephemeral	40	1,021.4	0.19345
S202	Intermittent	n/a	14.6	0.00277
S-21	Ephemeral	>10	47.3	0.00896
S-22	Ephemeral	15	140.9	0.02669
S-23	Ephemeral	20	317.2	0.06007
S238	Intermittent	>10	2,397.5	0.45407
S239	Ephemeral	>10	777.0	0.14716

S-24	Ephemeral	20	375.4	0.07110
S-25	Ephemeral	4	640.0	0.12121
S-26	Ephemeral	10	38.8	0.00735
S-27	Ephemeral	8	530.2	0.10041
S-28	Ephemeral	15	225.1	0.04263
S-3	Ephemeral	>10	562.2	0.10648
S-3	Ephemeral	10	16.8	0.00318
S-3	Intermittent	>10	550.0	0.10417
S-3	Intermittent	10	249.1	0.04719
S-30	Ephemeral	40	19.1	0.00361
S-32	Ephemeral	25	138.5	0.02622
S-36	Ephemeral	15	433.0	0.08202
S-38	Ephemeral	15	60.3	0.01142
S-4	Ephemeral	>10	227.5	0.04310
S-4	Intermittent	<10	590.5	0.11184
S-4	Intermittent	>10	1,215.2	0.23015
S-42	Ephemeral	15	64.2	0.01216
S-44	Ephemeral	<10	472.2	0.08943
S-5	Ephemeral	>10	387.9	0.07346
S-6	Ephemeral	25	208.1	0.03942
S-7	Ephemeral	>10	272.3	0.05156
S-8	Ephemeral	25	205.6	0.03894
S-9	Ephemeral	5	63.7	0.01207
Chair 6 POD				
Stream ID	**Flow Regime**	**Slope (%)**	**Length (Feet)**	**Length (Miles)**
S-1	Ephemeral	<10	96.4	0.01826
S-10	Ephemeral	15	89.1	0.01688
S-101	Ephemeral	15	217.6	0.04121
S-102	Ephemeral	40	518.4	0.09818
S-103	Ephemeral	15	248.6	0.04709
S-104	Ephemeral	30	226.0	0.04281
S105	Ephemeral	15	190.9	0.03616
S-106	Ephemeral	25	18.3	0.00346
S107	Ephemeral	>10	178.3	0.03378
S-108	Ephemeral	>10	55.1	0.01044
S-109	Ephemeral	>10	83.7	0.01584
S-11	Ephemeral	>10	243.7	0.04615
S-110	Ephemeral	>10	164.6	0.03117
S-111	Ephemeral	>10	353.6	0.06697
S-112	Ephemeral	>10	235.8	0.04465
S-113	Ephemeral	>10	42.2	0.00799
S-115	Ephemeral	>10	34.9	0.00662
S-117	Ephemeral	<10	72.0	0.01363
S-119	Ephemeral	<10	739.5	0.14005
S-12	Ephemeral	15	65.7	0.01244
S-123	Ephemeral	>10	92.7	0.01755

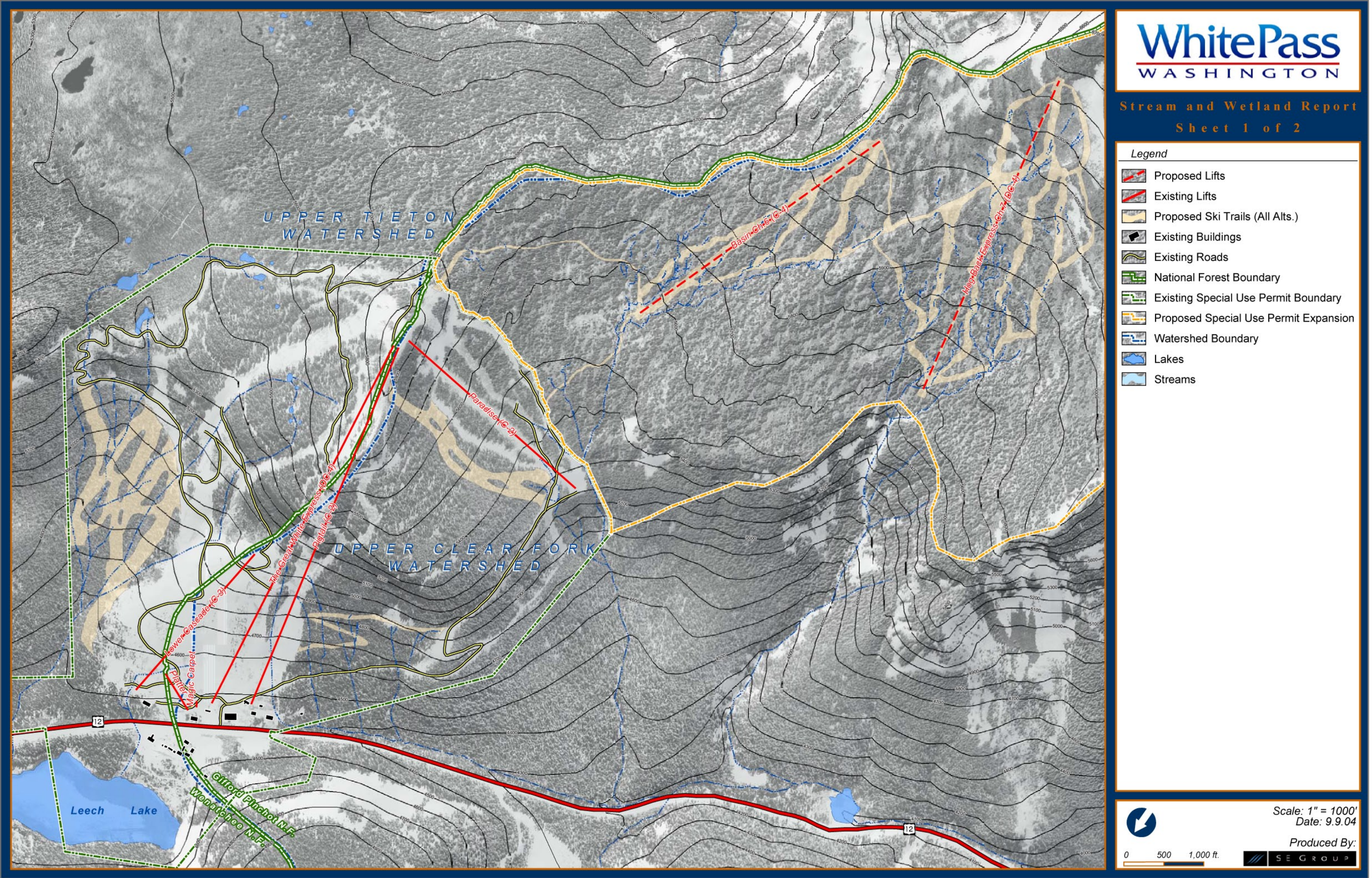
S-125	Ephemeral	>10	594.3	0.11255
S-127	Ephemeral	>10	49.3	0.00933
S-129	Ephemeral	>10	85.9	0.01627
S-13	Ephemeral	>10	228.5	0.04327
S-130	Ephemeral	<10	99.4	0.01882
S-14	Ephemeral	20	309.0	0.05853
S-15	Ephemeral	>10	156.3	0.02960
S-16	Ephemeral	20	189.1	0.03582
S-17	Ephemeral	>10	66.0	0.01250
S-18	Ephemeral	20	155.2	0.02939
S-19	Ephemeral	>10	331.9	0.06286
S-2	Ephemeral	20	336.8	0.06379
S-20	Ephemeral	20	135.6	0.02568
S-21	Ephemeral	25	331.1	0.06272
S-22	Ephemeral	15	68.4	0.01296
S-23	Ephemeral	>10	474.6	0.08989
S235	Ephemeral	<10	173.5	0.03286
S235	Intermittent	>10	254.6	0.04821
S236	Ephemeral	<10	59.5	0.01127
S236	Intermittent	<10	137.6	0.02606
S236	Intermittent	>10	667.0	0.12633
S237	Intermittent	>10	396.3	0.07506
S-24	Ephemeral	20	73.3	0.01388
S-25	Ephemeral	>10	193.9	0.03673
S-26	Ephemeral	>10	147.2	0.02787
S-27	Ephemeral	>10	872.6	0.16527
S-28	Ephemeral	15	99.5	0.01885
S-29	Ephemeral	>10	145.4	0.02754
S-3	Ephemeral	<10	421.8	0.07989
S-3	Ephemeral	>10	2,257.9	0.42763
S-3	Intermittent	<10	474.6	0.08988
S-3	Intermittent	>10	533.0	0.10095
S-31	Ephemeral	<10	512.2	0.09700
S-31	Ephemeral	>10	39.8	0.00753
S-32	Ephemeral	18	1,001.7	0.18971
S-32	Intermittent	<10	213.4	0.04041
S-33	Ephemeral	<10	278.5	0.05274
S-34	Ephemeral	15	100.6	0.01906
S-35	Ephemeral	<10	119.3	0.02260
S-36	Ephemeral	15	774.2	0.14663
S-37	Ephemeral	>10	59.7	0.01130
S-38	Ephemeral	15	447.3	0.08472
S-4	Ephemeral	10	90.0	0.01705
S-40	Ephemeral	18	64.8	0.01228
S-42	Ephemeral	20	410.9	0.07782
S-44	Ephemeral	18	495.6	0.09386

S-46	Ephemeral	<10	541.9	0.10263
S-46	Ephemeral	20	799.1	0.15134
S-48	Ephemeral	15	82.7	0.01566
S-5	Ephemeral	>10	305.9	0.05794
S-50	Ephemeral	20	169.6	0.03213
S-52	Ephemeral	<10	248.6	0.04709
S-58	Ephemeral	<10	84.5	0.01599
S-6	Ephemeral	<10	357.4	0.06769
S-60	Ephemeral	>10	156.9	0.02972
S-62	Ephemeral	>10	113.7	0.02154
S-64	Ephemeral	<10	326.1	0.06176
S-64	Ephemeral	20	676.7	0.12817
S-7	Ephemeral	>10	903.2	0.17107
S-8	Ephemeral	15	159.5	0.03021
S-9	Ephemeral	>10	74.9	0.01419
Existing SUP POD				
Stream ID	**Flow Regime**	**Slope (%)**	**Length (Feet)**	**Length (Miles)**
S-201	Intermittent	20	609.9	0.11551
S-203	Intermittent	n/a	167.7	0.03176
S-203	Intermittent	>10	2073.3	0.39266
S-203	Intermittent	7	204.7	0.03877
S-203	Perennial	>10	1,438.7	0.27248
S-204	Ephemeral	n/a	41.9	0.00793
S-204	Ephemeral	35	724.6	0.13723
S-204	Intermittent	n/a	14.1	0.00267
S-205	Intermittent	n/a	819.3	0.15516
S-205	Intermittent	>10	1,423.9	0.26967
S-205	Intermittent	9	831.1	0.15740
S-205	Perennial	>10	1,018.3	0.19285
S-207	Intermittent	n/a	16.7	0.00317
S-207	Intermittent	15	782.4	0.14819
S-209	Intermittent	n/a	197.3	0.03737
S-209	Intermittent	>10	571.7	0.10828
S-209	Intermittent	8	488.2	0.09247
S-209	Perennial	>10	663.0	0.12557
S-209	Perennial	14	1,577.2	0.29871
S-210	Ephemeral	n/a	216.3	0.04096
S-210	Ephemeral	25	238.2	0.04512
S-211	Intermittent	n/a	285.7	0.05411
S-211	Intermittent	30	1,505.5	0.28514
S-212	Intermittent	30	366.9	0.06949
S-213	Intermittent	30	257.6	0.04878
S-214	Perennial	n/a	136.0	0.02575
S-214	Perennial	35	438.4	0.08303
S-215	Intermittent	n/a	185.7	0.03517
S-215	Intermittent	23	1,122.0	0.21250

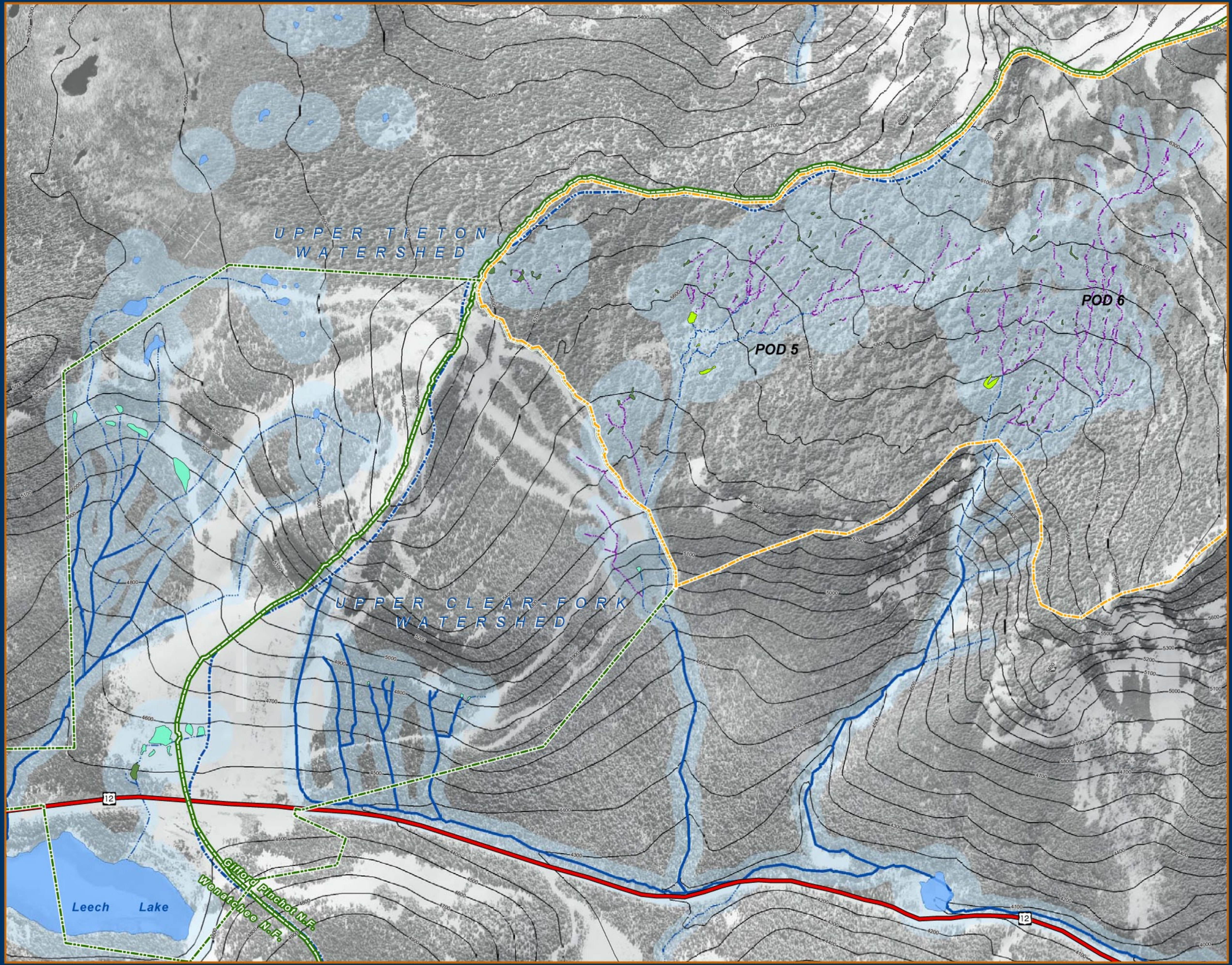
S-215	Perennial	23	390.1	0.07389
S-216	Perennial	35	132.4	0.02507
S-217	Intermittent	21	370.0	0.07008
S-218	Perennial	n/a	44.4	0.00840
S-218	Perennial	35	892.5	0.16903
S-219	Intermittent	>10	487.0	0.09223
S-220	Perennial	35	309.3	0.05858
S-221	Intermittent	>10	830.3	0.15726
S-221	Perennial	>10	2,105.4	0.39876
S-222	Perennial	35	630.4	0.11940
S-223	Intermittent	n/a	55.6	0.01053
S-223	Intermittent	>10	786.4	0.14893
S-224	Perennial	n/a	39.7	0.00752
S-224	Perennial	35	1,082.8	0.20507
S-225	Perennial	n/a	14.2	0.00270
S-225	Perennial	<10	666.3	0.12620
S-225	Perennial	>10	323.7	0.06130
S-226	Perennial	n/a	279.5	0.05294
S-226	Perennial	>10	1,078.7	0.20430
S-227	Intermittent	<10	191.2	0.03621
S-228	Perennial	n/a	173.4	0.03283
S-228	Perennial	35	1,394.9	0.26419
S-230	Perennial	n/a	869.9	0.16474
S-230	Perennial	>10	1,642.9	0.31115
S-231	Intermittent	n/a	199.2	0.03772
S-231	Intermittent	<10	1,814.2	0.34361
S-232	Intermittent	>10	261.9	0.04960
S-233	Ephemeral	>10	476.3	0.09020
S-233	Intermittent	>10	256.4	0.04856
S-234	Perennial	<10	189.5	0.03589
Total			**80,675.3**	**15.3**

APPENDIX F

Wetland and Stream Maps
for the White Pass Mountain Facilities Expansion Proposal



WhitePass
WASHINGTON
Stream and Wetland Report
Sheet 1 of 2
Legend
Proposed Lifts
Existing Lifts
Proposed Ski Trails (All Alts.)
Existing Buildings
Existing Roads
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
Watershed Boundary
Lakes
Streams
UPPER TIETON WATERSHED
UPPER CLEAR FORK WATERSHED
Basin Ch 6 (C-4)
Hog Back Express Ch 7 (DC-4)
Paradise (C-2)
The Great White Express (DC-4)
Pigtail (C-2)
Lower Cascade (C-3)
Platter
Magic Carpet
12
Leech Lake
Gifford Pinchot N.F.
Wenatchee N.F.
Scale: 1" = 1000'
Date: 9.9.04
0 500 1,000 ft.
Produced By:
SE GROUP



WhitePass WASHINGTON

Stream and Wetland Report
Sheet 2 of 2

Legend

- Stream - Perennial
- Stream - Intermittent
- Stream - Ephemeral
- Wetland - Depressional
- Wetland - Slope
- Wetland - Riverine
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion
- Watershed Boundary
- Lakes
- Riparian Reserves

Scale: 1" = 1000'
Date: 9.9.04

0 500 1,000 ft.

Produced By:
SE GROUP

Appendix D
Social, Economic, and Recreation Assumptions

APPENDIX D – SOCIAL, ECONOMIC, AND RECREATION ASSUMPTIONS

1.0 ASSUMPTIONS USED IN THE RECREATION AND SKIER VISITATION ANALYSIS

1) Visitation utilization in the first year (baseline conditions for all alternatives) is based on average total annual visitation at White Pass over the past five years (109,782 average visits from 2001-02 to 2005-06) (PNSAA 2006). During this same period of time, the market area (comprised of Cowlitz, Lewis, Pierce, Thurston and Yakima counties) experienced an average annual population growth of 5.3 percent (OFN 2005). Between 1996-97 to 2000-01 skier visits averaged 107,457 (PNSAA 2004).

2) The projections generally reflect the maximum visitation growth expectations in order to estimate potential "worst case" impacts to other resources.

3) Projections are based upon a ten-year period. All alternatives are implemented in a single phase.

4) Under all alternatives, skier visitation growth is expected to occur due to an expanding population base within the market area (Cowlitz, Lewis, Pierce, Thurston and Yakima counties). Projected population growth from 2005-2015 for the market area is shown below by county (refer to Table 1). The average annual projected increase for the entire area is 2.16 percent for the ten-year development period.

Table 1:
White Pass Market Area
Average Annual Population Growth
Projections From 2005-2015

County	Projected Annual Growth (%)
Cowlitz	2.67
Lewis	1.95
Pierce	1.71
Thurston	2.70
Yakima	1.79
Average	2.16

Source: State of Washington, 2002

5) Visitation projections have taken into consideration weather variables, recognizing that favorable or poor weather conditions have historically caused skier visits to fluctuate dramatically from year to year.

6) Under the Action Alternatives, it is expected that some growth in visitation would be the result of excitement generated by ongoing improvement and expansion, particularly when considering that very little new development has occurred at White Pass over the past 20 years.

7) Calculation of White Pass skier visitation projections is assumed to be linear. Therefore, growth was calculated using the following equation: Pt+n = Pt(1+r)n. Beyond the excitement-based growth in visitation under the Action Alternatives, a rate of 1 percent per year is used to project growth in visitation at White Pass.

2.0 ASSUMPTIONS USED IN THE SOCIAL AND ECONOMIC BREAK EVEN ANALYSIS

1) Revenue per visit, fixed, semi-variable and variable costs are summarized and annualized from the White Pass 6/30/06 nine-month income statement. Principal payments on long-term debt for 2006 are added to fixed costs. For the break-even analysis the expense per visit for semi-variable and variable costs are used to calculate these costs at each visit increment.

2) Debt service assumptions were based upon the various capital costs of each alternative. It is assumed that the alternatives could be 80 percent financed at 8 percent, for 10 years with a 20-year amortization schedule. The additional debt service is added to fixed costs for each alternative.

3) Revenue per visit is $31.48 for the fiscal year ended 9/30/06. Alternative 2 and Modified Alternative 4 open up a new skiing pod and enhance other facilities whereby resort management believes that they could achieve a per visit revenue of $37.00. Alternatives 6 and 9 do not offer a substantial increase in new or exciting terrain and therefore resort management believes that revenue per visit would be $34.00. These revenue per visit assumptions are used to calculated revenues at each visit increment.

4) Revenues, semi-variable, and variable costs are increased at 3 percent per year from year-one to forecast these at year-five. (A multiplier of 1.15 is used.).Construction costs are summarized below in Table 2.

Table 3:
Construction Costs for Action Alternatives

	Construction Quantities					Unit costs ($)	Base cost ($)	Construction Costs ($)			
	Alt. 1	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9			Alt 2	Mod. Alt. 4	Alt 6	Alt. 9
Buildings (sq ft.)	38,065	2,000	2,735	3,235	3,235	300	-	600,000	820,500	970,500	970,500
Parking lot (ac.)	6.83	-	8.03	2.63	2.63	120,000	-	-	963,600	315,600	315,600
Power Lines (ft.)	14,830	11,340	11,120	6,180	1,430	25	10,000	293,500	288,000	164,500	45,750
Communiction Lines (ft.)	14,280	16,750	16,570	6,180	4,290	25	-	418,750	414,250	154,500	107,250
Waste Water Lines (ft.)	3,842	-	-	7,730	14,231	35	60,000	-	-	330,550	498,085
Water Line (ft.)	-	-	12,670	7,730	-	35	-	-	443,450	270,550	-
Maintenance Roads (ft.)	33,000	-	-	1,790	-	40	-	-	-	71,600	-
Clearing Only (ac.)	-	14.87	24.94	9.62	27.00	4,000	-	59,490	99,742	38,492	108,019
Clearing and Grading (ac.)	-	4.82	13.51	5.92	5.95	21,000	-	101,304	283,715	124,300	124,950
Grading Only (ac.)	-	-	7.45	-	7.59	17,000	-	-	126,630	-	129,030
Re-vegetation (ac.)	-	-	5.25	-	5.25	6,000	-	-	31,500	-	31,500
Total								1,473,044	3,471,387	2,440,592	2,330,684
Lifts								6,500,000	6,500,000	5,000,000	1,500,000
Grand Total								7,973,044	9,971,387	7,440,592	3,830,684

SE Group, 2006

3.0 WHITE PASS SKIER VISITATION PROJECTIONS

3.1 ALTERNATIVE 1 (NO ACTION)

Under the No Action Alternative, no improvements or additional facility development at White Pass would occur. Small incremental visitation growth (1.0 percent) will occur due to the expanding population base within the White Pass market from the base of 109,782 (for average visits from 2000-01 to 2005-06, including the low snow season of 2004-05) or 128,000 visits (from the DEIS, for average visits from 1999-2000 to 2003-04). The skier visitation projections (shown in five-year increments over the projection period) are shown below in Table 3:

Table 3:
White Pass Skier Visitation Projections for Alternative 1

Projection Year	DEIS Skier Visitation Projection (128,000 average visits from 1999-2000 to 2003-04)	FEIS Skier Visitation Projection (109,782[a] average visits from 2000-01 to 2005-06)
Year 1	128,000	109,782
Year 5	133,197	115,382
Year 10	139,992	121,268

[a] Average includes 2004-05 low snow year

3.2 ALTERNATIVE 2 AND MODIFIED ALTERNATIVE 4

Alternative 2 and Modified Alternative 4 provide different variations of the development of a fixed-grip quad chairlift in Pigtail Basin, a detachable quad in Hogback Basin, a mid-mountain lodge in differing locations in and adjacent to the basins and the 15 ski trails associated with these proposed lifts. It is assumed that because both alternatives provide similar facilities in the Hogback and Pigtail basins, visitation growth rates would be similar.

A development with two lifts within the Pigtail and Hogback basins would generate the most interest and is the type of terrain expansion the White Pass skier has been seeking for many decades. A sizable increase in skier visitation (40,000 annual visits) would occur due to the excitement of doubling the size of the ski terrain offered at White Pass, in conjunction with incremental visitation growth due to the continually expanding population base in the White Pass market area. The 40,000 number is based on the idea that the additional lifts add a CCC of approximately 1,580 (for Alternative 2) and 3,800 (for Modified Alternative 4), and that near capacity visitation would occur approximately 25 times after the opening of the new terrain. Based upon these factors, skier visits are projected to grow at a rate of 1 percent annually from a base of 149,782 visits in the first year. Projected skier visits are shown in five year increments for Alternative 2 and Modified Alternative 4 (refer to Table 4).

Table 4:
White Pass Skier Visitation Projections for Alternative 2 and Modified Alternative 4

Projection Year	DEIS Skier Visitation Projection (128,000 average visits from 1999-2000 to 2003-04)	FEIS Skier Visitation Projection (109,782[a] average visits from 2000-01 to 2005-06)
Year 1	168,000	149,782
Year 5	174,821	157,422
Year 10	183,739	165,453

[a] Average includes 2004-05 low snow year

3.3 ALTERNATIVE 6

Alternative 6 is the development of one chairlift in Pigtail Basin, a mid-mountain lodge within the existing Special Use Permit area and five ski trails associated with the lift.

This alternative would represent a smaller expansion of the ski terrain at White Pass. Therefore, much less interest and excitement would be generated which would be reflected in the visitation projections. As with Alternative 2 and Modified Alternative 4, stabilization of visits would follow the initial demand increase (14,000 annual skier visits) with incremental growth due to expanded population in the White Pass market, estimated at 1 percent annually, to follow. Future growth would increase at an annual rate of approximately 1 percent based on projections shown in five year increments below, in Table 5.

Table 5:
White Pass Skier Visitation Projections for Alternative 6

Projection Year	DEIS Skier Visitation Projection (128,000 average visits from 1999-2000 to 2003-04)	FEIS Skier Visitation Projection (109,782[a] average visits from 2000-01 to 2005-06)
Year 1	142,000	123,782
Year 5	147,766	130,096
Year 10	155,303	136,732

[a] Average includes 2004-05 low snow year

3.4 ALTERNATIVE 9

Alternative 9 is the "In-Fill" alternative with one chairlift development on the eastern most side of the existing Special Use Permit area, a mountain-top lodge and seven new ski trails.

Alternative 9 would generate considerable interest with the mountain top day lodge and provide some additional ski trails but would lack the interest of expanding into the Hogback Basin area. White Pass would still see the incremental growth due to population increases within the market place, estimated at 1 percent per year. Alternative 9 would produce an initial demand increase (6,000 annual skier visits) in visitation due to excitement about the improvements. Skier visits are shown in five year increments in Table 6, below.

Table 6:
White Pass Skier Visitation Projections for Alternative 9

Projection Year	DEIS Skier Visitation Projection (128,000 average visits from 1999-2000 to 2003-04)	FEIS Skier Visitation Projection (109,782[a] average visits from 2000-2001 to 2005-06)
Year 1	134,000	115,782
Year 5	139,441	121,688
Year 10	146,554	127,895

[a] Average includes 2004-05 low snow year

Appendix E

Watershed

SE GROUP

TECHNICAL MEMORANDUM

3245 146TH PLACE SE SUITE 360 BELLEVUE WA 98007

TEL: 425.653.5690 FAX: 425.653.5694

WWW.SEGROUP.COM

TO:	White Pass MDP FEIS Project File
FROM:	Travis Spikes
CC:	SE GROUP Project Files
DATE:	November 11, 2004 [Updated January 17, 2007]
RE:	White Pass MDP FEIS Flow Model Technical Report

This memorandum addresses the stream flows of the Upper Tieton River and Upper Clear Fork Cowlitz watersheds within the White Pass MDP project area. This analysis was developed to identify the potential to changes in stream flow associated with vegetation clearing resulting from the construction of ski area facilities proposed under the alternatives evaluated in the FEIS.

1.0 AFFECTED ENVIRONMENT

1.1 FLOW REGIME

As described in Section 3.1 of the FEIS, average annual precipitation at White Pass is 79.6 inches. The average snowpack between January and March is 37.6 inches, measured as a snow water equivalent. The snowpack at White Pass typically forms in mid-October and persists until late June or early July. Average annual snowfall within the White Pass Study Area is 350 inches (GoSki 2004 [www.goski.com]). Average annual temperatures within the White Pass Study Area are 35.8 degrees Fahrenheit during the period of record from 1989 through 2003. Temperatures range from average highs of 51.2 degrees Fahrenheit in August to average lows of 24.2 degrees Fahrenheit in February.

There are no stream gauges present within the White Pass Study Area or in the immediate vicinity to provide general stream flow characteristics. The closest stream gauge to White Pass that is located on an unregulated river is Station 14226500 on the Cowlitz River near Packwood. This station is located approximately 17 River Miles (RM) downstream of White Pass. Due to the distance from White Pass and the influence of downstream sub-basins, the data can not be directly used to characterize flow conditions in the streams within the White Pass Study Area.

The alpine weather cycles and associated stream flow responses that are characteristic of the hydrologic processes at White Pass are described as follows. Stream discharge increases in perennial stream channels as autumn rains fill the storage capacity of the soil. However, the greatest stream flows and most rapid increases in discharge are not controlled by rain alone, but also by rates of snow accumulation and snowmelt (i.e., rain-on-snow events). This is most prevalent in late October to mid-December, when frontal storms deliver warm rain and winds after the snowpack begins to develop. During these rain-on-snow events, all of the snowpack can melt during one storm event and contribute directly to very large peak flow events. The variability in the amount of stream flow begins to stabilize in the winter due to colder temperatures. Low winter flows are sustained by melt generated by ground heat, and by alternating freezing and thawing at the snowpack surface. Large and sustained peak flows occur during the spring and early summer when warm air temperatures cause the melt-off of the winter snowpack. The ephemeral stream channels in the White Pass Study Area typically go dry shortly after the spring melt is completed (refer to Figure 3-14 of the FEIS). The intermittent stream channels in the White Pass Study Area typically go dry later in the year, as shallow groundwater storage decreases later on in the summer (refer to Figure 3-14 of the FEIS). The stream channels located in the lower elevation portions of the White Pass Study Area are generally perennial; with larger contributing areas to sustain base flows and significant groundwater discharge from slope wetlands (refer to Figure 3-14 of the FEIS).

1.2 WATER USE

The White Pass Company has diverted for domestic use and fire control a small portion of source waters of Millridge Creek. During the 1996-97 season (Dec. 20 to March 16), the average peak weekend and holiday water use was 9,195 gallons (5 percent of capacity) per day for 1,870 skier visits or an average 4.92 gallons per skier visit. The highest visitor day use on record (2,949 skier visitors), 12,561 gallons were used (4.26 gal/visitor day) (refer to Section 3.13 – Utilities and Infrastructure). The dominant non-consumptive water use of Millridge Creek in the White Pass Study Area and downstream is the maintenance of cold water biota. Additional uses are for irrigation and recreation. Fish beneficial uses are discussed in Section 3.4 of the FEIS.

1.3 FLOW MODEL

It is well documented that removal of forest cover and creation of new impervious surfaces in a watershed increases available surface and shallow subsurface water, and can alter the flow regime of a watershed (Dunne, T. and L. B. Leopold 1978; Naiman, R.J. and R. E. Bilby 1998). The dominant type of land cover change that affects surface runoff generation and stream flow conditions is large-scale timber harvest, which increases residual soil moisture due to the excess water that would normally be used by trees through evapo-transpiration. The increased soil moisture promotes quicker development of surface water during rainstorms and additional shallow subsurface flow to streams in the treated area, especially in riparian areas adjacent to streams (Keppeler 1998). Research indicates that timber harvest in small watersheds (60-300 acres) can increase annual water yield by as much as 26 to 43 percent in completely clear-cut watersheds and can increase annual water yield in partially cut watersheds by 3 to 15 percent (Harr et al. 1979; Harr et al. 1982; Keppeler 1998). The construction of impervious surfaces (e.g., roads and parking lots) can also significantly increase stream flow by preventing rainfall from percolating into the soil, creating stormwater runoff that can contribute surface flow directly to streams (Wright et al. 1990). According to research by Ziemer (1981), newly constructed roads occupying five percent of a watershed did not result in a detectable change in base flow or peak flow. However, a separate study conducted in the Alsea watershed concluded that new roads occupying 12 percent of a watershed resulted in increases in peak flow of roughly 19 percent (Harr et al. 1975).

Many of the publicly available stream flow models are not suited for estimating potential changes in stream flow due to land cover alterations because they do not have an adjustable and/or accurate land cover variable in their algorithms (e.g., USGS Regional Equations, Index Flood Method). The stream flow models that do allow accurate adjustment of land cover are designed for flood control, stormwater routing, and agricultural purposes (e.g., HEC-1, HEC-RAS, HEC-HMS, StormCAD, BASIN, AGNPS) and are either not designed to accurately predict stream flow in watersheds with significant snow accumulation and melt or do not predict changes in stream flow at specific flow events. Since the existing publicly available stream flow models do not provide accurate stream flow predictions for alpine environments, a custom stream flow model was created to estimate the potential changes in stream flow conditions as a result of land cover changes from the Proposed Action in the Upper Clear Fork Cowlitz River and Upper Tieton River watersheds.

The geographic scope of the analysis for this custom flow model is larger than the White Pass Study Area because accurate flow modeling requires inclusion of the entire contributing area to the streams analyzed. Therefore, the scope of this analysis includes the White Pass Study Area, as well as lands to the north and east of the White Pass Study Area extending outward to the nearest drainage divide for the streams analyzed (refer to Figure 3-12 of the FEIS). This geographic area would be hereafter referred to as the Flow Model Analysis Area. The Upper Clear Fork Cowlitz watershed portion of the White Pass Study Area is approximately 1,460 acres in size and the Upper Tieton watershed covers approximately 535 acres of land. The model measures changes in flows at the mouth of the model area, which is at the inlet to Leech Lake for the Upper Tieton River and at the mouth of an unnamed tributary to Millridge Creek above Knuppenberg Lake for the Upper Clear Fork Cowlitz River.

The custom flow model was developed by first performing a thorough review of published literature in order to establish relationships between the size and type of watershed treatments (e.g., clear-cutting, road construction) and the measured effects on various stream flow parameters. Out of the 17 studies reviewed, seven were selected to be included in this model because they were conducted locally in Washington and Oregon, and typically involved watersheds with similar characteristics to the two analysis watersheds for this FEIS. For the purposes of this analysis, the existing and proposed stream flow conditions were calculated and presented as average 7-day low flow (low flow) and the 2-year peak flow (peak flow). These specific flow conditions were selected for analysis because, according to published literature, these are the flow conditions most likely to be affected by land cover changes from the implementation of activities such as those in the Action Alternatives (Beschta et al. 2000; Burton 1997; Keppeler 1998; Hicks et al. 1991).

Once the two flow rates to be modeled were selected, the data contained in the seven selected studies was synthesized for each of the two flow rates for this analysis. The synthesized data was then plotted on a X, Y scatter plot and trend lines were fit to the data with the percentage of the watershed treated on the X axis, and the percent change in the specific flow rate on the Y axis (refer to Illustrations 1 and 2). The most representative study for each flow (e.g., low flow or peak flow) was chosen based on the characteristics of the watersheds in the study, the location of the trend line relative to the trend lines from other studies, and the fit of the trend line to the data in the study. Once a trend line was selected for each flow rate, an equation was developed to describe the line so that the percent change in flow rate (discharge) could be calculated under any treatment scenario.

Illustration 1:
Changes to 7-Day Low Flow Discharge Due to Watershed Treatments

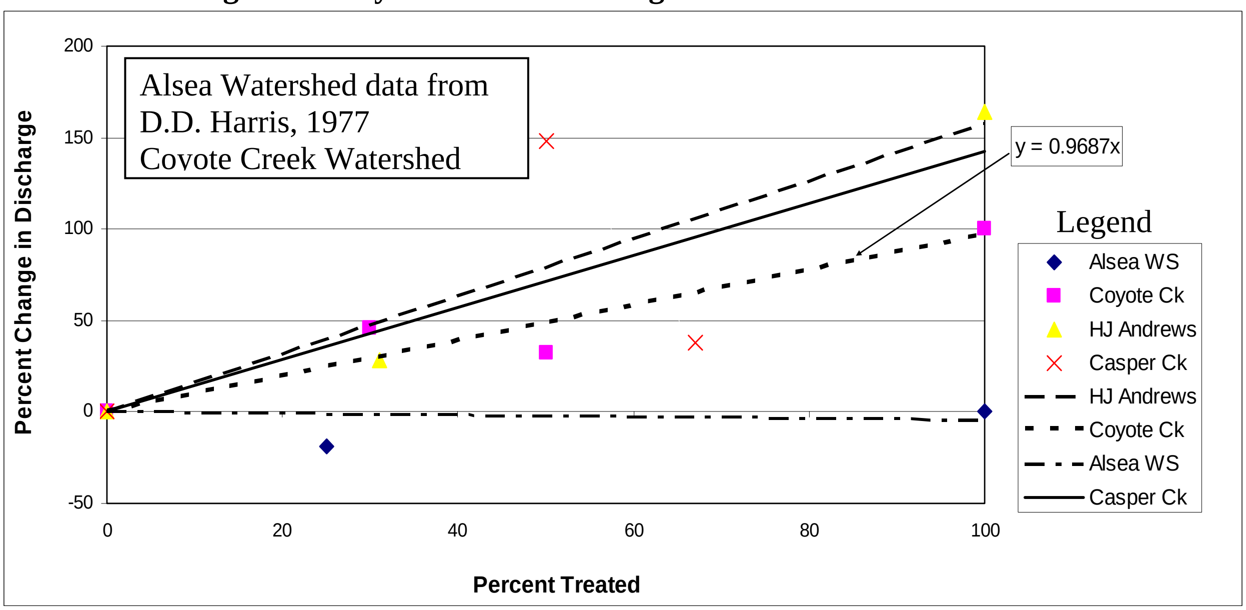
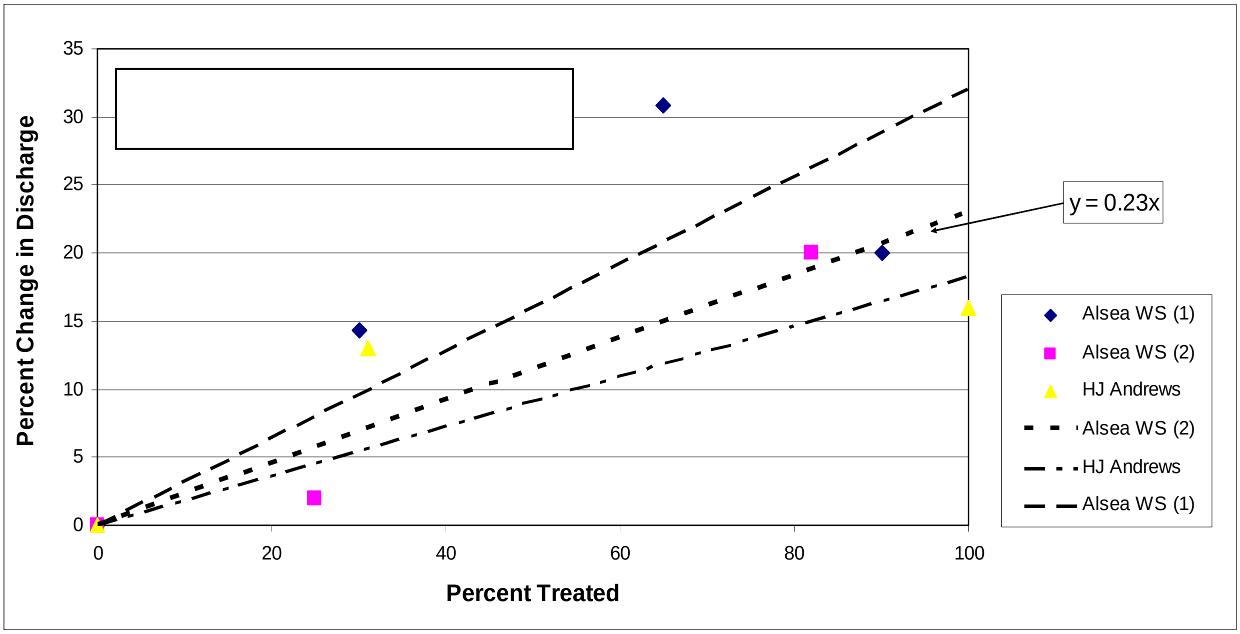


Illustration 2
Changes to 2-Year Peak Flow Discharge Due to Watershed Treatments



The estimated change in stream flow from existing conditions was calculated for each flow (low flow or peak flow) by determining the percentage of the watershed proposed for treatment and inserting the percentage into the appropriate equation. The treated area in each watershed for existing and proposed conditions was determined by calculating the total area of modified herbaceous and developed land cover in each watershed and dividing that value by the area of the watershed to be analyzed. Since there are no continuous stream gauges in the vicinity of the Flow Model Analysis Area, existing stream flow for the low flow and peak flow events was estimated using basin specific regression equations created by the U.S. Geological Survey (Sumioka et al. 1998). The regression equations are designed to provide stream flow estimates for various flow events (e.g., 2-year peak flow, 25-year peak flow, etc.) for ungauged streams by combining flow data from the nearest stream gauge with watershed specific data for the ungauged streams along with regression coefficients for the basin the streams are located in. The stream flow data from the Packwood station was used along with altitude corrected precipitation data from the Packwood weather station and analysis of watershed characteristics within the Flow Model Analysis Area to calculate low flow and 2-year peak flow estimates for the Upper Clear Fork Cowlitz River and the Upper Tieton River, at the downstream extent of the Flow Model Analysis Area. These calculations represent existing stream flow conditions for the Flow Model Analysis Area that are suitable for rough comparisons to the predicted increases in stream flow due to implementation of the Action Alternatives.

Using the stream flow prediction methods described above, in the existing conditions, the 7-day low flow for the Upper Clear Fork Cowlitz River is 3.12 cubic feet per second (cfs) at the mouth of the Flow Model Analysis Area (refer to Table 1). The estimated low flow for the Upper Tieton River is 1.23 cfs, which is less than the Upper Clear Fork Cowlitz due to the smaller watershed area (refer to Table 1). The estimated 2-year peak flows for the Upper Clear Fork Cowlitz and the Upper Tieton rivers are 130.7 cfs and 54.4 cfs respectively. The standard error for the flow calculation is 57 percent (Sumioka et al. 1998).

Table 1:
Estimated Stream Flows for the Two Mainstem Rivers in the Flow Model Analysis Area

Watershed Name	Drainage Area (acres)	7-Day Low Flow (cfs)	2-yr Peak Flow (cfs)
Upper Clear Fork Cowlitz River	1,460	3.12	130.7
Upper Tieton River	535	1.23	54.4

2.0 ENVIRONMENTAL CONSEQUENCES

2.1 ALTERNATIVE 1

Water Use

Under Alternative 1, the proposed White Pass Ski Area Expansion would not be implemented; therefore there would be no new impacts to the current water use at White Pass and conditions would remain as described in Section 3.3.2 of the FEIS.

Flow Regime

Under Alternative 1, the proposed White Pass Ski Area Expansion would not be implemented; therefore no impacts to the flow regimes of the Upper Clear Fork Cowlitz River and Upper Tieton River watersheds would occur as a result of tree removal or water withdrawals. The flow regimes of the streams within the White Pass Study Area would remain as described in Section 3.3.2 of the FEIS.

2.2 ALTERNATIVE 2

Water Use

Under Alternative 2, the source of domestic water for the White Pass Ski Area would continue to be from a surface water diversion on Millridge Creek located in the Upper Clear Fork Cowlitz River watershed. Due to the proposed increase in the CCC of White Pass under Alternative 2, the peak water demand during the ski season would increase from 12,561 gallons/day to 23,001 gallons/day (refer to Table Appendix E – FEIS1).

Table Appendix E-FEIS1:
White Pass Water Demand

	Alt. 1	Alt. 2	Modified Alt 4	Alt. 6	Alt. 9
CCC (skiers)	2,670	4,250	3,800	3,640	3,280
Peak Day (skiers)	2,949[a]	4,675	4,180	4,004	3,608
Gallons per skier[b]	4.92	4.92	4.92	4.92	4.92
Peak Demand (gal)	12,561[a]	23,001	20,566	19,700	17,751
Percent of Capacity[c]	24%	44%	40%	38%	34%

[a] Peak Day CCC and Peak Demand for Alternative 1 are measured values for a record skier visitation day.
[b] The measured peak is described under Existing Conditions in Section 3.3.2.5 – Flow Regime. Under the Action Alternatives, skiers are assumed to use 4.92 gallons per day (based on current peak usage).
[c] Storage capacity is 52,000 gallons.

This conservative estimate is based on assumed full utilization of the ski area capacity and facilities and an average water demand per guest of 4.92 gallons/day. The projected increase in water demand (based on measured peak demand values) would decrease the daily streamflow in Millridge Creek by approximately 0.016 cubic feet per second (cfs) during the ski season. The projected decrease of 0.016 cfs in Millridge Creek under Alternative 2 was not included in the flow model below because this amount would not be measurable with current monitoring technology and the flow model estimates stream flow impacts for the summer low flow period and the 2-year peak flow event when water withdrawals are unlikely by the ski area.

Flow Regime

Under Alternative 2, approximately 19.8 acres of forest clearing and construction of impervious surfaces would occur during the construction of the Hogback Express and Basin Chairlifts and associated trails. The proposed development would result in an estimated 1.4 percent (0.04 cfs) increase in 7-day low flow in the Upper Clear Fork Cowlitz River at the mouth of the Flow Model Analysis Area (refer to Table 2 and Figure 3-12 of the FEIS). Based on the relatively small projected increase in low flow and the typical amount of instrumentation error associated with measuring discharge rates, it is expected that the estimated increase in 2-year peak flow in the Upper Clear Fork Cowlitz River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology (refer to Figure 3-12 of the FEIS).

There would be no forest clearing or new impervious surfaces in the Upper Tieton River watershed under Alternative 2, therefore, there would be no changes to the 7-day low flow discharge of the Upper Tieton River from this project (refer to Table 2).

Table 2:
Changes to Flow in the Upper Clear Fork Cowlitz River and Upper Tieton River Watersheds due to Proposed Development in the Flow Model Analysis Area

Watershed	Alt. 1	Alt. 2		Modified Alt. 4		Alt. 6		Alt. 9	
	Existing Flow (cfs)	Increase in Flow	Increase in Flow (cfs)	Increase in Flow (%)	Increase in Flow (cfs)	Increase in Flow (%)	Increase in Flow (cfs)	Increase in Flow (%)	Increase in Flow (cfs)
7-Day Low Flow									
Upper Clear Fork Cowlitz	3.12	1.4 %	0.04	1.6 %	0.05	0.8 %	0.02	0.7 %	0.02
Upper Tieton	1.23	0.0 %	0.00	2.1 %	0.03	0.7 %	0.01	4.6 %	0.06
2-Year Peak Flow									
Upper Clear Fork Cowlitz	130.7	0.3 %	0.4	0.4 %	0.5	0.2 %	0.2	0.2 %	0.2
Upper Tieton	54.4	0.0 %	0.0	0.5 %	0.3	0.2 %	0.1	1.1 %	0.6
Note – Calculations of the Existing flows have a standard error of 57 percent according to the model. The percent increase in flows has approximately a 49 percent standard of error.									

The flow model results estimate that the 2-year peak flow discharge rate would increase by approximately 0.3 percent (0.4 cfs) over existing conditions in the Upper Clear Fork Cowlitz River as a result of the 19.8 acres of forest clearing and new impervious surfaces proposed in Alternative 2 (refer to Table 2). The relatively small projected increase in 2-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates suggests that the estimated increase in 2-year peak flow in the Upper Clear Fork Cowlitz River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology. It is anticipated that measurable changes to bank full discharge would not occur because bankfull flows in mountainous terrain have 11 to 100-year return intervals (Nolan et al. 1987), and regional studies used in this model indicate that the effects of watershed treatments do not significantly affect large peak flows (i.e., recurrence interval of 25 to 100 years) (Beschta et al. 2000; Harr et al. 1975). Since the majority of sediment transport and changes in channel morphology occur during large peak flow events, the relatively small changes in low flow and 2-year peak flow conditions estimated in this model indicate that implementation of Alternative 2 would not measurably affect sediment transport or channel morphology in the Upper Clear Fork Cowlitz River (Dunne and Leopold 1978; Beschta et al. 2000).

There would be no forest clearing or new impervious surfaces in the Upper Tieton River watershed under Alternative 2, therefore, there would be no changes to the 2-year peak flow discharge of the Upper Tieton River from this project (refer to Table 2).

Due to the small size of the Flow Model Analysis Area within each watershed, when compared to the 5th field watershed area (approximately 96 times as large as the respective portions in the model) the overall increase in flows would not be measurable and are therefore not included in the analysis.

Indirect impacts to the flow regimes of the Upper Clear Fork Cowlitz River and Upper Tieton River watersheds could occur from changes in the snow accumulation and the snow melt cycle from timber harvest and snow grooming. Timber harvest associated with construction of the proposed Hogback Express and Basin chairlifts would create new patch cuts within the Flow Model Analysis Area. Research shows that large clear-cuts increase snow accumulation and snow melt rates within the cleared areas and result in increases in flows to adjacent stream systems. However, data regarding patch and strip forest harvesting, which is typically used in ski trail construction, are more variable with mixed effects to stream flow. The variability in the results of these studies is likely due to the unpredictable changes in wind scour patterns between forested areas and patch openings due to changes in the snow accumulation and deposition rates within the opening. Research by Rixen and Stockli (2000) and Rixen et al. (2001) indicates that snow melt is typically delayed by one to two weeks on ski trails as compared to natural, ungroomed snow patches, due to the snow compaction from skiing and grooming operations. Therefore, no foreseeable indirect impacts to flow regimes in Upper Clear Fork Cowlitz River and Upper Tieton River watersheds are expected from timber harvest and ski trail grooming associated with the proposed project.

2.3 MODIFIED ALTERNATIVE 4

Water Use

Under Modified Alternative 4, the source of domestic water for the White Pass Ski Area would continue to be from a surface water diversion on Millridge Creek located in the Upper Clear Fork Cowlitz River watershed.

Due to the proposed increase in the CCC of the White Pass Ski Area under Modified Alternative 4, the peak water demand during the ski season would increase from approximately 12,561 gallons/day to 20,566 gallons/day, including approximately 225 gallons per day conveyed to the mid-mountain lodge through a pipe (refer to Section 3.13 – Utilities and Infrastructure). This conservative estimate is based on assumed full utilization of the ski area capacity and facilities and an average water demand per guest of 4.92 gallons/day. The projected increase in water demand (based on measured peak demand values) would decrease the daily streamflow in Millridge Creek by approximately 0.013 cfs during the ski season. The projected decrease of 0.013 cfs in Millridge Creek under Modified Alternative 4 was not included in the flow model because this amount would not be measurable with current monitoring technology and the flow model estimates stream flow impacts for the summer low flow period and the 2-year peak flow event when water withdrawals by the ski area are unlikely.

Under Modified Alternative 4, if the utility trenching for the waterline to the mid-mountain lodge was determined to be too impactful to streams and wetlands, a shallow groundwater well would be constructed in the vicinity of the proposed mid-mountain lodge to provide domestic water instead. If the well was to be built, the overall projected water demand for Modified Alternative 4 would be the same as under the trenched waterline, but the domestic water demand for the mid-mountain lodge would come from the groundwater well. The groundwater withdrawn would be approximately 225 gallons/day for potable use by the guests of the mid-mountain lodge. The localized soil moisture and flow regime impacts from the proposed groundwater withdrawn are not expected to be measurable due to the low volume of the withdrawn and surface disposal of grey water through a septic drainfield.

Flow Regime

Under Modified Alternative 4, impacts to the flow regime in the Upper Clear Fork Cowlitz River and Upper Tieton River watersheds would be similar to, but more than the impacts described under Alternative 2. Under Modified Alternative 4, additional clearing and grading would be required for construction of Trail 4-16. However, low flow in the Upper Clear Fork Cowlitz River would increase by approximately 1.6 percent over existing conditions, which is slightly more than under Alternative 2 and more than any other Action Alternative. This projected increase in low flow under Modified Alternative 4 would result in an estimated increase in discharge of approximately 0.05 cfs over the calculated existing discharge of 3.12 cfs (refer to Table 2). Similarly, the 2-year peak flow in the Upper Clear Fork Cowlitz would increase by approximately 0.4 percent under Modified Alternative 4, which is also the largest estimated increase as compared to the other Action Alternatives. Relating the estimated increase in 2-year peak flow under Modified Alternative 4 to calculated discharge rates would result in an increase from 130.7 cfs under existing conditions to 131.2 cfs under proposed conditions (refer to Table 2). The relatively small projected increase in low flow and 2-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Clear Fork Cowlitz River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology. Similar to Alternative 2, Modified Alternative 4 would not measurably affect sediment transport or channel morphology in the Upper Clear Fork Cowlitz River because large peak flow events would not be affected by the proposal.

Implementation of Modified Alternative 4 would result in an increase in low flow in the Upper Tieton River by approximately 2.1 percent over existing conditions due to proposed forest clearing and construction of new impervious surfaces. This projected increase in low flow would result in an estimated increase of approximately 0.03 cfs during a low flow event. Likewise, the estimated 2-year peak flows in the Upper Tieton River would increase by approximately 0.5 percent over existing conditions under Modified Alternative 4 resulting in an increase of approximately 0.3 cfs in discharge. The relatively small projected increase in low flow and 2-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the

Upper Tieton River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology. Similar to Alternative 2, Modified Alternative 4 would not measurably affect sediment transport or channel morphology in the Upper Tieton River because large peak flow events would not be affected by the proposal.

2.4 ALTERNATIVE 6

Water Use

Under Alternative 6, the source of domestic water for the White Pass Ski Area would continue to be from a surface water diversion on Millridge Creek located in the Upper Clear Fork Cowlitz River watershed. Due to the proposed increase in the CCC of White Pass under Alternative 6, the peak water demand during the ski season would increase from 12,561 gallons/day to 19,700 gallons/day. This conservative estimate is based on assumed full utilization of the ski area capacity and facilities and an average water demand per guest of 4.92 gallons/day. The projected increase in water demand (based on measured peak demand values) would decrease the daily streamflow in Millridge Creek by approximately 0.011 cfs during the ski season. The projected decrease of 0.011 cfs in Millridge Creek under Alternative 6 was not included in the flow model because this amount would not be measurable with current monitoring technology and the flow model estimates stream flow impacts for the summer low flow period and the 2-year peak flow event when water withdrawals by the ski area are unlikely.

Flow Regime

Impacts to low flow in the Upper Clear Fork Cowlitz River under Alternative 6 would be less than under Alternative 2 and Modified Alternative 4, with an increase of only 0.8 percent due to the elimination of the Hogback Express chair and trails from the proposal. The projected increase in low flow under Alternative 6 would result in an estimated increase in discharge of approximately 0.02 cfs over the calculated existing discharge of 3.12 cfs (refer to Table 2). Similarly, the 2-year peak flow in the Upper Clear Fork Cowlitz would increase by approximately 0.2 percent under Alternative 6, which is lower than Alternative 2 and Modified Alternative 4. The proposed forest clearing and construction of new impervious surfaces would increase peak flow discharge by approximately 0.2 cfs (refer to Table 2). The relatively small projected increase in low flow and 2-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increases in stream flow in the Upper Clear Fork Cowlitz River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology. Similar to Alternative 2, Alternative 6 would not measurably affect sediment transport or channel morphology in the Upper Clear Fork Cowlitz River because large peak flow events would not be affected by the proposal.

Implementation of Alternative 6 would result in an increase in low flow in the Upper Tieton River by approximately 0.7 percent over existing conditions due to proposed forest clearing and construction of new impervious surfaces. This projected increase in low flow would result in an estimated increase of approximately 0.01 cfs during a low flow event. Likewise, the estimated 2-year peak flows in the Upper Tieton River would increase by approximately 0.2 percent over existing conditions under Modified Alternative 4 resulting in an increase of approximately 0.1 cfs in discharge. The relatively small projected increase in low flow and 2-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Tieton River would not be measurable at the mouth of the Analysis Area with current monitoring technology.

2.5 ALTERNATIVE 9

Water Use

Under Alternative 9, the source of domestic water for the White Pass Ski Area would continue to be from a surface water diversion on Millridge Creek located in the Upper Clear Fork Cowlitz River watershed. Due to the proposed increase in the CCC of the White Pass Ski Area under Alternative 9, the peak water demand during the ski season would increase from 12,561 gallons/day to 17,751 gallons/day. This conservative estimate is based on assumed full utilization of the ski area capacity and facilities and an average water demand per guest of 4.92 gallons/day. The projected increase in water demand (based on measured peak demand values) would decrease the daily streamflow in Millridge Creek by approximately 0.008 cfs during the ski season. The projected decrease of 0.008 cfs in Millridge Creek under Alternative 9 was not included in the flow model because this amount would not be measurable with current monitoring technology and the flow model estimates stream flow impacts for the summer low flow period and the 2-year peak flow event when water withdrawals by the ski area are unlikely.

Flow Regime

Implementation of Alternative 9 would result in projected increases in low flow in the Upper Clear Fork Cowlitz River that would be very similar to those projected under Alternative 6 even though the distribution of the proposed impacts would be very different. According to the results of the model, Alternative 9 would result in an increase in low flow of approximately 0.7 percent (0.02 cfs) over existing conditions in the Upper Clear Fork Cowlitz River, which is less than any other Action Alternative (Refer to Table 2). Similarly, the 2-year peak flow in the Upper Clear Fork Cowlitz would increase by approximately 0.2 percent under Alternative 9, which is less than Alternative 2 and Modified Alternative 4, and equal to Alternative 6. The relatively small projected increase in low flow and 2-year peak flow, combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Clear Fork Cowlitz River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology. Similar to Alternative 6, Alternative 9 would not measurably affect sediment transport or channel morphology in the Upper Clear Fork Cowlitz River because large peak flow events would not be affected by the proposal.

The activities under Alternative 9 would result in the largest increases in low flow and peak flow in the Upper Tieton River as compared to the other Action Alternative due to the relatively extensive forest clearing proposed for the Chair 5 chairlift and associated trails. Under Alternative 9, approximately 38.9 acres of forest clearing and construction of new impervious surfaces would occur in the Upper Tieton River watershed, resulting in an approximately 4.6 percent (0.06 cfs) increase in low flow (refer to Table 2). Similarly, 2-year peak flows in the Upper Tieton River would increase by approximately 1.1 percent over existing conditions under Alternative 9 resulting in an increase of approximately 0.6 cfs in discharge (refer to Table 2). Even though these projected stream flow increases are the largest out of all of the Action Alternatives, these estimated discharge values are still within the typical amount of instrumentation error associated with measuring discharge rates, and therefore, these estimated increases in stream flow in the Upper Tieton River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology. Furthermore, the flow effects under Alternative 9 would not measurably affect sediment transport or channel morphology in the Upper Tieton River because large peak flow events would not be affected by the proposal.

SE GROUP

TECHNICAL MEMORANDUM

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TO:	White Pass MDP FEIS Project File
FROM:	Alex White
CC:	SE GROUP Project Files
DATE:	November 11, 2004
RE:	White Pass MDP FEIS Lakes and Ponds

This memorandum addresses the lakes and ponds within the White Pass MDP project area and impacts associated with the implementation of the alternatives evaluated in the White Pass MDP FEIS. These water bodies have not been identified as a significant issue for tracking in the FEIS, nor did they drive the development of any alternative. This analysis was developed to identify the potential to impacts to lakes and ponds with the construction of ski area facilities under the alternatives evaluated in the FEIS.

1.0 AFFECTED ENVIRONMENT

Two relatively large lakes whose water quality has been designated as Class AA by the State of Washington Department of Ecology are located within and adjacent to the White Pass Study Area. These include the shallow (mostly less than ten feet deep) Leech Lake on the north side of US 12 and Knuppenburg Lake. Both lakes are fed from springs and seeps that convey water to the lakes through streams from the White Pass Study Area.

Leech Lake is located immediately off US 12 and has picnic and camping areas on the north and east sides of the lake, as well as an undeveloped boat launch. These areas contain largely defoliated, compacted and eroding banks. In the same complex lie three trailheads (White Pass North, White Pass South, and White Pass Horse Camp) that provide access to the Pacific Crest Trail. At the White Pass South Trailhead, the Leech Lake outlet stream flows through a culvert under the Pacific Crest Trail.

Knuppenburg Lake covers about 4.5 acres and lies west of the White Pass Ski Area and south of US 12. The water quality, although it is not measured, appears exceptional (Class AA) during most periods of the year; however, it is suspected that significant sediment moves into the lake from the direct deposition of road sand and gravel through maintenance during snow melt periods. Observations of Knuppenberg Lake indicated that it is filling in due to the sediment loading from US 12 (Shepard. Pers. Comm.). During the summer months the lake is used for fishing because it is adjacent to US 12.

There are 12 small seasonal and perennial ponds scattered across the upper portion of the existing ski area above the large cliff bank in Landtype A (refer to Section 3.2 of the FEIS). These ponds serve as the headwaters to most of the intermittent streams that are tributaries to the Upper Tieton River within the White Pass Study Area. The distribution of these small ponds is displayed in Figure 3-14 of the FEIS.

2.0 ENVIRONMENTAL CONSEQUENCES

2.1 ALTERNATIVE 1

Under Alternative 1, the proposed expansion of White Pass Ski Area would not occur, and no direct or indirect impacts to lakes and ponds would occur from construction activities. Impacts to lakes and ponds from the ongoing operation and maintenance of White Pass Ski Area would continue to occur under Alternative 1. Therefore, the condition of the lakes and ponds within the White Pass Study Area would remain as described above in the Affected Environment section.

2.2 ALTERNATIVES 2, 6, 9, AND MODIFIED ALTERNATIVE 4

Under all Action Alternatives, there would be slight, but immeasurable impacts to lakes and ponds from construction activities taking place at White Pass Ski Area, therefore it is assumed that lakes and ponds would remain close to their existing conditions described above in the Affected Environment section. Impacts to lakes and ponds from the ongoing and increased operation and maintenance of White Pass Ski Area would continue to occur under all Action Alternatives.

Appendix F

Geology and Soils

SE GROUP
TECHNICAL MEMORANDUM
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TO:	White Pass MDP FEIS Project File
FROM:	Alex White
CC:	SE GROUP Project Files
DATE:	November 12, 2004
RE:	White Pass MDP FEIS Geology and Mass Wasting

This memorandum addresses the geology of the White Pass MDP project area and mass wasting associated with the implementation of the alternatives evaluated in the White Pass MDP FEIS.[1] Mass wasting was not identified as a significant issue for tracking in the FEIS, nor did mass wasting drive the development of any alternative. This analysis was developed to identify the potential to accelerate mass wasting with the construction of ski area facilities under the alternatives evaluated in the FEIS.

1.0 AFFECTED ENVIRONMENT

The geology of the White Pass Study Area consists of an uplifted block of the sedimentary Russell Ranch Formation that was formed during the Jurassic-Cretaceous period. The Russell Ranch Formation is highly faulted and sheared, low-grade metamorphic, graywacke and argillite with minor interbeds of conglomerate and carbonaceous siltstone (Clayton 1983). The Russell Ranch Formation has been interpreted to be part of a dismembered sea floor assemblage (Swanson 1978). The Russell Ranch Formation is dominantly overlain by various Pleistocene volcanics. The Pleistocene volcanics, mostly lava flows, erupted from several small vents and are variable in composition, ranging from dacite and andesite to basalt (Clayton 1983). Volcanic vents within the White Pass Study Area are at Hogback Mountain and Deer Lake Mountain. Other nearby volcanoes include Round Mountain, Spiral Butte, and Tumac Mountain.

[1] By definition, geology is the science and study of the solid matter of the earth, its composition, structure, physical properties, history and the processes that shape it. The term "geology" is used in this FEIS to describe the rock types occurring in the White Pass Study Area.
Mass wasting, also known as mass movement or slope movement, is the geomorphic process by which soil, regolith, and rock move downslope under the force of gravity. Types of mass wasting include creep, slides, flows, topples, and falls, each with their own characteristic features, and take place over timescales from seconds to years. When the gravitational force acting on a slope exceeds its resisting force, slope failure (mass wasting) occurs.

Three distinct geomorphic land types have been created to describe underlying geologic materials, mass wasting potential, and terrain analysis based on methods from Brazil and Wooten (1985). Mass Wasting is a relatively rapid down slope movement of rock and soil, including slumps, slides, rock falls, avalanches, and debris flows. These are natural disturbance mechanisms, which can frequently occur in steep, mountainous landscapes. These geomorphic land types and their features as related to slope stability and groundwater are discussed below and their locations shown in Figure 3-2 of the FEIS.

Landtype A is characterized by gentle plateau-like northeast to northwest facing slopes between Hogback Ridge and the Ginnette lakes to the northeast. Elevations range from 6,789 feet at Hogback Mountain to 5,420 feet at the northern limit of the unit. Underlain by relatively young resistant basalt, the soil in the area is generally poorly drained, with many ephemeral streams but few well-defined drainage networks. Areas of internally drained topography combined with shallow soil result in numerous small wetlands and there are also several small ponds within Landtype A. Most of Pigtail and Hogback Basins are in Landtype A and are not very susceptible to mass wasting.

Landtype B is characterized by moderate to steep slopes that either surround or are on the edges of the plateau-like slopes of Landtype A. Similar to Landtype A in that it is underlain by basalt, Landtype B is also frequently associated with Talus and Landslide Landtypes within the White Pass Study Area. Mass wasting events occur frequently in this unit on north to west-facing slopes because of the steep slopes associated with this Landtype. Rock fall and rock slides are the most common mass wasting types occurring in this Landtype. Slopes most susceptible to mass wasting in the area are steep slopes greater than 60 percent slope in Landtype B and/or areas with concentrated surface runoff or springs.

Landtype C consists mainly of colluvial and residual soil from highly fractured, deeply-weathered sandstone, siltstone and greywacke. Landtype C is found on gentle to moderate slopes in the northernmost part of the White Pass Study Area below 4,800 feet. Mass wasting is also common in the upper elevations of this Landtype. Ground water seeps and springs are most common in north-facing slopes in Landtype C at the contact of Landtypes B and C. Permeable north-dipping, scoriaceous or breccia zones between basalt layers in Landtype B transmit groundwater in a northerly direction. In Landtype C, drainages are more developed and incised because of less resistant rock.

Areas of large, recent mass wasting events were also mapped within and adjacent to the White Pass Study Area and termed the Landslide Landtype (refer to Figure 3-2 of the FEIS). The Landslide Landtype occurs primarily on steep slopes within Landtypes B and C in the western portions of the White Pass Study Area.

The Talus Landtype is the least abundant Landtype within the White Pass Study Area. Talus is characterized by rock and boulder fields on steep slopes that are frequently associated with cliffs and rock fall. Seeps and groundwater-fed wetlands can be found at the base of some talus fields within the White Pass Study Area (refer to Figure 3-2 of the FEIS).

2.0 ENVIRONMENTAL CONSEQUENCES

2.1 ALTERNATIVE 1

Under the No Action Alternative, there are no proposed activities in the White Pass Study Area, and therefore, the mass wasting potential would remain unchanged from existing conditions, as described in the Affected Environment section.

2.2 ALTERNATIVE 2

The proposed activities under Alternative 2 would have no effects on the existing geology within the White Pass Study Area since no mining for building materials or significant blasting is proposed. Proposed clearing and grading activities on certain Landtypes may however, have an effect on the mass wasting potential within the White Pass Study Area.

Processes that increase the probability of mass wasting would include reduction in soil stabilizing features (such as overlying vegetation), increased slope, increased surface or subsurface water flow, and exposure to avalanche paths. Although it is impossible to predict exactly where and when this type of process would occur, mass wasting would not likely be triggered by alterations in drainage or soil stabilizing features associated with implementation of Alternative 2.

Under Alternative 2, no clearing or grading would occur in landtypes B or C or in mapped Talus or Landslide Landtypes. In addition, surface and subsurface drainage patterns would not be affected by road building, culvert installation, or significant cut and fill grading, and therefore, the existing drainage network would largely remain intact. Areas within the White Pass Study Area that would be impacted through proposed clearing and grading activities would also be stabilized through Mitigation Measures (such as revegetation) to reduce mass wasting potential. Trail layout would be designed to minimize impacts to areas susceptible to mass wasting, and construction techniques (outlined in the Construction Plan) would follow recommendations of the geotechnical assessment for the project (refer to Mitigation Measure MM11 in Table 2.4-2 of the FEIS, Management Requirement MR4 in Table 2.4-3 of the FEIS, and Other Management Provisions OMP1, OMP2 and OMP4 in Table 2.4-4 of the FEIS). Therefore, human caused increases in mass wasting potential would be minimal as a result of the proposed activities under Alternative 2.

2.3 MODIFIED ALTERNATIVE 4

Similar to Alternative 2, the proposed activities under Modified Alternative 4 would have no effects on the existing geology within the White Pass Study Area since no mining for building materials or significant blasting is proposed.

Processes that increase the probability of mass wasting are as described under Alternative 2.

Under Modified Alternative 4, no clearing or grading would occur in mapped Landslide Landtypes. However, clearing and grading would occur approximately 50 feet upslope from a large Landslide area and within steep (greater than 60 percent) portions of Landtype B for the construction of trail 4-16 from the bottom of the proposed Hogback Express to the base of the Paradise Chair. The construction of trail 4-17 would occur in Landtype A and a small portion of Landtype B. Additionally, the grading for trail 4-18 would occur in steep (greater than 60 percent) portions of Landtype C and in a mapped Talus area. The construction of these trails could increase mass wasting potential if surface and shallow subsurface groundwater is not managed properly or if the cut and fill excavation is not engineered properly. As detailed in Management Requirement MR5 (Table 2.4-3), projects proposed in Landslide and Talus landtypes and on slopes steeper than 60 percent within landtypes B and C, a qualified engineer or geologist would assist in the final design of ski area facilities to minimize the effects of unstable slopes. MR5 would be implemented to minimize potential increases in mass wasting potential and limit the risk to infrastructure and guests (refer to Management Requirement MR5 in Table 2.4-3). Potential increases in mass wasting potential from this project would be further reduced through revegetation of exposed soils, and stopping work during large storm events. Trails would be designed to minimize impacts to areas susceptible to mass wasting (refer to Mitigation Measure MM11 in Table 2.4-2 of the FEIS, Management Requirement MR4 in Table 2.4-3 of the FEIS, and Other Management Provisions OMP1, OMP2 and OMP4 in Table 2.4-4 of the FEIS). Construction of a 7.0-acre parking lot in Landtype C would also occur under Modified Alternative 4. This proposed grading would be located in a low gradient (less than 15 percent) portion of Landtype C, therefore, increases in mass wasting potential are not expected.

2.4 ALTERNATIVE 6

Similar to Alternative 2, the proposed activities under Alternative 6 would have no effects on the existing geology within the White Pass Study Area since no mining for building materials or significant blasting is proposed.

Processes that increase the probability of mass wasting are as described under Alternative 2.

Under Alternative 6, no clearing or grading would occur in Landtype B or in mapped Talus or Landslide Landtypes. Approximately 2.5 acres of grading would occur in Landtype C for the proposed parking lot, however, the slope gradient in this area is less than 15 percent so increases in mass wasting potential are not likely. A permanent road is also proposed in Landtype A under Alternative 6 to access the bottom terminal of the proposed Basin Express from the existing ski area. The construction of the proposed road would require installation of four new culverts, two of which would be in perennial streams. Even though the proposed road and culverts would be located in Landtype A, site-specific engineering would be required to ensure that mass wasting potential would not be increased by changes in peak flow timing and magnitude and elevated debris torrent potential from improperly sized culverts (refer to Management Requirement MR5 in Table 2.4-3). Potential increases in mass wasting potential from implementation of Alternative 6 would be further reduced through revegetation of exposed soils, stopping work during large storm events, and trail layout would be designed to minimize impacts to areas susceptible to mass wasting (refer to Mitigation Measure MM11 in Table 2.4-2 of the FEIS, Management Requirement MR4 in Table 2.4-3 of the FEIS, and Other Management Provisions OMP1, OMP2 and OMP4 in Table 2.4-4 of the FEIS).

2.5 ALTERNATIVE 9

Similar to Alternative 2, the proposed activities under Alternative 9 would have no effects on the existing geology within the White Pass Study Area since no mining for building materials or significant blasting is proposed.

Processes that increase the probability of mass wasting are as described under Alternative 2.

Most of the 38.9 acres of clearing and grading proposed under Alternative 9 would occur on landtypes B and C. However, most of the proposed construction would take place on slopes between 15 and 30 percent, so increases in the mass wasting potential would be unlikely. Implementation of Mitigation Measures MM1, MM2, MM4, MM5, and MM6 would further reduce the potential for mass wasting in these areas. Construction of the proposed alternate egress route from the bottom terminal of the Paradise Chair to the base area would require cut and fill excavation on steep slopes (greater than 60 percent) in Landtype C. The construction of this trail could increase mass wasting potential if surface and shallow subsurface groundwater is not managed properly or if the cut and fill excavation is not engineered properly. A site-specific geotechnical analysis would be performed and incorporated into the construction plans for this trail in order to minimize potential increases in mass wasting potential and to limit the risk to infrastructure and guests (refer to Management Requirement MR5 in Table 2.4-3). Some of the proposed clearing and grading for the ski trails in the Paradise pod and the new Chair 5 pod in the eastern portion of the White Pass Study Area would occur on slopes from 30 to 60 percent. Geotechnical analysis would be required in these areas if slopes steeper than 60 percent are identified during final project design. Potential increases in mass wasting potential from these projects would be further reduced through revegetation of exposed soils, stopping work during large storm events, and trail layout would be designed to minimize impacts to areas susceptible to mass wasting (refer to Mitigation Measure MM11 in

Table 2.4-2 of the FEIS, Management Requirement MR4 in Table 2.4-3 of the FEIS, and Other Management Provisions OMP1, OMP2 and OMP4 in Table 2.4-4 of the FEIS). Specification would be provided in the Construction Plan.

SE GROUP
TECHNICAL MEMORANDUM

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TO:	White Pass MDP FEIS Project File
FROM:	Alex White
CC:	SE GROUP Project Files
DATE:	November 9, 2004
RE:	White Pass MDP FEIS Soil Compaction from Equipment Operation

This memorandum has been prepared to assess the potential for compaction of soils due to the operation of construction equipment associated with the implementation of the White Pass MDP, which includes the construction of chairlifts, ski trails, a lodge, and utilities in the currently undisturbed Hogback Basin area. Specifically, this memo addresses management practices that could be implemented to prevent compaction of soils, and/or the creation of a *de facto* road where no actual road is proposed.

1.0 SOIL COMPACTION RESEARCH

The operation of construction equipment, such as trackhoes and bulldozers, has the potential to compact native soils along the travel corridor. For the proposed White Pass Ski Area Expansion, equipment would be required for the construction of chairlifts, the lodge, and the installation of utilities. This equipment would operate in proposed ski trails or the proposed chairlift line over snow or native ground during construction.

Froehlich et al. (1985) evaluated soil compaction due to logging in Idaho. Rates of recovery were studied on compacted skid trails on granitic soils and volcanic soils in mixed-conifer sites of west-central Idaho. Soil bulk densities were measured at 5.1-, 15.2-, and 30.5-cm depths and compared with adjacent undisturbed soil. Volcanic soils showed greater initial compaction than granitic soils. Recovery rates for the two soil types were not significantly different, however. After 23 years, only the surface 5.1 cm of granitic soil had returned to bulk density values equivalent to undisturbed values.

Research shows that soil densities approached their maximum after four to six machine passes and changed little with a greater number of passes (Zaborske 1989). These studies also found that there was a significant increase in soil density between 1-4 and 5-8 skidder passes and between 5-8 and 50+ passes (Zaborske 1989).

The type of equipment used would also influence the level of soil compaction. The ground pressure on soils from equipment tires can be decreased in three ways; increasing the tire diameter and width, increasing the number of wheels that a piece of equipment has, and by using smaller and lighter equipment. One way of protecting soils from compaction is to reduce the pressure on the soil from equipment tires through increasing flotation, which is done by increasing the size of tires or tracks to spread the machine weight over more surface area. Ground pressures of less than 5 or 6 pounds per square inch (psi) are often considered high flotation. The use of low pressure tires has been found to produce less compaction than conventional tires; however, even though the use of low pressure tires minimizes soil compaction, some compaction is still likely to occur (Blinn and Smidt World Wide Web 10/04).

Soil compaction along the root zone of undisturbed trees has the potential to reduce the viability of trees. The greatest impacts to remaining trees that closely border the designated travel route would be those trees that would have traffic on two or more sides of the tree trunk (Meeks World Wide Web 10/04). Compaction of soils in the root zone has been shown to inhibit root growth, and possibly tree mortality (Meeks World Wide Web 10/04).

2.0 MANAGEMENT PRACTICES TO REDUCE SOIL COMPACTION

To reduce soil compaction that would occur during construction activities, a Travel Route Plan (TRP) would be created to reduce the amount of soil compaction that would occur in activity areas during the construction of the *Basin Chair* and the *Hogback Express* and their associated trails and infrastructure. Soil compaction would be minimized by designating the use of specific travel corridors along constructed ski trails and lift corridors. Under the TRP, the layout of the trail network would be considered so that equipment would compact as little ground as possible with minimal maneuvering, and these trail areas would be clearly marked before any construction activities began.

The TRP, which would be incorporated into the Stormwater Pollution Prevention Plan (SWPPP) would designate flagging of the boundaries of the designated travel routes. Equipment would not be allowed to go over the same tracks more than three times, unless over snow. The designated travel corridor in a ski trail, lift line, or utility corridor, would be moved out of the previous travel corridor after three passes when no snowpack is present. In addition, under the TRP, no equipment (i.e., trackhoe, bulldozer, spider) would be allowed to travel within the drip lines of remaining trees, so that tree roots remain viable and productive.

Soil duff layers (twigs, needles, and other organic debris on the soil surface) can act as a cushion against the forces of heavy machinery. However, downed logs and trimmed tree limbs are more effective than duff or leaf litter in reducing compaction when laid in front of machines to serve as a cushioning mat, and more passes over slash would be required to cause the same changes in density than over bare soil, litter and duff layers (Zaborske 1989). Where possible, other measures that would be taken to reduce soil compaction include operation of the equipment over slash, downed logs, and tree limbs; driving vehicular equipment over frozen soils or soils covered with snow; and not operating the equipment over any part of the project area during wet weather conditions. These conditions would also be specified in the TRP and SWPPP. The TRP would permit equipment to be transported to the activity areas over snow covered ground in order to reduce the amount of soil compaction.

Travel Route soil compaction reduction plan would specify that:

- Travel corridors would be marked/flagged in field to limit the area in which equipment can travel during any period. After a maximum of three passes over any travel corridor that is not covered with snow, a new travel corridor would be established within ski trails or lift lines.
- When no snow is present, machinery would not operate within the drip lines of the trees on the immediate trail/liftline boundaries, or any trees to remain as tree islands.
- Low pressure tires/tracked equipment would be used throughout the construction areas to minimize soil compaction.
- If possible, equipment would operate over snow to the greatest extent possible.
- No machinery would travel over the project area during wet weather.

Mitigation Measures/Management Requirements to be added to FEIS include:

- A Travel Route Plan would be created for the SWPPP to limit equipment to designated portions travel ways.
- No vehicular equipment would be allowed over project area during wet conditions as specified in the SWPPP.
- Where possible, equipment would drive over slash, downed logs, or tree limbs to reduce soil compaction.
- Low pressure tires/tracks would be used by all equipment to reduce soil compaction.

3.0 LITERATURE CITED

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TO:	White Pass MDP FEIS Project File
FROM:	Alex White
CC:	SE GROUP Project Files
DATE:	November 12, 2004
RE:	White Pass MDP FEIS White Pass Soil Groups

Figure 3-6 of the FEIS illustrates the spatial variability of the major soil units within the White Pass Study Area. The soil groups utilized in this analysis are derived from the Gifford Pinchot National Forest's Soil Resource Inventory (USDA Forest Service 1977; 1992) and the Naches Area Soil Survey (USDA, USFS, 1996). A common soil group designation was chosen for the corresponding soil mapping units in situations where the same soil class was mapped and numbered differently on each Forest. The group number and geographic area of the soil group is displayed in Table 1.

Soil Group 1 consists of deep, well drained soils formed in volcanic ash mixed with colluvium from andesite (ashy, Typic Vitricryands), with local inclusions of deep soils derived from glacial deposits. Soil Group 1 covers approximately 191.6 acres and is usually found within valley bottoms and the toeslopes/footslopes of mountains (refer to Table 1). These soils are typically well drained sandy loams that range from shallow depths to greater than 40 inches deep. Locations where this soil group is found is on gentle slopes with high moisture content that have potential for surface erosion and moderate mass movement. Most of the existing base area support facilities and resort complex as well as the lower portions of the existing SUP area along Hwy. 12 have been developed on this soil group. While this soil group is the most easily re-vegetated in the White Pass Study Area, difficulty could be encountered because of the short growing season and low soil temperatures that may limit revegetation success on disturbed areas on these soils.

Soil Group 2 consists of deep, well drained soils formed in volcanic ash mixed with colluvium from rhyolite or pyroclastic rocks (ashy, Typic Udivitrands), and is usually found on the steep slopes, shoulders, and backslopes of mountains. These soils are typically well drained sandy loams that range from 15 to 40 inches deep. Locations where this soil group is typically found include steeper slopes that have potential for moderate to severe surface erosion and mass movement. Within the White Pass Study Area, this soil covers approximately 253.8 acres and is found along the cliff band that traverses the existing SUP (refer to Table 1). Revegetation on this soil type is difficult because of the low soil fertility, short growing season, and low soil temperatures that limit and revegetation success.

Table 1:
Existing Soil Groups within the White Pass Study Area

Soil Group[a]	Area (acres)	Percent of White Pass Study Area
Group 1	191.6	12.2%
Group 2	253.8	16.2%
Group 3	356.0	22.7%
Group 4	541.4	34.4%
Group 5	180.0	11.5%
Group 6	22.4	1.4%
Group 7	24.8	1.6%
Total	**1570.0**	**100.0%**

[a] Soil Groups are combined soil types based on similar soil units from the GPNF and the WNF soil mapping and therefore might be different from other figures or numbers.

Soil Group 3 covers 356.0 acres and consists of deep, well drained soils formed in volcanic ash mixed with andesite, volcanic rocks, and pyroclastic colluvium (Typic Vitricryands) that are usually found on the benches, shoulders, and toeslopes of mountains (refer to Table 1). These soils are typically well drained sandy loams or loamy sands that range from 15 to 60 inches deep. Soils in Soil Group 3 have potential for severe surface erosion, however mass movement is not considered a problem for these soils. This soil group is typically found at the summit of White Pass and the slopes surrounding the upper terminals. This soil group is typically found in areas with extended snow cover, so the combination of a short growing season, low fertility and cold soil temperatures, makes any revegetation of disturbed areas difficult.

Soil Group 4 is the most common soil group in the White Pass Study Area and covers approximately 541.4 acres (refer to Table 1). Soil group 4 consists of deep, well drained soils formed in volcanic ash mixed with volcanic rocks, and pyroclastic colluvium (Typic Vitricryands) that are usually found on the benches and shoulders of mountains. These soils are typically well drained loamy sands that range from 15 to 60 inches deep. Soils in Soil Group 4 have potential for moderate surface erosion, but mass movement is not generally considered a problem for these soils. Soil Group 4 is typically found within Pigtail Basin and most of the proposed expansion area and in areas with extended snow cover, so the combination of a short growing season, low fertility and cold soil temperatures, makes any revegetation of disturbed areas difficult.

Soil Group 5 consists of deep, well drained soils formed in volcanic ash mixed with volcanic rocks, and pyroclastic colluvium (Typic Vitricryands) that are usually found on the benches and slopes of mountains. These soils cover180 acres and are typically well drained loamy sands that range from 10 to 40 inches deep. Soils within Soil Group 5 are subject to high surface erosion, and there is moderate potential for mass movement as well. Soil Group 5 is typically found at Hogback Peak and its surrounding slopes. This soil group is typically found in areas with extended snow cover, so the combination of a short growing season, low fertility and cold soil temperatures, makes any revegetation of disturbed areas difficult.

Soil Group 6 is characterized by rock outcrops, talus fields, and rubble lands (former avalanche disturbance) and is mostly found on rugged, rocky landforms. This soil group is the least abundant soil group in the White Pass Study Area, covering 22.4 acres. Rock falls and debris slides are a considered hazardous because of the unstable and sometimes steep slopes. Soil Group 6 is typically found near the base area and other locations around the White Pass Study Area. Revegetation is almost impossible because of the topography and rocky conditions.

Soil Group 7 is water bodies which includes Leech Lake and some of the small ponds near the PCT at the summit of White Pass. Soil Group 7 covers approximately 24.8 acres within the White Pass Study Area.

Appendix G

Vegetation Technical Report and Biological Evaluation

Supplemental Vegetation Information and Biological Evaluation for the White Pass Ski Area Expansion Proposal

Prepared For:

U.S. Forest Service
Okanogan-Wenatchee National Forest
Naches Ranger District

Prepared By:

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April, 2004

Executive Summary

This Vegetation Technical Report and Biological Evaluation (VTR&BE) has been prepared to supplement the analysis of vegetation and wildlife resources for the White Pass Ski Area Proposed Expansion Final Environmental Impact Statement (FEIS). It is intended to provide a bridge between the information presented in the FEIS and the complete record of information contained within the administrative project file maintained by the U.S. Forest Service. As such, this VTR&BE presents an analysis of the forest structure present within the White Pass Study Area and an evaluation of the effects of the Action Alternatives on proposed, endangered, threatened, and sensitive (PETS) botanical species that are suspected of occurring within the White Pass Study Area.

The first part of this report documents the forest structure of the White Pass Study Area. The forest structure refers to the tree size, canopy components, and canopy closure of the forested communities. The structure of the forest plays an important role in the types of habitat present that would be suitable for different wildlife species. Additional information on wildlife species and their usage of habitat within the White Pass Study Area can be found in Section 3.6 – Wildlife of the FEIS and the Wildlife Technical Report and Biological Evaluation in Appendix H.

The second part of this report contains the biological evaluation of PETS botanical species suspected of occurring within the White Pass Study Area. This BE concludes that there will be **No Impact** to PETS botanical species under any of the Action Alternatives because no species have been documented within the White Pass Study Area during any of the surveys/analyses conducted between 1987 and 2004.

1.0 Introduction

1.1 Project Location and Alternative Description

The White Pass Study Area lies within the Cascade Mountains and is located on Highway 12 approximately 55 miles west of Yakima, Washington. The White Pass ski area is within the boundaries of the Gifford Pinchot (GPNF) and Okanogan-Wenatchee National Forests (OWNF). Both the Upper Tieton and Clear Fork Cowlitz River watersheds occur in the White Pass Study Area.

Land use activities within the White Pass Study Area have contributed to the existing land cover, as represented by the mosaic of vegetation communities and developed areas that comprise the existing vegetation conditions. Vegetation within the White Pass Study Area is characterized by descriptions of the existing vegetation communities that occur in the entire White Pass Study Area and the forest structure of these communities. Existing data for the vegetation communities was compiled from the available GIS datasets, the watershed condition assessments (USDA, 1998a and USDA, 1998b) and the administrative record.

1.2 Methods

Existing Forest Structure

The forest structure was inventoried by characterizing forest stands on the ground and assimilating the data into GIS layers maintained by the GPNF and OWNF. For the White Pass FEIS analysis, vegetation information contained in separate GPNF and OWNF GIS datasets were merged into a single layer for the White Pass Study Area. The merged GIS data was supplemented with ski trail talus slope mapping from rectified aerial photographs and field data collection. Finally, the vegetation communities and forest structure were characterized following the procedures outlined in "Wildlife Habitat Relationships in Washington and Oregon" (Johnson and O'Neil, 2001) to address wildlife habitat occurrence.

1.3 Results

The existing forest structure within the White Pass Study Area has been classified based on the average size of trees, average canopy closure and the number of layers present in the canopy. Tree size is defined in terms of the diameter at breast height (DBH) of the dominant and co-dominant tree species. Tree size categories are shown in Table 3.5 – FEIS1.

Table 3.5 – FEIS1
Tree Size Categories

Tree Size	Diameter at Breast Height (inches)
Small	<21
Medium	21-32
Large	>32

Canopy coverage is expressed as a qualitative name given to represent a range of the percent closure. Canopy coverage categories are shown in Table 3.5 – FEIS2.

Table 3.5 – FEIS2
Canopy Coverage Categories

Canopy Closure	Canopy Coverage Percent
Open	<10%
Low	11-39%
Moderate	40-69%
Closed	>70%

The number of canopy layers is classified as single or multi. Overall, eight different forest structures have been classified within the Analysis Area (see Figure 3-35 Existing Forest Canopy Structure). Table 3.5-2 summarizes the forest canopy structure currently present in the White Pass Study Area. No large tree canopy classifications present[1] within the White Pass Study Area, although the northeastern portion of the existing SUP area contains mature forest that contains a majority of medium-sized trees, but large trees are also present.

[1] For purposes of incorporating the GIS data provided by the OWNF and the GPNF, tree size data was grouped according to follow categories: small tree = less than 21 inches DBH, medium tree = 21 to 32 inches DBH, large tree = greater than 32 inches DBH.

Table 1
Forest Canopy Structure Present within the White Pass Study Area

Category	Total Acres	Percent of Total White Pass Study Area
Open Areas	328.2	21%
Small tree - Multi-Story - Open	5.9	0%
Small tree – Single Story – Moderate Canopy	654.4	42%
Small tree – Multi-Story – Moderate Canopy	59.0	4%
Small tree – Multi-Story – Closed Canopy	195.5	12%
Medium tree – Multi-Story – Open Canopy	11.8	1%
Medium tree – Multi-Story – Moderate Canopy	62.6	4%
Medium tree – Multi-Story – Closed Canopy	252.7	16%
Total	**1570.0**	**100%**

Open Areas

The Open Areas forest structure includes all existing ski trails, parking lots, and roads where previous tree removal has resulted in the removal of the forested community. Naturally occurring Open Areas include talus slopes, lakes, and other naturally non-vegetated areas (i.e. meadows). This structure is categorized as having no forested layer and very little canopy closure from shrub and herbaceous layers (one to 10 percent). Open Areas cover approximately 328.2 acres (21 percent) of the White Pass Study Area.

Small tree - Multi-Story - Open

The Small tree – Multi-Story - Open forest structure occurs primarily within the existing ski area SUP and covers approximately 5.9 acres (< 0.1 percent). This forest structure consists of a two story tree layer with an average canopy closure of between one and 10 percent. In actuality, these areas are the small tree islands located on the lower slopes within existing ski trails. Tree clearing associated with construction of the ski area left several large trees behind. Subsequent growth has resulted in the second, smaller canopy layer that distinguishes these islands from a single story canopy structure. Tree size is classified as small, indicating that the majority of trees are less than 21 inches diameter at breast height (DBH).

Small tree – Single Story – Moderate Canopy

The Small tree – Single Story – Moderate Canopy forest structure occurs primarily in the high elevation proposed SUP expansion area and covers approximately 654.4 acres (42 percent). This structure covers the Mountain Hemlock Parkland community. The majority of this forest structure is located within the Clear Fork Cowlitz watershed. This forest structure consists of a single story tree layer with an average canopy closure of between 11 and 39 percent with patchy tree distribution. Tree size is classified as small, indicating that the majority of trees are less than 21 inches DBH.

Small tree – Multi-Story – Moderate Canopy

The Small tree – Multi-Story – Moderate Canopy forest structure occurs primarily in the existing SUP area and covers approximately 59.0 acres (4 percent). This forest structure consists of a two or more storied tree layer with an average canopy closure between 40 and 69 percent. Tree size is classified as small, indicating that the majority of trees are less than 21 inches DBH. This structure is located within the Mixed Conifer community and occurs primarily within the Clear Fork Cowlitz watershed.

Small tree – Multi-Story – Closed Canopy

The Small tree – Multi-story – Closed Canopy forest structure occurs primarily within the existing ski area SUP, extending slightly west into the proposed expansion area. This forest structure covers approximately 195.5 acres (12 percent of the White Pass Study Area) and consists of a two or more storied tree layer with an average canopy closure of greater than 70 percent. Tree size is classified as small, indicating that the majority of trees are less than 21 inches DBH. This structure occurs primarily in the Clear Fork Cowlitz watershed, in the western portion of the White Pass Study Area and entirely within the mixed conifer vegetation community.

Medium tree – Multi-Story – Open Canopy

The Medium tree – Multi-story – Open Canopy forest structure occurs within a small area in the northern portion of the White Pass Study Area and covers approximately 11.8 acres (1 percent). This forest structure consists of a two or more storied tree layer with an average canopy closure between 11 and 39 percent. Tree size is classified as medium, indicating that the majority of trees are between 21 and 32 inches DBH. This structure occurs north of Highway 12, adjacent to Leech Lake in the Mixed Conifer vegetation community. Past tree removal in this area has resulted in a more open canopy, compared to the denser canopy observed on the south side of Highway 12.

Medium tree – Multi-Story – Moderate Canopy

The Medium tree – Multi-story – Moderate Canopy forest structure occurs primarily in the western portion of the White Pass Study Area and covers approximately 62.6 acres (4 percent). This forest structure consists of a two or more storied tree layer with an average canopy closure between 40 and 69 percent. Tree size is classified as medium, indicating that the majority of trees are between 21 and 32 inches DBH. A majority of the Mountain Hemlock community and a small portion of the mixed conifer community occur within this forest structure. This forest structure is located primarily within the Clear Fork Cowlitz watershed.

Medium tree – Multi-Story – Closed Canopy

The Medium tree – Multi-story – Closed Canopy forest structure occurs primarily in the eastern portion of the White Pass Study Area and covers approximately 252.7 acres (16 percent). This forest structure consists of a two or more storied tree layer with an average canopy closure of greater than 70 percent. Tree size is classified as medium, indicating that the majority of trees are between 21 and 32 inches DBH. The majority of this structure is located within the Upper Tieton River watershed and includes portions of the Mixed Conifer community.

1.4 Effects of the Action Alternatives

1.4.1 Forest Structure

Alternative 1

Under Alternative 1, there would be no impacts to the existing forest structure within the White Pass Study Area. White Pass would continue to operate under their existing permit and no new development would occur.

Ongoing ski area operations and maintenance would continue to occur at White Pass. Impacts to the forest structure would occur during maintenance of ski trails from mowing and/or brushing. These activities would maintain a modified shrub and herbaceous community and prevent future regeneration of forest for as long as ski area operations persist. Impacts to vegetation from ski operations could occur from incidental contact from skiers, grooming equipment and vegetation, however these impacts are not expected to be measurable.

White Pass would continue to operate Nordic skiing on the Zigzag Trail under an annual SUP. Operations would not cause disturbance to vegetation (except for occasional hazard tree removal), as clearing for the trail corridor was completed several years ago, prior to this FEIS. The snowshoe trail network would continue to operate at White Pass under an annual SUP. Operations would not result in any disturbance to vegetation as trails are marked annually and located to avoid disturbance.

Alternative 2

Under Alternative 2, there would be approximately 19.7 acres of clearing and grading within the existing forest structure for lifts, trails, and facilities within the White Pass Study Area (see FEIS Figure 3-36 – Potential Impacts to Forest Canopy Structure, Alternative 2 and 6). All disturbance would occur within the Small tree – Single story – Open Canopy forest structure within the Clear Fork Cowlitz watershed (see Table 2).

Table 2
Potential Disturbances[a] to the Forest Structure within the White Pass Study Area

Type	Alt 2[b]	Modified Alt 4[b]	Alt 6[b]	Alt 9[c]
Open Areas (acres)	0.0	0.0	0.0	0.0
Small tree - Multi-story - Open (acres)	0.0	0.0	0.0	0.0
Small tree - Single story - Moderate Canopy (acres)	19.7	21.5	11.3	0.0
Small tree - Multi-story - Moderate Canopy (acres)	0.0	0.0	0.0	0.0
Small tree - Multi-story - Closed Canopy (acres)	0.0	12.0	0.0	10.1
Medium tree - Multi-story - Open Canopy (acres)	0.0	0.0	0.0	0.0
Medium tree - Multi-story - Moderate Canopy (acres)	0.0	0.0	0.0	1.0
Medium tree - Multi-story - Closed Canopy (acres)	0.0	11.0	3.8	24.2
Totals (acres)	**19.7**	**44.5**	**15.1**	**35.3**

[a] Disturbance to the forest does not imply that there would be an adverse impact or that the forest structure would be adversely impacted or changed as a result of the proposed activities. For example, creation of a ski trail in parkland (i.e., small tree – single story – moderate canopy) by connecting existing openings would retain a parkland forest structure.

[b] Under Alternatives 2, Modified Alternative 4, and 6 the existing forest structure would not change as a result of the proposed activities. There would be no change in the canopy coverage, tree size, or the number of canopy layers due to the tree island removal clearing prescription.

[c] Under Alternative 9, the full clearing and full clearing with grading prescriptions would result in changes to the forest structure.

Impacts to the forest structure have the potential to affect wildlife habitat within the White Pass Study Area (see FEIS Section 3.6 – Wildlife for more information on impacts to wildlife). The implementation of Other Management Practice OMP5 would reduce the amount of disturbance to the forest structure by clearly marking trail boundaries and using selective tree removal during construction. Trail clearing would occur within an open canopy structure and would not decrease the overall canopy coverage below the “Open” threshold of 11 percent. Likewise, there would be no change in the number of canopy layers or the tree size. Due to the amount (approximately 3.4 percent of the total forest structure type) and the location of disturbance within an open canopy structure that would occur under Alternative 2, the overall impact on the forest structure would not be measurable. The tree size, canopy layers, and canopy coverage designation for the area would remain within the criteria established for the existing forest structure type.

Indirect impacts to the forest structure would occur from ongoing maintenance activities associated with the ski area, i.e. trail mowing/ brushing, hazard tree removal, etc. The implementation of Other Management Practice OMP5 would minimize impacts to adjacent vegetation and the forest structure limiting the maintenance area and using low impact methods.

Modified Alternative 4

Under Modified Alternative 4, there would be approximately 21.5 acres of clearing and grading within the Small tree – Single story – Open Canopy forest from clearing and grading for the proposed lifts, trails, and facilities in Hogback Basin (see Table 2). An additional disturbance of approximately 12 acres would occur within the Small tree – Multi-story – Closed Canopy forest structure and approximately 11 acres within the Medium tree – Multi-story – Closed Canopy forest structure (see FEIS Figure 3-37 – Potential Impacts to Forest Canopy Structure, Modified Alternative 4). The implementation of Other Management Practice OMP5 would reduce the amount of disturbance to the forest structure by clearly marking trail boundaries and using selective tree removal methods. As described under Alternative 2, clearing within the Small tree – Single story – Open Canopy forest structure would not have any measurable impacts.

The 12 acres of disturbance to the Small tree – Multi-story – Closed Canopy forest structure results from the full clearing for construction of trail 4-16 and 4-17. While full clearing would occur within a closed canopy, the trail width would be limited to 30 feet on trail 4-16. The overall change to the canopy coverage would not drop below the 70 percent threshold for a closed structure. Therefore, the change to the forest structure would not be measurable.

Within the Medium tree – Multi-story – Closed Canopy forest structure, approximately 11 acres of disturbance would occur adjacent to existing openings in the forest structure, i.e. existing trails, and Highway 12. While full clearing represents a higher degree of impact than selective tree removal, because it would occur adjacent to existing openings, the overall impact to the forest structure would not be measurable. The tree size, canopy layers, and canopy coverage designation for the area would remain within the criteria established for the existing forest structure type.

Indirect impacts to the forest structure would occur from ongoing maintenance activities associated with the ski area, i.e. trail mowing/ brushing, hazard tree removal, etc. The implementation of Other Management Practice OMP5 would minimize impacts to adjacent vegetation and the forest structure limiting the maintenance area and using low impact methods.

Alternative 6

Under Alternative 6, impacts to the forest structure would be less than all other Action Alternatives due to the reduced development in Hogback Basin. Total clearing and grading impacts within the Small tree – Single story – Open Canopy forest structure would be approximately 11.3 acres and approximately 3.8 acres within the Medium tree – Multi-story – Closed Canopy forest structure (see Table 3.5-2, and Figure 3-36 – Potential Impacts to Forest Canopy Structure, Alternative 2,and 6). The implementation of Other Management Practice OMP5 would reduce the amount of impacts to the forest structure by clearly marking trail boundaries and using selective tree removal. As described under Alternative 2, impacts to the Small tree – Single story – Open Canopy would not be measurable. The 3.8 acres of impacts to the Medium tree – Multi-story – Closed Canopy occur adjacent to existing forest openings and would therefore have no measurable impact on the forest structure. The tree size, canopy layers, and canopy coverage designation for the area would remain within the criteria established for the existing forest structure type.

Indirect impacts to the forest structure would occur from ongoing maintenance activities associated with the ski area, i.e. trail mowing/ brushing, hazard tree removal, etc. The implementation of Other Management Practice OMP5 would minimize impacts to adjacent vegetation and the forest structure limiting the maintenance area and using low impact methods.

Alternative 9

Under Alternative 9, impacts to the forest structure would occur entirely within the existing SUP as no expansion is proposed (see Figure 3-38 – Potential Impacts to Forest Canopy Structure, Alternative 9). Clearing and grading impacts under Alternative 9 would result in approximately 10.1 acres to the Small tree – Multi-story – Closed Canopy structure and approximately 24.2 acres to the Medium tree – Multi-story – Closed Canopy forest structure (see Table 2). Implementation of Other Management Practice OMP5 would reduce impacts to adjacent natural vegetation communities would be minimized by establishing maximum clearing limits and felling trees away from adjacent and sensitive vegetation.

Full clearing associated with a new lift and trails within the Medium tree – Multi-story – Closed Canopy would create new openings within the forest structure. Since approximately 24.2 acres (approximately 10 percent of the total forest structure within the existing permit area) of tree removal would occur within this forest structure, the overall canopy closure would likely decrease. The decrease would likely drop the canopy closure below the 70 percent threshold and into a Moderate category. The resulting forest structure change would have the potential to affect wildlife habitat (see section 3.6 – Wildlife for more information on impacts to wildlife). Clearing for the proposed parking lot would not likely change overall forest structure because of the existing adjacent fragmented areas (existing trails and Highway 12). While the area of the proposed parking lot does occur within a larger continuous forested area, the specific location occurs on a small protrusion of the forested area into an existing opening.

Full clearing associated with a new lift and trails within the Small tree – Multi-story – Closed Canopy would create new openings within the forest structure. Since approximately 10 acres (approximately 5 percent of the total forest structure within the existing permit area) of tree removal would occur within this forest structure, the overall canopy closure would likely decrease. The decrease would likely result in an overall drop in the canopy closure below the 70 percent threshold. However, localized clearing with the *Paradise* pod for new trails would likely decrease canopy closure within the pod. The change would likely result in a Moderate canopy closure, similar to the adjacent forest structure within the *Paradise* pod. Clearing for the egress trail below the cliff band would not likely impact the forest structure due to the small amount (approximately 2 percent of the total forest structure) of clearing necessary.

Indirect impacts to the forest structure would occur from ongoing maintenance activities associated with the ski area, i.e. trail mowing/ brushing, hazard tree removal, etc. The implementation of Other Management Practice OMP5 would minimize impacts to adjacent vegetation and the forest structure limiting the maintenance area and using low impact methods.

2.0 Biological Evaluation

This evaluation is the documented U.S. Forest Service review of the proposed White Pass Ski Area Expansion Proposal. The following evaluation is consistent with laws, regulations and policy pertaining to Proposed, Endangered, Threatened and Sensitive (PETS) plant species (USDA, USFS, 1995; USFS, USBLM 1999) and Survey and Manage Plant species (USDA, USDI 1994; USDA, USDI 2001; USDA, USDI 2002; USDA, USDI, 2003; USDA, USDI, 2003b). The purpose of this evaluation is to determine how the proposed project may affect current PETS plant and Survey and Manage species. It will also identify any action necessary to assure that management activities do not jeopardize the continued existence of these species or result in the destruction or adverse modification of essential habitat.

A PETS plant is any taxon listed on the Regional Forester's Sensitive Plant List (USFS, 1999; USFS, 2004), and includes all federally listed and candidate plant species (USFWS, 2007a; USWFS, 2007b)). This evaluation implements recent policy changes enacted as a result of the January 9, 2006 US District Court decision regarding Survey and Manage Species. The 2004 ROD to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (2004 ROD) was vacated and management direction for PETS plants/SSS species would revert back to the 2001 Record of Decision for management of these species. In this regard, the White Pass analysis area has been surveyed consistent with species identified in both the 2001 Record of Decision including any amendments or modifications to the 2001 ROD that were in effect as of March 21, 2004 (Table 1.1, December 2003), as well as the 2004 ROD to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (2004 ROD).

2.1 Methods

A review of existing information for proposed, endangered, threatened and USFS sensitive (including former Survey and Manage species) species occurring within the White Pass Study Area was conducted. The most recent list of USFS sensitive species suspected of occurring within the White Pass Study Area was provided by the Naches Ranger District's botanist (see Table 3). This list was adapted from the Regional Forester's Sensitive Species list based on pre-field reviews of potentially suitable habitat within the White Pass Study Area. Subsequent field surveys validated the actual occurrence of suitable habitat for these species.

Numerous surveys for PETS species have been conducted by the USFS within the White Pass Study Area. Three surveys were conducted within the proposed expansion area (Barker, 1987; Parsons and Engle, 1992; Leingang, 1999). Eight surveys have been conducted within the current White Pass Special Use Permit (SUP) boundary (Engle, 1991; Parson and Engle, 1993; Parsons and Engle, 1994; Massie, 1995a; Massie, 1995b; Wheeler, 2000; Ianni, 2002; Ianni, 2003a). Survey methods followed the approved USFS protocol for sensitive plants and former Survey and Manage species. The objectives of the surveys were to (1) locate populations of special-status species within the White Pass Study Area in order to adequately protect populations, (2) conduct a floristic inventory to identify all vascular plant species in the White Pass Study Area, (3) search for special-status plant taxa within the White Pass Study Area, and (4) map the locations of the special-status plant populations in the White Pass Study Area. The species presented in Table 3 represents the subset of species listed on the Regional Forester's Sensitive Species List (USFS, 2004b) that are suspected to occur within the White Pass Study Area.

Table 3
Special Status Plant Species Suspected within the White Pass Study Area

Name of Species	Listing Type	Surveyed For	Habitat Present
Vascular Plants			
Agoseris elata	USFS Sensitive	Yes	Yes
Anemone nuttalliana	USFS Sensitive	Yes	Yes
Botrychium lanceolatum	USFS Sensitive	Yes	Yes
Botrychium montanum	Survey and Manage/ USFS Sensitive	Yes	Yes
Botrychium paradoxum	USFS Sensitive	Yes	Yes
Botrychium pinnatum	USFS Sensitive	Yes	Yes
Carex atrata var. *erecta*	USFS Sensitive	Yes	Yes
Carex comosa	USFS Sensitive	Yes	No
Carex densa	USFS Sensitive	Yes	No
Carex pauciflora	USFS Sensitive	Yes	Yes
Carex proposita	USFS Sensitive	Yes	Yes
Carex saxalitis var. *major*	USFS Sensitive	Yes	Yes
Carex stylosa	USFS Sensitive	Yes	Yes
Carex sychnocephala	USFS Sensitive	Yes	Yes
Castilleja cryptantha	USFS Sensitive	Yes	Yes
Coptis asplenifolia	Survey and Manage/ USFS Sensitive	Yes	No
Coptis trifolia	Survey and Manage/ USFS Sensitive	Yes	No
Cypripedium fasciculatum	Survey and Manage/ USFS Sensitive	Yes	No
Cypripedium montanum	Survey and Manage/ USFS Sensitive	Yes	No
Eleocharis atropurpurea	USFS Sensitive	Yes	Yes
Erigeron salishii	USFS Sensitive	Yes	Yes
Eritrichulum nanum var. *elongatum*	USFS Sensitive	Yes	Yes
Fritillaria camschatcensis	USFS Sensitive	Yes	No
Galium kamtschaticum	Survey and Manage/ USFS Sensitive	Yes	No
Geum rosii var. *depressum*	USFS Sensitive	Yes	Yes
Hackelia venusta	USFS Sensitive	Yes	No
Loiseluria procumbens	USFS Sensitive	Yes	Yes
Luzula arcuata	USFS Sensitive	Yes	Yes

Table 3
Special Status Plant Species Suspected within the White Pass Study Area

Name of Species	Listing Type	Surveyed For	Habitat Present
Pedicularis rainierensis	USFS Sensitive	Yes	Yes
Pellaea breweri	USFS Sensitive	Yes	Yes
Phacelia minutissima	USFS Sensitive	Yes	No
Platanthera obtusata	USFS Sensitive	Yes	No
Plantanthera sparsiflora	USFS Sensitive	Yes	Yes
Potentilla breweri	USFS Sensitive	Yes	Yes
Ranunculus populago	USFS Sensitive	Yes	Yes
Salix vestita var. *erecta*	USFS Sensitive	Yes	Yes
Sisyrinchium sarmentosum	USFS Sensitive	Yes	Yes
Spiranthes porrifolia	USFS Sensitive	Yes	Yes
Lichens			
Dendriscocaulon intricatulum	Survey and Manage/ USFS Sensitive	Yes	Yes
Dermatocarpon luridum	Survey and Manage/ USFS Sensitive	Yes	Yes
Hypogymnia duplicata	Survey and Manage/ USFS Sensitive	Yes	Yes
Leptiogium burnetiae ver hirsutum	Survey and Manage/ USFS Sensitive	Yes	Yes
Lobaria linita	Survey and Manage/ USFS Sensitive	Yes	Yes
Nephroma bellum	Survey and Manage/ USFS Sensitive	Yes	Yes
Nephroma occultum	Survey and Manage/ USFS Sensitive	Yes	Yes
Pilphorous nigricaulis	USFS Sensitive	Yes	Yes
Pseudocyphellaria rainierensis	Survey and Manage	Yes	No
Tholurna dissimilis	USFS Sensitive	Yes	Yes
Fungi			
Bridgeoporus nobilissimus	Survey and Manage/ USFS Sensitive	Yes	No
Bryophytes			
Rhizomnium nudum	Survey and Manage/ USFS Sensitive	Yes	Yes
Schistostega pennata	Survey and Manage/ USFS Sensitive	Yes	Yes
Scouleria marginata	USFS Sensitive	Yes	Yes
Tetraphis geniculata	Survey and Manage/ USFS Sensitive	Yes	No

2.2 Results

No PETS or Survey and Manage species listed in Table 3 were found during any of the botanical surveys conducted within the existing SUP area and the proposed expansion area as documented by the previously identified surveys. Additional information on the survey results can be found in the Summary of White Pass Botanical Surveys (USFS, 2003) contained in this appendix.

2.3 Effects of the Action

Alternative 2

Under Alternative 2, approximately 19.7 acres of clearing and grading would occur as a result of the Proposed Action (see Table 4). This action has the potential to directly impact sensitive botanical species through removal or indirectly through the alteration and loss of habitat. However, no sensitive botanical species have been found within the White Pass Study Area. Therefore, there would be **No Impact** to any of the listed vascular, lichen, fungi, or bryophyte species presented in Table 3 under Alternative 2.

Under Alternative 2, operation and maintenance of the existing ski area and the proposed expansion area would continue to prevent the re-establishment of the existing vegetation. These activities include, but are not limited to, brushing and mowing of ski trails, and the removal of danger trees. Operation and maintenance activities would continue to occur for as long as the area remains an active ski area. Since no PETS or Survey and Manage species have been found within the White Pass Study Area, operation and maintenance activities would have **No Impact** on PETS or Survey and Manage species under Alternative 2.

Table 4
Potential Disturbance to Vegetation within the White Pass Study Area

Type	Alt 2	Modified Alt 4	Alt 6	Alt 9
Mixed Conifer (acres)	0.0	21.6	3.8	35.3
Mountain Hemlock (acres)	0.0	0.0	0.0	0.0
Mountain Hemlock Parkland (acres)	19.7	21.5	11.3	0.0
Modified Herbaceous (acres)	0.0	1.3	0.2	3.6
Talus (acres)	0.0	0.0	0.0	0.0
Total (acres) [a]	**19.7**	**44.7**	**15.3**	**38.9**

[a] Note: Totals may vary due to rounding. Table 4 numbers refer to Table 3.5-5: Potential Impacts to Vegetation Communities within the White Pass Study Area.

Modified Alternative 4

Under Modified Alternative 4, approximately 44.7 acres of clearing and grading would occur as a result of the Proposed Action (see Table 4). Similar to Alternative 2, this action has the potential to directly and indirectly impact sensitive botanical species. However, since no sensitive botanical species have been found within the White Pass Study Area, there would be **No Impact** to any of the listed vascular, lichen, fungi, or bryophyte species presented in Table 3 under Modified Alternative 4.

As described under Alternative 2, there would be **No Impact** to PETS or Survey and Manage species from operation and maintenance activities.

Alternative 6

Under Alternative 6, approximately 15.3 acres of clearing and grading would occur as a result of the Proposed Action (see Table 4). Similar to Alternative 2, this action has the potential to directly and indirectly impact sensitive botanical species. However, since no sensitive botanical species have been found within the White Pass Study Area, there would be **No Impact** to any of the listed vascular, lichen, fungi, or bryophyte species presented in Table 3 under Alternative 6.

As described under Alternative 2, there would be **No Impact** to PETS or Survey and Manage species from operation and maintenance activities.

Alternative 9

Under Alternative 9, approximately 38.9 acres of clearing and grading would occur as a result of the Proposed Action (see Table 4). Similar to Alternative 2, this action has the potential to directly and indirectly impact sensitive botanical species. However, since no sensitive botanical species have been found within the White Pass Study Area, there would be **No Impact** to any of the listed vascular, lichen, fungi, or bryophyte species presented in Table 3 under Alternative 9.

As described under Alternative 2, there would be **No Impact** to PETS or Survey and Manage species from operation and maintenance activities.

2.4 Effect Determination

Since no species have been documented within the White Pass Study Area, the proposed White Pass Expansion would have **No Impact** on any of the listed vascular plants, lichens, fungi, and bryophytes listed in Table 3 (see Table 5).

Table 5
Determination of Effect for USFS Sensitive Plant Species

Species	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Vascular Plants	**No Impact**			
Lichens	**No Impact**			
Fungi	**No Impact**			
Bryophytes	**No Impact**			

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Addendum to Botanical Report for the Proposed 2003 White Pass Ski Area Expansion Project Naches Ranger District, Wenatchee National Forest

Introduction

This addendum is the documented U.S. Forest Service updated review of the proposed 2003 White Pass Ski Area Expansion project. The following report is consistent with laws, regulations, and policy pertaining to Proposed, Endangered, Threatened and Sensitive (PETS) plant species (USDA, USFS, 1995c). The purpose of this report is to document lichen and bryophyte surveys required as a result of recent policy changes within the U.S. Forest Service (USDA, USDI 2004b, USFS, 2004b). This report will also determine how the proposed project may affect newly listed PETS lichen and bryophyte species, and identify any action necessary to ensure that management activities do not jeopardize the continued existence of these species or result in the destruction or adverse modification of essential habitat.

Field Reconnaissance Results

Surveys for recently listed PETS lichen and bryophyte species were conducted on July 29 and 30, and August 2, 2004. Surveys were focused to evaluate habitat suitability and locate potential sites for 18 lichen and four bryophyte taxa recently added to the Regional Forester's Sensitive Species List (USFS, 2004b). Potentially suitable habitats include shaded rock outcrop crevices, krummholz form trees on ridges, and closed canopy mesic forest. Suitable habitats are a minor component of the proposed project area (approximately 50%). The majority of the project area is open parkland forest composed of stringers and islands of mountain hemlock, subalpine fir, and pacific silver fir in a matrix of mountain heather and delicious huckleberry meadows. This habitat type is effectively dry shortly after snowmelt has run off and is considered low probability habitat for PETS species. Although potentially suitable habitat was identified for five lichens and one bryophyte, no occurrences were located in the proposed project area.

Effects Analysis

Field survey was conducted for the lichen and bryophyte taxa groups, and no occurrences were located. Although these organisms are cryptic and can be overlooked, suitable habitats were carefully searched. The probability of occurrence for PETS lichens and bryophytes is very low in the proposed project area. It is determined that implementation of the project is unlikely to affect PETS lichens and bryophytes.

Evaluation of Fungi Habitat

Nineteen fungi were placed on the Regional Forester's Sensitive Species List as a result of recent Agency policy changes (USDA,USDI 2004b, USFS, 2004b).

Policy direction states, "if project surveys for a, species were not practical under t4 Survey and Manage standards and guidelines (most Category B and D species), or a species' status is undetermined (Category E and F species), then surveys will not be practical or expected to occur under the Special Status/ Sensitive Species policies either. Instead, other options for pre-project clearances would be used, such as evaluation of a species' habitat associations and the presence of suitable or potential habitat; review of existing occurrence records, surveys and inventories; use of research information, literature, or habitat models; or use of documentation or rationale provided by internal or external professional expertise" (USDA, USDI, 2004c).

Following this direction, surveys for eighteen of the nineteen fungi are considered impractical. They have been evaluated for known occurrences and potential habitat in the proposed project area (See Table I below). *Bridgeoporus nobilissimus*, a previous Survey and Manage Category A taxon, has been addressed under earlier survey protocols (Ianni, 2003b).

Table 1
Sensitive Fungal Taxa Habitat Presence and Known Occurrence Evaluation

Taxon	Habitat Presence	Known Occurrences In or Near Proposed Project Area
Albatrellus ellisii	Yes- on ground in forests	None
Clavariadelphus occidentalis	No	None
Clavariadelphus sachalinensis	Yes- under mixed conifers	None
Cordyceps capitata	No	None
Cudonia monticola	No	None
Gomphus bonarii	Yes- under *Abies* spp.	None
Gomphus kauffmanii	Yes- under *Abies* spp.	None
Gyromitra californica	Yes- coniferous forest	Near- closest about 8 miles away
Leucogaster citrinus	Yes- *Abies lasiocarpa* symbiont	None
Mycena monticola	Yes- conifer forests above 1000m	None
Otidea smithii	No	None
Ramaria amyloidea	Yes- *Abies* spp. associate	None
Ramaria largentii	Yes- *Abies* spp. associate	None
Ramaria rubrievanescens	Yes- Pinaceae spp. associate	None
Ramaria rubripermanens	Yes- Pinaceae spp. associate	None
Sarcodon fuscoindicum	Yes- on soil	Near-reported ≈ 7-10 miles away
Sowerbyella rhenana	No	None
Spathularia flavida	Yes- conifer litter and debris	None

Two of the eighteen species have known occurrences within 7 to 10 miles of the proposed project area. No species are known to occur within the proposed project area. Thirteen species have potential habitat in the proposed project area (Castellano et. al. 1999; Castellano et. al. 2003). The habitat descriptions given by Castellano et. al. are necessarily broad and general. The

Proposed White Pass Ski Area Expansion project area does not exhibit much mycological diversity when compared to moister environments in the general area. Few fungi were observed during survey work carried out in the summer and fall of 2002 and summer of 2004. Habitat is present for several species, but it is considered to have low to moderate occupation potential.

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Summary of Botanical Surveys Conducted in the White Pass Ski Area and Proposed Expansion Areas 1987-2003

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Twelve documented botanical surveys have occurred within the White Pass Ski Area and associated proposed expansion areas between 1987 and 2003. These surveys occurred to document the potential effects of proposed projects on US Forest Service administered lands upon special interest plant species. Surveys prior to 1999 were for listed Proposed, Endangered, Threatened, and Sensitive (PETS) plant species (USDA, USFS, 1995c). Surveys from 1999 and later include Survey and Manage (S&M) vascular plant, lichen, bryophyte, and fungi species (USDA, USDI, 1994b). This summary will chronologically recount the area(s), method(s), and results of each individually documented survey.

The Barker survey of 1987 was conducted for PETS plant species (Barker, 1987). Surveys were conducted on seven days between June 20 and July 26, 1987. Protocols for determining survey intensity level had not been developed when this survey took place and were not mentioned. The description of the survey method performed most resembles the intuitive-controlled level. This survey covered an early proposed expansion area that was bounded by Hwy. 12 on the north and Hogback Ridge on the west between Knuppenberg Lake and Hogback Mountain. The Pigtail-Hogback ridge forms the southeast boundary between Hogback Mountain and the current ski area boundary. The survey area boundary then goes northwest and then north following the current western boundary of the ski area back to Hwy. 12. This survey covered all of the area included in the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003). The survey did not locate any occurrences of the 20 target PETS taxa.

Engle performed a complete area survey on June 6, 1990 for PETS plants taxa at a proposed 4000 sq. ft. site for wastewater disposal/treatment site behind the hotel units at White Pass Ski Area (Engle 1991). No PETS species were documented as part of this survey, nor was it located in the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003).

Parsons and Engle (1992) reported a survey occurring on August 26 and 27, 1992 that searched for PETS plant species at two proposed ski area developments. Both areas were surveyed at the complete level, and no occurrences of the twelve suspected PETS taxa were located. Proposed chairlift 8 was located east of chairlift 3, and the area surveyed was the forested draw east of chairlift 3 between the ski area and the William O. Douglas Wilderness boundary, down to Hwy. 12. This area is outside of the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003). The "glade -run," an area north of chairlift 4 joining proposed chairlift 5 and existing trails near chairlift 4, was surveyed because it was the location of a proposed ski trail not surveyed by Barker in 1987. This area is within the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003).

Parsons performed a complete level survey for PETS on August 12, 1993 at four proposed project areas (Parsons & Engle, 1993). The first area was for danger tree removal along Execution and Lower Roller ski trails. The next three areas were for bridge replacements in the cross-country ski area. No PETS plants were located, and none of the areas are within the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003).

Parsons performed another complete level survey for PETS on August 12, 1993 for the proposed new route of chairlift 1 (Parsons & Engle, 1994). The survey followed the route of the current quad chairlift 1 at White Pass Ski Area. No PETS plants were located, and the area is not within the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003). The report also analyzed the potential effects upon PETS plant species (no effects) for placing three weather stations at White Pass in ecologically disturbed locations (bottom of chairlift 1 and tops of chairs 1 and 4).

Massie performed a complete level survey on August 30 and September 1, 1994 for PETS species at the Cat Track, Old Holiday, and Mainstreet ski trail modifications/ additions (Massie, 1995a). No PETS plants were located, and the area is not within the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003).

One year later, Massie performed another complete survey on July 18, August 3 and 7, 1995, for PETS plant species at the proposed cross-country ski area trail expansion (Massie, 1995b). The three proposed trails were on the north side of Hwy. 12. No PETS plants were located, and the area is not within the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003).

A two day survey completed in October 1999 by Yurky and Wheeler searched for potential occurrences of S&M lichen, fungi, bryophyte, and vascular plant species (Leingang, 1999). The area surveyed corresponds to the currently proposed chairlift 5 corridor in Township 13N, Range 11E, Section 14 between the Pigtail-Hogback ridge on the east and the boundary of Section 15 on the west. Complete survey level protocol was used at structure development locations and during parallel transacts performed across the slope from top to bottom. Two S&M listed bryophyte species, *Ptilidium californicum* and *Rhizomnium nudum*, were located as a result of this survey. These species have been removed from the S&M list over the last four years (USDA, USDI, 2003 and USDA, USDI, 2000).

Wheeler made a field check on June 5, 2000 to analyze the habitat suitability for PETS and S&M plant species at proposed tower and landing locations of chairlift 3, a propane storage site, a generator shed site, and the day lodge expansion (Wheeler, 2000). These locations had unsuitable habitat for PETS and S&M plant species, and were not further surveyed. A ski trail adjacent to chairlift 3 was not "adequately" surveyed at the time. There is no further documentation supporting Wheeler's statement that "Forest Service specialists intend to complete surveys immediately following snowmelt. The area is not within the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003).

Ianni performed a complete level survey for PETS and S&M at the proposed yurt site near the bottom of chairlift 4 on July 15, 2002 (Ianni, 2002). No PETS or S&M plant species were located, and the area is not within the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003).

Ianni performed surveys for PETS and S&M plant species in the proposed 2003 White Pass Ski Area expansion on Julv 15 and October 16, 2002 (Ianni, 2003b). Surveys were performed at the complete level at structure development locations, and a general survey was performed along the approximate route location of chairlift 6. One S&M listed bryophyte species, *Rhizomnium nudum*, was located as a result of this survey. This species has since been removed from the S&M list (USDA, USDI, 2003).

Ianni made a field check visit to analyze the habitat suitability for PETS and S&M plant species at a proposed halfpipe construction site east of chairlift 3 (Ianni, 2003a). The site was deemed low probability habitat for PETS and S&M plant species, and no listed species were observed during a cursory examination of the area. The area is not within the proposed 2003 White Pass Ski Area Expansion (USDA, USFS, 2003).

Surveys at the White Pass Ski Area and associated proposed expansion areas have covered a majority (60-70%) of the terrain. New projects, revisions of proposed expansion areas, and changes to PETS and S&M plant species lists have driven the need for botanical surveys at White Pass. No currently listed PETS or S&M plant species are known to occur in the White Pass Ski Area and associated proposed expansion areas as a result of the surveys conducted in the area.

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Appendix H

Wildlife Technical Report and Biological Evaluation

1.0 WILDLIFE TECHNICAL REPORT AND BIOLOGICAL EVALUATION

1.1 INTRODUCTION

This biological evaluation and wildlife report was prepared for use by the U.S. Forest Service in conducting Section 7 compliance and NEPA analysis for the proposed White Pass MDP proposal. This report discusses potential occurrence of and impacts to species federally listed as threatened or endangered under the Endangered Species Act (ESA), U.S. Forest Service Survey and Manage species, U.S. Forest Service sensitive species, USFWS Species of Concern, USFS Management Indicator Species, and USFS Species of Local Concern for the Okanogan and Wenatchee National Forests and the Gifford Pinchot National Forest. Potential effects and the method used to determine whether or not effects would occur are discussed in this document.

This section describes the wildlife and wildlife habitat within the White Pass Study Area. The adjoining areas are described for the more regional setting, to place the White Pass Study Area in context with the surrounding conditions, and to adequately describe wide-ranging species such as elk, mountain goat, gray wolf, and grizzly bear. A regional map of the White Pass Study Area, including the Upper Clear Fork Cowlitz River and Upper Tieton River Modified 5th Field Watersheds, is provided in Figure 3-11. Information on wildlife was derived from background literature, color aerial photographs, field studies, and discussions with state and federal resource agencies including the U.S. Forest Service (USFS) and U.S. Fish and Wildlife Service (USFWS).

The White Pass Study Area lies within the Cascade Mountains of southern Washington. Both the Upper Clear Fork Cowlitz and Upper Tieton watersheds occur within the White Pass Study Area. The White Pass Study Area is defined as the area for which project specific GIS data has been developed and in which potential ground disturbance under all Action Alternatives would occur (i.e., the existing SUP area and the proposed expansion area). The White Pass Study Area is shown in Figure 2-2. For the purposes of differentiating locations where proposed activities would occur the White Pass Study Area has been further broken down into two components: the Proposed Expansion Area which includes Hogback Basin, and the Existing Ski Area which is comprised of the current White Pass Ski Area SUP boundary. Field surveys were conducted in all areas where activities may occur under any or each of the Action Alternatives.

Biologists performed field surveys to document the occurrence of special status wildlife species or their habitats, including species federally listed as threatened or endangered under the Endangered Species Act (ESA), species proposed for listing under the ESA, U.S. Forest Service Survey and Manage species, U.S. Forest Service (USFS) sensitive species, USFS Species of Concern, as well as other 2001 Record of Decision (ROD) species, and management indicator species for the OWNF and the GPNF. In addition to field surveys, background literature was reviewed, color aerial photographs were analyzed and interpreted and state and federal resource agencies were contacted to accumulate information on wildlife resources.

This section focuses on wildlife habitat associations, the likelihood that specific wildlife species occur within the White Pass Study Area, and specific habitat types that are used by wildlife species. In addition, a discussion of habitat connectivity within the context of the White Pass area is also presented. Many of the wildlife species that may occur within the White Pass Study Area, and the habitat characteristics of those species were based on species identified in the *OWNF Forest Plan, as Amended* (USDA 1990b; USDA, USDI 1994, 2001, 2004a), and the *GP Forest Plan, as Amended*, and species listed under the Endangered Species Act (ESA). Additional sources of information include the OWNF and GPNF Geographic Information System (GIS) and watershed database *Clear Fork Watershed Analysis* (USDA 1998a) and *Upper Tieton Watershed Analysis* (USDA 1998b), and numerous technical studies.

The following management terms associated with wildlife species are used throughout this section:

- US Fish and Wildlife Service (USFWS) threatened and endangered and proposed species as designated under the ESA;
- USFS Survey and Manage Species per the 2001 Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (USDA, USDI 2001);[1]
- USFS sensitive species, which are species for which there are viability concerns as determined by the 2004 Regional Forester's Sensitive Animal List (USFS 2004b);
- USFWS Species of Concern. Species of concern is an informal term that refers to those species, which the USFWS believes, might be in need of concentrated conservation actions. Species of concern receive no legal protection and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species; and
- USFS/OWNF/GPNF Management Indicator Species (MIS); the Forest Plans (USDA 1990a and 1990b) identifies standards and guidelines to manage these species as representatives of a wide range of vertebrate species.

[1] On January 9, 2006, the 2004 ROD to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (2004 ROD) was vacated and management direction for PETS and Survey and Manage species would be provided pursuant to the 2001 Record of Decision for management of these species. In this regard, the White Pass analysis area has been surveyed consistent with species identified in both the 2001 Record of Decision including any amendments or modifications to the 2001 ROD that were in effect as of March 21, 2004 (Table 1.1, December 2003), as well as, the 2004 ROD to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (2004 ROD).

Vegetation communities, described in detail in Section 3.5 – Vegetation, are the basis for the descriptions of wildlife habitat in this section. Additional information regarding the forest structure, (i.e., the, tree size, canopy layers, and canopy closure) is described in the Vegetation Technical Report and Biological Evaluation located in Appendix G.

1.2 AFFECTED ENVIRONMENT

The 1,570-acre White Pass Study Area is comprised of a mosaic of wildlife habitats.[2] Elevations within the White Pass Study Area range from approximately 4,900 feet to over 7,000 feet. Existing wildlife habitat conditions within the White Pass Study Area have been influenced by past natural and human-caused modifications including, timber harvest, wildfires, road construction, ski area development, other developed recreation, and existing human use of the facilities, including trails.

Wildlife resources are described for the White Pass Study Area and, where applicable, habitat is referenced and described outside of the White Pass Study Area to analyze for wide-ranging species, including elk, gray wolf, and wolverine, among others.

1.2.1 General Wildlife Habitat Associations

The *Clear Fork Watershed Analysis* reports approximately 271 species of wildlife potentially occurring within the watershed and the *Upper Tieton Watershed Analysis* reports approximately 256 known species within its boundaries (USFS 1998a; USFS 1998b). While some of these species may be restricted to either the lower elevations of these watersheds, or the drier eastern portions of the Upper Tieton watershed, the majority of the species have the potential to occur within the White Pass Study Area. Common species include deer, elk, and Neotropical migratory birds. Wildlife use throughout the area declines during the winter, with many birds and mammals migrating away from the area or retreating into hibernation.

The White Pass Study Area provides habitat for a variety of wildlife typically associated with late-seral mixed conifer and mountain hemlock forests, mountain hemlock parkland, as well as herbaceous communities. The White Pass Study Area contains habitat types primarily associated with forested cover and is dominated by approximately 654.4 acres of mountain hemlock parkland (42 percent of the White Pass Study Area) which makes up the majority of the proposed expansion area followed by approximately 528.5 acres of mixed conifer forest (34 percent of the White Pass Study Area) which comprises the majority of the existing White Pass Ski Area (refer to Table 3.5-1 in Section 3.5 – Vegetation). Other habitat types include mountain hemlock forest, modified herbaceous communities (i.e., ski trails), and rock/talus. In addition to forest community types, structural elements such as tree size, canopy closure,

[2] The current SUP indicates that the permit area is 710 acres. However, GIS analysis indicates that the actual SUP area is approximately 805 acres. As a result of the NEPA process, of which this FEIS is a part, the acreage will be re-calculated based on the best available data.

and canopy structure were used to determine habitat associations for wildlife species that may be present within the White Pass Study Area. Information for this analysis was derived from *Wildlife – Habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001). These habitat communities and vegetation types are described in greater detail in Section 3.5 – Vegetation and the *Vegetation Technical Report and Biological Evaluation* in Appendix G.

1.2.2 Key Wildlife Habitats and Associated Species

The respective Gifford Pinchot and Okanogan-Wenatchee Forest Plans, as Amended, have defined unique habitats as those features that are generally limited in their occurrence across the landscape such as wetland and riparian areas, cliffs, rock outcrops, talus, mature forest, snags, and downed logs. Unique habitat features typically provide critical breeding sites, feeding areas, and roosting sites for cavity-nesting birds, bats, and denning mammals. The level of dependence on unique habitat features varies from species to species. The unique habitat types present in the White Pass Study Area are described below.

Vegetation communities are described in detail in Section 3.5 – Vegetation, and provide the basis for the descriptions and analysis of wildlife habitat throughout this section. The amount of each vegetation type within the White Pass Study Area is presented in Table 3.5-1, and the distribution of these vegetation types throughout the White Pass Study Area is shown in Figures 3-31 and 3-34.

Wetlands and Riparian Habitats

Wetland and riparian habitats include wet meadows, forested wetlands (coniferous and hardwood), shrub wetlands, stream-associated (riverine) wetlands, and riparian areas. Wetlands and riparian areas are recognized by the USFS as important wildlife habitats for reproduction and foraging, and as movement corridors (USDA, USDI 1994). It is important to note that functional riparian zones differ in habitat value from Riparian Reserves. Riparian Reserves are designated within the Forest Plans, as Amended and may contain land cover types that do not serve as important riparian habitats. Functional riparian zones are more indicative of riparian areas that provide reproductive, foraging, and connectivity habitat for wildlife.

Riparian zones are an important habitat component for many species. They provide cover, foraging, calving, or nesting sites for species such as the northern spotted owl, pine marten, California wolverine, and elk. These riparian areas provide habitat and connectivity between habitats for many wildlife species, ensure bank stability and stable fish habitat, moderate water temperature, and represent a source of large woody debris for streams.

The condition of riparian habitat associated with streams and wetlands within the White Pass Study Area varies by elevation. Lower elevation riparian areas consist primarily of multi-story, closed canopy, late-seral forest and modified herbaceous open ski trails while higher elevations are comprised of small tree, single-story, moderate canopy mountain hemlock parkland.

In total, approximately 5.3 acres of wetlands and 632.3 acres of Riparian Reserves occur within the White Pass Study Area. These wetlands occur in both the proposed expansion area (Hogback Basin) and the existing ski area of the White Pass Study Area. Historic impacts to wetlands in the White Pass Study Area include the construction of lift terminals, ski trails, and roads within the existing SUP. The ecological processes of the wetlands found in Hogback Basin are functioning normally and there has been little alteration of these areas by human activity. Section 3.3 – Watershed Resources contains a complete description of wetlands within the White Pass Study Area.

Refer to Section 3.3 – Watershed Resources for a more thorough description of existing riparian conditions within the White Pass Study Area.

Late-seral Forest

Late-seral forest communities provide shelter, denning, and foraging habitat for many species potentially occurring within the White Pass Study Area. Late-seral forests are defined as stands greater than 80 years in age. There are approximately 1,235.8 acres of late-seral forest within the White Pass Study Area.

Past management activities within the White Pass Study Area have resulted in fragmentation of late-seral forests which presents challenges to wildlife species that require dense cover for foraging, denning, or travel such as pine marten, pileated woodpecker, and northern spotted owl. These species require dense forest for protection from predators. In addition the complex structure typically associated with late-seral forest stands, such as multi-story layers of vegetation and a closed canopy (greater than 70 percent canopy cover) provide unique foraging and denning habitats. This dense forest of multi-storied, closed canopy habitat can be found within the existing White Pass Ski Area. There are approximately 195.5 acres of small tree late-seral mixed conifer forest with multi-story vegetation and a closed canopy, and approximately 252.7 acres of medium tree late-seral mixed conifer forest with multi-story vegetation and a closed canopy; all within the existing ski area (refer to Table 3.5-2 and Figure 3-35). These forest stands are fragmented by numerous ski trails, particularly in the eastern portion. Several distinctions are important to note regarding late-seral forest and the White Pass Study Area. First, late-seral forests do not necessarily qualify as old growth. In order for a forest to be considered as old growth it must contain specific structural elements and characteristics. There is no old growth forest officially classified within the White Pass Study Area. However, certain portions of the forest within the existing ski area contain some old growth characteristics. Therefore, while the area hasn’t been officially labeled as old growth this does not preclude the possibility that some old growth dependent species, such as northern spotted owl and great grey owl may utilize the area from time to time.

It is equally important to note that not all late-seral forest within the White Pass Study Area provides these structural and habitat characteristics. The proposed expansion area, which is comprised primarily of late-seral mountain hemlock parkland, has a moderate canopy structure (40-69 percent cover of small trees) and consists of a single-story of forested vegetation interspersed with a mosaic of treeless openings.

Snags and Downed Logs

Many wildlife species depend on snags and downed logs. Snags are used by at least 100 vertebrate species in forests in western Washington and Oregon (Brown 1985; Johnson and O'Neil 2001). Some species require snags in conjunction with early-seral habitat; others are generalist species that prefer mid- to late-seral habitats. Downed logs and woody debris are primary breeding areas for such species as the pine marten, and foraging habitat for the pileated woodpecker. In addition, these structures hold moisture during the dry summer months providing a cool, moist environment necessary for low-mobility species that depend on this unique microclimate habitat; and during the winter downed wood provides shelter from extreme temperatures. The Forest Plans, as amended, emphasize protection and management of large woody material (LWM) to ensure ecosystem functioning. Large woody material is defined as logs on the forest floor in pieces at least 24 inches in diameter at the large end (FEMAT 1993). Guidelines have been established for the maintenance of woody debris and snags for cavity-nesting species including pileated (and other) woodpeckers (USDA 1990a).

DecAID, the decayed wood advisor and management aid, is a planning tool intended to help advise and guide managers as they conserve and manage snags, partially dead trees and down wood for biodiversity (Mellen et al. 2003). The DecAID Advisor is an Internet-based summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. The information presented on wildlife species use of snags and down wood is based entirely on scientific field research and does not rely on modeling wildlife populations. As such, it offers a new way of estimating or evaluating levels of dead wood habitat that provide for a wide array of species and ecological processes.

A critical consideration in the use and interpretation of the DecAID tool is that of scales of space and time. DecAID is best applied at scales of subwatersheds, watersheds, sub-basins, physiographic provinces, or large administrative units such as Ranger Districts or National Forests. DecAID is not intended to predict occurrence of wildlife at the scale of individual forest stands or specific locations. It is intended to be a broader planning aid not a species or stand specific prediction tool. As such, it was determined that it was unnecessary to use the DecAID tool here because the Proposed Action is on a scale much smaller than that for which DecAID was intended and the Proposed Action is not of the type that would modify forest vegetation over a large scale, such as a timber sale. In addition, there would be minimal impacts to snags as a result of the Proposed Action due to the open nature of the mountain hemlock parkland in which the majority of the development activity would occur. Mountain hemlock parkland, as described in the Vegetation section of the FEIS, is defined as a mosaic of treeless openings and small patches of trees (Johnson and O'Neil 2001). Impacts to this habitat are expected to be minimal as the proposed ski area design would utilize the natural openings in the parkland rather than cut new trails and only snags that present safety hazards along trails or lift lines would be felled. Therefore, the Forest Service determined that snags are not considered a significant issue for this project.

Snag and Coarse Woody Debris (CWD) generation within the White Pass Study Area was found to be primarily associated with vegetative communities below 5,500 feet elevation. This roughly correlates with the zone of mixed conifer in the existing ski area (refer to Figure 3-35). Snags created above this elevation are limited in size and number by the shorter growing season and location in the mountain hemlock parkland vegetation community, which makes up much of the proposed expansion area. Woody debris found within the expansion area is smaller, approximately 6-13 inches in diameter, and generally not large enough to be classified as LWM, as defined by the Forest Ecosystem Management Assessment Team (FEMAT). More to the point, woody debris of this size is not typically considered suitable denning and foraging habitat for cavity nesting birds, pine martens, and pileated woodpeckers; however, it does provide suitable habitat for smaller mammals and invertebrates. Based on field observations, the existing ski area portion of the White Pass Study Area contains sufficient amounts of CWD to support many different species (Forbes, personal communication 2004).

Numerous snags are present within the White Pass Study Area. Snags in the existing ski area are composed primarily of medium and small trees set in dense forest with multiple stories and closed canopies. Snags are abundant within the existing White Pass Ski Area. Snags in the proposed expansion area are more scattered, composed of small trees, and set amongst a moderate canopy, single-story parkland.

1.2.3 Threatened, Endangered, and Proposed Species

Threatened and endangered terrestrial wildlife species and/or their habitats known to occur or potentially occur within the White Pass Study Area are listed in Table 1. The northern spotted owl (*Strix occidentalis caurina*) is listed as threatened and is the only federally listed species that is likely to occur in the White Pass Study Area. The species status, habitat requirements, ecology, potential to occur within the White Pass Study Area, and nature of occurrence are described in the following table.

**Table 1:
Federally Listed Threatened or Endangered Species
Potentially Occurring within the Project Area**

Species	Habitat Association	Potential for Using Project Area
Northern spotted owl [a] (*Strix occidentalis caurina*)	Occurs in all coniferous forest types at low to mid elevations of the Cascade Mountains in Oregon and Washington. Most abundant in late-seral and mature forests. Nests in cavities or platforms in trees or snags (Forsman 2003).	The lower portions of the White Pass Study Area contain forest types that provide nesting, roosting, and foraging habitat. The upper portions of the White Pass Study Area could provide some dispersal habitat. May disperse through White Pass Study Area.
Designated Critical Habitat for the Northern Spotted Owl	Habitat that provides the functional elements of habitat for the Northern Spotted Owl. This includes nesting, foraging, roosting, and dispersal habitat.	There are approximately 14 acres of CHU, WA-18 in the project area.
Canada Lynx [a] (*Felis Lynx canadensis*)	Requires early-successional forest for primary prey (snowshoe hare) and late-successional forest for breeding (Ruediger et al. 2000). Primary habitat does not exist in the project area (USFS and USFWS 2006).	Early successional forest is lacking in area. Not expected to occur within the White Pass Study Area.
Grizzly Bear [a] (*Ursus arctos*)	Vast areas of remote, undisturbed habitat; a variety of habitats including meadows, wet areas, open slopes with huckleberries (USFWS 1993).	Developments, such as highways, trails, campgrounds, and ski area have reduced the area of undisturbed habitat. Not expected to occur within the White Pass Study Area.
Gray Wolf [a] (*Canis lupis*)	Vast areas of remote, undisturbed habitat; isolation from human disturbance for denning (Paradiso and Nowak 1982).	Developments, such as highways, trails, campgrounds, and ski area have reduced the area of undisturbed habitat. Not expected to occur within the White Pass Study Area.
Bald Eagle (*Haliaaetus leucocephalus*)	Almost always found near large bodies of water where primary prey items of fish and waterfowl can be found (USFWS 1986).	Potential foraging by bald eagle likely occurs at Leech Lake.
Marbled Murrelet (*Brachyrampus marmoratus*)	Mature and old-growth forest with trees having large-diameter branches for nesting (Hamer and Cummins 1991) within 50 miles of eastern Puget Sound, (Puget Sound Zone, USFWS 1997).	Project area is outside the Puget Sound Zone; therefore, habitat for this species is not present in the White Pass Study Area. This species will not be discussed further.

[a] Consultation with USFWS for these species is ongoing throughout this FEIS process and the final Biological Assessment is published in Appendix N of this FEIS.

1.2.3.1 Northern Spotted Owl (Strix occidentalis caurina)

The northern spotted owl was listed as a threatened species by the USFWS in 1990 (55 FR 26194) and critical habitat was designated in 1992 (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 (NRF) activities 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; Forbes, personal communication 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 Pacific Northwest 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 percent (range 16-89 percent) 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; and 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 White Pass Study Area

The Gifford Pinchot and the Okanogan-Wenatchee National Forests GIS database indicate the presence of spotted owl NRF) habitat, and dispersal habitat in the White Pass Study Area. NRF within the White Pass Study 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 where adequate canopy cover (generally considered to be 40 percent or greater) is present.

There are approximately 1,570 acres of northern spotted owl habitat within the White Pass Study Area, including approximately 216 acres of NRF habitat, 1,024 acres of dispersal habitat, and 330 acres of non-forested habitat (talus, open water, cleared ski trails) (refer to Figure 3-39). The proposed Hogback expansion area is primarily classified as dispersal habitat, whereas the existing ski area SUP is primarily NRF habitat. 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 (LSR) or Managed Late Successional Areas (MLSA). More than 5,560 acres or 60 percent of the Upper Clear Fork Cowlitz Watershed Study Area is in LSR or MLSA allocation to the north and west of the White Pass Study Area. The LSR located in the vicinity of the White Pass Analysis Area are RW-153 on the east side and RW-144 on the west side. The areas to the east and south of the White Pass Study Area are in Wilderness. In addition, the non-wilderness portions of the Upper Tieton watershed to the east of the Project Area are also largely composed of LSR and MLSA.

The Critical Habitat Units (CHU) located in the vicinity of the White Pass Study Area are WA-18 on the east side and WA-37 on the west side. A portion of CHU WA-18 (approximately 14 acres) extends into the White Pass Study 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 White Pass Study Area, surveys for northern spotted owls were conducted inside portions of the White Pass Study 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 White Pass Study Area. No detections were made during these surveys. The vegetation in the White Pass Study 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 and fragmented NRF habitat within the White Pass Study Area, northern spotted owls are not expected to occur on a regular basis.

1.2.3.2 Canada Lynx (Felis lynx canadensis)

The Canada lynx (*Lynx canadensis*) is listed as threatened under the ESA and by the USFWS and 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 1998). 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 White Pass Study Area

Nearly all of the White Pass Study 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 White Pass Study Area, less than one resident lynx (not including kittens) could be expected to utilize the White Pass Study Area as a portion of their territory. However, there is little to no forage habitat within the White Pass Study 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 (USDA 2000d). According to guidelines established in the Lynx Habitat Mapping Direction memo, the White Pass Study 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 (USDA 2000d). Additionally, according to the Lynx Conservation Assessment Strategy (LCAS) and the Canada Lynx Conservation Agreement (USFS, USFWS 2005), which is an interim measure to promote the conservation of Canada lynx on Federal lands, the White Pass Study Area is located in peripheral lynx habitat. The habitat in the White Pass Study Area is considered unoccupied by the Occupied Mapped Lynx Habitat Amendment to the Canada Lynx Conservation Agreement (USFS, USFWS 2006). There have been no sightings or evidence of lynx use of the White Pass Study Area.

Since lynx prefer to travel through forest cover, and use riparian areas, saddles and ridges as travel habitat, the majority of the White Pass Study 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 White Pass Study Area to both the north and south. A more detailed discussion of habitat connectivity is contained later in this section. Use of the White Pass Study Area by Canada lynx is expected to be limited to rare pass-through dispersal events.

1.2.3.3 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. Preferred habitat is dense conifer forest interspersed with large meadows. Wolf territories are associated with areas of low human use, including undeveloped 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). 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.

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 acre 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. Wolves follow migrating big-game herds to lower elevation winter range areas. 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 1 mile or less per square mile of habitat (Theil 1985; Jensen et al. 1986).

Occurrence within the White Pass Study Area

The Forest Service has not conducted inventories for gray wolves in the vicinity of the White Pass Study 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 Upper 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 0.675 mile per square mile. Road densities for the Upper Clear Fork Cowlitz watershed exceed recommended targets for gray wolf management.

A large ungulate prey base exists within the White Pass Study Area during the summer season and extensive unroaded lands (Goat Rocks Wilderness and William O. Douglass Wilderness) connect to the White Pass Study Area. Big-game species are present within the White Pass Study Area during the summer but migrate to lower elevations during the winter in order to access more readily available sources of food. Thus, the presence of wolves is assumed during the summer and early fall. However, due to the high road density and recreational activity within the watersheds on a year-round basis, as well as absence of prey during the winter season, wolves are not expected to occur regularly within the White Pass Study Area.

1.2.3.4 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 1 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; and

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

Within the White Pass Study 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 White Pass Study 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 Study 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 White Pass Study Area or on the Naches or Cowlitz Valley Ranger Districts; although there have been confirmed sightings on the OWNF (USDA 1998a) to the north of the White Pass Study Area. A large ungulate prey base exists in the White Pass Study 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 White Pass Study 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 White Pass Study Area, habitat suitability for grizzly bears is greatly reduced by the existing level of human use in the White Pass Study Area. Given the low number of grizzly bears thought to occur in the Cascades and this reduced habitat suitability, regular use of the White Pass Study 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 White Pass Study 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).

1.2.3.5 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 to large sized 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 as of this time.

Occurrence within the White Pass Study Area

There is one documented occurrence of nesting bald eagle on Rimrock Lake, approximately 6 miles east of the White Pass Study Area. Bald eagles potentially forage around Leech Lake, which is located within the White Pass Study Area. Therefore, the occurrence of Bald Eagle within the White Pass Study Area is expected to be limited to pass through events.

1.2.3.6 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 White Pass Study Area

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

1.2.4 US Forest Service Survey and Manage and Protection Buffer Species

Six species of wildlife on the USFS Survey and Manage Species list for the OWNF and GPNF may occur within the White Pass Study Area. Where surveys were required and protocols exist surveys were conducted for terrestrial mollusks and amphibians. The species status, habitat requirements, ecology, potential to occur in the White Pass Study Area, and nature of occurrence are listed in Table FEIS1 and described below.

**Table FEIS1:
Wenatchee and Gifford Pinchot National Forest Survey and Manage Species Potentially Occurring within the White Pass Study Area**

Species	Habitat Association	Potential for Using White Pass Study Area
Puget Oregonian (*Cryptomastix devia*)	Mature to late successional moist forest and riparian zones, under logs, in leaf litter, around seeps and springs, and often associated with hardwood debris and leaf litter and/or talus (BLM 1999).	Not expected to occur in White Pass Study Area. Potentially suitable habitat in White Pass Study Area surveyed to existing protocol (Furnish et al. 1997a), Species not found.
Warty jumping-slug (*Hemphillia glandulosa)*	Moist conifer forests. Associated with conifer logs and/ or heavy ground cover of low vegetation, litter, and debris (BLM 1999).	Not expected to occur in White Pass Study Area. Potentially suitable habitat in White Pass Study Area surveyed to existing protocol (Furnish et al. 1997a), Species not found.
Malone jumping slug (*Hemphillia malonei*)	Moist forests, associated with riparian habitat or wet areas (i.e., seeps), and large woody debris.	Not expected to occur in White Pass Study Area. Potentially suitable habitat in White Pass Study Area surveyed to existing protocol (Furnish et al. 1997a), Species not found.
Keeled jumping-slug (*Hemphillia burringtoni*)	Moist conifer forests. Associated with conifer logs and/ or heavy ground cover of low vegetation, litter, and debris (BLM 1999).	Not expected to occur in White Pass Study Area. Potentially suitable habitat in White Pass Study Area surveyed to existing protocol (Furnish et al. 1997a), Species not found.
Blue-gray taildropper (*Prophysaon coeruleum*)	Rare in Washington; occurs in deep forest floor litter and/or associated with logs and other late successional forest components (Burke 1999).	Not expected to occur in White Pass Study Area. Potentially suitable habitat in White Pass Study Area surveyed to existing protocol (Furnish et al. 1997a), Species not found.
Larch Mountain Salamander (*Plethodon larselli*)	Talus slopes within Douglas-fir forests. Talus may have covering of moss kept moist by forest overstory (Csuti et al. 2001).	Not detected in White Pass Study Area. Potentially suitable habitat in White Pass Study Area surveyed to existing protocol (Crisafulli 1999), Species not found.
Van Dyke's Salamander (*Plethodon vandykei*)	Usually among large, woody debris within the wetted edge of streams and seeps. Near the northernmost edge of known range (Leonard et al. 1993).	Potentially suitable habitat present near seeps and streams. No observations during 1998-2001 surveys.
Great Gray Owl (*Strix nebulosa*)	Mature forest stands with greater than 60 percent canopy cover within 1,000 feet of natural openings and meadows larger than 10 acres. (Regional Interagency Executive Committee 1995).	Potentially suitable habitat is present within the White Pass Study Area however there were no observations of this species during surveys.

Table FEIS1:
Wenatchee and Gifford Pinchot National Forest Survey and Manage Species Potentially Occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using White Pass Study Area
Long-legged myotis (*Myotis volans*)	A variety of habitats including arid range lands, and humid coastal and montane forests. Summer day roosts are in buildings, rock crevices, fissures in the ground, and tree bark. Maternity colonies occur in attics, fissures in the ground, and under tree bark. Caves and mines are used for night roosts and hibernacula (Nagorsen and Brigham 1993).	May roost and forage in White Pass Study Area.
Long-eared myotis (*Myotis evotis*)	Forested habitat below the subalpine/parkland zone; roosts in trees, buildings, and caves and occurs in areas of low-density development (Johnson and Cassidy 1997).	May roost and forage in White Pass Study Area.
Silver-haired bat (*Lasionycteris noctivagans*)	Prefer older Douglas-fir/western hemlock forest to younger forests. Choose trees larger and taller than average, dead or damaged trees that contain refuge (Christy and West 1993). Forage primarily in clearcuts (Erickson and West 1996).	May roost and forage in White Pass Study Area.
Fringed myotis (*Myotis thysanodesa*)	Bunchgrass, interior Douglas-fir forest and ponderosa pine forest (Nagorsen and Brigham 1993).	No suitable habitat occurs within the White Pass Study Area.[a]
Pallid bat (*Antrozous pallidus*)	Low elevation, dry shrub-steppe and ponderosa pine forest.	No suitable habitat occurs within the White Pass Study Area.[a]

[a] As no suitable habitat for fringed myotis and pallid bat is present within the White Pass Study Area these species are not included in the following analysis.

1.2.4.1 Terrestrial Mollusks

Based upon pre-field discussions by Interdisciplinary Team (IDT) members and specialists, it was determined that the following Survey and Manage terrestrial mollusks (USDA, USDI 1994) may occur within the White Pass Study Area:

- Puget Oregonian,
- Keeled jumping-slug,
- Warty jumping-slug,

- Malone jumping slug, and
- Blue-gray taildropper.

These species are now listed on the Regional Forester's Sensitive Species List for the GPNF and the OWNF.

Habitat Requirements and Ecology

These mollusks occur in a variety of forest habitats. They are widely distributed in coniferous forest plant associations and dependent on specific habitat components such as rock outcrops, hardwoods or large logs. However, specific details on life span and reproduction for these species are largely unknown (BLM 1999).

The **Puget Oregonian** (*Cryptomastix devia*) is a medium to large sized snail (20 to 25 mm diameter) and is found in mature or late-successional forests in riparian zones, in association with leaf litter, and logs. It is often found close to seeps and springs and may be associated with hardwood leaf litter and debris, and/or talus. This species is often found in areas dominated by big-leaf maple and may be restricted to the low-to mid-elevational areas where these species occur (BLM 1999).

The **keeled jumping-slug** (*Hemphillia burringtoni*) and the warty jumping-slug (*Hemphillia glandulosa*) are both small slugs (13 to 26 mm long) that are found in moist coniferous forests in association with logs, a large amount of low ground cover, litter, and debris (BLM 1999).

The **Malone jumping slug** (*Hemphillia malonei*) has been found above 4,000 feet on the St. Helens Ranger District of the GPNF. This species is often found in moist forests, associated with riparian habitat or wet areas (i.e., seeps), and large woody debris. Potentially suitable habitat for this species is located within the riparian zone of the larger ponds within the proposed expansion area. Since these ponds would not be impacted by the Proposed Action, surveys were deemed unnecessary (Burke 1999).

The **blue-gray taildropper** (*Prophysaon coeruleum*) is found at higher elevations in Oregon, but is considered very rare in Washington (Burke 1999). However, currently known populations in Washington occur south of US 12, in the Cispus River Watershed south of Randle. While this species may be more likely to occur in the expansion area based on habitat observations across its total range, it is not expected to occur for the following reasons: 1) from observations of the blue-gray taildropper in captivity it appears to be sensitive to temperature extremes and 2) within its range in Washington, and in populations in central Oregon, they occur in relatively deep forest floor litter and/or are associated with logs and other late successional forest components. If this species occurs within the White Pass Study Area it would most likely be found in the riparian habitat or around some of the larger ponds. Surveys conducted in 1999 did not find any individuals or populations of the blue-gray taildropper (Leingang 1999).

Occurrence within the White Pass Study Area

Site visits and surveys in the proposed expansion area resulted in the determination that the area contains marginal habitat for USFS sensitive terrestrial mollusks (Burke 1999; Forbes, personal communication 2004). The blue-gray taildropper may potentially be found in riparian areas surrounding some of the larger ponds, which are characterized by a distinct increase in hydrophytic vegetation; however these ponds would not be impacted by the Proposed Action. None of the USFS sensitive terrestrial mollusk species were observed during any of the surveys conducted within the proposed expansion area in 1999 (Leingang 1999). Based on these surveys, the Puget Oregonian, Keeled Jumping-Slug, Warty Jumping-Slug, and the blue-gray taildropper are not expected to occur within the upper elevations of the White Pass Study Area (i.e., the proposed expansion area); however, suitable habitat may exist within the existing ski area. No surveys have been conducted for terrestrial mollusks within the existing ski area.

1.2.4.2 Larch Mountain Salamander (Plethodon larselli)

The Larch Mountain salamander is a Survey and Manage species under the Forest Plan, as amended. The Larch Mountain Salamander is also on the Regional Forester's Sensitive Species List for the GPNF and the OWNF.

Habitat Requirements and Ecology

Historically considered a talus obligate, Larch Mountain salamander has more recently been found to occupy a much broader range of habitats. Vegetation types within known sites vary from areas that are dominated by lichens and mosses to those dominated by late-seral forests. Larch Mountain salamanders have also been found in and near the entrances of caves and in and around seeps (Crisafulli 1999).

The distribution and abundance of this species is poorly known (Csuti et al. 2001). They are, however, thought to have small home ranges and limited capability to disperse (Crisafulli 1999).

The Larch Mountain salamander is entirely terrestrial and does not include a larval stage. Although habitat is variable, as described above, the common component of habitat used by this species are moist, cool conditions. The Larch Mountain salamander feeds on a variety of prey items, including mites and springtails. Larger individuals may also consume snails and earthworms (Csuti et al. 2001).

Occurrence within the White Pass Study Area

The known distribution of the Larch Mountain salamander is limited to areas within 22 km of the Columbia River in Multnomah and Hood River Counties and several locations in Washington. Within Washington, the highest known population of Larch Mountain salamander occurs at approximately 3,400 feet, well below that of the White Pass Study Area. One population has been documented on the Cowlitz Valley Ranger District of the GPNF (USDA 1999). Although habitat associations of Larch Mountain salamander are known to vary, as described above, upper elevation areas (above approximately 5,500 feet) do not provide suitable habitat because the area is comprised primarily of parkland habitat, which consists of tree islands composed of mountain hemlock, interspersed with grass and herbaceous vegetation. In addition, the soils are generally low in organic matter and dry quickly after snowmelt. Talus material is limited and rarely exhibits the moist, mossy, shady conditions thought to be prime habitat for Larch Mountain salamanders. Habitat types identified as potentially suitable for these species includes late-seral closed canopy forest (448.2 acres), all types of late-seral open canopy forest except the subalpine fir forest of which there is a total of 133.4 acres available in the White Pass Study Area, and talus (52.5 acres). However, the majority of the talus slopes present within the White Pass Study Area are located along Hogback Ridge, well out of the known range of these species (refer to Figure 3-31).

1.2.4.3 Van Dyke's Salamander (Plethodon vandykei)

Habitat Requirements and Ecology

Van Dyke's salamander is a Survey and Manage species under the Forest Plan, as amended and is currently listed as a candidate species by WDFW. It is associated with riparian areas of streams and seeps containing mature forest habitat and large down wood (Leonard et al. 1993). This species may also be found far from water, usually on north-facing slopes with a thick cover of moss. They have also been located in seepages over talus and in rock faces (Leonard et al. 1993).

Occurrence within the White Pass Study Area

Surveys for Van Dyke's salamanders were conducted in the proposed expansion area due to the proximity of the White Pass Study Area to the Cascade Crest and the fact that little is known about the distribution of this species. No Van Dyke's salamanders were located during protocol surveys and therefore, the species has a status of "not detected" in the White Pass Study Area (Pearson 1997).

1.2.4.4 Great Gray Owl (Strix nebulosa)

Habitat Requirements and Ecology

The great gray owl is a Survey and Manage species now listed as Sensitive on the Regional Forester's Sensitive Species List. Mature, old-growth stands or remnants of older trees and snags are an essential element. They use abandoned nests, typically built by other raptors or corvids, or broken tree tops and snags large enough to suit this large species. Great grey owls typically choose nest stands near an opening (man-made or natural) and with 60 percent canopy closure with an open understory (Regional Interagency Executive Committee 1995). The great gray owl depends upon late-seral forest habitat for nesting, especially large tree, multi-story, closed canopy forest. There are 510.7 acres of this habitat type available within the White Pass Study Area, all of which are located in the existing ski area (refer to Table 3.5-2 and Figure 3-35). In the White Pass Study Area, this would include all of the moderate canopy late-seral vegetation types except mountain hemlock parkland, which does not provide suitable canopy cover and nesting trees. Great gray owls prefer to forage in open areas. Within the White Pass Study Area there are approximately 988.4 acres of potential foraging habitat (modified herbaceous areas, mountain hemlock parkland, and the small tree, multi-story, open canopy vegetation) (refer to Figure 3-35).

Occurrence within the White Pass Study Area

Great gray owl surveys were conducted during 1997 following the 1995 great gray owl survey protocol; no owls were recorded and no further surveys have been conducted. Surveys were conducted in the vicinity of proposed expansion elements involving the removal of trees representing potentially suitable nesting habitat. These survey areas were along the edges of the proposed expansion area where the trees are larger. The interior of the proposed expansion area was deemed inadequate for nesting but would provide suitable foraging opportunities. Because the White Pass Study Area is within the range of the great gray owl, owls may occasionally pass through the area as part of the overall movement and distribution of the species within its range. There have been no documented occurrences of great gray owl on the GPNF or the OWNF (Forbes, personal communication 2004; Kogut, personal communication 2004).

1.2.4.5 Long-eared Myotis (Myotis evotis) and Long-legged Myotis (Myotis volans)

Habitat Requirements and Ecology

In Washington, the long-eared myotis and the long-legged myotis are widespread throughout the state (Johnson and Cassidy 1997). These species of myotis use a range of roost types during the summer such as loose tree bark, snags, and rock crevices (Maser et al. 1981). Foraging habitat for these species is associated with cliffs, forest openings, and over water (Bat Conservation International website 2007). Maternity colonies for the long-legged myotis are located in attics, fissures in the ground and under the bark of trees. Maternity colonies for long-eared myotis are usually located in buildings (Nagorsen and Brigham 1995).

Occurrence within the White Pass Study Area

New information indicates these myotis species maybe be present in or adjacent to the White Pass Study Area using live trees or snags as roost during the summer (Forbes, personal communication 2006). There are, however, no mines, caves, abandoned buildings or bridges within the White Pass Study Area that might be used by these myotis species. It is considered unlikely that these species, if present, are year-round residents in the White Pass Study Area (Forbes, personal communication 2004). If present during the summer, they most likely hibernate elsewhere during the winter season. It is likely that these species may forage within the White Pass Study Area.

1.2.4.6 Silver-haired bat (Lasionycteris noctivagans)

The silver-haired bat is listed as a species identified with management recommendations in the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines 2001. These management recommendations are intended to provide additional feasible protection for roost sites for bats.

Habitat Requirements and Ecology

The silver-haired bat is generally regarded as a tree bat although specific information on its summer roosting habits is limited (Nagorsen and Brigham 1995). Individuals have been known to utilize crevices in tree trunks, fissures in tree bark, abandoned woodpecker holes and bird nests. Typically, the silver-haired bat roosts alone or in small groups. This species hunts throughout the night. Prey items include small insect species such as moths, midges, leafhoppers, caddisflies, flies, beetles, ants, and termites.

It is unclear whether silver-haired bats migrate during the winter or if they hibernate (Nagorsen and Brigham 1995; Bat Conservation International website 2004).

Because this species utilizes trees for day roosts, maternity colonies, and (potentially) hibernacula, it is a species that is highly dependent of on late-seral forest as well as the availability of snags.

Occurrence within the White Pass Study Area

Late-seral forest within the White Pass Study Area provides suitable habitat for the silver-haired bat. It may occur within the White Pass Study Area.

1.2.5 Forest Service Sensitive Species

Four species of wildlife on the Regional Forester's Sensitive Species List for the OWNF and GPNF may occur within the White Pass Study Area. Where surveys were required and protocols existed, surveys were conducted (e.g., great gray owl). Species that have no survey protocol, presence was assumed based upon the occurrence of suitable habitat. The species status, habitat requirements, ecology, potential to occur in the White Pass Study Area, and nature of occurrence are listed in Table 2 and described below.

Table 2:
Wenatchee and Gifford Pinchot National Forest Sensitive Species
Potentially Occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using White Pass Study Area
American peregrine falcon (*Falco peregrinus anatum*)	Nest on cliffs near large concentrations of waterfowl or flocking birds (Johnsgard 1990). Known eyrie east of Dog Lake.	May forage in general White Pass Study Area and may occur as occasional migrant.
California wolverine (*Gulo gulo luteus*)	Requires vast areas of remote, undisturbed habitat (Banci 1994). Sensitive to human disturbance.	Human use is seasonally high along the Pacific Crest Trail (summer) and in the ski area (winter). May occur in White Pass Study Area.
Pacific western (Townsend's) big-eared bat (*Corynorhinus townsendii*)	Associated with caves, mines, rock crevices, and buildings which are used as both day and night roosts. Forested regions on both sides of the Cascades (Csuti et al. 2001).	Roost features limited in the White Pass Study Area. May use the White Pass Study Area for foraging.

1.2.5.1 American Peregrine Falcon (Falco peregrinus anatum)

The peregrine falcon was listed under the Endangered Species Conservation Act of 1969, and subsequently transferred to the ESA of 1973. It was federally delisted in 1999 (64 FR 46541-46558). It is currently on the USFS sensitive species list.

Habitat Requirements and Ecology

The peregrine falcon has adapted to a wide range of prey and nesting locations. The most critical habitat component for peregrine falcons is suitable nest sites, usually cliffs overlooking fairly open areas with an ample food supply.

Nesting habitat in the western United States most often includes tall rocky faces or cliffs overlooking an open expanse of lake, marsh or river bottomland. During winter migration, peregrine falcons may travel long distances and could potentially be present in many different habitats. Peregrine falcons most often winter in open non-forested areas near large bodies of open-water where concentrations of prey, particularly waterfowl, are available.

The peregrine falcon nesting season begins in March, with young usually fledged by late August. Peregrines defend a territory around the nest site, with the area defended varying between 100 yards to a mile from the nest. The home range territory in which they hunt varies in size from 25 to 100 square miles (Csuti et al. 2001).

Occurrence within the White Pass Study Area

There has been one reported sighting of a peregrine falcon in the Pigtail Peak area in August 1992. It was most likely an individual foraging. The nearest known eyrie is located east of Dog Lake, approximately 2.5 miles away. While infrequent foraging by peregrine falcons may occur, no nest sites are known to exist nor are there any suitable cliffs for nest sites within the White Pass Study Area. The Proposed Action is not expected to impact the ability of the peregrine falcon to forage in the area. Thus, there will be no further analysis of this species.

1.2.5.2 California Wolverine (Gulo gulo luteus)

Besides being a Region 6 sensitive species, the California wolverine is listed as a species of concern by the USFWS and is a candidate for listing by the WDFW. The current distribution of wolverines in Washington is unknown, although there are 28 records of documented sites from 1970 to 1990 that are primarily concentrated in north and central Cascades and in the northeastern corner of the state (Banci 1994; Johnson and Cassidy 1997).

Habitat Requirements and Ecology

Wolverines utilize a variety of habitats, ranging from tundra, taiga, and boreal forest in the northern portion of their range to high-elevation mixed conifer forest in the southern portion. In Washington, wolverines have been documented primarily within conifer forest habitats. Distribution appears to be closely tied to the availability of food, usually large animals such as elk that are primarily taken as carrion (Banci 1994). Although they are generally considered a high-elevation species they may follow ungulates to lower elevations during winter, when other sources of prey (i.e., marmots, hares, and various rodents) are inactive and largely unavailable (Marshall et al. 1996).

The Washington Gap Analysis identified subalpine and alpine zones as potential habitat (Johnson and Cassidy 1997). Wolverines prefer mature timbered areas that contain natural openings such as cliffs, slides, timber blowdown, basins and meadows. Alpine cirques are also known to provide important wolverine habitat. In the summer, they inhabit higher elevations, especially alpine-fir forests (Reel et al. 1989). Wolverines are known to utilize remote unroaded areas and are found almost entirely in areas that have not been developed, extensively modified, or accessed by humans. Wolverines appear not to tolerate land use activities that permanently alter or fragment and provide human access to habitats (Banci 1994). They are primarily nocturnal and they do not hibernate but may be inactive during inclement weather (Strickland et al. 1982).

Information on habitats used for denning, resting, foraging, and dispersal in the southern portion of the wolverine's range is limited. In northern areas natal dens occur in snow tunnels, holes dug under fallen trees, hollow logs, CWD, cavities in trees, old bear dens, abandoned beaver lodges, caves, under tree roots, and in rocks and boulders. Boulder fields located in alpine cirques seem to be important locations for natal dens (Forbes, personal communication 2004). Breeding usually is in late spring or early summer and young are produced from February to May and remain with the female for two years (Verts and Carraway 1998; Maser 1998). These types of sites may also be used as resting areas (Banci 1994). A study conducted in Montana found that resting sites were often located in timber types that provided cover (Hornocker and Hash 1981).

Wolverines have large home ranges that span a variety of habitats, with results of various telemetry studies concluding that home ranges for males range from 91 square miles to 354 square miles, while those of females are smaller, particularly if they have a litter (Marshall et al. 1996). The wolverine is a snow-evolved mammal with a large home range that could easily cross watershed boundaries.

Occurrence within the White Pass Study Area

Potentially suitable foraging and dispersal habitat is present within the White Pass Study Area and areas of CWD, which occur primarily within the existing ski area, could provide suitable denning habitat. Wolverines are habitat generalists and are therefore capable of utilizing all of the habitat types within the White Pass Study Area.

During the winter the regular prey base (deer and elk) for wolverines is limited within the White Pass Study Area due to deep snow pack; therefore, wolverines are not expected to occur on a regular basis during this time. Wolverines have been documented in the Tatoosh Wilderness of the Upper Clear Fork Cowlitz Watershed and several sightings have been recorded within the Upper Tieton River Watershed (USFS 1998a; USFS 1998b). The wolverine is not a common species in Washington, and occurs in low densities throughout its range; however it is known to occur in the Washington Cascades and may utilize the White Pass Study Area as part of a larger home territory. While the White Pass Study Area supports both vegetative and security habitat preferred by wolverine, no wolverine sightings have been reported.

1.2.5.3 Pacific Western (Townsend's) Big-Eared Bat (Corynorhinus townsendii)

The Pacific Western (Townsend's) big-eared bat is included on the Regional Forester's Sensitive Species List. Concern for the Pacific Western (Townsend's) big-eared bat stems from documented declines in populations that occur as scattered groups throughout the State; the limited amount of habitat available for this species, and it's intolerance for human disturbance at both nursery sites and hibernaculum (Marshall et al. 1996).

Habitat Requirements and Ecology

Pacific Western (Townsend's) big-eared bat is commonly considered a cave-dwelling species. As such, caves and abandoned mines are considered critical habitat for the species (Verts and Carraway 1998). Buildings and bridges are frequently used as night roosts (Csuti et al. 2001). They use caves or cave-like structures as roosts and although it has been documented that this species of bat will use snags as roots on occasions, it doesn't appear that snags are a primary roost type (Maser et al. 1981; Christy and West 1993). Females form nursery colonies that range in size from a dozen to several hundred individuals, usually within dimly lit areas of caves, mines, or buildings. Young are born from April-July depending on temperature, elevation, and latitude.

Foraging habitat for Townsend's big-eared bat includes forest edges, roads, or forest openings (Christy and West 1993). This bat tends to be late flying, emerging from the day roost approximately one hour after sunset (Nagorsen and Brigham 1995).

Townsend's big-eared bats are intolerant of human disturbance at both winter hibernacula and summer roosts (Csuti et al. 2001) and may abandon these sites in response to disturbance (Nagorsen and Brigham 1995). Marshall et al. (1996) reported research conducted in Oregon found that, between 1975 and 1985, populations had declined by approximately 58 percent west of the Cascades and 16.4 percent to the east of the Cascades. It was estimated that 2,800 individuals occupied the state at that time (Marshall et al. 1996).

Occurrence within the White Pass Study Area

There have been no surveys for Pacific Western (Townsend's) big-eared bats within the White Pass Study Area; however, based upon habitat requirements it is unlikely that the White Pass Study Area is likely to support a viable population of this species. The approximately 988.4 acres of foraging and dispersal habitat (forest edges, small tree, single-story, open canopy forest) within the White Pass Study Area could be used as foraging habitat. The lack of suitable roosting habitat (mines, caves, abandoned building, bridges) in the White Pass Study Area further reduces the probability of a population of Pacific Western big-eared bats would exist.

Reproductive habitat in the form of mines, caves, abandoned buildings, or bridges for the Pacific Western (Townsend's) big-eared bat is absent from the White Pass Study Area. However, there are approximately 988.6 acres of foraging and dispersal habitat (forest edges, small tree, single-story, open canopy forest) present within the White Pass Study Area. The White Pass Study Area would not provide enough habitat for a viable population but it could be part of a larger territory. Pacific Western Big-eared Bats may be present in or adjacent to the White Pass Study Area using live trees or snags as roost and foraging along the forest edges created by existing ski trails during the summer season. There have been no surveys for this species within the White Pass Study Area however it is unlikely that there is a viable population of Pacific Western (Townsend's) Big-eared Bats within the White Pass Study Area. The lack of caves, mines, building, or bridges suitable for roosting, maternal colonies, and hibernacula limits the likelihood that roosting activities would occur within the White Pass Study Area.

1.2.6 U.S. Fish and Wildlife Service Species of Concern

Several species of wildlife have been identified by the USFWS as being of increased concern, although they are not listed under the ESA. Species in this category that are either suspected or documented within the White Pass Study Area are listed in Table 3.

Table 3:
USFWS Species of Concern
Potentially Occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using Project Area
Cascades Frog (*Rana cascadae*)	Highly aquatic; closely associated with edges of seeps and other wetlands (Leonard et al. 1993).	Known to occur in White Pass Study Area.
Olive-sided flycatcher (*Contopus borealis*)	Northern and mountainous coniferous forests; perches on high dead branches (Stokes & Stokes 1995) or dead tops of trees (Ehrlich et al. 1988).	Known to occur in White Pass Study Area.

1.2.6.1 Cascade Frog (Rana cascadae)

Habitat Requirements and Ecology

The Cascade frog is distributed throughout the Cascade Range in the aquatic/riparian zones. It is closely associated with edges of seeps and other wetlands (Leonard et al. 1993). This species breeds from March to June and the adults use the same sites for breeding year after year. Breeding adults utilize wet meadows, marshes, ponds, and lakes; following breeding season adults can be found along slow moving reaches of streams and rivers. Riparian areas surrounding aquatic habitat provide protection from predators and cover from extreme temperature elements.

Occurrence within the White Pass Study Area

The Cascade frog is known to occur within the White Pass Study Area based on numerous sightings during fieldwork (Forbes, personal communication 2004). Observation of tadpoles in ponds indicates that reproduction occurs among the aquatic/riparian areas that provide habitat for this species within the White Pass Study Area. Breeding is likely to occur during the later part of the breeding season due to the snowpack remaining for longer periods of time at the higher elevations of the project area. There are approximately 5.3 acres of wetlands and 632.3 acres of Riparian Reserves within the White Pass Study Area that could provide habitat for the Cascade frog. It is important to note, however, that not all of the acreage listed as Riparian Reserves would provide suitable breeding habitat. As this species is highly aquatic, it would only be found in Riparian Reserves in close proximity to seeps, wetlands, and ponds. Although typically found in association with water; outside of the breeding season, when traveling or dispersing, Cascade frogs can be found far from water sources.

1.2.6.2 Olive-sided Flycatcher (Contopus borealis)

Habitat Requirements and Ecology

Olive-sided Flycatchers use open mature stands of various conifers including subalpine fir. It needs both late-seral forests and an open to moderate canopy or openings in the forest for foraging. The species utilizes high hunting perches in the form of live tress or snags where it can get a view of openings as well as mature forest and broken canopy for foraging (Sharp 1992). The olive-sided flycatcher is an aerial insectivore that breeds in upland forest and woodlands throughout most of the western U.S., and they are common in most forested areas of Washington. The Olive-sided Flycatcher is a Neotropical migrant that typically winters in South America.

Occurrence within the White Pass Study Area

Vegetation types identified as potential habitat for the olive-sided flycatcher include those in the open and closed canopy late-seral forest types. No surveys have been conducted for this species; however it is known to occur within the White Pass Study Area (Forbes, personal communication 2004).

1.2.7 Management Indicator Species

Thirteen wildlife species are listed as OWNF and/or GPNF management indicator species that may occur within the White Pass Study Area. The GPNF and OWNF Land and Resource Management Plans (USDA 1990a; USDA 1990b) identify standards and guidelines to manage these species as representatives of a wide range of vertebrate species. The Northwest Forest Plan (USDA, USDI 1994) amended these individual Forest Plans and replaced the land allocations for pileated woodpecker and pine marten with

Northwest Forest Plan Land Allocations. Additionally, mountain goat management areas were replaced by Northwest Forest Plan land allocations except where the standards and guidelines for mountain goat were more restrictive under the original Forest Plans. Although Northwest Forest Plan standards and guidelines have replaced the majority of those for MIS, these species were kept on the list of species to be included in this analysis because they are still recognized as species for which management is a concern. Management Indicator Species have been selected to coordinate habitat management planning between projects, Ranger Districts and Forests. The species status, habitat requirements, ecology, potential to occur within the White Pass Study Area, and type of occurrence are listed and described in Table 4.

Table 4:
OWNF and GPNF Management Indicator Species
Potentially occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using White Pass Study Area
Black-backed woodpecker (*Picoides arcticus*) Primary Cavity Excavator	Inhabit mixed conifer forests, primarily those in the mature or old-growth age class, and prefer areas of either fire or insect damage (Rodrick and Milner 1991). There are reports of black-backed woodpecker occurrence in most conifer forests including those dominated by true fir and mountain hemlock (Powell 2003), such as those found in the White Pass Study Area.	May occur in White Pass Study Area.
Black-tailed deer (*Odocoileus hemionus columbianus*) and Mule deer (*O. h. hemionus*)	Variety of habitats including ecotone between forest and meadow; late-seral forest, or small patches of shrub or trees (Maser 1998).	Known to occur in White Pass Study Area.
Downy woodpecker (*Picoides pubescens*) Primary Cavity Excavator	Sometimes found in conifer forests after the breeding season and especially in burned areas. However, downy woodpeckers generally prefer deciduous environments (Audubon Birdwatch 2004).	Suitable habitat present in White Pass Study Area. May occur in White Pass Study Area.
Hairy woodpecker (*Picoides villosus*) Primary Cavity Excavator	In Washington, the typical habitat of hairy woodpeckers is mature coniferous forest, although they are common in hardwood and mixed forests in other parts of their range. In Washington, they also frequent burned forests, mixed forests, wooded parks, and conifer-lined streams and shorelines. They require areas with heavier, more mature tree cover than downy woodpeckers and are more dependent on the presence of large trees (Audubon Birdwatch, 2004).	Suitable habitat present in White Pass Study Area. May occur in White Pass Study Area.

Table 4:
OWNF and GPNF Management Indicator Species
Potentially occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using White Pass Study Area
Mountain goat (*Oreamnos americanus*)	Closely associated with steep, rocky cliffs, pinnacles, ledges, and talus slopes. Dense conifer stands, including mature and old-growth, may be important in providing winter forage and thermal cover (USDA 1990a and USDA 1990b; WDFW 1999).	Known to occur in White Pass Study Area.
Northern flicker (*Colaptes auratus*) Primary Cavity Excavator	Northern flickers can be found throughout most wooded regions of North America, and they are familiar birds in most suburban environments. They need some open area and do not nest in the middle of dense forests, but they breed in most other forest types. Outside of the breeding season, they also frequent other open areas, including suburban lawns and parks, grassland, sagebrush, and even sand dunes (Audubon Birdwatch 2004).	Suitable habitat present in White Pass Study Area. May occur in White Pass Study Area.
Pileated woodpecker (*Dryocopus pileatus*) Primary Cavity Excavator	Late-seral forest; may feed in early to mid-seral forests particularly those containing remnant patches of late-seral trees (Marshall et al. 1996).	Suitable habitat present in White Pass Study Area. May occur in White Pass Study Area.
Pine marten (*Martes americana*)	Dense coniferous forests, subalpine forests, areas above timberline (Maser 1998).	Known to occur in White Pass Study Area.
Rocky Mountain elk (*Cervus elephus nelsoni*) and Roosevelt Elk (*C. e. roosevelti*)	Combination of forest and open habitats. Seclusion from human disturbance important for calving (Thomas and Toweill 1982). Known to occur within White Pass Study Area; observed during field work for this analysis.	Known to occur in White Pass Study Area.
Three-toed woodpecker (*Picoides tridactylus*) Primary Cavity Excavator	Three-toed woodpeckers breed in mature or old-growth boreal conifer forests, especially spruce, larch, fir, and pine. In North America they breed farther north than any other woodpecker, and in Washington they can be found at elevations from about 4,000 feet up to the tree line. They will come down lower to burned and flooded areas with standing dead trees and to other areas undergoing heavy infestations of wood-boring	Suitable habitat present in White Pass Study Area. May occur in White Pass Study Area.

Table 4:
OWNF and GPNF Management Indicator Species
Potentially occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using White Pass Study Area
	beetles. Their range and habitat overlap with those of Black-backed Woodpeckers, but they generally prefer denser forests (Audubon Birdwatch 2004).	
Williamson's sapsucker (*Sphyrapicus thyroideus*) Primary Cavity Excavator	Williamson's sapsuckers breed in dry, open, conifer forests in mountainous regions, especially along rivers and in areas with western larch. They appear to be most successful in conifer forests with many different species of trees. During their migration they use a wide variety of habitats, and in winter they often use broadleaved forests, especially along rivers and streams (Audubon Birdwatch 2004).	Suitable habitat present in White Pass Study Area. May occur in White Pass Study Area.

1.2.7.1 Black-backed woodpecker (Picoides arcticus)

The black-backed woodpecker is one of four species identified in the Forest Plan, as amended, as not being sufficiently protected by Riparian Reserve Standards and Guidelines and is in need of additional consideration (USDA, USDI 1994). As such, the Black-backed woodpecker is included as a protection buffer species. Protection buffers are additional standards and guidelines for specific rare and locally endemic species, and other specific species in the upland forest matrix (USDA, USDI 1994). Although provisions contained within the standards and guidelines for black-backed woodpeckers only pertain to matrix lands. There are no matrix lands within the White Pass Study Area; however they do exist in the lands adjoining the White Pass Study Area. This species is included in this analysis out of recognition that it is a species of special concern.

Habitat Requirements and Ecology

Black-backed woodpeckers inhabit mixed conifer forests, primarily those in the mature or late-seral age class, and prefer areas of either fire or insect damage (Rodrick and Milner 1991). There are reports of black-backed woodpecker occurrence in moist conifer forests including those dominated by true fir and mountain hemlock (Powell 2003), similar to those found in the White Pass Study Area.

Adults and larvae of wood-boring beetles (*Cerambycidae and Buprestidae*) comprise the bulk of the diet for this species, although it is also known to feed on bark beetles (family *Scolytidae*) (Powell 2003; Csuti et al. 2001; Marshall et al. 1996). Black-backed woodpeckers also consume ants, spiders, some fruit, acorns, and cambium, depending on the season and food availability (Csuti et al. 2001).

Black-backed woodpeckers begin nesting in May, and they excavate a nest cavity in a in a dead or diseased tree. Eggs are usually present in the nest until mid-June, and young are in the nest until mid July.

Occurrence within the White Pass Study Area

Suitable habitat for this species exists in the Project Area in forested areas, which contain a high number of dead and dying trees. Black-backed woodpeckers are only expected to occur intermittently within the White Pass Study Area due to their association with large densities of dead and dying trees.

1.2.7.2 Pileated Woodpecker (Dryocopus pileatus)

Habitat Requirements and Ecology

Pileated woodpeckers are associated with older, mature forest stands because of their dependence on both large-diameter trees with decay, and on snags for nesting, roosting, and foraging (Bull 2003). In addition, pileated woodpeckers have large home ranges.

The pileated woodpecker is most commonly found in mature to late-seral mixed conifer forests; although hardwood forests located in valley bottoms are also utilized. Necessary habitat components for this species include large diameter snags or living trees with some decay which are used for both nesting and roosting sites; both large diameter trees and logs which are used for foraging; and a dense canopy to provide cover which protects them from predators (Bull 2003). Pileated woodpeckers inhabit a wide variety of forest types throughout their range, including deciduous, coniferous, and mixed deciduous/coniferous forests, but they occur most commonly in mixed conifer and deciduous riparian habitats in the western United States (Winkler et al. 1995). In other parts of the species' range and in drier habitat conditions, pileated woodpeckers are associated with mature and old-growth forests (Bull 1987). In the southern Washington Cascades, most nests were found in old-growth stands (Lundquist and Mariana 1991).

The pileated woodpecker is a resident species that breeds throughout coniferous forests in western Oregon and Washington. Adults are not migratory and do not exhibit seasonal movements outside of the nesting territory. Juveniles disperse from their natal area in the fall.

Timber harvest has the most significant effect on habitat for this woodpecker. Forest fragmentation likely reduces population density and makes birds more vulnerable to predation as they fly between forest fragments (Bull 2003).

Pileated woodpeckers are primary cavity nesters. The species will excavate a new nest cavity each year. A diversity of other species use the cavities excavated by the pileated woodpecker. Therefore, the pileated woodpecker is considered an important species in forested areas. Nest trees are typically large-diameter dead trees with little bark, few limbs, and broken tops. Forest stands used for nesting contain many large-diameter live, dead and downed trees with at least two canopy layers (Mellen et al. 1992). Roost trees are similar to nest trees but typically have less bark remaining on the tree, fewer limbs, more cavities, more broken tops, and more canopy layers, indicating that roost trees are typically dead longer than nest trees (Bull 1987).

Pileated woodpeckers forage on or near the ground, particularly on large-diameter downed trees and logs. They feed primarily on carpenter ants, wood boring beetle larvae, fruits, nuts, and other insects and arthropods (Bull 1987).

Forest habitats within the existing ski area are dominated by dense stands of small and medium late-seral forest with a closed canopy. The proposed expansion area is comprised almost entirely of small tree, single-story, moderate canopy mountain hemlock parkland that is of limited use to pileated woodpeckers for nesting or foraging. Large snags for nesting are limited in the expansion area but are generally available within the existing ski area. Vegetation types providing potential habitat for pileated woodpeckers within the White Pass Study Area include those in the moderate and closed canopy late-seral types, excluding the mountain hemlock parkland, for total of 522.5 acres.

Occurrence within the White Pass Study Area

There are approximately 1235.9 acres of suitable habitat (late-seral forest) located in the lower elevations of the White Pass Study Area. This forest, located primarily within the existing ski area, provides suitable cover for protection from predators as well as important habitat components such as snags for nesting and LWM for foraging. This species is expected to occur within and utilize the White Pass Study Area as nesting and/or foraging habitat.

1.2.7.3 Primary Cavity Excavators

Habitat Requirements and Ecology

The guild of primary cavity excavators is used as a Management Indicator Species for snag and down woody material components of the forest habitat. This guild includes all woodpecker species, many of which are discussed above, and other bird species known to excavate their own cavities. Species analyzed for this project include the following:

- northern three-toed woodpeckers (*Picoides tridactylus*),
- hairy woodpeckers (*Picoides villosus*),
- downy woodpeckers (*Picoides pubescens*),
- northern flickers (*Colaptes auratus*),
- Williamson’s sapsucker (*Sphyrapicus thyroideus*),

- chickadees (*Poecile spp.*),
- nuthatches (*Sitta spp.*),
- pileated woodpeckers (*Dryocopus pileatus*), and
- black-backed woodpeckers (*Picoides arcticus*)

Secondary cavity nesters, such as owls, bats and flying squirrels, become additional beneficiaries of a viable primary excavator population. The availability of snags, future snags (green tree replacements), and downed logs for nest sites and as a food source for insect prey are generally the habitat limiting factors.

Forest Plan direction stipulates that sufficient 15-inch dbh and larger snags shall be retained to support 100 percent of potential primary cavity excavator populations. For the purpose of modeling the effects of alternatives on primary cavity excavators, the 1996 Forest-wide Standards and Guidelines for retaining 3.6 to 6.5 wildlife trees and three down logs per acre to be met in management units will be used. In riparian areas, a greater number would be retained in accordance with Forest Plan Standards and Guidelines.

Occurrence within the White Pass Study Area

No inventory of standing and down woody debris has been made for stands in the White Pass Study Area to determine snag numbers and distribution, but many of the stands are in an unmanaged condition, which leads to the natural development of snags and down wood as stands age. There are a large number of Pacific silver fir snags as well as replacement opportunities in the old growth stands in the existing SUP to support a viable primary cavity excavator population. Given that the timber stands in the proposed expansion area consist of small tree, moderate single story mountain hemlock parkland, the snag numbers and downed wood are less likely to provide suitable habitat for some these species requiring larger diameter trees.

Primary cavity excavators have been observed in the White Pass Study Area including Hogback Basin, but due to the elevation and juxtaposition of habitats within the area, this area is only capable of supporting a limited population, both in terms of numbers of individuals and in number of species.

1.2.7.4 Pine Marten (Martes americana)

Habitat Requirements and Ecology

Martens are associated with forested habitat and appear to prefer closed canopy mature forests. They have been observed using alpine areas and utilize forest openings if there is sufficient down wood to provide cover (Csuti et al. 2001).

In Oregon, the home range of a male Pine marten is approximately 1 square mile and the home range of a female is generally 0.25 square mile. Separation of home range territories within sexes and overlap between sexes is common (Maser 1998). Martens are generally considered to be forest dependent species and have been observed to avoid large forest openings, although non-forested habitats are used by martens, particularly during summer above tree line, and martens have been observed crossing openings (Ruggiero et al. 1994).

Important habitat components for marten include fallen trees, stumps, and rock piles that provide protective winter cover and access to prey under the snow. Large trees, snags, and logs are also used as resting and denning sites (Rodrick and Milner 1991). Late-seral conifer forests with canopy closures exceeding 30 percent supported the highest marten activity in Montana (Koehler and Hornocker 1977). Optimum marten habitat conditions for foraging have more than 20 logs per acre 6 inches or greater in diameter and for denning have more than 10 logs per acre 10 inches or greater in diameter (Allen 1982). Timber harvesting has been implicated as detrimental to marten populations due to reductions in preferred closed canopy forest and presumed reduction in prey availability (Yeager 1950; Koehler and Hornocker 1977).

Martens are primarily carnivorous and feed on small mammals including shrews, voles, woodrats, rabbits, squirrels, and mountain beaver, although marten’s prey items also include birds, insects, and fruits (Csuti et al. 2001). Marten populations may fluctuate with small mammal densities and winter snow conditions that influence access to prey (Allen 1982). Like other mustelids, martens are extremely active year round.

Occurrence within the White Pass Study Area

Suitable closed-canopy conifer habitats with an optimal component of snags and downed woody material are available in most all of the White Pass Study Area with the exception of the cleared ski trails and those portions of the White Pass Study Area over the 5,400-foot elevation (notably the proposed expansion area). The timbered stringers above 5,200-foot elevation could be used by marten as corridors for movement through the area. Tracks have been regularly observed below the quad chairlift near the rock cliff and in the Hogback Basin (Kogut, personal communication 2004). They have also been observed in nearby forested areas and it is assumed that they occupy home ranges within the White Pass Study Area.

1.2.7.5 Mule Deer (Odocoileus hemionus hemionus) and Black-Tailed Deer (O. h. columbianus)

Habitat Requirements and Ecology

The black-tailed deer (*Odocoileus hemionus columbianus*) is a subspecies of mule deer (*O. h. hemionus*) that occurs in forested habitats of western Washington from the Pacific Coast to the crest of the Cascades. It is a MIS for the GPNF and a managed game species for the State of Washington. Along the Cascade

Crest the black-tailed deer intermingles and interbreeds with the mule deer of eastern Washington, a MIS species for both the GPNF and the OWNF and also a state game species.

Winter habitat is generally a controlling factor in deer populations, along with hunting pressure and cougar predation. Deer in western Washington have also been affected by a disease, hair loss syndrome, which appears to be causing additional mortality (WDFW 1999). Winter ranges usually consist of low elevation (below 2,700 feet) riparian areas and drainages that supply both forage habitat and cover.

Black-tailed deer populations on the west side of the Cascade Mountains currently appear to be stable. The long-term prediction is for a decline in deer habitat as National Forest Service lands that have been removed from timber production, such as LSR on National Forests, mature into forest types less suitable for deer (WDFW 2002). Black-tailed deer are reported to breed from September to November, with peak activity occurring up to a month earlier than other subspecies of mule deer (Wallmo 1978). Migration patterns vary considerably throughout the range of the subspecies. Populations inhabiting higher elevations in summer migrate downslope to lower elevations when accumulations of snow make forage unavailable, while other populations move short distances to preferred food patches or do not migrate at all (Wallmo 1978).

Deer utilize a broad range of forage, mostly feeding on woody plants but in some seasons eating large amounts of grasses and forbs. Forage habitat is defined as vegetated areas with less than 60 percent cover, trees or shrubs more than 7 feet tall, and with a shrub or herbaceous understory (Roderick and Milner 1991). Deer will also forage in more open areas if cover is nearby. Denser forest with large trees and 70 percent crown closure is used as cover. Cover includes both thermal cover for body temperature regulation and hiding cover (Maser 1998).

Mule deer are generally considered an ecotone, or edge, species, although they also inhabit highly forested areas (Maser 1998). Within the White Pass Study Area there is large amount of edge, both as a result of vegetation management for winter recreation and because of naturally occurring conditions. Historic fires and past logging in the White Pass Study Area may have increased the amount of deer habitat by providing areas of managed herbaceous forage habitat interspersed with mature forest for cover. Summer range for mule deer is optimal where there is a diversity of forest successional stages with hiding/escape cover in proximity to food sources. North aspect slopes are used for loafing, with cool riparian drainages being important during the warmest weather and during fawning season.

Occurrence within the White Pass Study Area

Within the White Pass Study Area, the late-seral closed canopy vegetation types constitute potential cover, while vegetation in the late and mid-seral open canopy types is potential foraging habitat. Additional foraging habitat occurs in the mountain hemlock parkland, and managed herbaceous areas. Islands of trees within the parkland type can also be considered cover. Based upon these definitions, the

White Pass Study Area currently contains 932.3 acres of primary foraging habitat and 315.2 acres of cover. Portions of the White Pass Study Area that are not included as deer foraging or cover habitat are cliff and talus, lakes and ponds, and developed areas. Lakes and ponds, however, are recognized as important components of deer habitat, providing a source of water.

Sufficient summer thermal/hiding cover and foraging habitat is available across the White Pass Study Area to support the existing population of these species. Mule deer and black-tailed deer are common within the White Pass Study Area from late spring to fall but spend the winter season at lower elevations in the Tieton River or Clear Fork Cowlitz River Basins, as there is no winter habitat within the White Pass Study Area due to deep snowpack.

1.2.7.6 Rocky Mountain Elk (Cervus elaphus nelsoni) and Roosevelt Elk (C. e. roosevelti)

Habitat Requirements and Ecology

In Washington there are two different subspecies of elk, the Rocky Mountain elk and the Roosevelt elk, with the Rocky Mountain elk generally occurring east of the Cascade Crest and the Roosevelt elk generally occurring west of the Cascade Crest. Both subspecies are known to occur in the vicinity of the Cascade Crest and there is a region of integration along the Crest for these subspecies. Because habitat use is expected to be comparable for the two subspecies in the White Pass Study Area they will be discussed together.

The Rocky Mountain elk is an MIS for the OWNF. The Roosevelt elk is an MIS for the GPNF. Both are managed game species for the state of Washington. Along the Cascade Crest these species intermingle. Elk populations in the central Washington Cascade Range generally have geographically separate winter and summer ranges, each providing a different set of climate moderating features (Leege 1984). Elk are also known as ecotone species and migrate between summer and winter ranges. Elk require a juxtaposition of forest for cover and open habitats for forage. Dispersal corridors between summer and winter ranges must provide these requirements, along with relative freedom from human disturbance. Calving areas must also be relatively free from disturbance. Winter range is characterized by closed-canopy conifer forest, elevations below 3,000-foot, and mostly south facing slopes with snow accumulations of less than 18-24 inches. Forest canopy closure of 70 percent or greater with trees more than 40 feet tall provide optimal thermal cover, a dispersed snowpack, and litter/lichen foraging sources (Thomas et al. 1979). Elk use is concentrated under cover and along edge habitat with foraging generally 200 feet or less out into natural or managed openings. The optimal mix of thermal, hiding and foraging habitat is believed to be 20%:20%:60%, respectively (Thomas et al. 1979). Road densities of 1 mile per square mile or less open to motorized travel are preferred (Perry and Overly 1977). Human disturbance during winter can affect winter survival and subsequent breeding season fecundity.

Summer range for elk is characterized by more open-canopy forest (50 percent or greater), interspersed with grass/forb/shrub dominated foraging habitat (Irwin and Peek 1983), generally above 3,000-foot elevation. Elk activity changes to north and east slopes, with mid-day use of cool, dense shade and thickets or old-growth habitats being used for thermo-regulation (Hershey and Leege 1982). Elk often move along established traditional routes, both seasonally and daily.

Elk within the Cascades typically begin migrating in June up-slope to summer range (Cooper 1987), following new plant growth as it becomes available. Calving areas are defined as the upper reaches of winter range which offer open brush and grassy areas near water and nearby forested areas for cover. The elevation of calving varies with the depth of the snow pack and the availability of forage and cover. Young are born in early June and within a week or two, cow-calf herds are formed (Cooper 1987).

Mature bulls are solitary or occur in small groups during the spring and summer, and often seek out high, windy points where breezes grant some relief from flies and other insect pests. In early September, the rut begins with mature bulls gathering and attempting to maintain harems of up to 30 cows. Individuals begin to migrate downslope to winter ranges after the first heavy snowfall (typically mid-October to mid-November), where they typically stay from December through June (Cooper 1987).

Occurrence within the White Pass Study Area

Within the White Pass Study Area, the late-seral closed canopy vegetation types constitute potential cover, while vegetation in the late and mid-seral open canopy types is potential foraging habitat. Additional foraging habitat occurs in the mountain hemlock parkland, and managed herbaceous areas. Islands of trees within the parkland type can also be considered cover. Based upon these definitions, the White Pass Study Area currently contains 932.3 acres of primary foraging habitat and 315.2 acres of cover. Portions of the White Pass Study Area that are not included as elk foraging or cover habitat are cliff and talus, lakes and ponds, and developed areas. Lakes and Ponds, however, are recognized as important components of elk habitat, providing a source of water.

Elk use the White Pass Study Area predominantly during the spring, summer, and fall period when forage is available. Elk use of the White Pass Study Area is extremely limited to non-existent during the winter period due to the deep snowpack and lack of adequate forage. It appears that most of the animals that use the area during the summer season winter in the lower Tieton River Basin. A small herd of cow elk all with calves was observed at the 4,400-foot elevation level in the White Pass Study Area during June 1997. Many trails developed by frequent elk travel occur throughout late-seral forest stands and along ridges and riparian corridors throughout the White Pass Study Area. Sufficient summer thermal/hiding cover and foraging habitat is available across the area. The road density within the Upper Clear Fork Cowlitz River watershed, of which Hogback Basin is a part, is 0.7 mile per square mile. Most of Hogback Basin, however, is greater than 0.3 mile from an open road and would be considered security habitat.

1.2.7.7 Mountain Goat (Oreamnos americanus)

Habitat Requirements and Ecology

Mountain goats can be found on steep mountainous terrain supporting herbaceous and woody vegetation in the Central and North Cascade Range (Wigal and Coggins 1982). Mountain goats (*Oreamnos americanus*) are closely associated with features such as steep, rocky cliffs, pinnacles, ledges, and talus slopes that provide escape cover from predators. The species occupies a wide variety of vegetation types associated with these features. Distance between winter and summer ranges was found to range from approximately 1 to 7 miles in Montana (Rideout 1978; Nowak and Paradiso 1983).

During the winter, mountain goats migrate to lower elevations and use dense conifer stands for thermal cover (USDA 1990a; WDFW 1999). There is a high degree of variation in mountain goat migration patterns and distances traveled; with some traveling several miles and others only short distances. Mountain goat winter range is characterized by steep rocky slopes in close proximity to dense conifer stands that provide cover on east and southwest facing slopes at low elevation, where there is relatively little snow accumulation (Rodrick and Milner 1991). In the north Cascades, the mountain goat is a prey/carrion species for some listed carnivore species that forage in high elevation wilderness areas, such as wolverine and grizzly bear.

Occurrence within the White Pass Study Area

The White Pass Study Area and most particularly the upper extent of the south, east and west sides of Hogback Ridge is mountain goat summer range. Goats are occasionally sighted in Hogback Basin during the summer season and evidence of foraging activity can be observed (Forbes, personal communication 2004). Known populations occur to the north, south and west of the White Pass Study Area in the Goat Rocks and William O. Douglass Wilderness Areas. Mountain Goats may pass through the area during their move to and from winter range in the Round Mountain area.

Winter range, besides being an important factor for determining goat populations, is often the limiting factor controlling them. Their use of the White Pass Study Area in winter is non-existent or extremely limited at best due to deep snow pack and lack of forage. During this period they are typically found much lower in elevation and away from White Pass. The White Pass Study Area, including Hogback Basin, has no windswept open ridges, typical of some steep mountain settings where wind and snow conditions keep grasses and forbs exposed most of the winter. The White Pass Study Area typically has wet snow and deep snow packs, which bury feed sources for mountain goat from late fall to late spring.

<u>1.2.8 Species of Local Concern</u>

1.2.8.1 Neotropical Migratory Birds

Neotropical migratory birds have been defined as those species that regularly breed in continental North America and winter south of the Tropic of Cancer, typically in Central and South America and the

Caribbean. Widespread declines in populations of many Neotropical migrants have intensified interest in avian conservation and resulted in policy direction to evaluate the impact of proposed activities on the nesting habitats of these species.

The North American Breeding Bird Survey Program found that 75 percent of forest dwelling migrants in eastern North America declined in population during the 1980s (Robbins et al. 1989). Potential causes of these declines are numerous and diverse, and may involve environmental changes and habitat deterioration in breeding areas, winter habitats, migration corridors and stopover sites, or a combination of these factors (Sherry and Holmes 1992). Related to these potential causes is the problem of nest parasitism by the brown-headed cowbird, populations of which have expanded significantly in the last few decades due primarily to human-induced changes in the landscape (Ehrlich et al. 1988). One hundred eighteen species of Neotropical migratory birds are known to breed in Washington, including common passerine songbirds, hawks, and owls (Andelman and Stock 1994).

Neotropical migrants occur in a wide variety of habitat types including early- and late-seral forests (Finch and Stangel 1992). However, in the relatively arid western United States, densities of Neotropical migrants are highest in riparian areas, with coniferous forests being the second-most used habitat by this assemblage of species (Saab and Rich 1997). A detailed table of neotropical migratory birds (modified from Andelman and Stock 1994) was developed for the *I-90 Land Exchange DEIS* (USFS 1998) and is included in Table 5 of this document. Based on geographic proximity and habitat similarity, this list is considered representative of the neotropical migratory birds with the potential to occur in the White Pass Study Area, although not all species or their habitats in Table 5 are present in the White Pass Study Area.

Table 5 contains a list of Neotropical migratory birds that may occur within the White Pass Study Area. Many of these species utilize a variety of habitats; however their primary associations are listed in Table 5. Of these species, two are also special status species that are discussed separately in this document (peregrine falcon and olive-sided flycatcher).

Table 5:
Neotropical Migratory Birds Potentially Occurring in the White Pass Area Having a Primary Association with Forested Habitat [a,b]

Species	Old-Growth	Clearcut	Young Forest	Broad leaf Forest	Riparian	Meadow	Marshes	Subalpine	Cliff
Late-Successional Forest Associates (eastside and westside)									
Sharp-skinned hawk[c]	X		X		X				
Cooper’s hawk[c]	X		X	X	X				
Northern goshawk	X								
Red-tailed hawk[c]	X		X	X	X	X			X
Vaux’s swift[c]	X				X				
Northern flicker	X	X	X		X				
Olive-sided flycatcher[c]	X	X	X		X				
Western wood-pewee[c]	X		X	X					
Hammond’s flycatcher[c]	X		X	X	X				
Golden-crowned kinglet[d]	X		X						
Hermit thrush[c]	X		X						
American robin[c]	X	X	X	X	X	X			
Solitary vireo[c,d]	X		X	X	X				
Yellow-rumped warbler[c]	X		X						
Townsend’s warbler[c]	X		X						
Western tanager[c]	X		X	X	X				
Chipping sparrow[c,d]	X		X						
Dark-eyed junco	X	X	X	X					
Rufous hummingbird[c,d]	X	X	X	X	X	X			X
Red-breasted sapsucker	X		X	X					
Pacific-slope flycatcherc	X	X		X	X	X			
Swainson’s thrush	X	X	X	X	X				
Wilson’s warbler[c,d]	X		X	X	X				
Merlin[e]	X	X	X		X				
Late-Successional Forest Associates (westside only)									
Band-tailed pigeon	X		X						

Table 5:
Neotropical Migratory Birds Potentially Occurring in the White Pass Area Having a Primary Association with Forested Habitat [a,b]

Species	Old-Growth	Clearcut	Young Forest	Broad leaf Forest	Riparian	Meadow	Marshes	Subalpine	Cliff
Hermit warbler	X	X	X						
Late-Successional Forest Associates (eastside only)									
Flammulated owl	X								
Red-naped sapsucker	X		X	X					
Williamson's sapsucker	X		X	X					
Dusky flycatcher	X		X	X				X	
Early to Mid-Successional Forest Associates									
Turkey vulture[c]		X							X
MacGillivray's warbler[c]		X			X				
Brown-headed cowbird[c]		X		X	X				
Willow flycatcher[c]		X			X				
Cedar waxwing[c]		X		X	X				
Warbling vireo[c]		X		X	X				
Fox sparrow		X			X				
Orange-crowned warbler[c,d]		X		X	X				
Black-throated gray warbler[c]			X	X	X	X			
Rufous-sided towhee		X		X	X				
White-crowned sparrow[c]		X			X				

a USFS, 1998
b Table modified from USFS, 1998 and Andelman and Stock, 1994.
c Included in Sharp (1992) list of species found in MBSNF.
d Population trends declining based on data for species where population trends are known (Andelman and Stock, 1994).
e Species habitat association in this table was modified from its original association for this analysis.

1.2.8.2 Blue Grouse (Dendragapus obscurus)

Habitat Requirements and Ecology

The blue grouse is a focal species identified in the East Slope Cascades Landbird Conservation Plan (Oregon/Washington State Partners in Flight 2000). The blue grouse is a species of the western mountains of North America occurring from southeast Alaska and Yukon south along the Pacific coast to California and inland through mountains to New Mexico and Arizona. Blue grouse are found at lower elevations in semi-open habitats during the summer months, but migrate to higher elevations in the winter. Maximum habitat suitability occurs when trees, used primarily by territorial males, are well interspersed with the more open habitats used by hens and broods (Landbird Conservation Plan website 2004). Preferred forested habitats consist of multi-storied vegetation, which provides shelter, foraging, and protection from predators (Landbird Conservation Plan website 2004). Food is comprised mainly of plants such as herb leaves and flowers, conifer needles, and shrub berries, but insects may supplement the diet, especially for young juveniles. Winter food primarily consists of conifer needles.

Blue grouse breed in shrub/steppe and grassland areas, in alpine or subalpine ecotones, or in forest in or bordering montane areas. Nest sites vary considerably but are always on the ground or on stumps. Many have some sort of covering. Nests are formed by shallow depressions in the ground, often with thin linings of only dead vegetation. The nest is abandoned approximately one day after young are born. From that point on, hatchlings feed themselves. (Audubon Watchlist website 2004).

Occurrence within the White Pass Study Area

Suitable habitat for blue grouse is present throughout the White Pass Study Area. They are known residents of the White Pass Study Area.

1.2.8.3 White-tailed ptarmigan (Lagopus leucurus)

Habitat Requirements and Ecology

The white-tailed ptarmigan is a locally important species in the OWNF. White-tailed Ptarmigan breed in alpine habitats at or above tree limit and having krummholz or willow dominated vegetation situated near snowfields and rocky areas. Nest sites are located in snow free areas in rocky areas or near willow or spruce krummholz. In summer males and broods are often found near receding snowfields and rocky areas at higher elevations. In winter this species occupies willow-dominated basins or riparian areas at or below treeline where snow is available for roosting. (Colorado Partners in Flight website 2004).

Occurrence within the White Pass Study Area

Alpine meadows and mountain hemlock parklands within the White Pass Study Area provide suitable habitat for the white-tailed ptarmigan. It is known to occur within the White Pass Study Area.

1.3 HABITAT CONNECTIVITY AND FRAGMENTATION

Habitat connectivity and fragmentation refer to the size, quality, and spatial arrangement of patches of a species' habitat across the landscape, particularly the amount and arrangement of these patches as they relate to the dispersal of organisms. Loss of habitat, isolation of small populations, and direct mortality from collisions with motor vehicles are major concerns in the conservation of large carnivores (Singleton et al. 2002). Fragmentation and connectivity of LSH (Late-Successional Habitat) is one of the focus points in the Northwest Forest Plan. As previously mentioned, there are no designated Late-Successional Reserves within the White Pass Study Area.

The habitats within the White Pass Study Area are somewhat fragmented and diverse. Woody vegetation is sparse at the higher elevations, becoming denser and more diverse at the lower elevations. The patchiness has resulted from a number of man-caused and natural perturbations identified in the Upper Tieton Watershed Assessment and the Clear Fork Watershed Analysis (USFS 1998b; USFS 1998a). These included fires, logging, development of the ski area, and natural events, such as, avalanches and debris flows. Hogback Basin has remained relatively undisturbed and reflects historic conditions.

Connectivity of forest habitats is critical to the movement and dispersal of some species. Wide-ranging species, such as gray wolf and wolverine, can be affected by fragmentation caused by human encroachment in the form of roads, trails, dispersed and concentrated recreation, and development. The habitat needs of wide-ranging species are associated primarily with large undisturbed tracts of land rather than the need for contiguous areas of LSH or other forest cover. The maximum road density for wide-ranging species is usually 1 mile per square mile. The road density in the Upper Clear Fork Cowlitz Watershed is 0.7 mile per square mile and the road density for the Upper Tieton Watershed is 0.6 mile per square mile. The existing White Pass Ski Area as well as the Pacific Crest Trail adds to the elevated human activity levels in the area. These activities further reduce the level of isolation for wide-ranging species within the White Pass Study Area.

Under the existing condition, the area within the White Pass Study Area that has the highest level of human-caused fragmentation is the base area. Tree islands in this area, when combined into forested stands and not considering age class or species composition, are generally smaller than tree islands in the remainder of the White Pass Study Area. Throughout the upper portions of the existing ski area the late-seral forest is crisscrossed by numerous ski trails that break up the forest into smaller patches. The exception to this is the area from the proposed expansion area (Hogback Basin) where trees naturally occur in linear clumps in the mountain hemlock parkland vegetation type. This can be seen on Figure 3-31. For wide ranging animals potentially moving through the White Pass Study Area, potential travel habitat exists in Hogback Basin where the mountain hemlock parkland provides patches of forest for security.

Existing openings, such as ski trails, are unlikely to be a complete barrier to wide ranging species potentially moving through the White Pass Study Area as they are habitat generalists and typically utilize a number of different habitat types. For species with low mobility, however, such openings are more likely to be complete or partial barriers. Historic clearing of riparian vegetation and culverting of streams in particular have decreased habitat connectivity in the SUP area for riparian dependent species. Culverting of streams refers to covering the stream channel by some method to allow for the movement of skiers over the channel, which can occur over long distance where the channel crosses or follows the trail. Outside of areas in a developed condition, vegetation is reestablishing along much of the cleared riparian areas, although within cleared ski trails it would be maintained in a modified condition.

The study entitled Landscape Permeability for Large Carnivores in Washington: A Geographic Information System Weighted-Distance and Least-Cost Corridor Assessment (Singleton et al. 2002) used a GIS weighted-distance and least-cost corridor analysis to determine the regional-scale landscape permeability for sensitive large carnivores in Washington and adjacent portions of British Columbia and Idaho. This analysis placed particular emphasis on identifying areas where the Washington state highway system intersects potential large carnivore habitat and linkages between blocks of habitat. US 12 around White Pass was included in the Southern Cascade Range analysis of this model. It is important to note that this study was conducted using regional-scale spatial data sets that are effective for evaluating broad-scale patterns. It is not intended to provide fine-scale information for specific projects. However, it can be used to identify areas where linkages between blocks of habitat are a concern.

This study, which was intended for identifying relative landscape permeability based on broad-scale landscape characteristics, was focused on four species: wolverine, lynx, grizzly bear, and gray wolf. The regional species distribution, habitat associations, dispersal characteristics, and previous habitat modeling efforts were used to develop a conceptual model of landscape permeability for each of these wide-ranging species.

Habitat concentration areas identified in the southern Cascade Range were centered primarily on Mt. Rainier National Park, and the Norse Peak, William O. Douglass, Goat Rocks, and Mt. Adams Wilderness Areas. Distribution of available habitat for the focal species was constrained by high road densities and discontinuous forest cover on all sides. A total of 187 km of Washington state highway was identified passing through consistently identified available large carnivore habitat in the southern Cascade Range. The highways on the east side of Mt. Rainier National Park (US 12 and highways 410 and 123) passed through habitat available to all four focal species. Highway 410 and US 12 also pass through ungulate winter range areas in the Tieton and Naches River drainages that could be important for large carnivores.

As indicated by the landscape permeability model, connectivity in the Southern Cascade Region is limited by US 12 and highways 410 and 123 which means that wide-ranging species could encounter difficulties trying to cross these roadways.

More locally, the White Pass Study Area at White Pass is adjacent to two large wilderness areas, Goat Rocks and William O. Douglass. These areas provide large tracts of undisturbed land for wide-ranging species as well as species with smaller home ranges.

1.4 ENVIRONMENTAL CONSEQUENCES

The physical actions associated with the White Pass Proposed Expansion would result in impacts to wildlife and/or wildlife habitat and are referred to as *impact mechanisms*. Impacts can be classified and discussed in many different ways. For the purposes of this FEIS, impacts to wildlife will be discussed in terms of direct versus indirect and short versus long-term as defined below. Finally, impacts associated with the Proposed Expansion will be evaluated at a larger scale (watershed), incorporating the incremental impacts of other past, present, and reasonably foreseeable projects through a cumulative effects analysis.

Activities leading to direct and indirect impacts to wildlife, wildlife habitat, and wildlife habitat connectivity include the following:

Direct

Implementation of the Action Alternatives would result in direct impacts, both long-term and short-term, to wildlife and wildlife habitat. These impacts include permanent and temporary habitat loss, conversion of habitat from one type to another, habitat fragmentation, and disturbance to wildlife. Direct impacts to wildlife or wildlife habitat would result from the following proposed actions:

- Road and parking lot construction.
- Building construction.
- Chairlift terminal construction and tower placement.
- Clearing with grading for lifts and ski trails.
- Clearing without grading for lifts and ski trails.
- Bridge construction, particularly placement of footings.
- Utility line installation.
- Routine annual maintenance.

Direct beneficial impacts include those restoration projects that reduce habitat fragmentation such as decommissioning and revegetating roads or planting trees along streams to improve riparian conditions. Revegetating ski trails with clusters of trees may also provide some benefit to smaller wildlife species such as birds and small mammals as resting or foraging habitat. There would be some time lag before these benefits would occur due to the time needed for trees and other vegetation to grow at the revegetation sites.

Indirect

Indirect impacts to wildlife and wildlife habitat potentially occurring as a result of Action Alternative implementation include a potential increase in wind-throw leading to a potential increase in coarse woody debris (CWD) (depending on how wind-throw is treated) and a potential decrease in large mature trees; a decrease in the number of snags and dead or broken-topped trees; and a change in the species composition of the native plant communities in the White Pass Study Area due to potential introduction of non-native plant species. Project components potentially causing these types of impacts include:

- Road and parking lot construction.
- Clearing with grading for lifts and ski trails.
- Clearing without grading for lifts and ski trails.
- Tree removal to create gladed ski trails.
- Utility line installation.
- Hazard tree removal along lifts and ski trails.

Short and long-term impacts to wildlife and wildlife habitat include the following:

Short-term

Short-term impacts include temporary habitat loss resulting from ground disturbing activities in areas, which would subsequently be allowed to revegetate. Short-term impacts would also include temporary noise disturbance from construction activities. All previously listed activities have the potential to cause temporary noise disturbance. Project components potentially resulting in short-term impacts to wildlife habitat include:

- Vegetation disturbance in buffer areas of road, parking lot, chairlift, and building construction.
- Clearing with grading for lifts and ski trails within areas containing modified herbaceous habitat.

- Clearing without grading for lifts and ski trails within areas containing modified herbaceous habitat.
- Utility line installation.

Long-term

Long-term impacts include 1) the permanent loss or conversion of wildlife habitat, 2) fragmentation of wildlife habitat resulting in decreased connectivity and a decrease in travel habitat effectiveness, and 3) increased human use on a year round basis making the habitat in the area less suitable for species that are sensitive to human presence. Long-term impacts on wildlife or wildlife habitat would result from the following proposed actions:

- Road and parking lot construction.
- Building construction.
- Chairlift terminal construction and tower placement.
- Clearing with grading for lifts and ski trails.
- Clearing without grading for lifts and ski trails.
- Bridge construction, particularly placement of footings.
- Utility line installation.
- Routine annual maintenance.

Each Action Alternative (Alternatives 2, 6, 9 and Modified Alternative 4) would have potential impacts to wildlife resources. Information on wildlife habitats in this section is based on the vegetation communities and stand information developed for the White Pass Study Area as described in Section 3.5– Vegetation, the *Vegetation Technical Report and Biological Evaluation* (Appendix G), and as shown in Figures 3-31 and 3-34 in the FEIS. Impacts to vegetation, as well as wildlife would vary, depending on the wildlife species and the impact mechanism and alternative. Impacts are discussed individually for each species analyzed. Impacts to vegetation communities and watershed resources are listed in Table 3.5-5 and displayed in Figures 3-32, 3-33, 3-34, 3-36, 3-37, and 3-38.

1.4.1 Key Wildlife Habitats

Wetlands and Riparian Reserves

Wetlands and riparian areas provide important habitat functions, as discussed in Section 3.6.2. Potential impacts to riparian areas are identified in Section 3.3 – Watershed Resources (refer to Table 3.3-14.) Impacts to wildlife would result largely from changes in vegetation composition. Removal of vegetation or conversion from forest to modified herbaceous would lead to changes in species composition and structural diversity of riparian vegetation, thereby altering wildlife habitat quantity and quality. Effects of these changes would likely vary by wildlife species. These changes could also fragment habitat for riparian-dependent animals of low mobility, such as small mammals and amphibians, and reduce the value of riparian areas as travel corridors for species such as pine marten and elk.

Table 6:
Potential Direct Impacts to Riparian Reserves within the White Pass Study Area

	Alt. 1	Alt. 2	Modified Alt. 4	Alt. 6	Alt. 9
	(acres)	(acres)	(acres)	(acres)	(acres)
Area of Riparian Reserves	632.3	632.3	632.3	632.3	632.3
Proposed Clearing in Riparian Reserves	0.0	13.5	14.7	8.6	15.7
Proposed Grading in Riparian Reserves	0.0	4.2	11.1	4.0	8.7
Landcover Types within Riparian Reserves					
Forested	522.7	19.7	43.1	15.1	35.3
Talus	4.8	0	0	0	0
Modified Herbaceous	67.5	0	1.3	0.2	3.6
Developed	10.5	0	0	0	0
Conversion to modified herbaceous	0.0	19.6	36.4	11.8	32.6
Conversion to developed	0.0	0.1	8.1	3.3	2.7

Impacts to wetland and stream habitat would result from clearing activities and grading associated with terminal/tower construction and utility installation. Refer to Section 3.3 – Watershed Resources for a detailed discussion of wetland impacts.

Table 6 identifies the area of Riparian Reserves that would be eliminated or converted under each of the Action Alternatives. Actual impacts to riparian habitat would be less than identified in Table 6. Elimination of vegetation would result from construction of lift terminals and towers. Conversion of habitat would result from clearing and/or grading for ski trails which would result in the conversion of forested vegetation communities to managed herbaceous/shrub communities.

Operational impacts, such as noise disturbances, would occur as a result of ski trail and the chairlift maintenance. Ground disturbance associated with utility installation and grading activities could alter species habitat by increasing sediment delivery to streams, reducing shading, and increasing access by invasive plants. Construction impacts may include injuries and mortality to low-mobility species and nesting birds by construction equipment.

Alternative 2 represents the most impacts to Riparian Reserves in Hogback Basin, while Modified Alternative 4 has the highest acreage of impact to Riparian Reserves overall, as a result of clearing for ski trails, lifts and parking. Impacts under Modified Alternative 4 would be lower than Alternative 2 along the lifts and trails in Hogback Basin due to reduced clearing widths and routing trails around streams and wetlands, yet higher overall than Alternative 2 due to the inclusion of a parking lot and proposed trails within the existing SUP area. Alternative 6 would result in the lowest overall disturbance to Riparian Reserves in the White Pass Study Area (refer to Section 3.3 – Watershed Resources).

Late-Seral Forest

The White Pass Study Area contains approximately 1,236 acres of late-seral forest which can be broken down into two major zones within the White Pass Study Area: the mixed conifer forest in the existing ski area and the mountain hemlock parkland that comprises most of the proposed expansion area (refer to Figure 3-31). A smaller piece of late-seral mountain hemlock forest is located on the protruding northwest portion of the proposed expansion area. Late-seral forest has been identified as the primary habitat type that would be impacted by any of the Action Alternatives. Late-seral forests provide abundant shade, moisture, and security for a number of species, including the Pacific fisher, northern spotted owl, pileated woodpecker, and great gray owl. Table FEIS2 below displays impacts to late-seral forest resulting from each alternative.

Table FEIS2:
Potential Direct Impacts to Later-seral Forest within the White Pass Study Area

	Alt. 1	Alt. 2	Modified Alt. 4	Alt. 6	Alt. 9
	(acres)	(acres)	(acres)	(acres)	(acres)
Area of late-seral forest	1,236	1,236	1,236	1,236	1,236
Proposed Clearing and Grading	0.0	19.8	44.4	15.3	38.9

The greatest impacts to late-seral forest would occur under Modified Alternative 4 where approximately 43.2 acres would be impacted for the construction of lifts, trails and clearing for the parking lot near the base area (refer to Figure 3-33). The second greatest impacts to late-seral forest would occur under Alternative 9 (the infill alternative) where approximately 38.9 acres would be impacted for the construction of lifts and ski trails (refer to Figure 3-34). The fewest impacts to late-seral forest would occur under Alternative 6 with 15.1 acres removed or modified (refer to Figure 3-32). Alternative 2 would have approximately 19.7 acres of impacts to late-seral forest (refer to Figure 3-32).

Permanent impacts would include complete removal of late-seral forest for development of chairlifts and their associated ski trails under all the Action Alternatives. The ski trails would be maintained in a managed shrub/herbaceous condition.

Construction of the *Basin* and *Hogback Express* chairlifts (in Alternative 2 and Modified Alternative 4), the *Basin* chairlift (in Alternative 6), and *PCT* chairlift (in Alternative 9) and associated trails within late-seral forest has the potential to impact wildlife habitat connectivity by reducing the available connective habitat, increasing edge habitat, decreasing interior habitat, creating potential barrier effects, and increasing human activity, which in turn increases potential disturbance to animals moving through the area. Clearing for lifts and trails would result in similar linear openings that already exist in the mountain parkland habitat.

Full clearing would result in increased fragmentation of contiguous blocks of late-seral forest habitat within the White Pass Study Area as well as increased edge habitat. This would have the greatest potential effect on low mobility species and species dependent on interior forest conditions. For low mobility species, increased habitat fragmentation would increase the probability of population isolation. For organisms such as Cascade frogs, extensive fragmentation can represent a barrier to movement and individuals may become trapped in islands of remaining habitat, leading to a long-term effect of decreased genetic variability.

Habitat fragmentation and increased edge may also increase the risk of predation for animals moving through the area. Clearing of late-seral forest for ski trails and lift alignments would affect not only the area cleared but also a parallel band of remaining forest edge. For example, increased edge habitat may attract edge species, such as great horned owls, to the area that could result in an increased risk of predation for spotted owls potentially dispersing through the area, particularly when crossing openings in the forest. Clearing of late-seral forest would also result in increased edge habitat and may lead to indirect impacts of increased wind-throw.

Construction of the *Basin* and *Hogback Express* chairlifts (in Alternative 2 and Modified Alternative 4), the *Basin* chairlift (in Alternative 6), and *PCT* chairlift (in Alternative 9) would result in fragmentation of late-seral forest within the White Pass Study Area. The majority of trail clearing under Alternatives 2 and 6 would occur in the small tree, moderate canopy, single-story mountain hemlock parkland that comprises the majority of the proposed expansion area. Therefore, impacts to interior forest dependent species would not be as pronounced compared to Alternative 9 because this area already has a great deal of naturally occurring openings. Proposed ski trails have been designed to maximize these existing openings and minimize the amount of clearing necessary to meet standard trail requirements. Impacts to interior forest dependent species would be slightly greater under Modified Alternative 4 since there would be approximately 10 acres of clearing in the small tree, closed canopy, multi-story mixed conifer community. Chapter 2 contains a complete discussion of construction prescriptions.

Impacts to interior forest dependent species (such as northern spotted owl and pileated woodpecker) would be greater under Alternative 9 where fragmentation would occur within the medium tree, closed canopy, multi-story mixed conifer forest (refer to Appendix G – *Vegetation Technical Report and Biological Evaluation*). Fragmentation would indirectly impact forest dwelling wildlife species such as pine marten and pileated woodpecker by reducing overstory cover and LWM, considered key habitat components for late-seral dependent species. Some forest dependent species are hesitant and/or unwilling to cross large, open areas as they do not provide sufficient security cover. Since clearing of late-seral forests for ski trails and lifts would be maintained for the life of the ski area the impact of fragmentation would be permanent.

Periodic summertime maintenance of ski trails, utility lines, and lifts would result in direct and indirect impacts to late-seral forests. Indirect impacts as a result of these activities would include the increase in human activity and noise, which could result in avoidance of the area by some wildlife species. These occasions are expected to be brief and the impact of additional presence and noise is expected to cause only temporary and localized avoidance. Direct impacts resulting from off-season maintenance would occur during the denning, nesting, or breeding season of some species (e.g., marten, pileated woodpecker, etc.) in which case the additional presence and noise would potentially directly impact breeding individuals; causing den or nest abandonment and potential mortality of young.

Snags and Downed Logs

The White Pass Study Area contains approximately 1,236 acres of late-seral forest, most of which is capable of creating CWD and snags. Trail clearing of late-seral forest would result in a long-term reduction of snags within the White Pass Study Area as the cleared trails would be maintained for the life of the ski area. Generation of snags and CWD through forest maturation is already occurring but at a lower rate as a result of the low growth rates of forest vegetation at higher elevations. Reduction of existing snags would be greatest under Alternative 9 where trails and Chair 5 would be constructed in medium tree, closed canopy, multi-story forest (refer to *Appendix G – Vegetation Technical Report and Biological Evaluation*).

Direct impacts to snag-dependent wildlife species would occur if snags containing nesting and denning sites are cleared for trail/lift construction. These impacts would include potential mortality of individuals within the snag and potential nest/den abandonment. In addition, a short-term increase in human activity within the White Pass Study Area would lead to avoidance of the area in general and potential nest/den abandonment of snags located near construction activity. Since increased human activity in the White Pass Study Area would continue for the life of the ski area it is considered a long-term impact.

Clearing of mature forest for ski trails and lift corridors would not only impact the area being cleared but would also impact adjacent forest stands as hazard trees may be felled in the adjoining forest, indirectly impacting future snag recruitment. Other Management Provision OMP6 provides measures for retaining snags whenever possible to reduce the permanent loss of wildlife habitat incurred from their removal (refer to Table 2.4-2). All trees that are cleared for any of the Action Alternatives would be left on-site to provide additional downed wood (refer to clearing prescriptions, Chapter 2). Felling hazard trees would create more downed wood on the forest floor, which would be a beneficial impact for many species that utilize downed wood for foraging, breeding, and denning.

1.4.2 Threatened and Endangered Species

Table 7 presents the impacts to Threatened and Endangered species potentially occurring within the White Pass Study Area.

Table 7:
Available Habitat for Federally Listed Threatened or Endangered Species Potentially Occurring within the White Pass Study Area by Alternative

Species	Alt. 1/ Existing (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effect; All Alternatives
Northern spotted owl (*Strix occidentalis caurina*) Dispersal Habitat	1235.9	1216.2	1192.7	1220.8	1200.6	May Affect, Likely to Adversely Affect
Northern spotted owl (*Strix occidentalis caurina*) NRF Habitat	216	216	202.3	212.3	191.1	May Affect, Likely to Adversely Affect
Designated Critical Habitat for the Northern Spotted Owl, WA-18	14	14	14	14	14	No Effect
Canada Lynx (*Felis Lynx canadensis*) Dispersal Habitat	1,507.3	1,487.6	1,476.0	1,492	1,471.9	No Effect
Grizzly Bear (*Ursus arctos*)	1,507.3	1,487.6	1,476.0	1,492	1,471.9	No Effect
Gray Wolf (*Canis lupis*)	1,454.8	1,435.1	1,423.5	1,439.7	1,419.5	May Affect, Not Likely to Adversely Affect
Bald Eagle (*Haliaaetus leucocephalus*)	0	0	0	0	0	No Effect
Marbled Murrelet (*Brachyrampus marmoratus*)	0	0	0	0	0	No Effect

1.4.2.1 Alternative 1

Under Alternative 1, White Pass would continue to operate without any further development. Overcrowding on existing ski slopes would continue to be an issue. People would continue to ride the lift to the ski area boundary and hike out to Hogback Basin to ski, resulting in a low level of noise and human activity in the proposed expansion area. Under Alternative 1, suitable dispersal habitat could be removed through general maintenance of ski trails and hazard reduction. However, surveys for northern spotted owls within the existing SUP have not detected any presence of the species. Under Alternative 1, direct and indirect effects to northern spotted owl dispersal habitat would continue to manifest as occasional summertime maintenance of lifts and trails. There would be no new potential impacts to grizzly bear, Canada lynx, gray wolf, bald eagle or marbled murrelet as these species are not expected to occur in the White Pass Study Area. Therefore, there would be No Effect to federally listed threatened and endangered species under Alternative 1.

1.4.2.2 Alternative 2

Northern Spotted Owl

Habitat for northern spotted owl within the White Pass Study Area includes dispersal habitat and NRF habitat, as discussed in Section 1.2.3.1. This determination was made based on the elevation of the White Pass Study Area and its lack of detections during surveys in 1987, 1997, and 2000-04 (Pearson 2002).

Clearing would result in permanent removal of suitable dispersal habitat, as vegetation within the ski trail boundaries would be maintained as a managed shrub/herbaceous condition for the life of the ski area. Alternative 2 would remove approximately 19.8 acres (1.9 percent) of the available dispersal habitat within the White Pass Study Area (refer to Table 7). No NRF habitat would be removed under Alternative 2. There would no impacts to NRF habitat under Alternative 2.

Northern spotted owls nesting sites and activity centers have been observed adjacent to the White Pass Study Area since 1992. Because of the proximity of their activity, and vegetation modification within the area proposed for expansion, Alternative 2 could potentially affect dispersal patterns for this species. As known nesting sites are more than 1 mile away from the proposed activities in Hogback Basin and the existing parking area near the base area, it has been determined that the effects on spotted owl nesting by project activities are highly unlikely. The White Pass Study Area is adjacent to two large wilderness areas and other LSR and MLSA’s where suitable dispersal and nesting, roosting, and foraging habitat are widely available. It is unlikely that Alternative 2 would directly affect northern spotted owl dispersal habitat or the viability of the LSR. Data in the Clear Fork Cowlitz Watershed Analysis (USDA 1998a) also indicates that Hogback Basin is not within known nesting, roosting, foraging, or dispersal habitat for northern spotted owls.

Canopy closure and tree size would be negligibly affected by Alternative 2, as only individual scattered trees along ski trails and chairlift corridors would be removed rather than complete stands (refer to the *Vegetation Technical Report and Biological Evaluation* in Appendix G). Alternative 2 would occur in mountain hemlock parkland, high elevation forest with a naturally low canopy closure and comparatively small tree size (refer to Section 3.5 – Vegetation). As a result, Alternative 2 would have no effect on canopy cover within the expansion area. Effects to connectivity are discussed later in this section.

Under Alternative 2, clearing for ski trails and lift corridors would directly impact approximately 19.8 acres of potential dispersal habitat (refer to Table 7). Potential dispersal habitat remaining within the White Pass Study 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 potential dispersal habitat where islands of trees are removed for ski trails. The reduction of potential dispersal habitat and the creation of openings in the forest may increase the risk of predation for northern spotted owls if they were to disperse through the area.

Construction activities would require the use of a Type I helicopter (heavy lifting capacity) 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 through July 31 would be implemented thus limiting disturbance to northern spotted owls within the White Pass Study 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 season.

The information presented in the SEI report includes a review of the effects of forest fragmentation 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 northern 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 northern 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.

Alternative 2 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.

Potential impacts to 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 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 White Pass Study Area. However, these impacts would be intermittent and short-term in nature. In addition, due to the absence of detections during surveys between 1987 and 2004 it is considered unlikely that owls regularly disperse through the area. ***Therefore, there would be No Effect to northern spotted owls under Alternative 2.***

There is approximately 14 acres of Designated Critical Habitat for the Northern Spotted Owl, Critical Habitat Unit (CHU), WA-18, in the White Pass Study Area. CHU, WA-18 would not be affected by actions proposed in this alternative. ***Therefore, there would be No Effect to Designated Critical Habitat under Alternative 2.***

Canada Lynx

Alternative 2 would not be expected to result in significant impacts to **Canada lynx** since it is not expected to occur in the White Pass Study Area except during rare pass-through occasions. Potential operational impacts include disturbance to lynx traveling through the area due to recreation and maintenance activities during both summer and winter. These activities would occur in existing developed areas and new areas proposed for development under Alternative 2, and could temporarily cause lynx to alter their route through the area. As explained in Section 1.2.3.2, the White Pass Study 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 and USFWS (2005). In addition, the area is considered unoccupied (USFS, USFWS 2006). 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. ***Therefore, there would be No Effect to Canada lynx under Alternative 2.***

Grizzly Bear

Alternative 2 would not be expected to result in significant impacts to **grizzly bears**. The White Pass Study 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 White Pass Study Area since suitable habitat for hibernation is lacking within the White Pass Study Area. 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, such as vegetation mowing or brushing, could potentially disturb bears that might pass through the area but this is expected to be rare. The addition of new ski trails within the White Pass Study Area 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. ***Therefore, there would be No Effect to grizzly bear under Alternative 2.***

Gray Wolf

As described in Section 1.2.3.3, **gray wolves** use a variety of habitat types and appear to select habitat based upon prey availability and security from human disturbance. Prey, including deer, elk, and small mammals, is seasonally abundant throughout the White Pass Study Area. The presence of gray wolves is expected to be rare and limited to occasional use of the White Pass Study Area as part of a larger home range territory, in part because the White Pass Study Area is lacking in suitable denning habitat for this species.

Construction activities associated with Alternative 2 would include increased human activity and noise and could result in the short-term avoidance of the area by wolves.

Wolves could occasionally hunt within the White Pass Study Area during the summer. Ungulates are the primary prey of gray wolves. Within the White Pass Study Area elk, black-tailed, and mule deer are most common and impacts to these species could have adverse affects on potential wolf populations. One factor affecting wolf abundance is the relationship of 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). Both elk and deer are considered common in the White Pass Study Area in the summer but absent in the winter when the snowpack is too deep to support them.

For a complete discussion of potential impacts to elk and deer, primary prey species for gray wolves, see the discussion under each of these species in the following sections of this report. As described in the section for deer, the amount of foraging habitat and cover habitat would decrease under Alternative 2. Loss of cover would be a long-term effect while loss of foraging would be short-term until vegetation within graded areas has recovered. Greater impacts to deer and elk under Alternative 2 would be the short-term disturbance due to elevated noise and human activity in the White Pass Study Area, which would lead to avoidance of the area until construction activities subside. Any reduction in the number of potential prey animals occurring in the White Pass Study Area could make it more difficult for wolves to find prey in the area, further reducing the likelihood of wolves occurring in the area.

Impacts to wolves due to ski area operations are not expected as this species is not expected to occur in the White Pass Study Area during the winter due to lack of suitable prey and increased human activity. ***Therefore, there would be No Effect to gray wolves under Alternative 2.***

Bald Eagle

Alternative 2 is not expected to affect bald eagles as no known nests or wintering occurs within the White Pass Study Area. Potential foraging may occur at Leech Lake during the breeding season, however, due to the existing human use of the area, including the proximity of US 12, the existing ski area and campgrounds, to which the eagles may be somewhat acclimated, no impacts to foraging eagles are expected. ***Therefore, there would be No Effect to bald eagle under Alternative 2.***

Marbled Murrelet

The White Pass Study Area is located outside the range of suitable marbled murrelet habitat and no documented occurrences have been recorded within the White Pass Study Area. Alternative 2 is not expected to have any effect on marbled murrelet. Therefore, there would be No Effect to marbled murrelet under Alternative 2.

1.4.2.3 Modified Alternative 4

Northern Spotted Owl

Due to the absence of detections during surveys between 1987 and 2004 conducted during the breeding season, it is considered unlikely that owls regularly use the area during the breeding season. 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 White Pass 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 White Pass Study 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 installation 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 northern spotted owls from the construction of the ski runs.

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 through July 31 will be implemented thus limiting disturbance to northern spotted owls within the White Pass Study 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 season.

Suitable habitat (NRF and dispersal) for northern spotted owl within the White Pass Study Area would be impacted through clearing activities for ski trails, lifts, and facilities as summarized above in 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 (refer to Figure 3-41). 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.

Clearing for ski trails and lift corridors would directly impact approximately 43.2 acres of dispersal habitat within the White Pass Study Area (refer to Figure 3-41). Dispersal habitat remaining within the White Pass Study 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 owl nesting sites and activity centers have been observed adjacent to the White Pass Study Area since 1992. Modified Alternative 4 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 adjacent to the White Pass Study Area, and the amount of habitat removed is relatively small and spread throughout the entire White Pass Study Area, dispersal patterns are not expected to change. As known nesting sites are more than 1 mile away from the proposed activities, it has been determined that the effects on spotted owl nesting by the Modified Alternative 4 are highly unlikely.

Canopy closure and tree size would be negligibly affected by Modified Alternative 4 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.

Modified Alternative 4 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.

It is unlikely that Modified Alternative 4 would directly affect northern spotted owl dispersal habitat or the viability of the LSR. Modified Alternative 4 would not adversely affect the function of CHU and LSR or Managed Late-Successional Areas outside the White Pass Study Area utilized by northern spotted owls.

Modified Alternative 4 may affect, likely to adversely affect northern spotted owl through loss of suitable NRF habitat for construction.

No proposed activities would occur within CHU, WA-18. Modified Alternative 4 would not adversely affect the function of CHU, WA-18. ***Therefore, there would be No Effect to Designated Critical Habitat under Modified Alternative 4.***

Canada Lynx

Modified Alternative 4 is not expected to result in significant impacts to Canada lynx since it is not expected to occur in the White Pass Study Area, except during rare pass-through occasions. The White Pass Study Area is not located within a LAU and it is considered peripheral habitat according to the Canada Lynx Recovery Outline (USWFS 2005). Modified Alternative 4 is consistent with the Lynx Conservation Assessment and Strategy (LCAS; Ruediger et al. 2000) and the Lynx Conservation Agreement (USFS, USFWS 2005). An amendment to the Lynx Conservation Agreement (USFS, 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. ***Modified Alternative 4 would have No Effect on Canada lynx.***

Grizzly Bear

Modified Alternative 4 is not expected to result in significant impacts to grizzly bears. No grizzly bears have been documented or are know to occur with the White Pass Study Area. The White Pass Study 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 White Pass Study 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. ***Modified Alternative 4 would have No Effect on grizzly bear.***

Gray Wolf

Modified Alternative 4 is not expected to impact individuals as gray wolf occurrence has not been documented within the White Pass Study Area. The presence of gray wolves is expected to be rare and limited to occasional use of the White Pass Study 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 White Pass Study 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 White Pass Study Area during the summer. Potential impacts to the prey base from Modified Alternative 4 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 White Pass Study 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 White Pass Study Area during the summer when construction activities occur. A reduction in the number of potential prey animals occurring in the White Pass Study 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 White Pass Study Area and the changes should be negligible.

Construction activities during the summer months associated with Modified Alternative 4 would include increased noise and human activity within the White Pass Study Area that could result in short-term avoidance of the area by wolves. However, due to the proximity of US 12, the existing ski area operations, and human use of the PCT 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. ***Therefore, Modified Alternative 4 may affect, but is not likely to adversely affect gray wolf.***

Bald Eagle

Modified Alternative 4 is not expected to affect bald eagles, as no known nests or wintering occurs within the White Pass Study Area. Potential foraging may occur at Leech Lake during the breeding season, however, due to the existing human use of the area, including the proximity of US 12, the existing ski area and campgrounds, to which the eagles are likely somewhat acclimated, no impacts to foraging eagles are expected. ***Modified Alternative 4 would have No Effect on bald eagle.***

Marbled Murrelet

The White Pass Study Area is located outside the limit of suitable marbled murrelet habitat and no documented occurrences have been recorded within the White Pass Study Area. ***Modified Alternative 4 would have No Effect on marbled murrelet.***

1.4.2.4 Alternative 6

Northern Spotted Owl

Impacts to **northern spotted owl** under Alternative 6 would be similar to but fewer than the impacts described under Alternative 2. Approximately 15.1 acres of dispersal habitat would be impacted under this alternative; roughly half that of the amount impacted under Alternative 2. Additionally, there would be approximately 3.7 acres of clearing in NRF habitat within the existing ski area for development of a parking lot (refer to Figure 3-40). Therefore, there would be a total of approximately 18.8 acres of impacts (or 1.2 percent) to suitable habitat under Alternative 6.

A 0.25-mile road is proposed under Alternative 6. The road would run between the existing Quail trail to the base of the proposed *Basin* chairlift. Clearing and grading would be required for construction of this road, thus short-term indirect impacts to the northern spotted owl would occur from the additional noise and human activity. Additionally, this road would double as an egress trail during winter ski operations. Long-term impacts would be expected to be minimal as dispersal activity is typically limited to spring and late fall, during which time there would not be any activity from ski area operations within the *Basin* pod.

The mid-mountain lodge would be constructed adjacent to the Quail trail under Alternative 6. This would result in fewer potential long-term impacts to the northern spotted owl as the lodge would be located adjacent to a previously disturbed area. While short-term disturbance would occur during construction, long-term impacts would be expected to be minimal.

Under Alternative 6 the total SUP expansion area would be 282 acres thus limiting the proposed activities to a smaller portion of the Hogback Basin than in the other Action Alternatives. ***For these reasons, Alternative 6 may affect, likely to adversely affect northern spotted owl*** through loss of suitable NRF habitat for construction.

No proposed activities would occur within CHU, WA-18. Alternative 6 would not adversely affect the function of CHU, WA-18. ***Therefore, there would be No Effect to Designated Critical Habitat under Alternative 6.***

Canada Lynx, Grizzly Bear, and Gray Wolf

Under Alternative 6, the types of impacts to **Canada lynx, grizzly bear,** and **gray wolf** would be similar to Alternative 2, except with fewer acres (approximately 19.7 acres) of mountain hemlock parkland cleared for ski lifts and trails in the proposed expansion area. Additional impacts could result from clearing of forested areas for the road/egress trail. Construction activities could result in the short-term displacement of large ungulates, which are prey species for the gray wolf. Operational impacts under Alternative 6 would include increased noise and human activity within Hogback Basin; however, this activity would take place during the winter when these species are not expected to occur. The parking lot proposed under Alternative 6 would not be expected to have significant impacts to these species, as it would be constructed adjacent to the base area where a high level of human activity occurs year-round. ***Therefore, Alternative 6 would have No Effect on Canada lynx, grizzly bear, or gray wolf.***

Bald Eagle

Alternative 6 is not expected to affect bald eagles, as no known nests or wintering occurs within the White Pass Study Area. Potential foraging may occur at Leech Lake during the breeding season, however, due to the existing human use of the area, including the proximity of US 12, the existing ski area and campgrounds, to which the eagles are likely somewhat acclimated, no impacts to foraging eagles are expected. ***Alternative 6 would have No Effect on Bald Eagle.***

Marbled Murrelet

The White Pass Study Area is located outside the limit of suitable marbled murrelet habitat and no documented occurrences have been recorded within the White Pass Study Area. Alternative 6 is not expected to have any effect on marbled murrelet. ***Alternative 6 would have No Effect on marbled murrelet.***

1.4.2.5 Alternative 9

Northern Spotted Owl

Impacts to the **northern spotted owl** under Alternative 9 would be greater than under Alternative 2. All new lifts and trails would be constructed within the existing ski area (refer to Figures 3-34 and 3-38). Approximately 24.9 acres of NRF habitat would be cleared for construction of the ski lift and associated trails (refer to the *Vegetation Technical Report and Biological Evaluation* in Appendix G). In addition, 10.4 acres of dispersal habitat would be cleared in the western portion of the existing ski area for development of an egress trail for a total of approximately 35.3 acres (or 2.8 percent) of impacts to the suitable habitat for northern spotted owls.

Alternative 9, which proposes to build a new lift and associated trails within the existing ski area would result in fragmentation of late-seral forest. As a result it would be expected that the suitability of the existing ski area as potential habitat for the northern spotted owl would be diminished under the Alternative 9 scenario. Surveys for northern spotted owls within the White Pass Study Area have not resulted in any detections (Pearson 2002). According to the SEI report, forest fragmentation has the potential to affect dispersal patterns by forcing owls to detour around fragmented areas (Courtney et al. 2004). This would be an indirect impact under Alternative 9.

Construction of ski trails in this area would also reduce the amount of potentially suitable foraging habitat available and may reduce the effectiveness of foraging habitat by introducing increased amounts of human activity into the area.

Under Alternative 9 one new chairlift, the *PCT* chairlift, and seven new trails would be constructed in the eastern portion of the existing ski area. This portion of the ski area is comprised primarily of medium tree, multi-story, closed canopy, mixed hemlock forest. All of the impacts to vegetation would occur in late-seral forest. Construction of ski trails and the *PCT* chairlift would result in fragmentation of the forest within this portion of the existing ski area. Fragmentation would decrease the suitability of this forest for the interior forest dwelling northern spotted owl. Therefore, Alternative 9 would be expected to further decrease the available habitat within the existing ski area. However, surveys conducted over the past decade have not found any owls and the existing ski area is considered to be marginal NRF habitat at best due to its fragmented nature. Owls potentially utilizing the area for dispersal during the construction phase would be temporarily displaced by the increased noise and human activity. ***Alternative 9 may affect, likely to adversely affect northern spotted owl*** through loss of suitable habitat for construction.

No proposed activities would occur within CHU, WA-18. Alternative 9 would not adversely affect the function of CHU, WA-18. ***Therefore, there would be No Effect to Designated Critical Habitat under Alternative 9.***

Canada Lynx, Grizzly Bear, and Gray Wolf

Impacts to **Canada lynx, grizzly bear,** and **gray wolf** under Alternative 9 could occur in the more densely forested existing ski area portion of the White Pass Study Area. Impacts to these species from additional ski area operations are expected to be minimal as all proposed new trails and lifts would be developed adjacent to the existing high-use ski area. These species are not expected to occur within the White Pass Study Area during the winter due to the high level of human activity.

Construction impacts would potentially result in avoidance of the area during the summer and fall season; however, since these species are not expected to occur except on a transitory basis, these impacts would be short-term in nature. The parking lot proposed under Alternative 9 would not be expected to have significant impacts to these species, as it would be constructed adjacent to the base area, where a high level of human activity occurs year-round. ***Alternative 9 would have No Effect on Canada lynx, grizzly bear, or gray wolf.***

Bald Eagle

Alternative 9 is not expected to affect bald eagles, as no known nests or wintering occurs within the White Pass Study Area. Potential foraging may occur at Leech Lake during the breeding season, however, due to the existing human use of the area, including the proximity of US 12, the existing ski area and campgrounds, to which the eagles are likely somewhat acclimated, no impacts to foraging eagles are expected. ***Alternative 9 would have No Effect on bald eagle.***

Marbled Murrelet

The White Pass Study Area is located outside the limit of suitable marbled murrelet habitat and no documented occurrences have been recorded within the White Pass Study Area. Alternative 9 is not expected to have any effect on marbled murrelet. ***Alternative 9 would have No Effect on marbled murrelet.***

1.4.3 US Forest Service Survey and Manage Species

Table FEIS3 presents impacts to US Forest Service Survey and Manage Species.

Table FEIS3:
Available Habitat for Okanogan and Wenatchee and Gifford Pinchot National Forest Survey and Manage Species Potentially Occurring within the White Pass Study Area by Alternative

Species	Alt. 1	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9	Determination of Effects; All Alternatives
	(acres)	(acres)	(acres)	(acres)	(acres)	
Puget Oregonian (*Cryptomastix devia*)	522.5	522.5	500.8	518.7	487.2	May impact individuals but would not likely contribute to a trend toward federal listing
Warty jumping-slug (*Hemphillia glandulosa*)	522.5	522.5	500.8	518.7	487.2	May impact individuals but would not likely contribute to a trend toward federal listing
Keeled jumping-slug (*Hemphillia burringtoni*)	522.5	522.5	500.8	518.7	487.2	May impact individuals but would not likely contribute to a trend toward federal listing
Blue-gray taildropper (*Prophysaon coeruleum*)	569.7	550.2	548	565.9	534.4	May impact individuals but would not likely contribute to a trend toward federal listing

Table FEIS3:
Available Habitat for Okanogan and Wenatchee and Gifford Pinchot National Forest Survey and Manage Species Potentially Occurring within the White Pass Study Area by Alternative

Species	Alt. 1 (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effects; All Alternatives
Larch Mountain Salamander (*Plethodon larselli*)	575.0	555.3	553.3	571.2	539.3	May impact individuals but would not likely contribute to a trend toward federal listing
Van Dyke's Salamander (*Plethodon vandykei*)	216.8	216.8	192.0	214.8	195.3	May impact individuals but would not likely contribute to a trend toward federal listing
Great Gray Owl (*Strix nebulosa*) Nesting habitat	510.7	510.7	489	506.9	475.4	No impacts to this species are expected to occur.
Great Gray Owl Forgaing habitat	988.4	968.7	987.1	976.6	984.0	
Long-legged myotis (*Myotis volans*)	1,454.8	1,435.1	1,423.5	1,439.5	1,419.5	May impact individuals but would not likely contribute to a trend toward federal listing.
Long-eared myotis (*Myotis evotis*)	522.5	522.5	500.8	518.7	487.2	May impact individuals but would not likely contribute to a trend toward federal listing.
Silver-haired bat (*Lasioycteris noctivagans*)	327.0	327.0	317.4	323.3	301.8	May impact individuals but would not likely contribute to a trend toward federal listing
Fringed myotis (*Myotis thysanodes*)						
Pallid bat						

Alternative 1

Under Alternative 1, White Pass would continue to operate without any further development. Overcrowding on existing ski slopes would continue to be an issue. People would continue to ride the lift to the ski area boundary and hike out to Hogback Basin to ski, resulting in a low level of noise and human activity in the proposed expansion area. Under Alternative 1, suitable nest trees could be removed through general maintenance of ski trails and hazard reduction. ***No additional impacts would occur to Survey and Manage Species under Alternative 1.***

Alternative 2

As discussed in Section 1.2.4, surveys for **terrestrial mollusks** were conducted in 1999 with none found. Therefore, these species have a status of "not detected" and although absence cannot absolutely be determined, these species are unlikely to occur within the proposed expansion area. ***Therefore, impacts to terrestrial mollusks under Alternative 2 are not expected to occur.***

As discussed in Section 1.2.4, no suitable habitat for **Larch Mountain salamander** and **Van Dyke's salamander** exists at the higher elevations of the proposed expansion area. ***Therefore, impacts to these species are not expected to occur under Alternative 2.***

As explained in Section 1.2.5, the **great gray owl** depends upon mature forest habitat, especially closed canopy forest. This habitat is not found within the proposed expansion area in the Hogback Basin (refer to Figure 3-35). Mature open canopy forest with potential for large snags may also be used by great gray owls; however, large snags are generally unavailable within the proposed expansion area because it is composed of a small tree, single-story, moderate canopy mountain hemlock parkland forest (refer to Figure 3-35).

Construction of trails and lifts under Alternative 2 would not reduce any suitable nesting habitat as all potential nesting habitat is located within the existing SUP ski area. However, the proposed expansion area contains suitable foraging habitat for this species. Under Alternative 2 approximately 19.7 acres of potential foraging habitat would be directly impacted by construction activities such as increased noise and human activity in the area. These impacts would be considered short-term, however, because cleared ski trails represent suitable foraging habitat for this species.

Because no great gray owls were detected during surveys, conducted to current protocol in 1997, they are not expected to occur in the White Pass Study Area and no ski area operational impacts to great gray owls are anticipated within the White Pass Study Area. There is a possibility that an increase in disturbance to great gray owls potentially occurring in areas outside of the White Pass Study Area may occur as a result of increased recreation. These would be short-term and incidental impacts that are not quantifiable, since there are no known occurrences of great gray owls in the vicinity. ***Therefore, impacts to great gray owl under Alternative 2 are not expected to occur.***

Clearing of late-seral forest would impact habitat for the **long-legged myotis** and the **long-eared myotis**. These species are known to roost under loose tree bark, a characteristic of late-seral forest. These myotis species also utilize snags as roosting sites. Areas of full clearing within late-seral habitat would result in a reduction in the amount of roosting habitat available for these species. Snags would also be removed along edges of ski trails as a part of hazard tree management. Roosting habitat would therefore be reduced in these management areas and potential direct impacts could occur to individuals utilizing trees that are removed. However, it is important to note that the proposed expansion area does not contain large trees or a dense canopy therefore, it does not provide high quality roosting habitat for these species.

Construction of chairlifts and ski trails would increase the amount of edge habitat within the White Pass Study Area thereby increasing the amount of potential foraging habitat for these species. Of the approximately 1,454.8 acres of foraging habitat available for the long-legged myotis, approximately 19.7 acres (1.4 percent) would be impacted under implementation of Alternative 2. Long-eared myotis, which tend to prefer more forested foraging habitat, have approximately 522.5 acres available habitat, none of which would be impacted under Alternative 2. ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend toward federal listing for the long-legged myotis and the long-eared myotis.***

Impacts to the **silver-haired bat** under Alternative 2 would occur from the reduction in late-seral forest. The silver-haired bat is known to roost under loose tree bark, a characteristic of late-seral forest. This species will also utilize snags as roosting sites. Areas of full clearing within late-seral forest habitat could result in a reduction in the amount of roosting habitat available for these species. Snags would also be removed from along the edges of ski trails as a part of hazard tree management. Roosting habitat could therefore be reduced in these management areas. However, Other Management Provision OMP6 would restrict the removal of snags and the management of hazard trees is only expected to require the removal of occasional, individual trees that present a danger to public safety, reducing the potential impacts to the silver-haired bat. Clearing for chairlifts and ski trails would increase the amount of edge habitat in the White Pass Study Area, thereby increasing the amount of potential foraging habitat for this species. ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend towards federal listing for the silver-haired bat.***

Modified Alternative 4

As discussed in Section 1.2.4, surveys for **terrestrial mollusks** were conducted in 1999 with none found. Therefore, these species have a status of "not detected" and although absence cannot absolutely be determined, these species are unlikely to occur within the proposed expansion area. Therefore, impacts to terrestrial mollusks in the higher elevation proposed expansion area are not expected to occur under Modified Alternative 4.

However, the proposed parking lot, which would be constructed adjacent to the base area may contain suitable habitat, although the likelihood of mollusk presence is low. There would be approximately 1 percent of impacts to available habitat for terrestrial mollusk species. Management Requirement MR9 would require surveys be performed for these species prior to any ground disturbing activities. Potential impacts to terrestrial mollusks from construction of the parking lot could include direct mortality of individuals and long-term loss of habitat. Trees cleared for construction of the parking lot would be scattered throughout the White Pass Study Area, thus providing additional habitat for these species.

Therefore, Modified Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for terrestrial mollusks.

As discussed in Section 1.2.4, no suitable habitat for **Larch Mountain salamander** and **Van Dyke's salamander** exists at the higher elevations of the proposed expansion area. Therefore, impacts to these species in the higher elevation proposed expansion area are not expected to occur under Modified Alternative 4.

However, the proposed parking lot may contain potential habitat for these salamander species, although the likelihood of salamander presence is low. Management Requirement MR9 would require surveys be performed for these species prior to any ground disturbing activities. Potential impacts to Larch Mountain and Van Dyke's salamanders from construction of the parking lot could include direct mortality of individuals and long-term loss of habitat (approximately 5.9 percent of the suitable habitat available within the White Pass Study Area). Trees cleared for construction of the parking lot would be scattered throughout the White Pass Study Area, thus providing additional CWD habitat for these species. ***Therefore, Modified Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for Larch Mountain salamander and Van Dyke's salamander.***

Impacts to **great gray owls** under Modified Alternative 4 would be similar to Alternative 2. The majority of the proposed trails and both of the proposed lifts would be installed in the mountain hemlock parkland in the proposed expansion area. This parkland does not provide the proper nesting habitat structure required by the great gray owl although it does provide suitable foraging habitat. Modified Alternative 4 would result in approximately 1.3 acres of impacts within suitable foraging habitat. In addition, approximately 21.7 acres of suitable nesting habitat would be directly impacted under Modified Alternative 4. The proposed egress trails, which would require the clearing of approximately 12.0 acres of small tree, multi-story, closed canopy mixed conifer forest, could potentially result in the disturbance of owls during construction. Long-term impacts to this species would be negligible because cleared ski trails represent suitable foraging habitat for the great gray owl. However, surveys have not found any evidence of owls in the area. ***Therefore, impacts to this species are not expected to occur.***

Impacts to the **long-legged myotis** and the **long-eared myotis** under Modified Alternative 4 would be similar to, but greater than, Alternative 2. Foraging habitat for the long-legged myotis would be reduced by approximately 31.3 acres (2.2 percent). Foraging habitat for the long-eared myotis would be reduced by approximately 21.7 acres (4.2 percent). ***Therefore, Modified Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the long-legged myotis and the long-eared myotis.***

Impacts to the **silver-haired bat** under Modified Alternative 4 would be similar to, but greater than, Alternative 2, because of the addition of the egress trail, ski trials, and the expanded parking lot (approximately 9.6 acres, or 2.9 percent). Construction activities could lead to avoidance of the area as could ski area operations. Additional edge habitat created by ski trail clearing would result in a small increase in foraging habitat for this species. ***Therefore, Modified Alternative 4 may impact individuals but would not likely lead to a trend towards federal listing for the silver-haired bat.***

Alternative 6

As discussed in Section 1.2.4, surveys for **terrestrial mollusks** were conducted in 1999 with none found. Therefore, these species have a status of "not detected" and although absence cannot absolutely be determined, these species are unlikely to occur within the proposed expansion area. Alternative 6 would impact approximately 0.7 percent of the habitat available for terrestrial mollusks within the White Pass Study Area. ***Therefore, Alternative 6 may impact individuals but would not likely lead to a trend toward federal listing for terrestrial mollusks.***

As discussed in Section 1.2.4, no suitable habitat for **Larch Mountain salamander** and **Van Dyke's salamander** exists at the higher elevations of the proposed expansion area. Therefore, impacts to these species in the higher elevation proposed expansion area are not expected to occur under Alternative 6. However, the proposed parking lot contains potential habitat for these salamander species. Management Requirement MR9 would require surveys be performed for these species prior to any ground disturbing activities. Potential impacts to Larch Mountain and Van Dyke's salamanders from construction of the parking lot could include direct mortality of individuals and long-term loss of habitat. Alternative 6 would impact approximately 0.7 percent of the habitat available within the White Pass Study Area for these species. Trees cleared for construction of the parking lot would be scattered throughout the White Pass Study Area, thus providing additional CWD habitat for these species. ***Therefore, Alternative 6 may impact individuals but would not likely lead to a trend toward federal listing for Larch Mountain salamander and Van Dyke's salamander.***

Impacts to **great gray owls** under Alternative 6 would be similar to Alternative 2. Approximately 3.8 acres of potential nesting habitat within the existing ski area and approximately 11.8 acres of potential foraging habitat within the proposed expansion area would be directly impacted due to construction activities. Increased noise and human activity resulting in potential avoidance of the area would be a short-term impact since cleared ski trails represent suitable foraging habitat for the great gray owl. As stated in Alternative 2, surveys conducted have not found any evidence that this species resides within the White Pass Study Area. ***Therefore, no impacts to great gray owl are expected to occur under Alternative 6.***

Impacts to the **long-legged myotis** and the **long-eared myotis** under Alternative 6 would be similar to, but greater than, Alternative 2. Foraging habitat for the long-legged myotis would be reduced by approximately 15.3 acres (1.1 percent), roughly 10 acres less than Alternative 2. Foraging habitat for the long-eared myotis would be reduced by approximately 3.8 acres (0.7 percent), more than Alternative 2, which would not result in a reduction of habitat for this species. ***Therefore, Alternative 6 may impact individuals but would not likely lead to a trend toward federal listing for the long-legged myotis and the long-eared myotis.***

Impacts to the **silver-haired bat** under Alternative 6 would be greater than Alternative 2 because development would occur within the more heavily forested portions of the White Pass Study Area. Under Alternative 6 there is approximately 3.7 acres (1.1 percent) of the habitat available to this species within the White Pass Study Area. Construction activities could lead to avoidance of the area as could ski area operations. Additional edge habitat created by ski trail clearing would result in a small increase in foraging habitat for this species. Ski area operations could potentially lead to avoidance of the area due to increased noise and human activity. ***Therefore, Alternative 6 may impact individuals but would not likely lead to a trend towards federal listing for the silver-haired bat.***

Alternative 9

As discussed in Section 1.2.4, **terrestrial mollusks** are not expected to occur within the proposed expansion area due to habitat restrictions and lack of sightings during surveys conducted in 1999 (Leingang 1999). However, suitable habitat exists within the late-seral, multi-story closed canopy, mixed conifer forests of the existing ski area. Management Requirement MR9 would require additional surveys for these species be performed if Alternative 9 is selected. Alternative 9 would impact approximately 6.6 percent of the available terrestrial mollusk habitat within the White Pass Study Area.

Potential direct impacts to these species under Alternative 9 would include mortality of individuals from construction equipment and clearing. All trees cleared for development of ski trails and lifts would be retained on-site and used to enhance CWD habitat within the ski area which would create additional habitat for terrestrial mollusk species. ***Therefore, Alternative 9 may impact individuals but would not likely lead to a trend toward federal listing for terrestrial mollusks.***

Impacts to **Larch Mountain salamander** and **Van Dyke's salamander** could occur under Alternative 9. As discussed in Section 1.2.4, potentially suitable habitat exists within the existing ski area and, should Alternative 9 be selected, Management Requirement MR9 would require surveys be performed for this species in all areas where disturbance may occur.

Direct amphibian mortality is possible where construction activity would be in or near forested or riparian areas. Construction equipment may crush any salamanders present in these areas, and disturbance to LWM could harm individual animals. The sedentary, subterranean lifestyle of this species may protect salamanders from direct impacts but leave them unable to find new habitat. Due to the limited mobility of this species, reduction in habitat area or change in edge microclimates could increase habitat fragmentation. Alternative 9 would impact approximately 7.2 percent of the available terrestrial salamander habitat. ***Therefore, Alternative 9 may impact individuals but would not likely lead to a trend toward federal listing for Larch Mountain salamander and Van Dyke's salamander.***

Impacts to the **great gray owl** under Alternative 9 would be greater than Alternative 2. The existing ski area contains elements of great gray owl nesting habitat such as a closed canopy and dense forests. Under Alternative 9 approximately 35.3 acres of potential nesting habitat and approximately 4.4 acres of foraging habitat within the White Pass Study Area would be cleared for development of ski trails and the *PCT* lift. This would be approximately 2.6 percent of the available habitat within the White Pass Study Area. These trails would be maintained for the life of the ski area thus resulting in long-term impacts to potential habitat to nesting habitat. However, cleared ski trails represent potential foraging habitat for great gray owls therefore, within the existing ski area, the suitable nesting habitat would be converted to suitable foraging habitat for this species.

In addition, ski trail maintenance requires the falling of hazard trees. Danger trees are typically snags and decaying trees that are too close to the ski trail and must be removed for public safety. Since these trees also provide excellent nesting habitat the removal of snags could potentially result in adult and/or infant mortality or nest abandonment. However, removal of danger trees is not expected to occur on a regular basis. OMP6 stipulates that removal would occur only when necessary to provide for public safety. In addition, downed snags would be left on site to provide additional forest habitat. ***Therefore, Alternative 9 may impact individuals but would not likely lead to a trend towards federal listing for the great gray owl.***

Impacts to the **long-legged myotis** and the **long-eared myotis** under Alternative 9 would be greater than Alternative 2. Foraging habitat for the long-legged myotis would be reduced by approximately 35.3 acres (2.4 percent), roughly 15.6 acres less than Alternative 2. Foraging habitat for the long-eared myotis would be reduced by approximately 35.3 acres (6.8 percent), more than Alternative 2. ***Therefore, Alternative 9 may impact individuals but would not likely lead to a trend toward federal listing for the long-legged myotis and the long-eared myotis.***

Impacts to the **silver-haired bat** under Alternative 9 would be greater than Alternative 2 because Alternative 9 would occur entirely within the heavily forested existing ski area as opposed to the mountain hemlock parkland of the proposed expansion area. Impacts could include the clearing of trees, thus the removal of potential roosting habitat and potential mortality of individuals. Approximately 35.3 acres of mixed conifer forest would be impacted under Alternative 9. In total, this would amount to 10.7 percent of the available habitat within the White Pass Study Area for this species. Development of ski trails would increase the amount of foraging habitat for these species. Ski area operations would potentially result in avoidance of the area however the new trails would be located within the existing ski area where a high level of human activity already occurs. Therefore, this species is not expected to occur frequently. ***Therefore, Alternative 9 may impact individuals but would not likely lead to a trend towards federal listing for the silver-haired bat.***

1.4.4 Forest Service Sensitive Species

Table 8 presents impacts to OWNF and GPNF Sensitive Species.

Table 8:
Available Habitat for Okanogan and Wenatchee and Gifford Pinchot National Forest Sensitive Species Potentially Occurring within the White Pass Study Area by Alternative

Species	Alt. 1	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9	Determination of Effects; All Alternatives
	(acres)	(acres)	(acres)	(acres)	(acres)	
California wolverine (*Gulo gulo luteus*)	1,507.3	1,487.6	1,476.0	1,492	1,471.9	May impact individuals but would not likely contribute to a trend toward federal listing
Pacific western (Townsend's) big-eared bat (*Corynorhinus townsendii*) Foraging habitat	988.4	968.7	987.1	976.6	984.0	May impact individuals but would not likely contribute to a trend toward federal listing

Alternative 1

Under Alternative 1, White Pass would continue to operate without any further development. Overcrowding on existing ski slopes would continue to be an issue. People would continue to ride the lift to the ski area boundary and hike out to Hogback Basin to ski, resulting in a low level of noise and human activity in the proposed expansion area. Additionally, continued summertime use of the PCT would maintain human recreational presence in the area. Under Alternative 1, suitable nest trees could be removed through general maintenance of ski trails and hazard reduction. ***No additional impacts would occur to OWNF or GPNF Sensitive Species under Alternative 1.***

Alternative 2

Potentially suitable foraging and dispersal habitat for the **California wolverine** is present within the White Pass Study Area. The primary impact to wolverine could be the increase in human activity within the White Pass Study Area, as wolverines do not tolerate land use activities that permanently alter or fragment habitat and provide human access (Banci 1994). Short-term direct impacts include noise and activity associated with ski lift construction and ski trail clearing and grading. Noise and human presence associated with these activities may cause wolverine to avoid moving through the area.

Potential long-term direct impacts would result from increased winter recreational use of the area associated with the *Basin* and *Hogback Express* chairlifts and associated trails. In addition, ski trail grooming is often undertaken at night, resulting in almost continuous activity within the proposed expansion area during the winter ski season. Consequently, these activities may alter potential use of the area or lead to complete avoidance. Accordingly, Alternative 2 would further degrade the suitability of habitat available for wolverines within the White Pass Study Area by expanding wintertime recreation into habitat relatively undisturbed by human presence.

During the summer, ski lift and trail maintenance activities may have direct impacts on animals potentially moving through the area, as the associated noise and activity may alter use of the area. These activities would be expected to be of short duration with lift maintenance occurring on an annual basis and ski trail maintenance occurring less frequently. Alternative 2 would permanently remove approximately 19.7 acres of late-seral forested habitat (refer to the *Vegetation Technical Report and Biological Evaluation* in Appendix G). This would amount to approximately 1.3 percent of the available habitat within the White Pass Study Area for wolverine (refer to Table 8). Increased recreational use and maintenance activities could reduce the effectiveness of the White Pass Study Area for travel habitat. The continued presence of forested habitat to the south, east, and west of the White Pass Study Area would allow wolverines to move through the area, avoiding the White Pass Study Area; therefore, impacts would be expected to be limited to a modification in travel direction. ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend towards federal listing for the wolverine.***

Foraging habitat for **Pacific Western (Townsend's) big-eared bat** is present within the White Pass Study Area in the form of forest edges, roads, and forest openings. Forested dispersal habitat is also available. Alternative 2 would impact approximately 2.0 percent of the available habitat for this species within the White Pass Study Area (refer to Table 8). Construction associated with lift and trail development would increase noise and human activity within the area, which may disturb individuals that utilize the area. These construction-related impacts would be short-term disturbance.

Clearing would also result in the creation of additional edge to forest habitat, increasing the amount of foraging habitat available. Long-term impacts would include nighttime trail grooming within the White Pass Study Area, which could disturb foraging individuals, as this is a nocturnally foraging species.

Reproductive habitat for the Pacific Western (Townsend's) big-eared bat is absent within the White Pass Study Area, thus the disturbance caused by implementation of Alternative 2 would be limited to non-breeding individuals. ***Therefore, the Proposed Action may impact individuals but would not likely lead to a trend towards federal listing for the Pacific Western (Townsend's) big-eared bat.***

Modified Alternative 4

Under Modified Alternative 4, the potential impacts to **California wolverine** due to construction and ski area operations would be similar to, but slightly greater than, Alternative 2. Construction of ski trails and lift corridors would result in the elimination of approximately 21.5 acres of mountain hemlock parkland, roughly the same as Alternative 2 (refer to Figure 3-33). However, Modified Alternative 4 would also include the development of an egress trail through relatively undisturbed habitat. This trail would result in an additional 12.0 acres of clearing in small tree, multi-story, closed canopy mixed conifer forest just outside the existing ski area boundary (refer to the *Vegetation Technical Report and Biological Evaluation* in Appendix G). The parking lot proposed under Modified Alternative 4 would not be expected to have significant impacts to these species, as it would be constructed adjacent to the base area where a high level of human activity occurs year-round. Modified Alternative 4 would impact approximately 31.3 acres (2.1 percent) of habitat within the White Pass Study Area for wolverine. ***Therefore, Modified Alternative 4 may impact individuals but would not likely lead to a trend towards federal listing for the California wolverine.***

Under Modified Alternative 4, impacts to **Pacific Western (Townsend's) big-eared bat** would be similar to, but less than Alternative 2. Impacts to habitat would amount to approximately 1.3 acres (0.1 percent) of that available within the White Pass Study Area. Additional edge (foraging) habitat would be created by the inclusion of the egress trail. ***Therefore, Modified Alternative 4 may impact individuals but would not likely lead to a trend towards federal listing for the Pacific Western (Townsend's) big-eared bat.***

Alternative 6

Under Alternative 6, the potential impacts to **California wolverine** due to construction and ski area operations would be similar to, but fewer than, those described for Alternative 2. Alternative 6 would result in the clearing of approximately 11.3 acres forested habitat (refer to Figure 3-32). In addition, approximately 3.8 acres of forested habitat would be cleared for the development of a parking lot. Approximately 1 percent of the habitat available within the White Pass Study Area to wolverines would be impacted. As stated previously, however, this parking lot is not expected to result in significant impacts as it would be constructed adjacent to the base area which currently receives a high level of human activity. ***Therefore, Alternative 6 may impact individuals but would not likely lead to a trend toward federal listing for the California wolverine.***

Under Alternative 6, impacts to **Pacific Western (Townsend's) big-eared bat** would be similar to, but fewer than Alternative 2. Alternative 6 would impact approximately 1.2 percent of the available habitat within the White Pass Study Area. ***Therefore, Alternative 6 may impact individuals but would not likely lead to a trend towards federal listing for the Pacific Western (Townsend's) big-eared bat.***

Alternative 9

Under Alternative 9, the potential impacts to **California wolverine** due to construction and ski area operations would all occur within the existing ski area and not within the proposed expansion area. Alternative 9 would result in a loss of approximately 35.3 acres of forested habitat (refer to Figure 3-34). Alternative 9 would leave the proposed expansion area undeveloped resulting in increased habitat connectivity over the other Action Alternatives. Although Alternative 9 would impact approximately 2.3 percent of the available habitat within the White Pass Study Area for wolverines, by containing all of the proposed new trails and lift within the existing ski area Alternative 9 would concentrate the increased noise and human activity into an area that currently receives a high level of use. Although use of the Hogback Basin by backcountry skiers would continue to represent an intrusion on wolverine travel habitat, the localized containment of recreational activity would result in the fewest impacts to this species that is so highly sensitive to disturbance. ***Therefore, Alternative 9 may impact individuals but would not likely lead to a trend toward federal listing for the California wolverine.***

Alternative 9 would result in the fewest impacts to **Pacific Western (Townsend's) big-eared bat** foraging habitat (approximately 0.4 percent). Alternative 9 would result in the fragmentation of late-seral forest within the existing ski area, thus increasing the amount of forest edge and increasing foraging habitat for Pacific Western big-eared bats. ***Therefore, Alternative 9 may impact individuals but would not likely lead to a trend towards federal listing for the Pacific Western (Townsend's) big-eared bat.***

1.4.5 USFWS Species of Concern

Table 9 presents the impacts to USFWS Species of Concern.

Table 9:
Available Habitat for USFWS Species of Concern
Potentially Occurring within the White Pass Study Area by Alternative

Species	Alt. 1 (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effects; All Alternatives
Cascades Frog (*Rana cascadae*)	5.3	5.1	5.2	5.2	5.2	May impact individuals but would not likely contribute to a trend toward federal listing.
Olive-sided flycatcher (*Contopus borealis*)	1,235.9	1,216.2	1,192.7	1,220.8	1,200.6	May impact individuals but would not likely contribute to a trend toward federal listing.

Alternative 1

Under Alternative 1, White Pass would continue to operate without any further development. Overcrowding on existing ski slopes would continue to be an issue. People would continue to ride the lift to the ski area boundary and hike out to Hogback Basin to ski, resulting in a low level of noise and human activity in the proposed expansion area. Under Alternative 1, suitable nest trees could be removed through general maintenance of ski trails and hazard reduction. ***No additional impacts would occur to USFWS Species of Concern under Alternative 1.***

Alternative 2

As explained in Section 1.2.5, **Cascade frogs** are known to occur within the White Pass Study Area, having been observed on numerous occasions during fieldwork (Robinson, personal communication 2004; Forbes, personal communication 2004). Many of the ponds in which these frogs were observed are located within the existing ski area and they are assumed to be present within the wetlands of the proposed expansion area.

Total impacts to wetlands under Alternative 2 would be approximately 0.09 acre (approximately 1.7 percent of the available habitat for this species within the White Pass Study Area) which would consist of the trimming of shrub vegetation and removing any trees within the construction limits by cutting the tree flush to the ground (the stumps would not be removed), processing the tree by hand, and leaving all parts of the tree onsite (lop and scatter) (refer to Table 2.4-1). Potential impacts to these riverine wetlands from this clearing prescription would be minimized through implementation of Mitigation Measures MM8, and MM9 which would ensure that the surface of the wetland would not be graded, the natural ground cover would be maintained, and any tree removal would not cause incidental wetland impacts (refer to Table 2.4-2).

Under Alternative 2, there would be the potential for approximately 0.03 acre of grading impacts in wetlands within the White Pass Study Area, but there would likely be no long-term, direct impacts to wetlands due to grading. Implementation of MM1 requires that the project be designed to avoid the need for a Clean Water Act Section 404 permit (wetland fill) from the Army Corps of Engineers. The implementation of MM8 would also require the avoidance of grading impacts to wetlands during ski trail construction. The proposed clearing under Alternative 2 within riverine wetlands would have a long-term, direct impact on some of the functions of these wetlands, such as shading, nutrient and organic carbon cycling, and wildlife habitat. In addition, the potential for increased sediment delivery to wetlands would be increased during construction. Implementation of Management Requirements, Other Management Provisions, and Mitigation Measures would minimize the potential for these indirect impacts. ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend toward federal listing for the Cascade frog.***

Under Alternative 2, removal of late-seral forest habitat would also reduce the amount of nesting habitat available for **olive-sided flycatchers** within the White Pass Study Area. Under Alternative 2 approximately 19.7 acres (approximately 3.6 percent) of potential habitat for this species would be cleared for the development of ski trails, lifts, and the mid-mountain lodge. Potential direct impacts to olive-sided flycatchers include loss of nesting habitat and a localized reduction in the population. Loss of individual birds could occur during construction if vegetation was removed in suitable nesting habitat during the nesting season. Potential indirect impacts to olive-sided flycatchers may occur as a result of forest fragmentation, although this impact would not be as severe within the mountain hemlock parkland area. Increased fragmentation may contribute to increased nest predation by jays attracted to the edge habitat. These impacts to olive-sided flycatcher are expected to be short-term and occur during the year of construction. ***Therefore, Alternative 2 may impact individuals but would not likely lead to a trend toward federal listing for the olive-sided flycatcher.***

Modified Alternative 4

Impacts to **Cascade frogs** under Modified Alternative 4 would be similar to, but fewer than, Alternative 2. There would be approximately 0.12 acre of direct impacts to wetlands. However, with the implementation of Mitigation Measures MM9, MM1 and MM3 this 0.12 acre impact could be avoided, so that there would be no long-term, direct impacts to wetlands due to grading under Modified Alternative 4. ***Therefore, Modified Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the Cascade frog.***

Under Modified Alternative 4 impacts to **olive-sided flycatchers** would be similar to, but greater than, Alternative 2. Of the approximately 1,236 acres of habitat available to this species approximately 43.2 acres (3.5 percent) would be cleared for ski trails, lifts, the egress trail, and the parking lot (refer to Figure 2-4). ***Therefore, Modified Alternative 4 may impact individuals but would not likely lead to a trend toward federal listing for the olive-sided flycatcher.***

Alternative 6

Impacts to **Cascade frogs** under Alternative 6 would be similar to, but fewer than, Alternative 2. There would be approximately 0.11 acre of direct impacts to wetlands (2 percent). Under Alternative 6, there would be potential for 0.02 acre of grading impacts in wetlands within the White Pass Study Area. However, with the implementation of Mitigation Measures MM1, MM3, and MM9, this 0.02 acre impact could be avoided so that there would be no long-term, direct impacts to wetlands due to grading under Alternative 6. Therefore, Alternative 6 may impact individuals but would not likely lead to a trend toward federal listing for the Cascade frog.

Under Alternative 6 impacts to **olive-sided flycatchers** would be similar to, but less than, Alternative 2. Alternative 6 would include construction of one chairlift, rather than two, within the proposed expansion area. Of the approximately 1,236 acres of habitat available to this species approximately 15.1 acres would be cleared for ski trails, lifts, the egress trail, and the parking lot (1.2 percent) (refer to Figure 2-6). Impacts to olive-sided flycatchers resulting from construction would include avoidance of the area. Ski area operations would not result in significant disturbance to this species. ***Therefore, Alternative 6 may impact individuals but would not likely lead to a trend toward federal listing for the olive-sided flycatcher.***

Alternative 9

Impacts to **Cascade frogs** under Alternative 9 would include approximately 0.07 acre of direct impacts to wetlands (1.3 percent of the available habitat for Cascade frogs within the White Pass Study Area), roughly 0.02 acre fewer than Alternative 2. Under Alternative 9, there would be potential for 0.05 acre of grading impacts in wetlands within the White Pass Study Area, with 0.04 acre of it occurring in the Upper Clear Fork Cowlitz Watershed and 0.01 acre of grading in the Upper Tieton Watershed. However, with the implementation of Mitigation Measures MM9, MM1 and MM3, these impacts could be avoided so that there would be no long-term, direct impacts to wetlands due to grading under Alternative 9. These Mitigation Measures would reduce impacts to wetlands through various limits on clearing and grading in the vicinity of wetlands and Riparian Reserves (refer to Table 2.4-2). Construction impacts to this species would include potential mortality of individuals due to the increase in human activity and the influx of large machinery. Long-term impacts to Cascade frogs are not expected to occur. ***Therefore, Alternative 9 may impact individuals but would not likely lead to a trend toward federal listing for the Cascade frog.***

Under Alternative 9 impacts to **olive-sided flycatchers** would be greater than Alternative 2. Of the approximately 1,236 acres of habitat available to this species approximately 35.3 acres would be cleared for ski trails, lifts, the egress trail, and the parking lot; which is roughly 2.9 percent of the habitat available within the White Pass Study Area for this species (refer to Figure 2-8). Potential direct and indirect impacts would be as described under Alternative 2. ***Therefore, Alternative 9 may impact individuals but would not likely lead to a trend toward federal listing for the olive-sided flycatcher.***

1.4.6 USFS Management Indicator Species

Table 10 presents the impacts to USFS Management Indicator Species.

Table 10:
Available Habitat for Okanogan and Wenatchee and Gifford Pinchot National Forest Management Indicator Species Potentially Occurring within the White Pass Study Area by Alternative

Species	Alt. 1 (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effects; All Alternatives
Black-backed woodpecker (*Picoides arcticus*)	522.5	522.5	500.8	518.7	487.2	May impact individuals, but would not affect species viability in the project area
Black-tailed deer (*Odocoileus hemionus*), Mule deer (*O. h. hemionus*)	932.3 Foraging	912.6	909.4	924.1	932.2	May impact individuals, but would not affect species viability in the project area
	315.2 Cover	315.2	293.6	311.5	280.0	
Primary Cavity Excavators	522.5	522.5	500.8	518.7	487.2	May impact individuals, but would not affect species viability in the project area
Mountain goat (*Oreamnos americanus*)	522.5	522.5	500.8	518.7	487.2	May impact individuals, but would not affect species viability in the project area
Pileated woodpecker (*Dryocopus pileatus*)	522.5	522.5	500.8	518.7	487.2	May impact individuals, but would not affect species viability in the project area
Pine marten (*Martes americana*)	522.5	522.5	500.8	518.7	487.2	May impact individuals, but would not affect species viability in the project area
Rocky Mountain elk (*Cervus elephus nelsoni*); Roosevelt Elk (*C. e.*)	932.3 Foraging	912.6	909.4	924.1	932.2	May impact individuals, but would not affect species viability in the project area
	315.2 Cover	315.2	293.6	311.5	280.0	

Alternative 1

Under Alternative 1, White Pass would continue to operate without any further development. Overcrowding on existing ski slopes would continue to be an issue. People would continue to ride the lift to the ski area boundary and hike out to Hogback Basin to ski, resulting in a low level of noise and human activity in the proposed expansion area. Under Alternative 1, suitable nest trees could be removed through general maintenance of ski trails and hazard reduction. ***No additional impacts would occur to USFS Management Indicator Species under Alternative 1.***

Alternative 2

Impacts to the **black-backed woodpecker** under Alternative 2 would be minimal. The proposed expansion area does not contain habitat typically associated with this species. Occasional individuals may occur from time to time in this area in which case they would most likely move elsewhere during construction activities. ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for black-backed woodpeckers.***

Impacts to **black-tailed deer** and **mule deer**, as well as **Roosevelt elk** and **Rocky Mountain elk** under Alternative 2 would be similar; therefore, they will be discussed together. Potential direct impacts to these species would include loss or conversion of cover habitat, a decrease in foraging habitat, and disturbance due to construction and increased human activity. Under Alternative 2, the amount of foraging habitat for these species would decrease by approximately 19.7 acres. This would occur as a result of converting late-seral habitat (cover) to a modified herbaceous condition (foraging) through ski trail construction, and clearing for chairlift construction. Alternative 2 would not result in the loss of any cover habitat for these species because the proposed lifts and trails would be constructed in the proposed expansion area where the landscape is comprised of small tree, single-story, moderate canopy mountain hemlock parkland. This landscape is naturally more open and provides less cover for deer and elk. These species are known to utilize the area and small islands of trees can serve as cover; however the development of ski trails in this area is not expected to have long-term impacts on cover habitat.

Direct short-term impacts to both elk and mule deer would include temporary displacement from specific areas during construction and the temporary loss of foraging habitat in areas disturbed by trenching for utility line installation. Direct long-term impacts to elk and deer may also occur as a result of disturbance from ski trail or lift maintenance. Deer and elk are not expected to calve within the White Pass Study Area due to late season snowpack; however adults and young will move into the area as summer progresses.

Indirect long-term impacts to elk and deer may occur if noxious weeds become established in areas disturbed by construction activities, leading to a long-term reduction of forage quality in the White Pass Study Area. This impact would be minimized through implementation of Management Requirement MR7, which provides various methods of noxious weed prevention measures (refer to Table 2.4-3 and Appendix O). ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for black-tailed deer, mule deer, Roosevelt elk, and Rocky Mountain elk.***

Impacts to **mountain goats** under Alternative 2 could occur through reduction in forested cover habitat since the White Pass Study Area does not contain any suitable cliff habitat for this species. However, the proposed expansion area does not contain dense canopy cover, which is an important source of thermal cover for mountain goats during the winter. This species is known to occur within the White Pass Study Area during the summer. Construction activities during the summer would result in increased noise and human activity, which would most likely lead to avoidance of the area during this time. ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for the mountain goat.***

The **pileated woodpecker** is expected to occur within the White Pass Study Area based on signs observed during field surveys. Their habitat is comprised of forests containing snags and downed logs. Suitable habitat for this species occurs within the late-seral forests of the existing ski area. The proposed expansion area is comprised of small tree, single-story, moderate canopy mountain hemlock parkland. It does not contain adequately sized CWD nor does it contain many suitable snags. However, pileated woodpeckers have been known to venture into this area from time to time. Alternative 2 is not expected to impact snag numbers due to the small number of acres that will receive some sort of activity (treatment) in terms of alteration from its current vegetative status. It is expected that natural processes would continue and that the 100 percent snag level would be the one expected to occur, except in the immediate vicinity of facilities, such as lift lines, lodges or other buildings. Impacts to this species under Alternative 2 would occur from the additional noise and human activity associated with construction activities. This would be a short-term impact since this species is not expected to be a regular visitor to the less suitable habitat available within the proposed expansion area. ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for the pileated woodpecker.***

Impacts to **primary cavity excavators** under Alternative 2 would be minimal, as Alternative 2 would take place outside of suitable nesting and foraging habitat. As described for pileated woodpeckers, primary cavity excavators potentially occurring within the White Pass Study Area are associated with dense canopy forests containing trees that are larger in size than those found within the proposed expansion area, which is made up of small tree, single-story, moderate canopy, mountain hemlock parkland. These species may occasionally venture into the proposed expansion area and may experience short-term impacts from the increased noise and human activity associated with construction and ski area operations; however, these impacts are expected to be limited to avoidance of an area that does not provide primary habitat. ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for primary cavity excavators.***

Construction activities such as noise and increased human presence could cause temporary disturbance and displacement of **pine marten** utilizing the White Pass Study Area. Martens are typically associated with dense canopy forest containing large amounts of downed wood to use for foraging and an abundant supply of snags used for denning. This type of habitat is available within the existing ski area but not within the proposed expansion area, which contains the more scattered mountain hemlock parkland. This does not preclude the possibility that martens may utilize the proposed expansion area from time to time, potentially when dispersing. Therefore, impacts to pine martens from Alternative 2 are expected to be limited to disturbance of individuals that may use the proposed expansion area on occasion. Impacts would include avoidance of the area due to increased noise and human activity. Potential mortality of individuals could occur if snags are removed while individuals are utilizing them. Removal of snags could result in potential mortality of young or den abandonment. However, as stated previously, martens are not expected to regularly utilize the proposed expansion area. ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for pine marten.***

Modified Alternative 4

Impacts to the **black-backed woodpecker** under Modified Alternative 4 would be similar to those described under Alternative 2. However, Modified Alternative 4 would include the addition of an egress trail, ski trails within the existing ski area, and a 7-acre parking lot (refer to Figure 3-36). There would be approximately 21.7 acres of impact to black-backed woodpecker habitat under Modified Alternative 4. Impacts to this species would include the short-term impacts associated with construction activities, such as increased noise and human activity. Long-term impacts would occur as a direct loss of habitat from construction of the egress trail and disturbance of individuals from ski area activities. ***Therefore, Modified Alternative 4 May impact individuals, but would not affect species viability in the project area for the black-backed woodpecker.***

Impacts to **black-tailed deer**, **mule deer**, **Roosevelt elk**, and **Rocky Mountain elk** under Modified Alternative 4 would be similar to, but greater than, Alternative 2. Under Modified Alternative 4 the amount of foraging habitat for these species would decrease by approximately 22.9 acres, slightly higher than Alternative 2. This would occur as a result of converting late-seral habitat (cover) to a modified herbaceous condition (foraging) through ski trail construction, and clearing for chairlift construction. Modified Alternative 4 would also result in the loss of approximately 21.6 acres of forested cover habitat for these species due to clearing for lifts, trails, and development of the mid-mountain lodge (refer to Figure 3-37). However, as discussed under Alternative 2, the proposed lifts and trails would be constructed in the proposed expansion area where the landscape is comprised of small tree, single-story, moderate canopy mountain hemlock parkland. This landscape is naturally more open and provides less cover for deer and elk. These species are known to utilize the area and small islands of trees can serve as cover; however the development of ski trails in this area is not expected to have long-term impacts on cover habitat. ***Therefore, Modified Alternative 4 May impact individuals, but would not affect species viability in the project area for black-tailed deer, mule deer, Roosevelt elk, and Rocky Mountain elk.***

Impacts to **mountain goats** under Modified Alternative 4 would be as described under Alternative 2; however Modified Alternative 4 would result in additional impacts (approximately 21.7 acres (4.2 percent) of the habitat available within the White Pass Study Area) due to the addition of the egress trail, ski trails within the existing ski area, and a 7-acre parking lot (refer to Figure 3-37). The egress trail would be constructed in suitable cover habitat for mountain goats. Therefore, construction activities could lead to short-term avoidance of the area. The White Pass Study Area does not provide suitable winter habitat for mountain goats. Therefore, there would be no impacts from ski area operations under Modified Alternative 4. ***Therefore, Modified Alternative 4 May impact individuals, but would not affect species viability in the project area for the mountain goat.***

Impacts to **pileated woodpecker** and **primary cavity excavators** under Modified Alternative 4 would be similar to, but greater than, Alternative 2 due to the addition of the egress trail, ski trails within the existing ski area, and a 7-acre parking lot. Clearing for these trails would require the removal of approximately 21.7 acres (4.2 percent) of the available habitat for this species within the existing ski area (refer to Figure 3-37). Impacts to this species would include the short-term impacts associated with construction activities such as increased noise and human activity. Long-term impacts would occur as a direct loss of habitat from construction of the egress trail and disturbance of individuals from ski area activities. In addition, maintenance of this trail would require the occasional removal of hazard trees. Since these trees provide suitable nesting habitat for pileated woodpeckers, this action could result in potential nest abandonment, injury or mortality of adults and nestlings. However, the Modified Alternative 4 is not expected to impact snag numbers due to the small number of acres that would receive some sort of activity (treatment) in terms of alteration from its current vegetative status. It is expected that natural processes would continue and that the 100 percent level of snags would be the one expected to occur, except in the immediate vicinity of facilities, such as lift lines, lodges or other buildings. As described in Section 1.2.6 the pileated woodpecker and other primary cavity excavators are not expected to occur regularly in the mountain hemlock parkland habitat that comprises the proposed expansion area. ***Therefore, Modified Alternative 4 May impact individuals, but would not affect species viability in the project area for pileated woodpeckers and primary cavity excavators.***

Impacts to the **pine marten** under Modified Alternative 4 would be similar to, but greater than, Alternative 2 due to the addition of the egress trail, ski trails within the existing ski area, and a 7-acre parking lot. Clearing for this trail would require the removal of approximately 21.7 acres (4.2 percent) of the available habitat for this species within the existing ski area (refer to Figure 3-37). Impacts to Pine marten would include the short-term impacts associated with construction activities such as increased noise and human activity. Long-term impacts would occur as a direct loss of habitat from construction of the egress trail and disturbance of individuals from ski area activities. In addition, maintenance of this trail would require the occasional removal of hazard trees. Since the trees in the vicinity of the egress trail provide suitable nesting habitat for pine marten, this action could result in potential nest abandonment, injury or mortality of adults and nestlings. ***Therefore, Modified Alternative 4 May impact individuals, but would not affect species viability for pine marten.***

Alternative 6

Impacts to the **black-backed woodpecker** under Alternative 6 would be similar to those described under Alternative 2. However, Alternative 6 would not include the addition of the *Hogback Express* lift in the Hogback Basin (refer to Figure 3-36). Clearing under Alternative 6 would result in the removal of approximately 11.3 acres of mountain hemlock parkland within the proposed expansion area (2.2 percent of the available habitat for this species within the White Pass Study Area). Impacts to this species would include the short-term impacts associated with construction activities such as increased noise and human activity. Long-term impacts resulting from operation use of the new trails would be minimal due to infrequent use of the area by this species. ***Therefore, Alternative 6 May impact individuals, but would not affect species viability in the project area for the black-backed woodpecker.***

Impacts to **black-tailed deer**, **mule deer**, **Roosevelt elk**, and **Rocky Mountain elk** under Alternative 6 would be similar to, but fewer than, Alternative 2. Under Alternative 6 the amount of foraging habitat for these species would decrease by approximately 8.2 acres, roughly 11.5 acres less than Alternative 2. This would occur as a result of converting late-seral habitat (cover) to a modified herbaceous condition (foraging) through ski trail construction, and clearing for chairlift construction. Alternative 6 would also result in the loss of approximately 3.7 acres of forested cover habitat for these species due to clearing for lifts, trails, and development of the mid-mountain lodge (refer to Figure 3-36). However, as discussed under Alternative 2, the proposed lifts and trails would be constructed in the proposed expansion area where the landscape is comprised of small tree, single-story, moderate canopy mountain hemlock parkland. This landscape is naturally more open and provides less cover for deer and elk. These species are known to utilize the area and small islands of trees can serve as cover; however, the development of ski trails in this area is not expected to have long-term impacts on cover habitat for these species. In addition, this species does not utilize the White Pass Study Area during the winter due to deep snow accumulation; therefore, impacts would be limited to the summer season. ***Therefore, Alternative 6 May impact individuals, but would not affect species viability in the project area for black-tailed deer, mule deer, Roosevelt elk, and Rocky Mountain elk.***

Impacts to **mountain goats** under Alternative 6 would be similar to, but greater than, Alternative 2 (approximately 3.8 acres, or 0.7 percent of the habitat available within the White Pass Study Area). Alternative 6 would reduce the number of lifts in the proposed expansion area from two to one. Short-term impacts to this species would occur during construction activities and summertime maintenance. These activities would occur during the summer months when mountain goats utilize a broader range of habitat. Impacts would include avoidance of the area due to increased noise and human activity. ***Therefore, Alternative 6 May impact individuals, but would not affect species viability in the project area for the mountain goat.***

Impacts to **pileated woodpecke**r and **primary cavity excavators** under Alternative 6 would be similar to, but fewer than, Alternative 2. Approximately 3.8 acres of forested habitat (0.7 percent of the available habitat for this species) would be impacted under this Alternative. As discussed under Alternative 2, the proposed expansion area does not contain high quality nesting and foraging habitat for these species and therefore, impacts under Alternative 6 are expected to be minimal. ***Therefore, Alternative 6 May impact individuals, but would not affect species viability in the project area for pileated woodpeckers and primary cavity excavators.***

Impacts to the **pine marten** under Alternative 6 would be similar to, but fewer than, Alternative 2. Approximately 3.8 acres of forested habitat (0.7 percent of the available habitat for this species) would be impacted under this Alternative. Occasional use of the proposed expansion area by this species could lead to potential impacts associated with construction and maintenance activities. Impacts would include the short-term impacts associated with construction activities such as increased noise and human activity. Long-term impacts to this species under Alternative 6 are expected to be minimal, as this species is not expected to be a frequent visitor to the upper elevations of the proposed expansion area. Construction of ski trails would result in additional noise and human activity. However, clearing for trails is expected to be minimal, as the trails would be designed to utilize existing openings in the mountain hemlock parkland. Long-term impacts resulting from operation use would be minimal due to infrequent use of the area by this species. ***Therefore, Alternative 6 May impact individuals, but would not affect species viability in the project area for pine marten.***

Alternative 9

Impacts to **black-backed woodpecker** under Alternative 9 would be greater than Alternative 2. Under Alternative 9 approximately 35.3 acres (6.8 percent) of forested habitat within the existing ski area would be cleared for development of ski trails, the *PCT* lift, and parking lot. Direct impacts would occur to this species during construction activities due to increased noise and human activity in the area. In addition, operational impacts during the winter season would increase the noise and human activity in the area, which could potentially lead to avoidance of the area. However, as discussed in Section 3.6.2, the black-backed woodpecker is not expected to occur regularly within the White Pass Study Area. ***Therefore, Alternative 9 May impact individuals, but would not affect species viability in the project area for the black-backed woodpecker***.

Impacts to **black-tailed deer**, **mule deer, Roosevelt elk**, and **Rocky Mountain elk** under Alternative 9 would be greater than Alternative 2. Construction activities would temporarily affect deer and elk in the vicinity. Under Alternative 9, approximately 0.1 acre of foraging habitat would be impacted and approximately 35.2 acres of forested cover habitat would be impacted due to construction of trails, the *PCT* lift, and the parking lot. Disturbance would be likely to occur as a result of construction activities, such as the use of heavy equipment, increased human activity, and increased noise. Since these species are highly mobile, they are capable of moving away from localized disturbances. Continued disturbance over an extended period of time, however, can cause these species to alter their behavior, including displacing them from otherwise suitable foraging and cover habitat available in the White Pass Study

Area. ***Therefore, Alternative 9 May impact individuals, but would not affect species viability in the project area for black-tailed deer, mule deer, Roosevelt elk, and Rocky Mountain elk.***

Impacts to forested cover habitat for **mountain goats** would occur under Alternative 9. The existing ski area does not contain suitable cliff habitat for this species but it does contain dense canopy forest, which mountain goats utilize for cover and thermal protection. Under Alternative 9, approximately 35.3 acres of potential cover habitat (6.8 percent) would be cleared for development of trails, the *PCT* lift, and the parking lot. Impacts due to noise and increased human activity could occur during construction and during summertime maintenance activities. The increase in activity could result in avoidance of the area by mountain goats, which would seek out an undisturbed location. Long-term impacts due to ski area operations are not expected as this species does not occur in the White Pass Study Area during the winter. ***Therefore, Alternative 9 May impact individuals, but would not affect species viability in the project area for the mountain goat***.

Impacts to **pileated woodpecker** and **primary cavity excavators** under Alternative 9 would result from the clearing of approximately 35.3 acres (6.8 percent) of forested habitat within the existing ski area (refer to Figure 3-37). Long-term impacts to pileated woodpeckers and primary cavity excavators would include the permanent removal of late-seral forest, which would reduce the amount of habitat available for this species. This would result in long-term reduction both through the reduction in the amount of recruitment habitat for snags and from increasing the amount of area subject to hazard tree management. Habitat would be permanently lost within areas of full clearing with or without grading. Snags that are felled and left on the forest floor would lose value as nesting habitat but they would retain value as foraging habitat and contribute to CWD in the area. Nesting, depending on the location, could be directly impacted by construction if nest trees are removed or nearby construction causes enough noise and disturbance to result in nest abandonment. ***Therefore, Alternative 9 May impact individuals, but would not affect species viability in the project area for pileated woodpeckers and primary cavity excavators.***

Pine marten are known to use mature forest in the White Pass Study Area as described in Section 1.2.6. Approximately 35.3 acres of forested habitat (6.8 percent of the available habitat for this species) would be impacted under this Alternative. Clearing of mature forest would result in a decrease in the amount of denning, foraging, and travel habitat available for this species. Removal of snags in cleared areas and forested areas adjacent to new ski trails, and parking lots would also reduce the amount of denning habitat available to this species. Direct impacts from construction could include mortality of adults and/or young as well as den abandonment during the clearing of forested habitat. In addition, construction activities would result in short-term impacts such as increased noise and human activity, which would lead to avoidance of the area while such activities take place. Operational impacts could result in similar avoidance as martens seek areas less frequented by humans. Alternative 9 would result in increased fragmentation of medium tree, closed canopy, multi-story mixed conifer forest; more so than Alternative 2 which would primarily utilize the natural openings in the mountain hemlock parkland of the proposed expansion area (refer to the *Vegetation Technical Report and Biological Evaluation* in Appendix G). Timber cleared from new ski trails would be left on site to provide CWD which would benefit marten, by providing additional denning, foraging, and security habitat. ***Therefore, Alternative 9 May impact individuals, but would not affect species viability in the project area for pine marten.***

1.4.7 Species of Local Concern

Table 11 presents the impacts to USFS Species of Local Concern.

Table 11:
Available Habitat for Species of Local Concern Potentially Occurring within the White Pass Study Area by Alternative

Species	Alt. 1 (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effects; All Alternatives
Neotropical Migratory Birds[a]	1,507.3	1,487.6	1,466.1	1,492.0	1,468	May impact individuals, but would not affect species viability in the project area
Blue Grouse (*Dendragapus obscurus*)	1,454.8	1,435.1	1,423.5	1,439.5	1,419.5	May impact individuals, but would not affect species viability in the project area
White-tailed ptarmigan (*Lagopus leucurus*)	654.4	634.7	632.9	643.1	654.4	May impact individuals, but would not affect species viability in the project area

[a] Neotropical Migratory Birds occupy a variety of habitats; therefore, the entire SUP, with the exception of developed areas, was considered to be habitat for this group as a whole.

Alternative 1

Under Alternative 1, White Pass would continue to operate without any further development. Overcrowding on existing ski slopes would continue to be an issue. People would continue to ride the lift to the ski area boundary and hike out to Hogback Basin to ski, resulting in a low level of noise and human activity in the proposed expansion area. Under Alternative 1, suitable nest trees could be removed through general maintenance of ski trails and hazard reduction. ***No additional impacts would occur to Other Species of Interest under Alternative 1.***

Alternative 2

Forty-one species of **Neotropical migratory birds** may occur in the mature forest habitat in the White Pass Study Area (refer to Table 5). Removal of forested habitat in the White Pass Study Area would result in a decrease in the amount of nesting habitat available for these species. Forest fragmentation may also result in an increase in nest predation since nest predators such as jays are attracted to edge habitat. Five of these species (golden-crowned kinglet, solitary vireo, chipping sparrow, rufous hummingbird, and Wilson's warbler) have been identified as having declining populations (Andelman and Stock, 1994) (refer to Table 5). Decreases in nesting habitat availability and increases in nest predation in the White Pass Study Area may incrementally contribute to these trends. Potential direct impacts to these species may occur as a result of clearing and construction activities during the nesting season, potentially resulting in nestling mortality. ***However, while Alternative 2 May impact individuals, but would not affect species viability in the project area for neotropical migratory birds.***

Impacts to **blue grouse** under Alternative 2 would include the clearing of approximately 19.7 acres of mountain hemlock parkland, roughly 1.4 percent of the available habitat for this species within the White Pass Study Area. Blue grouse tend to frequent lower elevations during the summer; however, they migrate to higher elevations during the winter and therefore, could be directly impacted by ski area operations. The open nature of the proposed expansion area may invite skiers to explore off-trail, leading to potential disturbance of foraging individuals and potential injury due to collision. Because they tend to prefer lower elevations during the summer, blue grouse are not expected to experience significant impacts from construction or summertime maintenance activities. ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project for the blue grouse.***

Impacts to the **white-tailed ptarmigan** under Alternative 2 would include the clearing of approximately 19.7 acres of mountain hemlock parkland, roughly 3.0 percent of the available habitat for this species within the White Pass Study Area. Construction and ski area maintenance activities during the summer could result in nest abandonment, as well as, adult and/or nestling mortality. Impacts from construction activities would be short-term in nature. During the winter, ski area operations would potentially lead to avoidance of the area due to increased noise and human activity. ***Therefore, Alternative 2 May impact individuals, but would not affect species viability in the project area for the white-tailed ptarmigan.***

Modified Alternative 4

Impacts to **Neotropical migratory birds** under Modified Alternative 4 would be similar to, but greater than, those described under Alternative 2. Modified Alternative 4 would result in greater impacts to Riparian Reserves (RR) than Alternative 2, which could mean greater potential impacts (i.e., disturbance, nest abandonment, individual mortality) to species utilizing RR for foraging or nesting. Impacts to Neotropical migratory birds from ski area operations could include avoidance of the area due to increased noise and human activity. Construction of the parking lot in the base area could potentially lead to nest abandonment and mortality of adults and/or young. ***Therefore, Modified Alternative 4 May impact individuals, but would not affect species viability in the project area for neotropical migratory birds.***

Impacts to **blue grous**e under Modified Alternative 4 would be similar to, but greater than, those described under Alternative 2. Under Modified Alternative 4, clearing of approximately 31.3 acres of habitat would occur as a result of construction of the ski trails, facilities and parking lot (refer to Figure 3-37). Approximately 2.2 percent of the available habitat within the White Pass Study Area for this species would be impacted. Impacts to blue grouse within the proposed expansion area would be as described under Alternative 2. Additionally, construction of the parking lot in the late-seral forest near the base area could potentially result in disturbance and mortality of blue grouse during the summertime. ***Therefore, Modified Alternative 4 May impact individuals, but would not affect species viability in the project area for the blue grouse.***

Impacts to the **white-tailed ptarmigan** under Modified Alternative 4 would include construction and ski area maintenance activities during the summer, which could result in nest abandonment, as well as, adult and/or nestling mortality. Approximately 21.5 acres of (3.3 percent) of habitat would by impacted under Modified Alternative 4, slightly more than under Alternative 2. Impacts from construction activities would be short-term in nature. During the winter, ski area operations would potentially lead to avoidance of the area due to increased noise and human activity. ***Therefore, Modified Alternative 4 May impact individuals, but would not affect species viability in the project area for the white-tailed ptarmigan.***

Alternative 6

Impacts to **Neotropical migratory birds** under Alternative 6 would be similar to, but fewer than, those described under Alternative 2. Alternative 6 would include the construction one chairlift instead of two thus reducing the duration of construction activities within the proposed expansion area; therefore, there would be fewer disturbances to these species as a result of increased noise and human activity within the White Pass Study Area. Clearing for lift terminals and ski trails could potentially result in nest abandonment and nestling mortality. Impacts from ski area operations would most likely be limited to an avoidance of the area due to increased noise and human activity. ***Therefore, Alternative 6 May impact individuals, but would not affect species viability in the project area for Neotropical migratory birds.***

Impacts to **blue grouse** under Alternative 6 would be similar to, but fewer than, those described under Alternative 2. Under Alternative 6, clearing of approximately 15.3 acres (1.1 percent) of habitat would be impacted (refer to Figure 3-36). Impacts to blue grouse within the proposed expansion area would be as described under Alternative 2. Additionally, construction of the parking lot in the late-seral forest near the base area would potentially result in disturbance and mortality of blue grouse during the summertime. ***Therefore, Alternative 6 May impact individuals, but would not affect species viability in the project area for the blue grouse.***

Impacts to **white-tailed ptarmigan** under Alternative 6 would be similar to, but fewer than, those described under Alternative 2. Under Alternative 6, clearing of approximately 11.3 acres of habitat would be impacted (refer to Figure 3-36). In total, this would amount to 1.7 percent of the available habitat within the White Pass Study Area for this species. Impacts to white-tailed ptarmigan within the proposed expansion area would be as described under Alternative 2. ***Therefore, Alternative 6 May impact individuals, but would not affect species viability in the project area for the white-tailed ptarmigan.***

Alternative 9

Impacts to **Neotropical migratory birds** under Alternative 9 would be similar to those described under Alternative 2, however development would occur within the medium tree, closed canopy, multi-story mixed conifer forest within the existing ski area (refer to the *Vegetation Technical Report and Biological Evaluation* in Appendix G). Impacts to these species from construction activities would include potential nest abandonment and nestling mortality, loss of breeding habitat, and avoidance of the area due to increased noise and human activity. Increased forest fragmentation could result in an increase in predation for some species and an increase in foraging habitat for other species. Ski area operations would potentially lead to avoidance of the area. ***Therefore, Alternative 9 May impact individuals, but would not affect species viability in the project area for Neotropical migratory birds.***

Impacts to **blue grouse** under Alternative 9 would include the clearing of approximately 35.3 acres of forested habitat within the existing ski area, the most of any alternative (refer to Figure 3-38). In total, this would amount to 2.4 percent of the available habitat within the White Pass Study Area for this species. Impacts resulting from construction and summer maintenance activities as well as wintertime ski area operations would all potentially occur within this area. These impacts could include potential nest abandonment and mortality of individuals, as well as avoidance of the area. ***Therefore, Alternative 9 May impact individuals, but would not affect species viability in the project area for the blue grouse.***

Impacts to the **white-tailed ptarmigan** under Alternative 9 would be minimal. As described in Section 1.2.7 the white-tailed ptarmigan is not expected to occur frequently in heavily forested areas, as it prefers open tundra above timberline. ***Therefore, Alternative 9 May impact individuals, but would not affect species viability in the project area for the white-tailed ptarmigan.***

Habitat Connectivity

Habitat connectivity and fragmentation refer to the size, quality, and spatial arrangement of patches of a species' habitat across the landscape, particularly the number and arrangement of these patches as they relate to the dispersal of organisms. All of the projects listed in Tables 12 and 13 below would affect habitat connectivity to varying degrees. Ongoing and future projects occurring in and around previously developed areas that currently receive a high level of human activity would continue to limit the use of some portions of those areas by wildlife.

Late-seral forest habitat has been identified as an important area of habitat connectivity for wide-ranging species such as northern spotted owl, pine marten, and pileated woodpecker. Low mobility wildlife species, such as terrestrial mollusks, also depend on microhabitats provided by late-seral forest. Construction of a chairlift and ski trails within this type of forest has the potential to impact habitat connectivity by reducing the available connective habitat, increasing edge habitat, decreasing interior habitat, creating potential barrier affects, and increasing human activity, which in turn increases potential disturbance to animals moving through the area. Low mobility species would not be as able to move and avoid these impacts as high mobility species would be. Therefore, the impacts to connectivity would be greater for the low mobility species.

As mentioned in Section 1.4, the proposed expansion area represents previously undisturbed travel habitat (the mountain hemlock parkland community) that could provide connectivity for many wildlife species that occur in the OWNF and GPNF. While the vegetation community may be undisturbed, existing human recreational presence (e.g., PCT users and backcountry skiers) may deter the use of the area for some species sensitive to human presence such as gray wolf and wolverine. Construction of chairlifts and ski trails within this area has the potential to impact wildlife habitat connectivity by reducing the available connective habitat, creating potential barrier affects, and increasing human activity, which in turn increases potential disturbance to animals moving through the area.

Modified Alternative 4 would have the greatest potential impact to habitat connectivity of all the Action Alternatives because it would result in removal of the greatest amount of mountain hemlock parkland in the proposed expansion area as well as introduce development and increased recreational activity to a previously undisturbed area. However, because the nature of parkland habitat is to contain tree islands and treeless openings the primary impact to habitat connectivity would occur as a result of the intrusion of recreational activity into this previously undisturbed habitat and not necessarily as a result of forested parkland removal. In addition, the majority of increased activity within the proposed expansion area would occur during the winter when most species are not present or dispersing through the area.

Alternative 9 would result in the greatest amount of fragmentation of dense forest of all the Action Alternatives as it occurs entirely within the existing ski area. Late-seral forest would be removed in order to create new ski trails and lift lines. This fragmentation would potentially affect interior forest dwelling species that depend on forest cover for travel and safety. Species unwilling to cross open areas such as ski trails may find themselves limited to a small patch of forest within the ski area. Due to the current level of activity within the existing ski area it is expected that many species avoid passing through the area except on an occasional basis. However, human activity is generally limited to the winter months with summertime activity consisting primarily of ski area maintenance and existing sources of human recreational activity (e.g., PCT trail, campgrounds, etc.). Therefore, increased fragmentation within the existing ski area under Alternative 9 would most likely result in an alteration of travel direction as animals skirt around the area. Potential side affects of this alteration of travel direction could result in an increase of animals that move north toward US 12 thereby increasing the potential for vehicle collisions and mortality.

The construction of chairlifts and ski trails would reduce the overall amount of undisturbed habitat in the proposed expansion area. Increases in human activity associated with chairlift and ski trail development may reduce the effectiveness of the area as travel habitat, particularly for species sensitive to human activity. Short-term direct impacts include noise and activity associated with ski lift construction and ski trail clearing and grading. Noise associated with these activities and human presence may cause animals to avoid moving through the area. Potential long-term direct impacts (e.g., area avoidance) would result from increased winter recreational use of the area associated with *Basin* and *Hogback Express* chairlifts and ski trails. In addition, ski trail grooming is often accomplished at night, and noise and light from this activity, particularly in the new proposed pods may alter use of the area by nocturnal species.

During the summer ski lift and trail maintenance activities may have direct impacts on animals potentially moving through the area, as the associated noise and activity may alter use of the area. These activities would be expected to be of short duration with lift maintenance occurring on an annual basis and ski trail maintenance occurring less frequently, as vegetation growth rates are slow.

1.4.8 Cumulative Effects

As described in Section 3.0 - Introduction, cumulative effects to wildlife are considered at the site scale (White Pass Study Area) and the Cumulative Effects Analysis Area (CEAA). The CEAA is comprised of two fifth field watersheds: the Upper Tieton watershed and the Upper Clear Fork Cowlitz watershed. A list of projects occurring within the Upper Clear Fork Cowlitz watersheds (refer to Table 3.6-13) and the Upper Tieton (refer to Table 3.6-14) and the impact to wildlife are presented below.

The alteration of vegetation communities described in Section 3.5 – Vegetation has the potential to impact wildlife habitat. For purposes of this analysis, cumulative impacts could result from both long-term and short-term losses of wildlife habitat. A long-term loss of wildlife habitat occurs when the native vegetation community is not easily replaced. For example, the removal of forested habitat is a long-term impact as the re-growth of the forest occurs on the order of decades. Similarly, the creation of new impervious surfaces in any community type results in the long-term loss of wildlife habitat. Short-term losses of habitat occur when herbaceous and shrub communities are disturbed, but are ultimately revegetated in a short (1-2 years) period of time. A second type of short-term cumulative impact occurs during construction phases of the various actions described in Tables 3.6-13 and 3.6-14. During this phase, noise generated by equipment and the increased human presence can impact wildlife in the vicinity of the action. This typically leads to avoidance behaviors by wildlife species and may disrupt normal behavioral patterns. This type of impact typically dissipates following the completion of construction activities as noise returns to background levels.

Table 3.6-13: Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Wildlife

Project Number	Project Name	Cumulative Effects
UCFC-3a	Palisades Scenic Viewpoint Project	Approximately 0.5 acre of trees, shrub, and herbaceous wildlife habitat associated with the project footprint was removed. Implementation of this project had no temporal overlap with the proposed White Pass expansion as the project site is assumed to be stabilized. As the project occurred within an existing area of high human activity and associated disturbance to wildlife, this project is not expected to have had any long-term impacts to wildlife.
UCFC-3b	Palisades Scenic Viewpoint Project Vegetation Mgmt	Wildlife habitat would be impacted on approximately 1 acre where trees were felled. Wildlife may be displaced in the short-term during project implementation. There would be an overlap in time with the construction of the White Pass expansion. There is no spatial overlap with the White Pass Study Area. The effects to wildlife from this project would not be measurable at the 5th field scale. Implementation of the Action Alternatives, combined with the additional vegetation removal from this and other projects identified in this table, would cumulatively impact wildlife from additional loss of habitat and human activity at the 5th field watershed scale.
UCFC-4	Mt Rainier/Goat Rocks Scenic Viewpoint	Approximately 0.75 acre of stand treatment would be conducted along US 12. There would be an overlap in time with the construction of the White Pass expansion. There is no spatial overlap with the White Pass Study Area. The effects to wildlife from this project would not be measurable at the 5th field watershed scale. Implementation of the Action Alternatives, combined with the additional vegetation removal from this and other projects identified in this table, would cumulatively impact wildlife from additional loss of habitat and human activity at the 5th field watershed scale.
UCFC-5	White Pass Wildfire	The wildfire burned approximately 204 acres within the Upper Clear Fork Cowlitz watershed resulting in direct impacts to vegetation and associated wildlife habitat. In the eight years following the fire, it is expected that some natural regeneration has occurred. This project did not overlap the in space with the White Pass Study Area. Partial natural regeneration of the vegetation has occurred since the fire. In the long-term, the effects of the fire, coupled with the effects of the White Pass expansion and other project effects listed in this table, will contribute to a cumulative reduction in forest habitat at the 5th field watershed scale. With continued revegetation, the potential for long-term effects of this fire will be reduced.
UCFC-6	Knuppenberg Lake Bridge Removal	Beneficial effects to 0.24 acre of riparian habitat resulted from the removal of the bridge, improving riparian conditions in the long-term. Short-term impacts including disturbance of wildlife from human activity and noise associated with demolition did not overlap with the White Pass expansion. Long-term beneficial impact to wildlife from recovery of riparian areas would overlap with the effects of the White Pass expansion. While the project does not overlap in space with the White Pass Study Area, the beneficial impact to wildlife habitat would occur at the 5th field watershed scale.

Table 3.6-13:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Wildlife

Project Number	Project Name	Cumulative Effects
UCFC-7	Wilderness Trail Maintenance	Short-term disturbance to wildlife would result from clearing and brushing, ground disturbance and structure maintenance. Short-term, seasonal increases in disturbance of wildlife along the trail would also result from improved human access. Trail maintenance effects on wildlife would overlap in time with the effects of the White Pass expansion as maintenance activities would occur during the summer months. While the effects of system trail maintenance do not overlap with the White Pass Study Area, noise from increased human presence during maintenance activities would impact wildlife within the White Pass Study Area and at the 5th field watershed scale.
UCFC-8	Ongoing Road Maintenance	Permanent direct impacts of up to 46.3 acres of forest and shrub wildlife habitat along the margins of existing roads would result from this project. During maintenance activity, human and equipment disturbance to wildlife from clearing, grading, and maintenance of stream crossings would directly affect wildlife. Long-term impacts are not expected to occur. Road maintenance would overlap in time with the construction of the White Pass expansion as construction activities would occur during the summer months. While the project does not overlap with the White Pass Study Area, increased noise from maintenance activities would cumulatively affect wildlife at the 5th field watershed scale.
UCFC-9	Camp Site Maintenance	Additional noise and human activity during maintenance activities within dispersed areas would lead to short-term avoidance of the area by wildlife. Campsite maintenance would overlap in time with the effects of the construction of the White Pass expansion as maintenance activities would occur during the summer months. Maintenance activities, including increased human presence, and associated noise at dispersed sites would impact wildlife within the White Pass Study Area and at the 5th field watershed scale.
UCFC-11	Air Quality Monitoring Building	Construction of this building resulted in a long-term loss of 0.02 acres of wildlife habitat. Implementation of this project had no temporal overlap with the proposed White Pass expansion as the project site is assumed to be stabilized. Spatially, this project occurred within the White Pass Study Area and results in a loss of wildlife habitat at the 5th field watershed scale combined with implementation of the Action Alternatives and other projects listed in this table.
UCFC-12	Rockfall Mitigation (between mileposts 143 and 149)	No long-term impacts to wildlife are expected to have resulted from this project as construction activities occurred within the US 12 right-of-way. Implementation of this project did not overlap in time with the proposed White Pass expansion. Spatially, this project occurs outside the White Pass Study Area, and did not contribute to a loss of wildlife habitat at the 5th field watershed scale because it is located within the previously modified US 12 corridor.

**Table 3.6-13:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Clear Fork Cowlitz Watershed on Wildlife**

Project Number	Project Name	Cumulative Effects
UCFC-14	Unstable Slope Repair Projects (between mileposts 145.61 and 145.77)	No long-term impacts to wildlife are expected to result from this project as construction activities will occur within the US 12 right-of-way. Implementation of this project will overlap in time with the proposed White Pass expansion. Spatially, this project occurs outside the White Pass Study Area, and will not contribute to a loss of wildlife habitat at the 5th field watershed scale because it is located within the previously modified US 12 corridor.
UCFC-15	Unstable Slope Repair Projects (between mileposts 141.8 and 144.4)	No long-term impacts to wildlife are expected to result from this project as construction activities occur within the US 12 right-of-way. Implementation of this project will not overlap in time with the White Pass expansion. Spatially, this project occurs outside the White Pass Study Area, and will not contribute to a loss of wildlife habitat at the 5th field watershed scale because it is located within the previously modified US 12 corridor.
UCFC-16	Highway 12 Hazard Tree Removal	Hazard tree removal will reduce or modify wildlife habitat for species dependant on snags and LWD. The effects of a portion of the project would overlap spatially with the effects of the White Pass expansion (i.e. US 12 at White Pass). As hazard tree removal would overlap in time with construction of the White Pass expansion, it would cumulatively add to the loss of wildlife habitat for species dependant on LWD and snags.
UCFC-17	White Pass Ski Area Yurt Construction	Long-term, direct impact to wildlife habitat resulted from approximately 0.01 acre of new impervious surfaces from construction of the yurt. Spatially, the effects of the yurt overlap with the White Pass expansion. The effects of the project had no temporal overlap with the White Pass expansion as the project site is assumed to be stabilized. As the project occurred within the White Pass Study Area, an existing disturbance to wildlife from human activity, this project is not expected to have had any long-term impacts to wildlife.
UCFC-18	Special Forest Product Permits	Short-term temporary impacts to wildlife (avoidance) would result from increased human presence during collection of boughs and beargrass. Spatially, this project would result in short-term disturbances to wildlife at the 5th field watershed scale when combined with construction activities (noise) for the White Pass expansion and other projects identified in this table. Temporally, annual collection of beargrass and boughs would overlap with construction of the White Pass expansion.
UCFC-20	Benton Rural Electric Association (REA) Power Line Maintenance	No new long-term impacts to wildlife habitat are expected to result from maintenance activities as the vegetation is maintained in a non-natural condition. Temporary noise impacts would potentially disturb wildlife during construction. Ongoing maintenance would overlap in time with the White Pass expansion and would cumulatively add to short-term noise disturbance to wildlife in the White Pass Study Area and at the 5th field watershed scale.

**Table 3.6-14:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Tieton Watershed on Wildlife**

Project Number	Project	Wildlife
UT-2	White Pass Ski Area Sewer Line Replacement	Approximately 0.73 acre of grading will occur, associated with the excavation of the trench and resulting in the loss of ground cover vegetation (habitat for wildlife) in the short-term. Also in the short-term, during construction, noise impacts may cause some wildlife to avoid the area. Project implementation and effects are expected to overlap in time and space with the effects of the White Pass expansion. No long-term effects to wildlife are expected because the disturbed soil areas will be immediately stabilized/ revegetated after construction and construction equipment will not be present upon completion of the project. Combined with the White Pass expansion and other projects identified in this table, this project would add to a cumulative, short-term loss of wildlife habitat within and outside of the White Pass Study Area within the 5th field watershed.
UT-3	White Pass Ski Area Generator Shed and Propane Tank	Approximately 0.004 acre of shrub and herbaceous wildlife habitat associated with the project footprint was removed. Implementation of this project had no temporal overlap with the proposed White Pass expansion as the project site is assumed to be stabilized. As the project occurred within the White Pass Study Area, an existing disturbance to wildlife from human activity, this project is not expected to have had any long-term impacts to wildlife.
UT-4	White Pass Ski Area Relocation of Chair 3 and Platter Lift	Approximately 0.01 acre of shrub and herbaceous wildlife habitat associated with the project footprint was removed. Implementation of this project had no temporal overlap with the proposed White Pass expansion as the project site is assumed to be stabilized. As the project occurred within the White Pass Study Area, an existing disturbance to wildlife from human activity, this project is not expected to have had any long-term impacts to wildlife.
UT-5	US Cellular Tower	Approximately 0.004 acre of shrub and herbaceous wildlife habitat associated with the project footprint was removed. Implementation of this project had no temporal overlap with the proposed White Pass expansion as the project site is assumed to be stabilized. As the project occurred within the White Pass Study Area, an existing disturbance to wildlife from human activity, this project is not expected to have had any long-term impacts to wildlife.
UT-6	White Pass Ski Area Restaurant/Condo Conversion	Approximately 0.25 acre of existing building footprint was removed and converted to condominiums. Spatially, the effects of the project overlap with the White Pass expansion. The effects of the project had no temporal overlap with the White Pass expansion as the project site is assumed to be stabilized. As the project occurred within the White Pass Study Area, an existing disturbance to wildlife from human activity, this project is not expected to have had any long-term impacts to wildlife.
UT-7	White Pass Ski Area Cross Country Yurt	Approximately 0.25 acre of existing disturbed area was redeveloped. Spatially, the effects of the yurt overlap with the White Pass expansion. The effects of the project had no temporal overlap with the White Pass expansion as the project site is assumed to be stabilized. As the project occurred within the White Pass Study Area, an area of existing disturbance to wildlife from human activity, this project is not expected to have had any long-term impacts to wildlife.

Table 3.6-14:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Wildlife

Project Number	Project	Wildlife
UT-8	White Pass Ski Area Manager's Cabin	Approximately 0.25 acre of trees, shrub and herbaceous wildlife habitat associated with the project footprint was removed. Effects to wildlife from this project had no temporal overlap with the White Pass expansion as the project site is assumed to be stabilized. As the project occurred within the White Pass Study Area, an area of existing disturbance to wildlife from human activity, this project is not expected to have had any long-term impacts to wildlife.
UT-10	Dog Lake Campground/Four Trailhead Reconstruction	This project would impact approximately 1.0 acre of wildlife habitat, including Riparian Reserves within the 5th field watershed scale. As this project is anticipated to overlap in time with the proposed White Pass expansion, short-term impacts (avoidance) to wildlife would likely result from construction noise. No long-term impacts are expected to occur.
UT-11	Clear Creek Overlook Reconstruction	This project would impact approximately 1.0 acre of wildlife habitat through the reconstruction of an overlook and the addition of the interpretive trail. As this area is already heavily used by humans, this project would not result in an increase in disturbance to wildlife from increased human presence. The project effects do not overlap with the White Pass Study Area, however, it is anticipated that the loss of habitat would be realized at the 5th field watershed scale. As the effects of this project would overlap in time with effects of the White Pass expansion, there would be a cumulative short-term increase in construction noise disturbance to wildlife at the 5th field watershed scale.
UT-16	Trail 1106 Water Crossing	If a ford is constructed (instead of bridge replacement), up to 0.1 acre of vegetation will be removed to reroute the trail, resulting in the short-term loss of 0.1 acre of riparian wildlife habitat. In addition, short-term impacts to wildlife from increased human presence and associated noise during reconstruction activities may cause some wildlife to avoid the area. This project does not overlap spatially with the White Pass Study Area. Project implementation and effects are expected to overlap in time with the effects of the White Pass expansion. No long-term effects to wildlife are expected because the abandoned trail segment will be closed and allowed to revegetate. Combined with the White Pass expansion and other projects identified in this table, this project would add to a cumulative, short-term loss of wildlife habitat within the 5th field watershed.
UT-17	North Fork Tieton System Ski Trail Grooming	Trail grooming likely creates short-term noise disturbances to wildlife during winter months. Construction noise associated with the White Pass expansion would occur during summer months and would therefore not overlap in time or space with grooming noise. Following completion of the expansion, grooming of new ski trails would overlap in time with the North Fork Trail grooming and would likely add to short-term noise disturbance to wildlife during winter months.

Table 3.6-14: Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Wildlife

Project Number	Project	Wildlife
UT-18	Benton Rural Electric Association (REA) Power line Maintenance	Power line maintenance will spatially overlap with the White Pass Study Area and the 5th field watershed. No new long-term impacts to wildlife habitat are expected to result from maintenance activities as the vegetation is maintained in a non-natural condition. Temporary noise impacts would potentially disturb wildlife during construction. Ongoing maintenance would overlap in time with the White Pass expansion and would cumulatively add to short-term noise disturbance to wildlife within the White Pass Study Area and at the 5th field watershed scale.
UT-19	Highway 12 Hazard Tree Removal	Hazard tree removal will reduce or modify wildlife habitat for species dependant on snags and LWD. The effects of a portion of this project would overlap spatially with the effects of the White Pass expansion (i.e. US 12 at White Pass). As hazard tree removal would overlap in time with construction of the White Pass expansion, it would cumulatively add to the loss of wildlife habitat for species dependant on LWD and snags.
UT-20	Clear Lake Recreation Projects	This project would be constructed within the existing camp and would not result in the additional loss of wildlife habitat. Spatially, the effects of the project would not overlap with the effects of the White Pass expansion. It is expected that construction will result in short-term impacts to wildlife from construction related noise. It is expected that the effects of this project would overlap in time with the effects of the White Pass expansion resulting in a cumulative noise impact to wildlife in the 5th field.
UT-23	System Trail Maintenance	Short-term disturbance to wildlife would result from clearing and brushing, ground disturbance and structure maintenance. Short-term, seasonal increases in disturbance of wildlife along the trail would also result from improved human access. Trail maintenance effects on wildlife would overlap in time with the effects of the White Pass expansion as maintenance activities would occur during the summer months. While the effects of system trail maintenance do not overlap with the White Pass Study Area, noise from increased human presence during maintenance activities would impact wildlife within the White Pass Study Area and at the 5th field watershed scale.
UT-24	Snoqueen Mine	Ongoing mining operations are not expected to result in further impacts to habitat under the existing permit, but continuing operations would create ongoing noise disturbances to wildlife. There would be no overlap in space with construction of the White Pass expansion as the mine is located outside the White Pass Study Area. However, construction of the White Pass expansion would overlap in time with ongoing noise and cumulatively add to the noise disturbance to wildlife at the 5th field watershed scale.
UT-25	*Zig Zag* Nordic and Snowshoe Trails	Trail grooming likely creates short-term noise disturbances to wildlife during winter months. Construction noise associated the White Pass expansion would occur during summer months and would therefore not overlap in time or space with grooming noise. Following completion of the expansion, grooming of new ski trails would not overlap in time with grooming because use will have been discontinued on these trails.

Table 3.6-14:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Wildlife

Project Number	Project	Wildlife
UT-26	Highway 12 Rock Stabilization (at Mile Post 155)	No long-term impacts to wildlife are expected to result from this project as construction activities will occur within the previously modified US 12 right-of-way. Implementation of this project would likely overlap in time with the proposed White Pass expansion. Spatially, this project occurs outside the White Pass Study Area, but is not expected to contribute to a loss of wildlife habitat at the 5th field watershed scale because it is located along US 12.
UT-27	Highway 12 Rock Stabilization (at Mile Post 155)	No long-term impacts to wildlife are expected to have resulted from this project as construction activities occurred within the previously modified US 12 right-of-way. Implementation of this project did not overlap in time with the proposed White Pass expansion. Spatially, this project occurs outside the White Pass Study Area, and did not contribute to a loss of wildlife habitat at the 5th field watershed scale because it is located along US 12.
UT-28	Camp Prime Time Accessible Trail, Wagon Ride Route and Tree House	This project would be constructed within the existing camp and would not result in the additional loss of wildlife habitat. It is expected that construction will result in short-term impacts to wildlife from construction related noise. It is expected that this project would overlap in time with the proposed White Pass expansion resulting in a cumulative noise impact to wildlife.
UT-29	Clear Lake Boat Launch Heavy Maintenance	This project would be constructed within the existing recreation area and would not result in the additional loss of wildlife habitat. It is expected that construction will result in short-term impacts to wildlife from construction related noise. It is expected that this project would overlap in time with the White Pass expansion resulting in a cumulative noise impact to wildlife.
UT-30	US Cellular Backup power at White Pass Communications Site	This project was implemented within the existing disturbed area and did not result in the additional loss of wildlife habitat. It is expected that this project would overlap in time with the White Pass expansion resulting in a cumulative noise impact to wildlife from occasional generator use.
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	This project would be constructed within the existing disturbed area and would not result in the additional loss of wildlife habitat. It is expected that construction will result in short-term impacts to wildlife from construction related noise. It is expected that this project would overlap in time with the proposed White Pass expansion resulting in a cumulative noise impact to wildlife.
UT-32	Camp Site Maintenance	Additional noise and human activity during maintenance activities would lead to short-term avoidance of the areas. Camp maintenance would overlap in time with the construction of the White Pass expansion as maintenance activities would occur during the summer months. Maintenance activities, including increased human presence and associated noise, would impact wildlife within the White Pass Study Area and at the 5th field watershed scale.

Table 3.6-14:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Wildlife

Project Number	Project	Wildlife
UT-35	Unstable Slope Repair Projects (between Mile Posts 161.93 and 165.02)	No long-term impacts to wildlife are expected to result from this project as construction activities will occur within the previously modified US 12 right-of-way. The disturbance effects of this project do not overlap with the effects in the White Pass Study Area, but are expected to overlap in time with the effects of the White Pass expansion. The project will not contribute to a loss of wildlife habitat at the 5th field watershed scale because it is located along US 12.

As described in Tables 3.6-14 and 3.6-15, projects occurring within each 5th field watershed of the CEAA would cumulatively impact wildlife through short-term noise disruptions, increased human activity, and long-term losses of habitat. At the site scale, the projects described in the tables would cumulatively impact wildlife habitat over approximately 4.8 percent of the White Pass Study Area (refer to Table 3.6-15). Combined with the implementation of the White Pass Expansion, impacts to wildlife would occur over a maximum of 7.6 percent of the site scale. However, because the site scale includes an existing ski area development, major state highway, and human activity, no measurable cumulative impacts to wildlife are expected to occur.

Within the CEAA, cumulative impacts to wildlife habitat would occur over 0.37 percent of the area (refer to Table 3.6-15). As described previously, short-term impacts to wildlife would occur from short-term noise disruptions, increased human activity, and the loss of habitat. The maximum area of long-term, habitat-related cumulative impact from the White Pass expansion (Modified Alternative 4) and the projects described in Tables 3.6-13 and 3.6-14 would affect approximately 0.4 percent of the CEAA (refer to Table 3.6-15). The CEAA includes the existing ski area, US 12, and numerous other sources of human activity. As the cumulative impact from the White Pass expansion and other projects occurs over a small percentage of the CEAA and distributed throughout currently-developed areas within the CEAA, the cumulative effect to wildlife are not expected to be measurable.

Table 3.6-15
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Cumulative Effects Analysis Area[a] on Wildlife

Impact Type	Alt. 1		Alt. 2		Mod. Alt. 4		Alt. 6		Alt. 9	
	Area (ac.)	Percent of Scale (%)	Area (ac.)	Percent of Scale (%)	Area (ac.)	Percent of Scale (%)	Area (ac.)	Percent of Scale (%)	Area (ac.)	Percent of Scale (%)
White Pass Study Area Scale										
White Pass Projects	0.00	0.00	19.70	1.25	44.51	2.84	15.10	0.96	35.30	2.25
Projects Not Associated with the White Pass Expansion	74.72	4.76	74.72	4.76	74.72	4.76	74.72	4.76	74.72	4.76
Cumulative Impacts	**74.72**	**4.76**	**94.42**	**6.01**	**119.24**	**7.59**	**89.82**	**5.72**	**110.02**	**7.01**
Fifth Field Scale										
White Pass Projects	0.00	0.00	19.70	0.01	44.51	0.02	15.10	0.01	35.30	0.02
Projects Not Associated with the White Pass Expansion	708.11	0.37	708.11	0.37	708.11	0.37	708.11	0.37	708.11	0.37
Cumulative Impacts	**708.11**	**0.37**	**727.81**	**0.39**	**752.63**	**0.40**	**723.21**	**0.38**	**743.41**	**0.39**

[a] The Cumulative Effects Analysis Area (CEAA) is the combined areas of the Upper Tieton and modified Upper Clear Fork Cowlitz watersheds.

Appendix I

Fisheries Technical Report and Biological Evaluation

APPENDIX I – REVISED WHITE PASS FISHERIES TECHNICAL REPORT AND BIOLOGICAL EVALUATION FOR THE WHITE PASS EXPANSION PROPOSAL

1.0 INTRODUCTION

This Revised Fisheries Technical Report and Biological Evaluation has been prepared to supplement the analysis of fisheries resources for the White Pass Ski Area Expansion Final Environmental Impact Statement (FEIS). The analysis contained in this document has been updated from the Fisheries Biological Evaluation that accompanied the Draft EIS. The biological evaluation is meant to assess the impacts of the Action Alternatives on federal proposed, threatened, and endangered species under the provisions of the Endangered Species Act (ESA). Additionally, U.S. Forest Service sensitive species are included in this analysis per forest plan requirements.

1.1 PROJECT DESCRIPTION

The White Pass Ski Area expansion proposal has specific actions which may potentially affect water quality draining the project area, and thus occupied fish habitat downstream. These actions are detailed in Chapter 2 of the FEIS in Section 2.3. These actions include: full clearing with grading, full clearing with no grading, tree island removal/clearing, tree island retention, forest edge scalloping, and forest edge feathering. Full clearing with grading would occur at all locations where structures are proposed (e.g., lift towers, buildings, parking lot), and along key trails where a smooth surface is necessary. Graded surfaces would be re-vegetated where appropriate (i.e., ski trails). The remainder of actions all entail different levels of clearing overstory vegetation (trees) to create open routes for ski trails while feathering ski trail edges to minimize impacts on scenic quality, and leaving understory vegetation (shrubs, grasses, forbs) intact. Between 28.8 to 90 acres of new ski trails are proposed under the Action Alternatives. Where proposed ski trails intersect and cross stream channels, Riparian Reserves would have various levels of clearing (permanent overstory tree removal). Utilities for lift towers and new buildings would be buried underground within the limits of proposed ski trails, with aerial crossings over streams. Specific details for each of the Action Alternatives can be found in Chapter 2 of the FEIS (refer to Sections 2.3.2 - 2.3.6).

1.2 PROJECT AREA (WHITE PASS STUDY AREA)

The project area encompasses approximately 1,572 acres and lies on the crest of the Cascade Mountains. The project area drains into two river systems, the Cowlitz and Tieton Rivers. The project area includes the current and proposed SUP area of White Pass.

Cumulative Effects Analysis Area

Customized 5th field watersheds were delineated for cumulative effects determinations in each drainage, and to assess potential indirect impacts to fish populations/habitat downstream of the White Pass Study

Area. On the Tieton side, the analysis area includes the Clear Creek and North Fork Tieton River drainages, which join together in Clear Lake, as well as the Indian Creek and South Fork Tieton River – all of which drain to Rimrock Lake. This customized 5th field encompasses 118,204 acres, and is called the Upper Tieton watershed.

On the Cowlitz River side, Millridge Creek and the Clear Fork Cowlitz River drainages at the confluence with the Cowlitz River, excluding Mount Rainier National Park, were included for this analysis. This customized 5th field totals 70,722 acres, and is called the Upper Clear Fork Cowlitz watershed.

2.0 METHODS

A thorough review of available data and literature on fisheries resources for the White Pass project area was completed. Primary sources include the Clear Fork Watershed Analysis (USDA 1998a) and the Upper Tieton Watershed Assessment (USDA 1998b). Additional information containing detailed fish distribution, habitat data and the occurrence of special status species (i.e., threatened, endangered, or Forest Service sensitive) for Millridge Creek and Clear Creek respectively, were collected and reviewed. Other data sources include stream survey reports, previous biological evaluations, and documents as referenced throughout the text.

To assist in making effects determinations to fisheries populations from the proposed actions, the Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale (USDI 1998) will be used.

3.0 FISH DISTRIBUTION

3.1 UPPER TIETON RIVER WATERSHED

Within the Upper Tieton River watershed, only resident fish are known to occur (USDA 1998b). Redband trout (*Oncorhynchus mykiss*), brook trout (*Salvelinus fontinalis*), whitefish (*Prosopium williamsoni*), and sculpins (*Cottus spp*.) are typically found throughout the watershed (USDA 1998b). Within Leech Lake, brook trout have been introduced as part of a stocking program. The fish present in Leech Lake represent the only known fish presence within the White Pass Study Area in either the Upper Tieton or the Upper Clear Fork Cowlitz watersheds.

Clear Creek, which drains Leech Lake and flows into Clear Lake, is known to contain populations of brook trout, cutthroat trout, rainbow trout and sculpins (USFS 1997b, 2005). Dog Lake, which flows into Clear Creek, contains rainbow trout (redband) and brook trout (USDA 1998b). Additionally, bull trout are not expected to occur within Clear Creek, as evidenced by the lack of detection during snorkel surveys. Bull trout are known to occur within the North Fork Tieton River and Clear Lake (USFS 1997a, 2004). Rimrock Lake supports a known population of bull trout, however spawning primarily occurs in Indian

Creek and the South Fork Tieton River. Consequently, Clear Lake and the North Fork Tieton River have been proposed as critical habitat for bull trout.

Anadromous fish are excluded from the Upper Tieton River watershed due to the Tieton Dam on Rimrock Lake. Passage of resident fish upstream from Rimrock Lake is limited by a thermal barrier at the fish ladder leading into Clear Lake due to warmer temperatures in the ladder (USFS 1994). This thermal barrier appears to limit bull trout migration out of Rimrock Lake and into the North Fork Tieton River. Within Clear Creek, waterfall barriers to resident fish passage occur at the outlet of Leech Lake and a waterfall below the US 12 crossing (USFS 1994). These natural barriers isolate resident fish populations within Clear Creek.

3.2 UPPER CLEAR FORK COWLITZ WATERSHED

The Upper Clear Fork Cowlitz watershed contains resident populations in addition to several anadromous fish including; Chinook salmon, coho salmon, and steelhead (USDA 1998a). Within the Upper Clear Fork Cowlitz watershed, all fish populations described occur outside of the White Pass Study Area. Bull trout in the Cowlitz River are listed as Threatened under the ESA. The Columbia River Distinct Population Segment includes the upper Cowlitz River. No bull trout are known to occur within the Clear Fork Cowlitz River and their presence is considered unlikely based on the exhaustive sampling conducted by the GPNF with no positive results. The last anecdotal report of native char within the Upper Clear Fork Cowlitz watershed was Dolly Varden (*Salvelinus malma*) and occurred in 1934. The historic sightings of Dolly Varden may have been bull trout, which Cavander (1978) subsequently described as a distinct species (USDA 1998a). Knuppenberg Lake supports a limited brook trout fishery, but heavy fishing pressure and possible emigration downstream out of the lake keeps production minimal. It was thought that brown trout might be more successful and were planted by the Washington Department of Wildlife in 1983, 1987, and 1988 without considerable success (USDA 1998a).

Anadromous fish distribution within the Clear Fork Cowlitz River is limited by a waterfall barrier approximately 8 miles downstream of the White Pass Study Area, at approximately River Mile 1.3. Downstream of the confluence of the Clear Fork Cowlitz River with the Cowlitz River, Tacoma Public Utilities and Lewis County Public Utility District operate three dams that block upstream anadromous fish migration (USDA 1998a). Currently, salmon and steelhead are trapped at hydroelectric projects in the lower reaches and hauled to several release points upstream of the last barrier dam (Cowlitz Falls Dam). Within Millridge Creek, fish distribution is limited by steep gradients associated with headwater tributaries. Knuppenberg Lake is known to have been stocked with brown trout, an introduced species from stocking programs (USDA 1998a). Rainbow trout and brook trout both occur within Millridge Creek (USFS 2004). No fish are known to occur within the White Pass Study Area due to the higher gradient streams that are primarily intermittent.

3.3 SPECIAL STATUS SPECIES

Special status fish species known to occur within downstream reaches of the Upper Clear Fork Cowlitz and Upper Tieton watersheds are listed below in Table 1.

Table 1:
Special Status Species Occurring in the
Upper Clear Fork Cowlitz and Upper Tieton River Watersheds

Species	Status	Presence Within Downstream Reaches	
		Upper Tieton River	Upper Clear Fork Cowlitz
Lower Columbia River Chinook (*Oncorhynchus tschawytscha*)	Federal Threatened	N	Y
Lower Columbia River Steelhead (*Oncorhynchus mykiss*)	Federal Threatened	N	Y
Bull Trout (*Salvelinus confluentus*)	Federal Threatened	Y	N
Lower Columbia River Coho (*Oncorhynchus kistuch*)	Federal Threatened	N	Y
Redband Trout (*Oncorhynchus mykiss sp.*)	USFS Sensitive Species	Y	N

4.0 HABITAT AND DOCUMENTATION OF ENVIRONMENTAL BASELINE

4.1 FISH HABITAT

Fish habitat is characterized by the variables that affect the physical and chemical environment of a water body that the fish inhabit. The physical environment can be characterized by habitat type, stream flow, large woody debris, and stream channel characteristics. In simplest terms, stream habitat types can be described as pool, riffle, or glide. Pools provide resting and cover habitat for fish and also allow fine sediments to settle out due to reduced velocity. Spawning typically takes place in riffle or glide areas, and pool tailouts. A stream may have high quality fish habitat when it has alternating, well distributed habitat units, with an adequate minimum area of each, to support the life cycle requirements of the species present (actual habitat quality also depends on elements such as the complexity or diversity of these units, cover provided, food supplies, etc.). The distribution of habitat units under natural conditions depends on the type of channel, the amount of water, the amount and type of sediment, and the nature of the streamside vegetation. Watershed management activities may therefore alter the distribution of habitat units by disturbing the channel, changing the water or sediment input to the stream, or changing the streamside vegetation. Stream characteristics include the channel type, geometry, geomorphology, dimensions, substrate, bank stability, and riparian zone vegetation.

The chemical environment of a stream is characterized by the water quality. Water quality includes stream temperatures, sediment, and pollutants all of which have the potential to affect fish habitat. Fish exhibit preferences for certain water temperature ranges at various points during their life cycle; incubation, rearing, migration, and spawning (Bjornn and Reiser 1991). Increased sediment levels can cover gravels, reducing available spawning habitat. Additionally, increased sediment can also result in increased water turbidity which affects the ability of fish to forage and navigate. Pollutants can affect fish and other aquatic organisms when concentrations reach threshold levels. Indirect impact to fish habitat could occur when pollutants impact macroinvertebrate communities, an important food base for most fish species.

Streams and ponds within the proposed SUP expansion area (i.e., Hogback Basin) do not support fish due to the steep gradients and ephemeral/intermittent stream channels and ponds. Leech Lake, located in the northeastern corner of the White Pass Study Area, supports the only known fish habitat within the White Pass Study Area. Approximately 30 percent of the White Pass Study Area drains east through Leech Lake and Clear Creek into the Upper Tieton River watershed. Waters draining west from White Pass into the Upper Clear Fork Cowlitz watershed through Knuppenberg Lake and Millridge Creek include the Hogback Basin and approximately 70 percent of the White Pass Study Area.

Upper Tieton River Watershed

In Upper Tieton River watershed, fish habitat within the White Pass Study Area is generally limited to Leech Lake. Streams within the White Pass Study Area are typically intermittent or perennial Rosgen Type A channels, which are typically steep, transport channels (SE Group 2004). Streams characteristics within Clear Creek are typically Rosgen Type B channels, which are primarily transport channels and do not contain high quality fish habitat (USDA 1998b). Access to fish habitat is limited by several barriers, including a waterfall below Leech Lake, and a culvert at the US 12 crossing. Access to off-channel habitat is limited by waterfalls and culverts on several tributaries to Clear Creek. Pool habitat within Clear Creek is currently functioning adequately. Stream surveys of the lower reaches indicate that pool and riffle frequency is approximately 37 pools per mile with the total length of riffle habitat dominating (USFS 1997b). No stream surveys within the White Pass Study Area have assessed pool and riffle habitat. For more information on stream types, see Section 3.3 – Watershed Resources.

Large woody debris (LWD) provides rearing and spawning habitat for fish by creating pools, trapping sediment, stabilizing stream banks, and providing cover. LWD densities within Clear Creek were measured during a stream survey of the lower reaches of Clear Creek and are below the Forest standards (USFS 1997b). The standard for LWD is 100 pieces per mile with a diameter greater than 12 inches. Within Clear Creek, the lower reaches contained approximately 33 pieces per mile (USFS 1997b). Within the watershed, LWD recruitment has been limited due to clearing associated with road development (USFS 2000).

Very little data regarding substrate conditions are available for Clear Creek. Previous assessments have rated this parameter to be at risk due to road crossings and the potential for sediment delivery to the stream (USFS 2000 and 2004). Several road crossings of Clear Creek likely contribute sediment to the system (USFS 1994). A survey of Clear Creek (approximately River Mile 0.0 to 2.2) indicated that pools within the lower reaches are dominated by sand and gravel (USFS 1997b). Clear Creek substrate is predominately cobbles and boulders (USFS 1994).

Riparian vegetation in Clear Creek and the Upper Tieton River watershed is fairly intact (USFS 2004). Therefore riparian vegetation is functioning adequately to provide shade and stream cover for fish species.

As described in Section 3.3 – Watershed Resources, available water quality information is limited. Water temperatures within Clear Creek average 55.3 degrees Fahrenheit. The maximum 7-day average temperature is approximately 52.2 degrees, which meets the standard for bull trout (USFS 2004). There is limited data available on other water quality parameters within Clear Creek (USDA 1998b). Within the White Pass Study Area, water temperatures are primarily influenced through springs and average temperatures are 42 to 45 degrees (USFS 1994). No 303d listed water bodies occur within the watershed (USDA 1988b).

As discussed in Section 3.3 – Watershed Resources, stream flows within the Upper Tieton watershed portion of the White Pass Study Area for the 7-day low flow is approximately 1.23 cubic feet per second (cfs) and the 2-year peak flow is 54.4 cfs. The flow is measured at the mouth of the flow model analysis area which is located at the inlet to Leech Lake.

Upper Clear Fork Cowlitz River Watershed

In the Upper Clear Fork Cowlitz River watershed, streams within the White Pass Study Area are not fish-bearing. Stream characteristics within the White Pass Study Area are typically ephemeral and intermittent Rosgen Type A channels, which are steep transport channels and do not provide high quality fish habitat (SE Group 2004). Millridge Creek contains limited fish habitat. Fish presence in Millridge Creek is assumed to be from stocking programs in Knuppenberg Lake. Stream channels within the mainstem Clear Fork Cowlitz River and Millridge Creek are also predominately Rosgen Type A channels (USDA 1998a). Habitat is highly fragmented within Millridge Creek and lower portions of the Clear Fork Cowlitz River due to fish migration barriers, resulting from natural steep channel gradients, and a high density of road crossings (greater than one per mile).

Quality fish habitat within the Clear Fork Cowlitz River is considered limited due to a lack of pools throughout surveyed reaches (USDA 1998a). In general, a comparison between 1935 and 1991 stream data has shown an overall loss of 36 percent of pool habitat in the Clear Fork Cowlitz River (USDA

1998a). Riffles are the predominant habitat type in Millridge Creek, primarily due the steeper gradient characteristic of a Rosgen A channel type (Type A and Aa).

LWD conditions within the Clear Fork Cowlitz River have been rated as good, indicating that there is a density greater than 80 pieces per mile (USDA 1998a). Forest clearing associated with US 12 has limited LWD input to Millridge Creek and will continue to limit recruitment potential in the future. As such, LWD conditions within Millridge Creek are poor.

The dominant substrate, as characterized by a 1992 stream survey, in the Clear Fork Cowlitz River is cobbles (USDA 1998a). Qualitative descriptions of substrate in Millridge Creek below Knuppenberg Lake indicated mainly a sandy bottom, interspersed with gravel, cobbles, and boulders in steeper sections (USFS 1983). Spawning gravel conditions within Millridge Creek and the Clear Fork Cowlitz River is a known data gap (USDA 1998a). Millridge Creek is somewhat sediment impaired due to road sanding operations on US 12 contributing to an increased percent of fine sediment in the stream. Knuppenberg Lake acts as a natural sediment trap on Millridge Creek, which minimizes downstream sediment transport to known fish habitat in the mainstem Clear Fork Cowlitz River. The percent of fine sediment within the Clear Fork Cowlitz River is low, indicating that impacts to fish habitat (particularly spawning gravel conditions) are less likely to occur (USDA 1998a).

Riparian vegetation within the Upper Clear Fork Cowlitz is relatively intact (USDA 1998a). Therefore riparian vegetation is functioning adequately to provide shade and stream cover for fish species. Previous clearing associated with US 12 adjacent to Millridge Creek has reduced the amount and function of riparian vegetation in these areas. However, no fish have been documented in the portion of Millridge Creek adjacent to US 12.

As described in Section 3.3 – Watershed Resources, available water quality information is limited. Stream temperature within the lower reaches of Millridge Creek averaged 8.5 degrees Celsius (47 degrees Fahrenheit) from point measurements taken during a stream survey (USFS 1983), which meets the 2006 Washington State Surface Water Quality Standard for bull trout (refer to Section 3.3 – Watershed Resources). No 303d listed water bodies occur within the Upper Clear Fork Cowlitz River watershed (USDA 1998a).

As discussed in Section 3.3 – Watershed Resources, streams flows within the Upper Clear Fork Cowlitz watershed portion of the flow model analysis area for the 7-day low flow is approximately 3.12 cfs. The 2-year peak flow is approximately 130.7 cfs.

4.2 ENVIRONMENTAL BASELINE (CEAA)

4.2.1 Upper Tieton River Watershed

4.2.1.1 Population Structure

Steelhead trout occurred in the watershed prior to the construction of Rimrock Dam, but were eliminated when the dam was constructed in 1924, so they will not be included in the following population discussion. There is no confirmed steelhead trout spawning use in the main Tieton River below Rimrock Dam. Spawning and rearing does occur in Oak Creek, a lower river tributary.

Subpopulation Size

Rimrock lake supports a relatively strong but isolated (by Rimrock dam) population of bull trout. Both Indian Creek and the South Fork Tieton Rivers are very important bull trout spawning and rearing streams. Based on 1996 and 2004 snorkel surveys, bull trout are also known to occur in the North Fork Tieton River, but the key spawning areas are unknown (Central Washington University 1996). No bull trout spawning habitat occurs downstream of the White Pass Study Area. Minnow trapping throughout much of Clear Creek, a small amount of electrofishing, and a short snorkel survey on Clear Creek have been conducted, with no bull trout found.

Redd counts have been conducted annually in Indian Creek since 1988 and in the South Fork Tieton since 1994. The Indian Creek redd counts average 142 per year but have decreased in the last three years. South Fork Tieton redd counts average 161 with a low of 95 in 1994 a high of 233 in 1996, and appear stable. A redd count survey occurred in the North Fork Tieton in 2004 (1 bull trout redd found), and a partial survey was conducted in 2006 with negative results (USFS unpublished data). An extensive snorkeling census for bull trout (and other fish species) in the North Fork Tieton River and in Clear Creek was conducted in 2004 and 2005 respectively. Bull trout were found in the North Fork Tieton River, but none were found in Clear Creek. Currently the Bureau of Reclamation and cooperators are preparing a feasibility study to improve fish passage facilities at Clear Lake Dam to restore bull trout access to the North Fork Tieton River and Clear Creek. Subpopulation size is considered to be **functioning adequately** for bull trout.

White Pass SUP Expansion Effects All Alternatives: The proposed activities will **maintain** the functioning adequately rating for bull trout. Actions that clear overstory trees within Riparian Reserves (mostly intermittent stream channels) could have a delayed increase in streambank instability (and sediment movement downstream) as the existing instream large wood gradually breaks down and is flushed downstream. Maintaining permanent ski trails across stream channels will decrease the future available large wood that could fall into stream channels. Large trees cleared in Riparian Reserves will be felled towards stream channels and left in place. This will create an added pulse of large wood for stream channels that will function to keep streambanks stable for an unknown number of years.

Construction of the parking area will disturb soils, and increase localized runoff. Specified stormwater management and other Mitigation Measures will minimize sediment delivery and increased flow to Leech Lake, however. Implementation of the Action Alternatives would result in an increase in low flows to Leech Lake by a range of 0.0 percent under Alternative 2 to 4.6 percent under Alternative 9. This projected increase in low flow would result in an estimated increase of approximately 0.00 cfs (Alternative 2) to 0.06 cfs (Alternative 9) during a low flow event. Likewise, the estimated two-year peak flows to Leech Lake would increase by a range of 0.0 percent under Alternative 2 to 1.1 percent under Alternative 9, resulting in an increase of approximately 0.0 to 0.6 cfs in discharge, respectively, in the Upper Tieton River (refer to FEIS Table 3.3-18). The relatively small projected increase in low flow and two-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Tieton River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology.

The increase in sediment delivered to bull trout habitat would likely be immeasurable, particularly below Leech Lake, which would function as a sediment trap. The WEPP model estimated that short-term project-generated sediment detachment within the White Pass Study Area which would potentially reach streams and/or wetlands would increase by a range of 0.0 percent under Alternative 2 to 12.8 percent under Alternative 9 (refer to FEIS Table 3.3 FEIS4). Long-term, project-generated sediment yield would increase by a range of 0.0 percent under Alternative 2 to 0.8 percent under Alternative 9 (refer to FEIS Table 3.3 FEIS4 and Appendix L – WEPP Technical Report). Management Requirement MR1 would require the implementation of a SWPPP during construction and proper stabilization/treatment of construction activities. The use of silt fences would constitute a short-term measure during construction (silt fences are typically removed after the site stabilizes) and could reduce potential sediment yields to streams by 90 percent, although it has been estimated that actual effectiveness would be 60 to 65 percent. Furthermore, long-term reductions in sediment yield to streams would be reduced through revegetation and other BMPs (e.g., sediment basins). Therefore, with mitigation, sediment delivery due to the parking lot and other construction activities is expected to be negligible.

All proposed activities within the Upper Tieton River watershed drain into Leech Lake before continuing on to reach Clear Creek and Clear Lake. The impact of increased sediment would be localized to non fish-bearing stream channels upstream of Leech Lake, and will not affect the subpopulation size of bull trout in Clear Lake.

Growth and Survival

Growth and survival appears to be **functioning adequately** for bull trout with two spawning populations. Redd counts in Indian Creek have been stable except the last three years, and have been stable in the South Fork Tieton, even with large disturbances such as floods and severe draw-down of Rimrock Lake.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the functioning adequately rating for bull trout and all other resident fish populations, for the same rationale/reasons listed above under Subpopulation Size.

Life History Diversity and Isolation

Migratory bull trout populations are present but are isolated above the Rimrock Lake so life history strategies that utilized the lower Tieton and possibly the Naches River are no longer present in the Upper Tieton. Currently bull trout passage from Rimrock Lake into Clear Lake (and the North Fork Tieton River) is impeded by design limitations of the existing fish ladder. Bull trout are known to migrate from Rimrock Lake up to the base of Clear Lake Dam, but avoid the channel leading to the fish ladder, presumably because surface waters flowing down the ladder are too warm for bull trout. Water flowing through the dam is cold, from deep water release. There is some indication that the Indian Creek and Tieton populations are somewhat distinct. In several years of monitoring, Indian Creek fish have not been observed spawning in the South Fork and vice versa (Paul James, Central Washington University, personal communication). It is not known how well juvenile fish are able to move through Rimrock Lake from their natal streams to possibly refound a population in one stream or the other. Therefore, bull trout Life History and Isolation is considered to be **functioning at risk**.

White Pass SUP Expansion Effects All Alternatives: This proposal will **maintain** the functioning at risk rating for bull trout because no barriers to fish movement would be added or removed. Bull trout will continue to be isolated above Rimrock Lake, and between Rimrock Lake and Clear Lake/North Fork Tieton River. Competition will continue between historically stocked rainbow and brook trout and native trout regardless of these projects.

Persistence and Genetic Integrity

Two relatively strong bull trout populations exist, the South Fork Tieton and Indian Creek. Fish tagging study data indicate that the spawning populations of Indian Creek and the South Fork Tieton River do not intermix, even though both populations forage in Rimrock Lake. A small bull trout population occurs in the North Fork Tieton River. Because the populations are somewhat isolated, and the ubiquitous presence of brook trout within the upper watershed, bull trout Persistence and Genetic Integrity will be considered **functioning at risk**.

White Pass SUP Expansion Effects All Alternatives: These projects will **maintain** the functioning at risk ratings for bull trout for the same reasons as are listed above in the Life History Diversity and Isolation section listed above.

4.2.1.2 Water Quality

Temperature

Both the North Fork Tieton River and Clear Creek are **functioning adequately** as can be seen from the table below. During low flow conditions of summer and fall, the channel of middle Clear Creek goes sub-surface. A large off channel spring approximately 2 miles from Clear Lake produces the entire surface flows that reach Clear Lake during summer low flow periods. The water is very cold (40 degrees Fahrenheit) at the spring.

Table 2:
Stream Temperatures from Recording Thermographs

Stream	Year	# days >61*	# days >58*	# days sampled	Max. Temp.	Max. 7-day Avg.
North Fork Tieton River at Scatter Creek	1997	0	0	41	53.6	51.6
North Fork Tieton River at 1200	1997	0	0		52.7	51.0
	1998	0	0	41	58.7	57.3
	1999	0	0	72	52.4	51.1
	2000	0	0		55.6	54.8
Clear Creek at Rd 1200	1997	0	0	56	55.3	52.2

White Pass SUP Expansion Effects All Alternatives: Streams within the Upper Tieton watershed are functioning adequately and expected to be **maintained** by this project. Thinning and permanent loss of overstory trees is proposed to occur within Riparian Reserves. Most of this area is along intermittent streams that do not flow during mid-summer thru fall, and should not influence downstream water temperatures in reaches supporting fish populations. Surface flows in Clear Creek between the project area and Clear Lake go subsurface during the summer low flow period. Increased growth of shrubs, willows and alders after the overstory canopy is cleared will restore some shading that is lost from the proposed actions.

Sediment

Limited sediment data is available for streams in the Upper Tieton watershed. Pebble counts were conducted in the North Fork Tieton River during the 1998 level II survey. Surface fines <6mm averaged 22 percent within the three survey reaches. Reach 3 is entirely within Wilderness and had the highest percentage of surface fines (average=31 percent) The North Fork Tieton is considered **functioning adequately**, because the majority of this drainage is within Wilderness, and primarily influenced by natural processes. Clear Creek is considered **functioning at risk**, because of the presence of the 840 road in the floodplain which has likely delivered fine sediment above natural levels and increased streambank erosion due to confinement from the road.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the current sediment condition ratings for fish bearing streams downstream of the project area for the same rationale/reasons discussed in the Subpopulation Size.

Chemical Contaminants/ Nutrients

No streams in the Upper Tieton watershed are on the 303(d) list and there are no known or suspected sources of contaminants, therefore the Upper Tieton is considered to be **functioning adequately**.

White Pass SUP Expansion Effects All Alternatives: This condition will be **maintained** under the proposed actions by following Best Management Practices (USFS 1988), and implementing specific Mitigation Measures in the FEIS.

4.2.1.3 Habitat Access

Physical Barriers

Rimrock dam is a complete migration barrier isolating the Upper Tieton from the rest of the Naches subbasin. Clear Lake Dam isolates the North Fork Tieton from both the South Fork Tieton and the mainstem Tieton. A ladder was constructed at the Clear Lake dam in 1992 in an attempt to provide access for bull trout from Rimrock Lake to Clear Lake and its tributaries. Bull trout have not been using the ladder possibly due to water temperatures. Water through the ladder is 50 degrees Fahrenheit while most of the water being released comes from the bottom of the lake and is 40 degrees Fahrenheit. Adult bull trout do move to the base of the dam, but whether they would migrate over the ladder if water temperatures were suitable, or if they are just feeding on kokanee spawners is unknown. No bull trout observed at the base of Clear Lake appear to be in spawning condition (pers. comm., Cummins). A culvert on Hell Creek (tributary to North Fork Tieton River) at the 1207 road appears to be at least a seasonal barrier to juvenile fish and possibly adults. It is unknown if bull trout rear in Hell Creek. There are no other known man-made barriers located in the Upper Tieton watershed. Overall the Upper Tieton is considered **functioning at unacceptable risk**.

White Pass SUP Expansion Effects All Alternatives: This project will not affect fish passage in any way, so it will **maintain** the functioning at unacceptable risk rating.

4.2.1.4 Habitat Elements

Substrate

Limited sediment data is available for streams in the Upper Tieton watershed. Substrate embeddedness estimates are no longer part of the Region 6 Level II Stream Survey due to the difficulty in achieving consistent survey results. Substrate embeddedness was not surveyed in Clear Creek or the North Fork Tieton River. Pebble counts were conducted in the North Fork Tieton River during the 1998 level II survey. Surface fines <6mm averaged 22 percent within the three survey reaches. Reach 3 is entirely within Wilderness and had the highest percentage of surface fines (average=31 percent) The North Fork Tieton is considered **functioning adequately**, because the majority of this drainage is within Wilderness, and primarily influenced by natural processes. Clear Creek is considered **functioning at risk**, because of the presence of the 840 road in the floodplain which has likely delivered fine sediment above natural levels and increased streambank erosion due to confinement from the road.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the current sediment condition ratings for fish bearing streams downstream of the project area for the same rationale/reasons discussed in the Subpopulation Size.

Large Woody Debris

Forest Plan Standards require >100 pieces of LWD (80 percent >12 inches in diameter and 20 percent >20 inches in diameter) per mile of stream. Reach 1 of the North Fork Tieton River has 63 pieces per mile >12 inches. Several of its small tributaries have had riparian timber harvest, so it is rated **functioning at risk**. Reaches 2 and 3 of the North Fork Tieton River have 51 and 90 pieces of LWD per mile, have had very little timber harvest and other management because of proximity to and inclusion in Wilderness, so they are rated **functioning adequately**. Reaches 1 and 2 of Clear Creek are **functioning at risk**.

Table 3:
Large Instream Wood Counts in Streams within the Analysis Area

Stream	Reach	Large/ Mile	Medium/ Mile	Small/ Mile	Total Wood/ Mile	Large+ Med/ Mile
North Fork Tieton River (1998 Survey)	1	26	37	78	141	63
	2	13	38	87	138	51
	3	36	54	83	173	90
Clear Creek	1	2	30	102	134	32
	2	14	36	80	130	40

White Pass SUP Expansion Effects All Alternatives: Much of the watershed is functioning appropriately (except Clear Creek and Reach 1 of the North Fork Tieton). In the short-term, project actions will increase instream large wood in those areas affected by ski trail creation, as some trees will be felled into intermittent stream channels to create ski trails. In the long-term, instream large wood will decrease in those site specific stream segments that are maintained as ski trail clearings, as the current wood decomposes or is flushed downstream. On the 5th field scale, this project is not likely to adversely affect the current large wood rating, and would not affect instream wood densities in fish bearing streams downstream of the project area. This project will **maintain** the current condition ratings for Clear Creek, as wood transport out of the project area to downstream fish-bearing stream reaches is likely impossible, due to slope position of the ski trail clearing, small size of stream channels, the culvert under US 12, and the catchment of Leech Lake. Conditions of the North Fork Tieton will not change, because it functions independent of Clear Creek above Clear Lake.

Pool Frequency and Quality

Most streams are considered to be **functioning adequately** for the channel type with deep pools within geomorphic constraints. The watershed is largely unmanaged so streams are **functioning adequately**.

Table 4:
Pool Frequencies

Stream	Reach	Gradient (%)	Pools/ reach	Bankfull width (ft)	BFCW/ pool surveyed	Pools/mile
North Fork Tieton River	1	<1	68	70.0	4.1	18.6
	2	2.1	46	66.6	5.0	15.5
	3	0.01	63	50.5	5.6	18.7
Clear Creek	1	3	70	No Data		35
	2	3	11	No Data		80

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the functioning appropriately rating for pools. Adverse effects to quality pool habitat is largely caused by increased sedimentation, increased peak flows, loss of instream large wood, or floodplain constriction. This project has slight potential to increase sedimentation downstream within the project area. This is not expected to be measurable. Leech Lake is a natural sediment trap that would buffer Clear Creek from increased sedimentation. The project would not change peak flows/timing, floodplain constriction, or large wood densities in downstream stream reaches.

Off-Channel Habitat

Off-channel habitat is **functioning adequately** in the form of side channel habitat, tributaries and beaver dams. The North Fork Tieton has beaver dams, side channels, ponds and marshes present. Side channels were noted in the Clear Creek survey.

White Pass SUP Expansion Effects All Alternatives: This project is not expected to have an impact on off-channel habitat and therefore the functioning appropriately off-channel habitat will be **maintained**.

Refugia

The North Fork Tieton and Clear Creek provide habitat refugia but the presence of introduced rainbow and brook trout may displace native species or make suitable habitat unusable. Refugia for bull trout is considered **functioning at risk**.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the at-risk rating for refugia in the watershed at the 5th field scale. No measurable change in the quality of fish habitat is expected in Clear Creek.

4.2.1.5 Channel Conditions and Dynamics

Width/Depth Ratio

Overall width/depth ratios appear to be appropriate for the channel types and channel types are appropriate for the geomorphic setting and are **functioning adequately**.

Table 5:
Bankfull Width/Depth Ratios

Stream	Reach	BFCW	BFCD	Bankfull W/D
North Fork Tieton River	1	70.0	2.0	35.0
	2	66.6	1.9	35.1
	3	50.5	1.9	26.6
Clear Creek	1	No Data	No Data	No Data
	2	No Data	No Data	No Data

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the current functioning appropriately rating. Adverse effects to width/depth ratios are largely caused by increased sedimentation, increased peak flows, loss of instream large wood, or destabilized streambanks.

This project has slight potential to increase sedimentation downstream within the project area. This is not expected to be measurable. Leech Lake is a natural sediment trap that would buffer Clear Creek from increased sedimentation. The WEPP model estimated that short-term project-generated sediment detachment within the White Pass Study Area, which would potentially reach streams and/or wetlands, would increase by a range of 0.0 percent under Alternative 2 to 12.8 percent under Alternative 9 (refer to FEIS Table 3.3 FEIS4). Long-term, project-generated sediment yield would increase by a range of 0.0 percent under Alternative 2 to 0.8 percent under Alternative 9 (refer to FEIS Table 3.3 FEIS4 and Appendix L – WEPP Technical Report). Management Requirement MR1 would require the implementation of a SWPPP during construction and proper stabilization/treatment of construction activities. The use of silt fences would constitute a short-term measure during construction (silt fences are typically removed after the site stabilizes) and could reduce potential sediment yields to streams by 90 percent, although it has been estimated that actual effectiveness would be 60 to 65 percent. Furthermore, long-term reductions in sediment yield to streams would be reduced through revegetation and other BMPs (e.g., sediment basins). Therefore, with mitigation, sediment delivery due to the parking lot and other construction activities is expected to be negligible.

The project would not change peak flows/timing, large wood densities, or streambank stability in downstream stream reaches. Implementation of the Action Alternatives would result in an increase in low flow in the Upper Tieton River by a range of 0.0 percent under Alternative 2 to 4.6 percent under Alternative 9. This projected increase in low flow would result in an estimated increase of approximately 0.00 (Alternative 2) to 0.06 cfs (Alternative 9) during a low flow event. Likewise, the estimated two-year peak flows in the Upper Tieton River would increase by a range of 0.0 percent under Alternative 2 to 1.1 percent under Alternative 9, resulting in an increase of approximately 0.0 to 0.6 cfs in discharge, respectively (refer to FEIS Table 3.3-18). The relatively small projected increase in low flow and two-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Tieton River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology.

Streambank Condition

Streambank condition during stream surveys was measured as the percentage of ground cover representing physical (bedrock, boulders or cobbles) or vegetative (shrubs, trees or grasses) armoring against scour from bankfull flow.

In 1998, the total length of eroded streambank for each side of the stream was recorded at measured units. The percentage of streambank that was eroding at these sites was calculated and it is assumed that this percentage is representative of the whole reach. Reach 1 of the North Fork Tieton is rated **functioning at risk** with 70.3 percent of its streambanks being stable, and Reaches 2 and 3 are rated **functioning adequately** with 94.5 percent and 85 percent of their streambanks being stable. Reaches 1 and 2 of Clear Creek are rated **functioning adequately** with 1.33 and 2.8 percent notes as “eroded” respectively.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the current functioning adequately rating for streams in the Upper Tieton watershed. Streambank stability will be maintained in downstream reaches, and by retaining understory vegetation along streambanks cleared for ski trails.

Floodplain Connectivity

The Upper Tieton watershed is **functioning adequately** as all streams are well connected with their floodplains, with the exception of Clear Creek. Clear Creek is rated **functioning at risk**, because it is confined in places by the 840 road. Other areas where floodplain function has been altered are the Clear Lake impoundment where the stream floodplains are now inundated. The reservoir has sterile drawdown zones as opposed to floodplains and little littoral zone, making it functioning at unacceptable risk.

White Pass SUP Expansion Effects All Alternatives: Stream channels directly affected by the proposed action are intermittent streams with very limited floodplain potential due to their steepness and current entrenched condition. The loss of overstory trees within Riparian Reserves in the project area would not affect floodplain connectivity in downstream reaches of Clear Creek. Current conditions will be **maintained**.

4.2.1.6 Flow/ Hydrology

Peak/Base Flow

Clear Creek and the North Fork Tieton have had little or no timber harvest and are considered **functioning adequately**.

White Pass SUP Expansion Effects All Alternatives: The project will **maintain** the At Risk rating. Overstory clearing would increase the total acres with <10 percent canopy closure in the South Fork Clear Creek subwatershed. Currently, 6.5 percent of the total subwatershed (2,215 acres) is in the <10 percent canopy closure condition. Alternative 9 would result in the greatest amount of overstory clearing in mature forest along perennial channels of any Action Alternative, approximately 20.3 acres, and increase the area of <10 percent canopy closure to 7.5 percent. Typically increases to peak flows are not likely unless 25-30 percent of a subwatershed is in the <10 percent canopy closure condition (Garrigues, personal communication 2004). Implementation of the Action Alternatives would result in an increase in low flow in the Upper Tieton River by a range of 0.0 percent under Alternative 2 to 4.6 percent under Alternative 9. This projected increase in low flow would result in an estimated increase of approximately 0.00 (Alternative 2) to 0.06 cfs (Alternative 9) during a low flow event. Likewise, the estimated two-year peak flows in the Upper Tieton River would increase by a range of 0.0 percent under Alternative 2 to 1.1 percent under Alternative 9, resulting in an increase of approximately 0.0 to 0.6 cfs in discharge, respectively (refer to FEIS Table 3.3-18). The relatively small projected increase in low flow and two-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Tieton River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology.

Drainage Network Increase

North Fork Tieton and Clear Creek are considered **functioning adequately**.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the functioning adequately rating relative to drainage network increase. The proposed action will not construct any new roads or trails. Revegetation of areas disturbed by construction of lift towers will follow Forest Service Best Management Practices to minimize soil erosion until vegetation is re-established.

4.2.1.7 Watershed Conditions

Road Density and Location

Road densities are variable within the Upper Tieton watershed. As can be seen from the table below, the North Fork Tieton and Clear Creek watersheds are **functioning adequately** due to having road densities less than 1.0 mile/square mile.

Table 6:
Road and Stream Densities

Watershed	Total Acres	Total Square Miles	Road Miles	Road Density (mi./sq. mi.)
North Fork Tieton River	31,559	49.3	33.3	0.68
Clear Creek	12,225	19.1	12.2	0.64

White Pass SUP Expansion Effects All Alternatives: No new roads will be constructed or obliterated within the Upper Tieton watershed, so the project will **maintain** the current functioning adequately rating.

Disturbance History

Much of the North Fork Tieton Creek drainage is within Wilderness and not impacted by management activities, so is rated **functioning adequately**.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the functioning adequately rating. Although some disturbance will occur within Riparian Reserves, listed fish populations downstream would not be affected (refer to sub-population size section). The proportion of forested acres in the South Fork Clear Creek subwatershed with <10 percent canopy cover will approach 7.5 percent, well within accepted thresholds.

Riparian Reserves

North Fork Tieton and Clear Creek watersheds are **functioning adequately** with largely intact (little management) Riparian Reserves.

White Pass SUP Expansion Effects All Alternatives: Although Riparian Reserves will degraded on the site specific scale from permanent loss of overstory trees, the project will **maintain** the adequately functioning rating within the 5th field watershed analysis area.

Disturbance Regime

Most of the watershed is in mesic or wet forest. The fire regime has not been greatly altered. Disturbance regime is **functioning adequately** for Clear Creek and the North Fork Tieton.

White Pass SUP Expansion Effects All Alternatives: The proposed project should not effect the quality of fish habitat downstream, so disturbance regime conditions will be **maintained**.

Integration

Significant bull trout populations exist in the Upper Tieton. The North Fork Tieton is **functioning adequately**. Clear Creek is **functioning at risk** due to the large number of brook trout present.

White Pass SUP Expansion Effects All Alternatives: The White Pass expansion would **maintain** the functioning adequately rating for the North Fork Tieton and Indian Creek, and the at risk rating for Clear Creek since none of the project occurs in these areas.

4.2.2 Upper Clear Fork Cowlitz River Watershed

4.2.2.1 Population Structure

Subpopulation Characteristics (subpopulation size, growth and survival, life history diversity/isolation, persistence/genetic integrity, integration)

Chinook salmon, Coho salmon, steelhead trout, interior redband trout: Several factors combine to limit anadromous and resident fish in the Upper Clear Fork Cowlitz watershed. Natural and human-caused barriers such as bedrock falls, high stream channel gradients, logjams, and road crossings prevent migration of adult spawners and rearing juveniles. Hydroelectric dams on the Cowlitz River currently block volitional passage of anadromous species into the Upper Clear Fork Cowlitz watershed. Currently salmon, and steelhead are trapped and hauled around the hydroelectric facilities in the lower Cowlitz River (USDA 1998a).

White Pass SUP Expansion Effects All Alternatives: The Gifford Pinchot National Forest has insufficient data to rate these indicators. Fish passage records on the Cowlitz River dams cannot be used to evaluate this watershed because fish are collected from all five 5th field watersheds upstream (USFS 2001).

4.2.2.2 Water Quality

Temperature

There is very little water temperature data for this watershed. The existing data show cold water temperatures, but little data has been collected on afternoon or evening temperatures for the Clear Fork Cowlitz River or Millridge Creek. Given the position in the watershed, altitude, relatively undamaged condition of the watersheds and glacial source of these streams it is unlikely that water temperatures exceed 59 degrees Fahrenheit. Based on the available data, streams in the Upper Clear Fork Cowlitz watershed are rated **functioning adequately**.

White Pass SUP Expansion Effects All Alternatives: Streams within the Upper Clear Fork Cowlitz watershed are functioning adequately and expected to be **maintained** by this project. Thinning and permanent loss of overstory trees is proposed to occur within Riparian Reserves along intermittent snowmelt channels in a parkland canopy structure with 40-69 percent canopy cover. Most of this area is along intermittent streams that do not flow during mid-summer thru fall, and should not influence downstream water temperatures in reaches supporting fish populations. Maintenance of existing vegetation and increased growth of shrubs, willows and alders after the parkland canopy is thinned will maintain/restore shading that is lost from the proposed actions.

Sediment (in spawning areas)

No data addresses sediment in the manner described by the matrix criteria. However, the sediment regime at the watershed scale reflects near-natural conditions as most of the sediment delivered to the system is generated from natural sources (e.g., glacial systems, natural mass wasting). Many streams were rated for fine sediments under the Clear Fork watershed analysis in 1998. On a local 7th field watershed scale, some streams are sediment impaired (Millridge Creek). US 12 is in close proximity to Millridge Creek, and winter sanding operations are likely increasing fine sediments in that stream. Millridge Creek is considered **functioning at risk**. The Upper Clear Fork Cowlitz is **functioning adequately** because fine sediment is not considered a limiting factor in the watershed as it was mostly rated as Good in the watershed assessment.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the current sediment condition ratings for fish bearing streams downstream of the project area. Actions that clear overstory trees within Riparian Reserves (mostly intermittent stream channels traveling through a parkland canopy structure with low LWD potential) could have a delayed increase in streambank instability (and sediment movement downstream) as the existing instream large wood gradually breaks down and is flushed downstream. Maintaining permanent ski trails across stream channels will decrease the future available large wood that could fall into stream channels. Large trees cleared in Riparian Reserves will be felled towards stream channels and left in place. This will create an added pulse of large wood for stream channels that will function to keep streambanks stable for an unknown number of years. The increase in sediment delivered would likely be immeasurable, particularly below Knuppenberg Lake, which would function as a sediment trap. The WEPP model estimated that short-term project-generated sediment detachment within the White Pass Study Area, which would potentially reach streams and/or wetlands within the Upper Clear Fork Cowlitz watershed, would increase by a range of 9 percent under Alternative 6 to 68 percent under Modified Alternative 4 (refer to FEIS Table 3.3 FEIS4). Long-term, project-generated sediment yield would increase by a range of 3 percent under Alternative 9 to 10 percent under Alternative 9 (refer to FEIS Table 3.3 FEIS4 and Appendix L – WEPP Technical Report). Management Requirement MR1 would require the implementation of a SWPPP during construction and proper stabilization/treatment of construction activities. The use of silt fences would constitute a short-term measure during construction (silt fences are typically removed after the site stabilizes) and could reduce potential sediment yields to streams by 90 percent, although it has been estimated that actual effectiveness would be 60 to 65 percent. Furthermore, long-term reductions in sediment yield to streams would be reduced through revegetation and other BMPs (e.g., sediment basins). Therefore, with mitigation, sediment delivery due to the parking lot and other construction activities is expected to be negligible. All proposed activities within the Millridge Creek watershed drain into Knuppenberg Lake before continuing downstream into the Clear Fork Cowlitz River. The predicted increase in sediment delivery downstream of the White Pass Study Area would be localized to non fish-bearing stream channels upstream of Knuppenberg Lake. Due to the natural sediment trap at Knuppenburg lake, implementation of BMPs to reduce sediment delivery to stream channels, and the spatial separation of 8 stream miles between the White Pass Study area and occupied habitat, the project will have no effect to listed fish species.

Chemical Contaminants/ Nutrients

No streams in the Upper Clear Fork Cowlitz watershed are identified in the watershed assessment as water quality limited from contaminants. Therefore, the Upper Clear Fork Cowlitz is considered to be **functioning adequately**.

White Pass SUP Expansion Effects All Alternatives: This condition will be **maintained** under the proposed action by following Best Management Practices (USFS 1988), and implementing specific Mitigation Measures in the FEIS.

4.2.2.3 Habitat Access

Physical Barriers

Although the watershed analysis does not identify any known unnatural barriers to fish passage, it does indicate that the Millridge and middle Clear Fork sub-watersheds to be highly fragmented six-field drainages with >1 road crossing (with streams) per mile of stream. Most road crossings are on intermittent non fish-bearing streams. Overall the Clear Fork and Millridge drainages are considered **functioning at risk**.

White Pass SUP Expansion Effects All Alternatives: This project will not affect fish passage in any way, so it will **maintain** the functioning at risk rating.

4.2.2.4 Habitat Elements

Substrate

Substrate embeddedness estimates are not part of the Region 6 level II stream survey anymore, due to the difficulty in collecting data consistently among surveyors. However, the sediment regime at the watershed scale reflects near-natural conditions as most of the sediment delivered to the system is generated from natural sources (e.g., glacial systems, natural mass wasting). Many streams were rated for fine sediments under the Clear Fork watershed analysis in 1998. On a small scale, some streams are sediment impaired (Millridge Creek). US 12 is in close proximity to Millridge Creek, and winter sanding operations are likely increasing fine sediments in that stream. Millridge Creek is considered **functioning at risk**. The Upper Clear Fork Cowlitz is **functioning adequately** because fine sediment is not considered a limiting factor in the watershed as it was mostly rated as Good in the watershed assessment.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the current sediment condition ratings for fish bearing streams downstream of the project area for the same rationale/reasons discussed under Sediment.

Large Woody Debris

Stream survey data indicates that some reaches of the Upper Clear Fork Cowlitz watershed meet the criteria. However, these numbers may be inflated because smaller size standards may have been used when categorizing large wood counts. About 58 percent of the Clear Fork stream length is considered in good condition (80 pieces of LWD per mile). Because of uncertainty of data quality, the Upper Clear Fork Cowlitz watershed is rated **functioning at risk**. Millridge is rated **functioning at risk** because the near proximity of US 12 is limiting the amount of large trees next to the stream and thus future large wood recruitment to the stream.

White Pass SUP Expansion Effects All Alternatives: Although the majority of tree removal will take place in a parkland forest structure with low LWD recruitment potential, in the short-term, project actions will increase instream large wood in those areas affected by ski trail creation, as some trees will be felled into intermittent stream channels. In the long-term, instream large wood will decrease in those site specific stream segments that are maintained as ski trail clearings, as the current wood decomposes or is flushed downstream. On the 5th field scale, this project would not degrade the current large wood rating, and would not affect instream wood densities in fish bearing streams downstream of the project area. This project will **maintain** the current condition ratings for Millridge Creek and Clear Fork Cowlitz River, as wood transport out of the project area to downstream fish-bearing stream reaches is likely impossible, due to slope position of the ski trail clearing, small size of stream channels, and the catchment of Knuppenberg Lake.

Pool Frequency and Quality

The indicator is rated **functioning at risk** for Millridge Creek and Clear Fork Cowlitz River because nearly all of the surveyed stream length lacks pool type habitat and rates fair for pool frequency. A comparison of large pools between 1935 and 1991 shows a loss of 6.7 pools per mile (-36 percent).

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the functioning at risk rating for pools. Adverse effects to quality pool habitat is largely caused by increased sedimentation, increased peak flows, loss of instream large wood, or floodplain constriction. This project has slight potential to increase sedimentation downstream within the project area. The WEPP model estimated that short-term project-generated sediment detachment within the White Pass Study Area, which would potentially reach streams and/or wetlands within the Upper Clear Fork Cowlitz watershed, would increase by a range of 9 percent under Alternative 6 to 68 percent under Modified Alternative 4 (refer to FEIS Table 3.3 FEIS4). Long-term, project-generated sediment yield would increase by a range of 3 percent under Alternative 9 to 10 percent under Alternative 9 (refer to FEIS Table 3.3 FEIS4 and Appendix L – WEPP Technical Report). This is not expected to be measurable below the White Pass Study Area. The predicted increase in sediment delivery downstream of the White Pass Study Area would be localized to non fish-bearing stream channels upstream of Knuppenberg Lake. Due to the natural sediment trap at

Knuppenburg lake, implementation of BMPs to reduce sediment delivery to stream channels, and the spatial separation of 8 stream miles between the White Pass Study area and occupied habitat, the project would have no effect to pool habitat occupied by listed fish species. Knuppenberg Lake is a natural sediment trap that would buffer Millridge Creek and the Clear Fork Cowlitz from increased sedimentation.

The project would not measurably change peak flows/timing, floodplain constriction, or large wood densities in downstream stream reaches. Implementation of the Action Alternatives would result in an increase in low flow in the Upper Clear Fork Cowlitz watershed by a range of 0.7 percent under Alternative 9 to 1.6 percent under Modified Alternative 4. This projected increase in low flow would result in an estimated increase of approximately 0.02 (Alternative 9) to 0.05 cfs (Modified Alternative 4) during a low flow event. Likewise, the estimated two-year peak flows in the Upper Clear Fork Cowlitz watershed would increase by a range of 0.2 percent under Alternatives 6 and 9 to 0.4 percent under Modified Alternative 4, resulting in an increase of approximately 0.2 to 0.4 cfs in discharge, respectively (refer to FEIS Table 3.3-18). The relatively small projected increase in low flow and two-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Clear Fork Cowlitz watershed would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology.

Off-Channel Habitat

The valley types in this watershed are narrow and not conducive to the formation of off-channel habitats. US 12 is likely constricting portions of Millridge Creek from forming off-channel habitat, and is **functioning at risk**. The Clear Fork Cowlitz is relatively unconstrained, and is **functioning adequately** given its naturally narrow valley type.

White Pass SUP Expansion Effects All Alternatives: This project is not expected to have an impact on off-channel habitat and therefore the current conditions for off-channel habitat will be **maintained**.

Refugia

The Clear Fork Cowlitz River does provide refugia for resident populations. This habitat is not accessible to anadromous fish or downstream resident populations. Much of Millridge Creek is likely too steep to provide refugia to native fishes, and is likely inhabitated only by stocked fish that migrated up and down from Knuppenberg Lake. Since habitats are insufficient in connectivity, this indicator is **functioning at risk**.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the at-risk rating for refugia in the watershed at the 5th field scale. No measurable change in the quality of fish habitat is expected downstream.

4.2.2.5 Channel Conditions and Dynamics

Width/Depth Ratio

Virtually no field data exists to assess this indicator. The Clear Fork Watershed analysis attempts to address this question with aerial photo analysis. The Clear Fork Cowlitz has short sections that were interpreted to have widened since 1973. The weakness of such an exercise is that it totally dependent on the line of vegetation and not channel dimensions. Because of lack of data and limited photo analysis, this indicator is rated **functioning at risk**.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the current functioning at risk rating. Degradation of width/depth ratios are largely caused by increased sedimentation, increased peak flows, loss of instream large wood, or destabilized streambanks. This project has slight potential to increase sedimentation downstream within the project area. The WEPP model estimated that short-term project-generated sediment detachment within the White Pass Study Area, which would potentially reach streams and/or wetlands within the Upper Clear Fork Cowlitz watershed, would increase by a range of 9 percent under Alternative 6 to 68 percent under Modified Alternative 4 (refer to FEIS Table 3.3 FEIS4). Long-term, project-generated sediment yield would increase by a range of 3 percent under Alternative 9 to 10 percent under Alternative 9 (refer to FEIS Table 3.3 FEIS4 and Appendix L – WEPP Technical Report). This is not expected to be measurable downstream of the White Pass Study Area. Knuppenberg Lake is a natural sediment trap that would buffer Millridge Creek from increased sedimentation.

The project would not change peak flows/timing, large wood densities, or streambank stability in downstream stream reaches. Implementation of the Action Alternatives would result in an increase in low flow in the Upper Clear Fork Cowlitz watershed by a range of 0.7 percent under Alternative 9 to 1.6 percent under Modified Alternative 4. This projected increase in low flow would result in an estimated increase of approximately 0.02 (Alternative 9) to 0.05 cfs (Modified Alternative 4) during a low flow event. Likewise, the estimated two-year peak flows in the Upper Clear Fork Cowlitz watershed would increase by a range of 0.2 percent under Alternatives 6 and 9 to 0.4 percent under Modified Alternative 4, resulting in an increase of approximately 0.2 to 0.4 cfs in discharge, respectively (refer to FEIS Table 3.3-18). The relatively small projected increase in low flow and two-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Clear Fork Cowlitz watershed would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology.

Streambank Condition

No data exists to directly address this habitat condition. The Clear Fork watershed analysis used the data from Pfankuch rating forms, which rate channel stability. This system incorporates many factors including bank stability. The model is more for predicting instability than measuring stability. Since no

6th field watersheds were rated as "good" in the watershed assessment this indicator is rated **functioning at risk**.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the current functioning at risk rating for streams in the analysis area. Streambank stability will be maintained in downstream reaches, and by retaining understory vegetation along streambanks cleared for ski trails.

Floodplain Connectivity

Based on field observations and post-flood assessment, there appear to be some stream reaches with noticeable channel downcutting (i.e., floodplain abandonment). Road density is moderate within the developed portions of some sub-watersheds. Overall the loss of floodplain connectivity is not considered to be extreme and this indicator is rated *functioning at risk*.

White Pass SUP Expansion Effects All Alternatives: Stream channels directly affected by the proposed action are intermittent streams with very limited floodplain potential due to their steepness and current naturally entrenched condition. The loss of Riparian Reserves overstory trees along intermittent reaches in a subalpine parkland canopy structure in the project area due to thinning would not affect floodplain connectivity in downstream reaches of Millridge Creek and the Clear Fork Cowlitz River. Current conditions will be **maintained**.

4.2.2.6 Flow/ Hydrology

Peak/Base Flow

The analysis area has an Aggregate Recovered Percentage (ARP) value of 95.9 percent (hydrologic maturity). The ARP method calculates a predicted hydrologic recovery for a basin based on stand year-of-origin, tree species, and site class, assuming that a stand is 100 percent hydrologically recovered once it reaches an average diameter at breast height of 8 inches. This is close to natural conditions, and rated **functioning adequately**.

White Pass SUP Expansion Effects All Alternatives: The project will **maintain** the functioning adequately rating. The proposed action would decrease the ARP value by less than 1 percent within the analysis area (from 95.9 percent to 95.6 percent). Typically increases to peak flows are not likely unless a watershed is modified to less than 70 percent ARP condition (Garrigues, personal communication 2004). Implementation of the Action Alternatives would result in an increase in low flow in the Upper Clear Fork Cowlitz watershed by a range of 0.7 percent under Alternative 9 to 1.6 percent under Modified Alternative 4. This projected increase in low flow would result in an estimated increase of approximately 0.02 (Alternative 9) to 0.05 cfs (Modified Alternative 4) during a low flow event. Likewise, the estimated two-year peak flows in the Upper Clear Fork Cowlitz watershed would increase by a range of 0.2 percent under Alternatives 6 and 9 to 0.4 percent under Modified Alternative 4, resulting in an increase of approximately 0.2 to 0.4 cfs in discharge, respectively (refer to FEIS Table 3.3-18). The relatively small projected increase in low flow and two-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Clear Fork Cowlitz watershed would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology.

Drainage Network Increase

This indicator is rated **functioning adequately**. The drainage network increase was estimated by counting the number of stream crossings by roads, multiplying the number of stream by an average distance between the crossing and the nearest drainage structure and dividing by the total miles of stream in the watershed. The overall value was 1.7 percent.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the functioning adequately rating relative to drainage network increase. One new permanent road (0.25 mile) is proposed under Alternative 6, and would cross four intermittent stream channels in Riparian Reserves. As mitigation, 0.6 mile of road would be obliterated within the Upper Clear Fork Cowlitz watershed. The proposed action will not construct any new roads or trails aside from re-routing the PCNST (Modified Alternative 4) at the crest. Revegetation of areas disturbed by construction of lift towers or other facilities will follow Forest Service Best Management Practices to minimize soil erosion until vegetation is re-established.

4.2.2.7 Watershed Conditions

Road Density and Location

Overall the road density was 0.69 mile per square mile and Riparian Reserve road density was moderate in the lower Clear Fork watershed (1.5 miles/square mile), and low in the other watersheds within the analysis area. This indicator is rated **functioning adequately**.

White Pass SUP Expansion Effects All Alternatives: One new permanent road (0.25 mile) is proposed under Alternative 6, and would cross four intermittent stream channels in Riparian Reserves. As mitigation, 0.6 mile of road would be obliterated within the Upper Clear Fork Cowlitz watershed. Because an equal or greater distance of road will be obliterated in this watershed, the project will **maintain** the current functioning adequately rating. No new roads will be constructed or obliterated under the other Action Alternatives.

Disturbance History

The ARP exceeds 95 percent in the analysis area, therefore this indicator is **functioning adequately**.

White Pass SUP Expansion Effects All Alternatives: This project will **maintain** the functioning adequately rating. Although some disturbance will occur within Riparian Reserves, fish populations downstream should not be adversely affected. The percentage of the watershed as ARP will decrease by less than 1 percent to 95.6 percent, still well above accepted thresholds (70-75 percent).

Riparian Reserves

There is very little fragmentation of Riparian Reserves from management activities. However Riparian Reserves are fragmented and impacted on Millridge Creek from the adjacent US 12, so this indicator is **functioning at risk**.

White Pass SUP Expansion Effects All Alternatives: Although Riparian Reserves will degraded on the site specific scale from permanent loss of overstory trees in a parkland forest along intermittent snowmelt channels, the project will **maintain** the functioning at risk rating within the modified 5th field analysis area.

Disturbance Regime

There have been about 15 ten-year or greater flood events since 1970 on the Cowlitz River. The effects of these floods are less than in the lower watersheds, because this watershed is a relatively unmanaged headwater watershed. However, at least one major channel changing land slide was observed in the Upper Clear Fork Cowlitz sub-watershed after the 1996 flood. This indicator is rated **functioning at risk**.

White Pass SUP Expansion Effects All Alternatives: The proposed project should not effect the quality of occupied fish habitat downstream, so disturbance regime conditions will be **maintained**.

5.0 EFFECTS OF THE ACTION

5.1 FISH DISTRIBUTION

Alternative 1

Under Alternative 1, there would be no impacts to fish presence. White Pass Ski Area would continue to operate within its current SUP area and no construction would occur. Ongoing operations and maintenance of the White Pass Ski Area would continue to occur. These activities typically include trail maintenance during summer months, facility maintenance, and winter ski operations (i.e., grooming). Trail and facility maintenance involves brushing and mowing vegetation. Grooming operations typically extend the persistence of the snowpack later in the spring melt period through artificial compaction. Typically, this results in a one to two week delay in the timing of peak spring melt flows (Stockli and Rixen 2000; Rixen et al. 2001). Indirect impacts to fish presence from the maintenance and operation activities are not expected to be measurable because they occur in areas previously cleared and maintained in a modified condition.

Alternatives 2 and 6

Under Alternatives 2 and 6, White Pass Ski Area would expand its existing ski operations into the Pigtail and Hogback Basins. No direct impacts to fish would occur as there is no fish presence within the streams in the proposed expansion area. No in-water work would occur in Leech Lake or any stream channels.

As discussed in Section 3.3 – Watershed Resources, approximately 17.7 acres (Alternative 2) or 12.6 acres (Alternative 6) of clearing and grading would occur within Riparian Reserves (refer to Table 3.3-14). According to the WEPP model, short-term soil detachment within the Upper Clear Fork Cowlitz watershed would increase by approximately 23 percent under Alternative 2, and 9 percent under Alternative 6. Long-term soil detachment would increase by approximately 4 percent under Alternative 2, and 5 percent under Alternative 6. In the Upper Tieton watershed, short-term soil detachment would increase by 0.0 percent under Alternative 2 and 0.1 percent under Alternative 6. Short-term soil detachment would increase by 0.0 percent under Alternative 2 and 0.8 percent under Alternative 6. Increased sedimentation and decreased water quality could potentially impact fish presence downstream in Leech Lake, Knuppenberg Lake, Clear Creek, and Millridge Creek. Implementation of Mitigation Measure MM3 would reduce trail widths when crossing streams and Riparian Reserves to minimize potential disturbances in these areas. The implementation of Management Requirement MR1 would require the development of a Stormwater Pollution Prevention Plan (SWPPP) and Mitigation Measures MM2, MM4, and MM7 would require associated water quality monitoring to ensure that potential impacts to downstream water quality are minimized.

Implementation of the Alternatives 2 or 6 would result in an increase in low flow in the Upper Tieton River by approximately 0.0 percent under Alternative 2 and 0.7 percent under Alternative 6. This projected increase in low flow would result in an estimated increase of approximately 0.00 (Alternative 2) to 0.01 cfs (Alternative 6) during a low flow event. Likewise, the estimated two-year peak flows in the Upper Tieton River would increase by 0.0 percent under Alternative 2 and 0.2 percent under Alternative 9, resulting in an increase of approximately 0.0 to 0.1 cfs in discharge, respectively (refer to FEIS Table 3.3-18). In the Upper Clear Fork Cowlitz watershed, seven-day low flow would increase by 1.4 percent under Alternative 2 and 0.8 percent under Alternative 6, resulting in an increase of approximately 0.05 and 0.02 cfs respectively. Two-year peak flow would increase by 0.3 percent under Alternative 2 and 0.2 percent under Alternative 6, resulting in an increase of approximately 0.5 and 0.2 cfs, respectively. The relatively small projected increase in low flow and two-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates indicates that the estimated increase in stream flow in the Upper Tieton and Upper Clear Fork Cowlitz watersheds would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology. Potential indirect impacts to downstream fish presence are therefore not expected to be measurable.

Modified Alternative 4

Under Modified Alternative 4, White Pass Ski Area would expand its existing ski operations into the Pigtail and Hogback Basins and new development would take place in the existing SUP area, including a 7-acre parking lot. No direct impacts to fish would occur as there is no fish presence within the streams in the proposed expansion area. No in-water work would occur in Leech Lake or any stream channels.

As discussed in Section 3.3 – Watershed Resources, approximately 25.8 acres of clearing and grading would occur within Riparian Reserves within the White Pass Study Area under Modified Alternative 4 (refer to FEIS Table 3.3-14). As described by the WEPP model, short-term soil detachment in the Upper Clear Fork Cowlitz watershed would increase by approximately 68 percent under Modified Alternative 4. Long-term soil detachment in this watershed would increase by approximately 10 percent. In the Upper Tieton watershed, short-term soil detachment would increase by 0.1 percent, and long-term soil detachment would increase by 0.2 percent. Increased sedimentation and decreased water quality could potentially impact fish presence downstream in Leech Lake, Knuppenberg Lake, Clear Creek, and Millridge Creek. Implementation of Mitigation Measure MM3 would reduce trail widths when crossing streams and Riparian Reserves to minimize potential disturbances in these areas. The implementation of Management Requirement MR1 would require the development of a Stormwater Pollution Prevention Plan (SWPPP) and Mitigation Measures MM2, MM4, and MM7 would require associated water quality monitoring to ensure that potential impacts to downstream water quality are minimized.

Implementation of Modified Alternative 4 would cause increases in the seven-day low flow in the Upper Clear Fork Cowlitz watershed by 1.6, resulting in an increase of approximately 0.05 cfs. Two-year peak flow would increase by 0.4 percent, or 0.5 cfs, in the Upper Clear Fork Cowlitz watershed within. Seven-day low flow within the Upper Tieton watershed would increase by approximately 2.1 percent, resulting in an increase of 0.03 cfs under Modified Alternative 4. Two-year peak flow in the Upper Tieton would increase by 0.5 percent, or 0.3 cfs, under Modified Alternative 4. Potential indirect impacts to downstream fish presence are therefore not expected to be measurable.

Alternative 9

Under Alternative 9, White Pass Ski Area would expand ski operations within the existing SUP area through the addition of a new surface lift and trails. No direct impacts to fish would occur as there are no fish present within the SUP area.

Approximately 24.4 acres of clearing and grading would occur within Riparian Reserves (refer to Table 3.3-14 in Section 3.3 – Watershed Resources). Increased sedimentation and decreased water quality could potentially impact downstream fish presence in Leech Lake, Clear Creek, and Millridge Creek. Implementation of Mitigation Measure MM3 would reduce trail widths when crossing streams and Riparian Reserves to minimize potential disturbances in these areas. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measures MM2, MM4, and MM7 would require associated water quality monitoring to ensure that potential impacts to downstream water quality are minimized. Potential indirect impacts to downstream fish presence are therefore not expected to be measurable.

5.2 FISH HABITAT

Alternative 1

Under Alternative 1, White Pass would continue to operate without any further development. No additional impacts would occur to fish habitat under Alternative 1. Ongoing operations and maintenance of the White Pass Ski Area would continue to occur. These activities typically include trail maintenance during summer months, facility maintenance, and winter ski operations (i.e., grooming). Indirect impacts to fish habitat from the maintenance and operation activities are not measurable because they occur in areas previously cleared and maintained in a modified condition.

Alternative 2

Under Alternative 2, White Pass would expand the existing ski area SUP into the Hogback Basin. There would be no direct impacts to fish habitat as there is no habitat present within the White Pass Study Area. Indirect impacts to fish habitat could occur in downstream reaches of the Clear Fork Cowlitz River and Upper Tieton River watersheds through increased sediment loading, changes in water quality (i.e., temperature), and changes in flow. Implementation of Mitigation Measure MM3 would reduce trail widths when crossing streams and Riparian Reserves to minimize potential disturbances in these areas. Additionally, Mitigation Measures MM3 would require that trees cut within Riparian Reserves be left on the ground, outside of ski trails but remaining within the Riparian Reserve, to provide future LWD recruitment downstream. The 17.7 acres of clearing and grading within Riparian Reserves under Alternative 2 would immediately reduce any LWD input that these areas currently provide to the streams although the clearing in parkland is not anticipated to result in the loss of large wood, due to the comparatively small tree size class in the parkland community. Since stream channels in the White Pass Study Area are located very high in the watershed and are typically ephemeral and intermittent, it is assumed that LWD in the channel has a low probability of being transported downstream by high water events.

Approximately 17.7 acres of clearing and grading would occur within Riparian Reserves under Alternative 2 (refer to Table 3.3-14 in Section 3.3 – Watershed Resources). Increased sedimentation and decreased water quality could potentially impact downstream fish habitat in Leech Lake, Knuppenberg Lake, Clear Creek, and Millridge Creek. According to the WEPP model, short-term soil detachment within the Upper Clear Fork Cowlitz watershed would increase by approximately 23 percent under Alternative 2. Long-term soil detachment would increase by approximately 4 percent. In the Upper Tieton watershed, short-term soil detachment would increase by 0.0 percent, and long-term soil detachment would increase by 0.0 percent under Alternative 2 (refer to FEIS Appendix L – WEPP). There would be no impacts to the Upper Tieton watershed because no development would take place in this watershed under Alternative 2. The potential for increased sediment loading would not be measurable above baseline levels. Increased sediment loading would potentially occur from clearing and grading within riparian influence zone on moderate to high erosion potential areas (refer to Section 3.3 – Watershed Resources). Under Alternative 2, no clearing or grading would occur within high erosion potential areas and approximately 2.6 acres would occur on moderate and low erosion hazard areas. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measure MM2 and Other Management Practice OMP5 would require appropriate erosion control Best Management Practices (i.e., silt fencing) and the revegetation of exposed soils to reduce potential erosion and sediment yield to streams. Therefore, the potential for increased sediment loading would not be measurable.

As described in Section 3.3 – Watershed Resources, existing stream shading is approximately 46.5 percent in the Upper Clear Fork Cowlitz watershed (the range of variation is 23 to 70 percent) and 49.5 percent in the Upper Tieton watershed (the range of variation is 25 to 75 percent). There would be no impacts to stream shading within the Upper Tieton watershed under Alternative 2. In the Upper Clear Fork Cowlitz watershed, approximately 17.7 acres of clearing and grading would occur within Riparian Reserves. Stream shading would be reduced by approximately 4.5 percent as a result, therefore the amount of solar radiation reaching the stream would increase slightly, potentially warming the water. Since a majority of the activities would occur adjacent to intermittent and ephemeral streams, no impacts to water temperature are anticipated because no water would be present during summer months when solar radiation is at it highest point. The implementation of Mitigation Measures MM3 and MM10 would retain riparian understory vegetation to the greatest extent practicable to maintain stream shading.

Impacts to water quality would be short-term and would result from potential runoff from leaks and spills associated with construction equipment. No long-term impacts to water quality are expected because there would be no new point sources of pollution under Alternative 2. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measures MM2, MM4, and MM7 would require associated water quality monitoring to ensure that potential impacts to downstream water quality are minimized. Potential indirect impacts to downstream fish presence are therefore not expected to be measurable.

A potential increase in low flow and 2-year peak flows could occur as a result of forest clearing proposed under Alternative 2. As discussed in Section 3.3 – Watershed Resources, forest clearing and creation of new impervious surfaces can increase surface and shallow subsurface flows, ultimately altering the flow regime of a watershed (Dunne, T. and L. B. Leopold 1978; Naiman, R.J. and R. E. Bilby 1998). Proposed forest clearing within the White Pass Study Area would only have the potential to affect surface flows because research indicates that forest clearing predominantly affects soil moisture, surface runoff, and shallow subsurface flow in the soil profile (Naiman and Bilby 1998; Keppeler 1998; Harr et al. 1975). As described in Section 3.3 – Watershed Resources, the flow model analysis area does not account for the flows at the mouth of each 5th field watershed area. Instead, the flow model watershed area has been modified to include the entire drainage area of the White Pass Study Area, which is located in the headwaters of the 5th field. The flow model area within the Upper Tieton drainage is approximately 535 acres with the flow measured at the inlet to Leech Lake. The flow model area within the Upper Clear Fork Cowlitz drainage is approximately 1,460 acres and all flows are measured at the confluence with Millridge Creek. Under Alternative 2, the low flow in the modified Upper Tieton River watershed would not increase, whereas in the modified Upper Clear Fork Cowlitz River watershed, low flows would increase by approximately 1.4 percent over existing conditions (refer to FEIS Table 3.3-18). Due to the lack of gauging stations within each watershed, the percent increase cannot be applied to actual low flow values. As modeled, the increase in low flow does not take into consideration the groundwater fed component of the flow model area within the Upper Clear Fork Cowlitz drainage. Groundwater discharges below the cliff band are the main component of low flows of the drainage from the proposed expansion area. Therefore, the increase in low flow associated with forest removal in the expansion area is likely overstated and actual increase in low flow would not be measurable at downstream gauging locations.

Peak flows within the White Pass Study Area typically occur during the fall, early season rain-on-snow-events, and during spring snow melt when the ground surface becomes saturated. Surface and shallow subsurface flow associated with rain events and snow melt is the main contribution to peak flows within the White Pass Study Area (refer to Section 3.3 –Watershed Resources). The peak flow response to forest clearing proposed under Alternative 2 would not increase in the Upper Tieton River and would increase in the Clear Fork Cowlitz River by approximately 0.3 percent over existing conditions. The small increase in peak flow in not expected to be measurable at downstream gauging locations.

Modified Alternative 4

Under Modified Alternative 4, White Pass would expand the existing ski area SUP boundary into the Hogback Basin and development would take place within the existing ski area, including a 7-acre parking lot. No direct impacts to fish habitat would occur because there is no habitat present within the White Pass Study Area. Indirect impacts to fish habitat under Modified Alternative 4 would be the most of any Action Alternative due to the amount of full clearing proposed. Potential downstream impacts to fish habitat would be slightly more than as described under Alternative 2 due to the additional construction associated with the parking lot and ticket booth.

Approximately 25.8 acres of clearing and grading would occur within Riparian Reserves under Modified Alternative 4 (refer to Table 3.3-14 in Section 3.3 – Watershed Resources). Increased sedimentation and decreased water quality could potentially impact downstream fish habitat in Leech Lake, Clear Creek, and Millridge Creek. Impacts to fish habitat would be as described, but slightly more than under Alternative 2 due to the construction of Trails 4-16 and 4-17, and the parking lot. The implementation of Management

Requirement MR1 would require the development of a SWPPP and Mitigation Measure MM2 and Other Management Practice OMP5 would require appropriate erosion control Best Management Practices (i.e., silt fencing) and the revegetation of exposed soils to reduce potential erosion and sediment yield to streams. Therefore, the potential for increased sediment loading would not be measurable.

A Conceptual Stormwater Management Plan (CSMP) for the proposed parking area was created to help attain water quality, sediment regime and in-stream flow Aquatic Conservation Strategy Objectives (ACSOs). The objective of the CSMP is to maintain and restore water quality to support healthy riparian, aquatic, and wetland ecosystems; maintain and restore the sediment regime under which aquatic ecosystems evolved, including timing, volume, rate and character of sediment input, storage, and transport; maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic and wetland habitats and to retain patterns of sediment, nutrient and wood routing; and to protect the timing, magnitude, duration, and spatial distribution of peak, high and low flows. The CSMP would achieve these objectives through collection, detention and routing of surface runoff, improvement of water quality/sediment retention, and treatment for petroleum hydrocarbon contaminants (refer to FEIS Appendix M – Conceptual Stormwater Management Plan).

Increased sedimentation could potentially impact downstream fish habitat in Leech Lake, Knuppenberg Lake, Clear Creek, and Millridge Creek. The potential for increased sediment loading within the Upper Clear Fork Cowlitz watershed would be as described, but slightly more than under Alternative 2 due to the construction of the emergency egress trail. Impacts to the Upper Tieton watershed would be more than under Alternative 2 due to construction of the parking lot and ticket booth (refer to Section 3.3 – Watershed Resources).

Under Modified Alternative 4, impact to stream shading would be similar to, but slightly more than as described under Alternative 2. Clearing and grading associated with the construction of the 7-acre parking lot and ticket booth would occur in the Upper Tieton watershed. Stream shading would be reduced by less approximately 1.5 percent. Since streams are fed primarily by groundwater below the cliff band, no impact to stream temperatures are expected. In the Upper Clear Fork Cowlitz watershed, stream shading would be reduced by 5.6 percent, slightly more than as described under Alternative 2(refer to Table 3.3-15).

Potential impacts to water quality would be as described under Alternative 2, except the construction of the parking lot and ticket booth would have the potential to impact water quality in the Upper Tieton watershed through increased runoff during construction. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measures MM2, MM4, and MM7 would require associated water quality monitoring to ensure that potential impacts to downstream water quality are minimized. Implementation of the CSMP for the proposed parking lot would help to maintain and restore water quality, sediment regime, and in-stream flows (refer to

Appendix M – Conceptual Stormwater Management Plan). Potential indirect impacts to downstream fish presence are therefore not expected to be measurable.

The potential for increased low and peak flows within the White Pass Study Area would be similar to, but slightly more than as described under Alternative 2. Within the modified Upper Tieton River watershed, low flows would increase by approximately 2.1 percent and peak flows by approximately 0.5 percent over existing conditions. The small increase in flow is not expected to be measurable at downstream gauging locations.

Alternative 6

Under Alternative 6, White Pass would expand the existing ski area SUP boundary into Pigtail Basin. No direct impacts to fish habitat would occur because there is no habitat present within the White Pass Study Area. Potential downstream impacts to fish habitat would be lowest of any Action Alternative due to the reduced amount of development proposed.

Approximately 12.6 acres of clearing and grading would occur within Riparian Reserves under Alternative 6 (refer to Table 3.3-14 in Section 3.3 – Watershed Resources). Increased sedimentation and decreased water quality could potentially impact downstream fish habitat in Leech Lake, Clear Creek, and Millridge Creek. Implementation of Mitigation Measures MM7 and OMP5 would require appropriate erosion control Best Management Practices (i.e., silt fencing) and the revegetation of exposed soils to reduce potential erosion and sediment yield to streams.

Increased sedimentation and decreased water quality could potentially impact downstream fish habitat in Leech Lake, Knuppenberg Lake, Clear Creek, and Millridge Creek. The potential for increased sediment loading would be as described, but slightly less than under Alternative 2 due to the reduced development in the Hogback Basin. Potential impacts to fish habitat from increased sediment loading to the Upper Tieton watershed would be slightly more than under Alternative 2 due to construction of the parking lot and ticket booth (refer to Section 3.3 – Watershed Resources).

Potential impacts to water quality would be similar to, but slightly less than as described under Alternative 2 due to the reduced development in the Hogback Basin. The construction of the parking lot and ticket booth would have the potential to impact water quality in the Upper Tieton watershed through increased runoff. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measures MM2, MM4, and MM7 would require associated water quality monitoring to ensure that potential impacts to downstream water quality are minimized. Potential indirect impacts to downstream fish presence are therefore not expected to be measurable.

A Conceptual Stormwater Management Plan (CSMP) for the proposed parking area was created to help attain water quality, sediment regime and in-stream flow Aquatic Conservation Strategy Objectives (ACSOs). The objective of the CSMP is to maintain and restore water quality to support healthy riparian, aquatic, and wetland ecosystems; maintain and restore the sediment regime under which aquatic ecosystems evolved, including timing, volume, rate and character of sediment input, storage, and transport; maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic and wetland habitats and to retain patterns of sediment, nutrient and wood routing; and to protect the timing, magnitude, duration, and spatial distribution of peak, high and low flows. The CSMP would achieve these objectives through collection, detention and routing of surface runoff, improvement of water quality/sediment retention, and treatment for petroleum hydrocarbon contaminants (refer to FEIS Appendix M – Conceptual Stormwater Management Plan).

The potential for increased low and peak flows within the White Pass Study Area would be similar to, but slightly more than as described under Alternative 2. Within the flow model analysis area for the Upper Tieton River watershed, low flows would increase by approximately 0.7 percent and peak flows by approximately 0.2 percent over existing conditions. The small increase in flow is not expected to be measurable at downstream gauging locations.

Alternative 9

Under Alternative 9, White Pass would construct new lifts and trails within the existing ski area SUP boundary. There would be no direct impacts to fish habitat because no habitat is present within the White Pass Study Area. Potential downstream impacts to fish habitat could occur in the Upper Clear Fork Cowlitz River and Upper Tieton River watersheds through changes in flow, changes in water quality (i.e., temperature), and increased sediment loading.

Approximately 24.4 acres of clearing and grading would occur within Riparian Reserves along perennial streams and in mature, closed-canopy forest structure under Alternative 9 (refer to Table 3.3-14 in Section 3.3 – Watershed Resources). Increased sedimentation and decreased water quality could potentially impact downstream fish habitat in Leech Lake, Clear Creek, and Millridge Creek. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measure MM2 and Other Management Practice OMP5 would require appropriate erosion control Best Management Practices (i.e., silt fencing) and the revegetation of exposed soils to reduce potential erosion and sediment yield to streams. Therefore, the potential for increased sediment loading would not be measurable.

The potential for increased sediment loading would be similar to, but slightly more than Alternative 2 due to the increased development in the Upper Tieton and Upper Clear Fork Cowlitz watersheds. Approximately 1.2 acres of grading would occur on high erosion potential soils and approximately 10.7 acres on moderate and low erosion potential areas would occur due to construction of the lifts, trails, parking lot, and ticket booth (refer to Table 3.2-4). Due to the reduced trail development in Alternative 9, this potential impact would be substantially less than would occur in the other Action Alternatives. The implementation of Management Requirement MR1 would require the development of a SWPPP and

Mitigation Measure MM2 and Other Management Practice OMP5 would require appropriate erosion control Best Management Practices (i.e., silt fencing) and the revegetation of exposed soils to reduce potential erosion and sediment yield to streams. Therefore, the potential for increased sediment loading would not be measurable.

Under Alternative 9, impact to stream shading would be similar to, but slightly more than as described under Alternative 2. Approximately 20.3 acres of clearing and grading would occur in the Upper Tieton watershed associated with the construction of the lift, trails, parking lot, and ticket booth. Stream shading would be reduced by approximately 8.6 percent on perennial and intermittent stream channels (refer to Section 3.3 – Watershed Resources for more information on stream shading). Since streams are fed primarily by groundwater below the cliff band, no impact to stream temperature is expected. In the Upper Clear Fork Cowlitz watershed, impacts to stream shading would result from approximately 4.1 acres (1.0 percent) of clearing associated with trail construction. Similar to the Upper Tieton watershed, streams are primarily fed by groundwater below the cliff band. The implementation of Mitigation Measures MM3 and MM10 would retain riparian understory vegetation to the greatest extent practicable to maintain stream shading. Therefore, no measurable impacts to stream temperatures within the Upper Clear Fork Cowlitz watershed are expected under Alternative 9.

Potential impacts to water quality would be similar to, but slightly less than as described under Alternative 2 from the trail construction within the existing ski area. The construction of a new lift, trails, parking lot, and ticket booth would have the potential to impact water quality in the Upper Tieton watershed through increased runoff during construction. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measures MM2, MM4, and MM7 would require associated water quality monitoring to ensure that potential impacts to downstream water quality are minimized. Implementation of the CSMP for the proposed parking lot would help to maintain and restore water quality, sediment regime, and in-stream flows (refer to Appendix M – Conceptual Stormwater Management Plan). Potential indirect impacts to downstream fish presence are therefore not expected to be measurable.

The potential for increased low and peak flows within the flow model area would be similar to, but slightly more within the Upper Tieton River drainage than as described under Alternative 2 because of the increased forest clearing (specifically full clearing in mature, closed-canopy forest, as opposed to the tree island removal in parkland proposed in the other Action Alternatives) within the existing ski area. Low flows would increase by approximately 4.6 percent and peak flows by approximately 1.1 percent over existing conditions. The increase in flow is not expected to be measurable at downstream gauging locations.

Within the Clear Fork Cowlitz River flow model area, the increase in flows would be slightly less than as described under Alternative 2 due to the reduced amount of tree removal proposed. Low flows would increase by approximately 0.7 percent over existing conditions, whereas peak flows would increase by approximately 0.2 percent. Therefore, increased flows in the Upper Clear Fork Cowlitz watershed are not expected to be measurable at downstream gauging locations.

6.0 EFFECTS DETERMINATION

The effect determination for the Proposed Action and all Action Alternatives on listed fish species occurring with the Upper Tieton River watershed is listed below in Table 7. Table 8 lists the effect determination for each listed species occurring within the Upper Clear Fork Cowlitz River watershed.

Table 7:
Determination of Effects to Special Status Species Occurring in the Upper Tieton River Watershed

Species	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Middle Columbia River Steelhead (*Oncorhynchus mykiss*)	No Effect			
Bull Trout (*Salvelinus confluentus*)	No Effect			
Redband Trout (*Oncorhynchus mykiss sp.*)	No Effect			

Table 8:
Determination of Effects to Special Status Species Occurring in the Upper Clear Fork Cowlitz Watershed

Species	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Lower Columbia River Chinook (*Oncorhynchus tschawytscha*)	No Effect			
Lower Columbia River Steelhead (*Oncorhynchus mykiss*)	No Effect			
Lower Columbia River/Southwest Washington Coho (*Oncorhynchus kistuch*)	No Effect			

7.0 CONCLUSION

7.1 UPPER TIETON RIVER WATERSHED

Special Status Species and Other Resident Fish Populations

The determination for this project relative to bull trout is **No Effect** under all Action Alternatives. The project **will not jeopardize the continued existence** of redband/inland rainbow trout, and if it was listed the determination for this project would be **No Effect** under all Action Alternatives. The permanent clearing of Riparian Reserves will potentially increase some localized sediment movement downstream as discussed in the Subpopulation Size section. This potential effect will be buffered by Leech Lake, so downstream fish populations will not be adversely affected.

Steelhead and Essential Fish Habitat for Chinook and Coho salmon

The determination for Middle Columbia River steelhead and Essential Fish Habitat relative to all projects occurring in the Upper Tieton watershed is **No Effect** under all Action Alternatives, because steelhead passage to the Upper Tieton watershed is blocked by Rimrock dam. Predicted effects to water quality or fish habitat above the dam would have no effect downstream due to the buffering affects of the dam.

7.2 UPPER CLEAR FORK COWLITZ RIVER WATERSHED

Special Status Species, Essential Fish Habitat and Other Resident Fish Populations

The effects determination for this project relative to Lower Columbia River steelhead and Chinook and coho salmon is **No Effect** under all Action Alternatives. Similarly this project will have **No Effect** on Essential Fish Habitat for Chinook and coho salmon under all Action Alternatives. Habitat occupied by anadromous fish is over 8 miles downstream of the project area. The permanent clearing of Riparian Reserves (on intermittent stream channels) will potentially increase some localized sediment movement downstream as discussed in the Sediment section. This potential effect would be buffered by Knuppenberg Lake, so downstream resident fish populations in Millridge Creek and the Clear Fork Cowlitz River would not be adversely affected.

8.0 REFERENCES

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Appendix J

Prehistory, Ethnohistory/ Ethnography and History

APPENDIX J – THE PREHISTORY, ETHNOHISTORY/ ETHNOGRAPHY, AND HISTORY

1.0 PREHISTORY

Archaeological evidence from sites in the upper Cowlitz watershed suggest that initial human use of the area began around 7,000 years ago (USDA Forest Service 1997g). Early residents of the area likely employed foraging subsistence strategies that required frequent shifts in residence and a broad-based economy. Archaeological data from the upper Cowlitz area have provided little information regarding social or political organizations, beliefs, cultural affiliation, or the structure of the settlement system.

Initial human use of the Cowlitz area appears to have ended abruptly with the onset of Mount St. Helens' Smith Creek Eruptive Phase 3,900 to 3,500 years ago. Lewarch and Benson (1991) suggest that the intensity of volcanism, including the largest tephra eruptions in the history of the volcano, may have been the initial cause of human abandonment that lasted for nearly 2,000 years.

By about 450 AD, people were reoccupying the same sites used by Early Period inhabitants, but using a subsistence strategy quite different than their predecessors. Groups that reoccupied the area are thought to have used a strategy incorporating logically oriented collection, processing and storage of key resources. These developments may have given rise to the development of semi-permanent winter villages not unlike those used by native groups in the ethnographically documented historic period.

2.0 ETHNOHISTORY/ETHNOGRAPHY

In addition to the archeological survey and testing, an ethnographic study of the project area was conducted (Bouchard and Cox 1998). The information obtained from this work indicates the Cowlitz Divide and Backbone Ridge formed the western limits of the territory claimed by the Yakama as their own, whereas the Taidnapam claim extended further east, to the crest of the Cascade Range. The White Pass area was "equally accessible to both groups and evidently its berry and hunting resources were exploited by both, without contest and enmity" (Smith 1964).

Taidnapam

The proposed Project Area is in the Clear Fork of the Cowlitz River. Indians within the Cowlitz River drainage are comprised of two groups: the Lower Cowlitz (often referred to as just "Cowlitz") and the "Upper Cowlitz" (or Taidnapam). The language spoken in the Upper Cowlitz drainage system, upriver from what is now the site of the Mossyrock Dam, was not "Cowlitz" Coast Salish as spoken in the Lower Cowlitz, but Taidnapam - also known as "Upper Cowlitz" - a sub-dialect of the Northern Sahaptin language spoken by tribes living primarily east of the Cascades (Hajda 1990; Rigsby and Rude 1996). Charlie Ashue, a man of mixed Yakama and Puyallup (Coast Salish) ancestry who was consultant to Arthur Ballard in the 1920s, stated that a long time ago, his grandfather's people and others from the

Naches River area “drifted over to the head of the Cowlitz River,” after two of their hunters convinced many of the tribes to move to this land of plentiful game, fish and other food. These migrants became the Taidnapam (Ballard 1929).

The decimation of the Cowlitz proper by disease, which was more severe than the losses suffered by tribes further north, was recorded at the time as having first taken place in 1829 (Parker 1835, cited in Ray 1974). The total population of Taidnapam circa 1840 was estimated at 350 (Ray 1974) but may have been as high as 1,000 before epidemic disease swept through the area at the onset of the historic period (Ellis et al. 1991).

Ethnographic information elicited by anthropologists would place the Taidnapam’s eastern boundary at the Cowlitz River drainage along the Cascade Divide, with White Pass running through that boundary. James Teit (1910) who elicited a Cowlitz definition of the Taidnapam’s traditional boundaries confirms this eastern boundary.

Taidnapam winter village sites were on or very near the Cowlitz River east of Mossyrock. After leaving the winter villages, they fished for salmon at sites on the Cowlitz and its tributaries, and collected early spring greens and camas in the river valley prairies, including at Chapman Prairie 7 miles east of Randle. As the summer wore on, the Taidnapam moved higher into the mountains to collect huckleberries and hunt mountain goats, often sharing large huckleberry camps with the Yakama. Berry gathering played a central role in Cowlitz life, and they may have depended more on berries as a dietary supplement than other Washington tribes (Ray 1966). Mary Eyley indicates the Taidnapam collected so many huckleberries that they traded some to the Lower Cowlitz for other foods. Mary Kiona gave a general identification of the best Cowlitz berry patches in the old days from the Tatoosh range and along the Cascades range. Deer and elk meat also was a large part of the Taidnampam diet, and they were known as excellent hunters.

The Yakima-Cowlitz Trail, which followed the Cowlitz River to a fork where one branch went north to Naches Pass and another to Cowlitz Pass, was a primary cross-Cascade travel route for both the Taidnapam and Yakama. Other ethnographically documented travel routes include a trail between the Cowlitz and Nisqually rivers over Skate Creek; the Cowlitz to Carbonado Trail; and the Klickitat Trail over Cispus Pass.

Mountainous areas have been broadly described by some as unique places for Native spiritual renewal (Hajda et al. 1995). Some particular, identifiable parts of the wilderness were supposedly of even more specific spiritual importance. Taidnapam people would visit specific locations in search of individual guardian spirits to bestow particular spirit powers upon them. The Taidnapam also believed in the existence of unnatural beings who did not, unlike guardian spirits, enter into personal relationships with humans, and whose influence could well be maligned. The higher reaches of the upper Cowlitz generally, particularly the highest elevations, were more commonly associated with these supernatural creatures (Hajda et al. 1995; Carpenter 1981).

While the seasonal round activities of the Cowlitz encompassed a broad geographical area, primary ethnographic source materials lack specific references to the use of White Pass. Jim Yoke indicated that the Taidnapam utilized areas in every direction around White Pass, moving along the valleys south of White Pass including the upper Cispus and upper Tieton valleys, as well as through Tieton Pass to the head of the Cowlitz. He indicated as well that Yakama people also used these places (Jacobs 1934). Interaction by Taidnapam with non-native people began in the period ca. 1833-1840 as local Indian people took their furs to the Hudson's Bay Company trading post at Cowlitz Farm near present day Toledo.

By 1882, only two Indian families remained in the area that had been almost totally depopulated by smallpox, according to Tompkins (1933). The United States government formally extinguished Indian title to all lands in the upper Cowlitz River Basin in 1864, despite the fact that no treaty was ever signed or ratified (Ray 1974). Many Taidnapam families left the upper Cowlitz area between 1880 and 1900 for the Yakama Reservation, becoming enrolled Yakama Tribal members. A few descendents of the Taidnapam continue to live on a plot of Indian Trust land along Kiona Creek in the Middle Cowlitz area. All are currently enrolled members of the Yakama Indian Nation. Representatives of the present-day Cowlitz Indian Tribe, however, represent both the Lower Cowlitz and Upper Cowlitz or Taidnapam. The Cowlitz recently received Federal Tribal recognition.

Yakamas

As previously stated, White Pass sits at the outer extents of both the Yakama and Cowlitz territories, and these mountainous uplands were more a shared territory with berry and hunting resources shared without enmity by both groups. The Tieton Watershed portion of the Project Area is part of the vast land area ceded by Indians of the Washington Territory.

Yakama settlement and subsistence focused along the larger river courses, but the Cascades were utilized extensively during the summer and fall as resources there became available. According to the field findings of Ray (1936), the highest Yakama settlement in the Tieton River Watershed was miya'wax, a permanent village at Rimrock, about 14 miles east of White Pass. This was an area where wild carrots (Yakama: sawik [*Periderida gairdneri*]) and other roots were dug and dried in quantities and where salmon were caught and dried. The people living in the Tieton watershed referred to themselves as the Nahchishhlama (Smith 1964).

Smith (1964) made an association between the village of miya'wax to White Pass, and gave some emphasis to the regular presence of the Yakama around Mount Rainier, where they actively and regularly used a portion of its slopes during August and September to harvest huckleberries and blueberries. Smith observed that a trail existed between the Rimrock village site and White Pass, and considered it very likely that the Yakama from this village traveled to Mount Rainier through White Pass. Smith also speculated that the close connections between the Yakama and the Taidnapam made White Pass a possible link for travelers between the two groups.

Schuster's (1998) most recent work on the Yakama gives a broad outline of the Yakama seasonal round of subsistence activities. When the snows melted in February or March, a "first foods feast" was held in the winter village community longhouse featuring the first of numerous wild plants that would be gathered during the year (first celery). In mid-spring, as salmon reached the interior Plateau, a "first salmon" feast was held before the people dispersed from the winter villages to fishing stations along the major rivers (Columbia, Upper Cowlitz, Cowlitz Clear Fork). When salmon runs diminished in April, families dispersed to root digging grounds where women would dig and store roots while men hunted. The plains east of Ellensburg in the Kittitas Valley were some of the most important gathering grounds. In June, the Yakama would again disperse to fishing stations for the year's second and largest run of salmon. By July, as the summer heat reached the valleys, the Yakama would head for the higher elevations of the mountains to hunt and gather plants. In late summer, families moved even higher into the mountains as the huckleberries ripened, finally returning to the valleys in fall for the Chinook salmon run. Travel would also take place to trading centers on the Columbia, and the hunters pursued deer and elk in the mountains. Around the middle of November, people would return to their winter villages.

While ethnographic sources lack specific references to the Project Area, some contemporary Yakama have identified the White Pass area as being an important traditional use site (with tribal foods, big game and medicine) long used as a summering place, and as a place used by Kamiakin's Band for refuge during the Yakima Wars in the 1850s. In a recent interview (Dugas et al. 1997), tribal members indicated that the Yakama used trails in the White Pass area for overland travel and hunting for generations, and that Saluskin and Kamiakin, former Yakama leaders, used the trails for hunting and overland travel. The trails cross over White Pass in an east-west direction, but north-south trails also led to resource procurement places. Some informants have seen rocks and rock outcroppings that marked trails or were used during hunting activities in the Project Area, some of which have been destroyed. Contemporary informants also note that medicinal and food plants were and continue to be gathered in the Project Area by Yakama people, and speak of Hogback Basin as a particularly important heritage/spiritual place because of its reported connection with the mid-19th century Yakama Chief Kamiakin during the Yakama Indian Wars of the 1850s.

3.0 HISTORY

Historic uses of the Project Area include themes of exploration and survey, travel routes, grazing, mining and recreation. Developments at the White Pass area shown on the 1904 Mount Aix, Washington USGS Quadrangle Map consist of a trail extending up the Tieton River over Round Mountain, providing access to Hogback Mountain and Knuppenburg Lake, and the Clear Fork Cowlitz River. Early miners, such as James Longmire and A.J. Treadway, reportedly traveled over the old Cowlitz Pass Indian Trail, a short distance to the north, in 1864. The mountain streams in and around White Pass were well prospected in the 1850s and 1860s (Holstine 1994:4.2), though great mineral wealth was never recovered.

White Pass was named after Charles White, one of a group of railroad surveyors who worked their way up and down the Cascade Crest in the 1880s in search of a cross-territory railroad route for Northern Pacific. When the railroad decided to construct over Stampede Pass, White Pass was largely forgotten as a transportation route for more than 40 years. The road to White Pass from the east side of the mountains developed over a long period of time. Construction of about 15 miles of road up the Tieton River from the Naches River began in 1905 in support of the Tieton Irrigation Project and canal construction. The road was pushed as far west as Clear Lake, where a dam was built, by 1914, and to the construction site for Rimrock Dam by 1918. The present route of US 12 was not mapped until 1931, and it was not until 1951 that the pass was open for Sunday-only traffic (Cook 1986). In the mid-1950s, White Pass Highway (US 12) opened for year round travel.

Grazing dominated uses of upland forest lands in the late 1880s to early 1900s. Prior to the creation of Forest Reserves in 1897, settlers and stockmen were free to graze their livestock in the mountains however they chose. In the decade between 1897 and 1889, the number of sheep in Yakima County more than tripled from 5,000 to 16,000. By 1899, upwards of 261,000 sheep were reported for the county. George Jackson and Kenneth McCall ran sheep in the Goat Rocks, Russell creek and Hogback mountains. By the early 1900s, Dan Goodman, William Regan, George Jackson and other stockmen were running sheep in the Cowlitz Pass area by way of the Cowlitz Trail. When the Organic Act was passed in 1897, a basis was provided for a permit grazing system. The Project Area became part of the Hogback sheep allotment extending from Round Mountain to south of Tieton Pass. Under the protection of the Forest Reserves and subsequent National Forest, the numbers of animals permitted to range the mountains were significantly reduced. The Hogback allotment was closed to grazing in 1945.

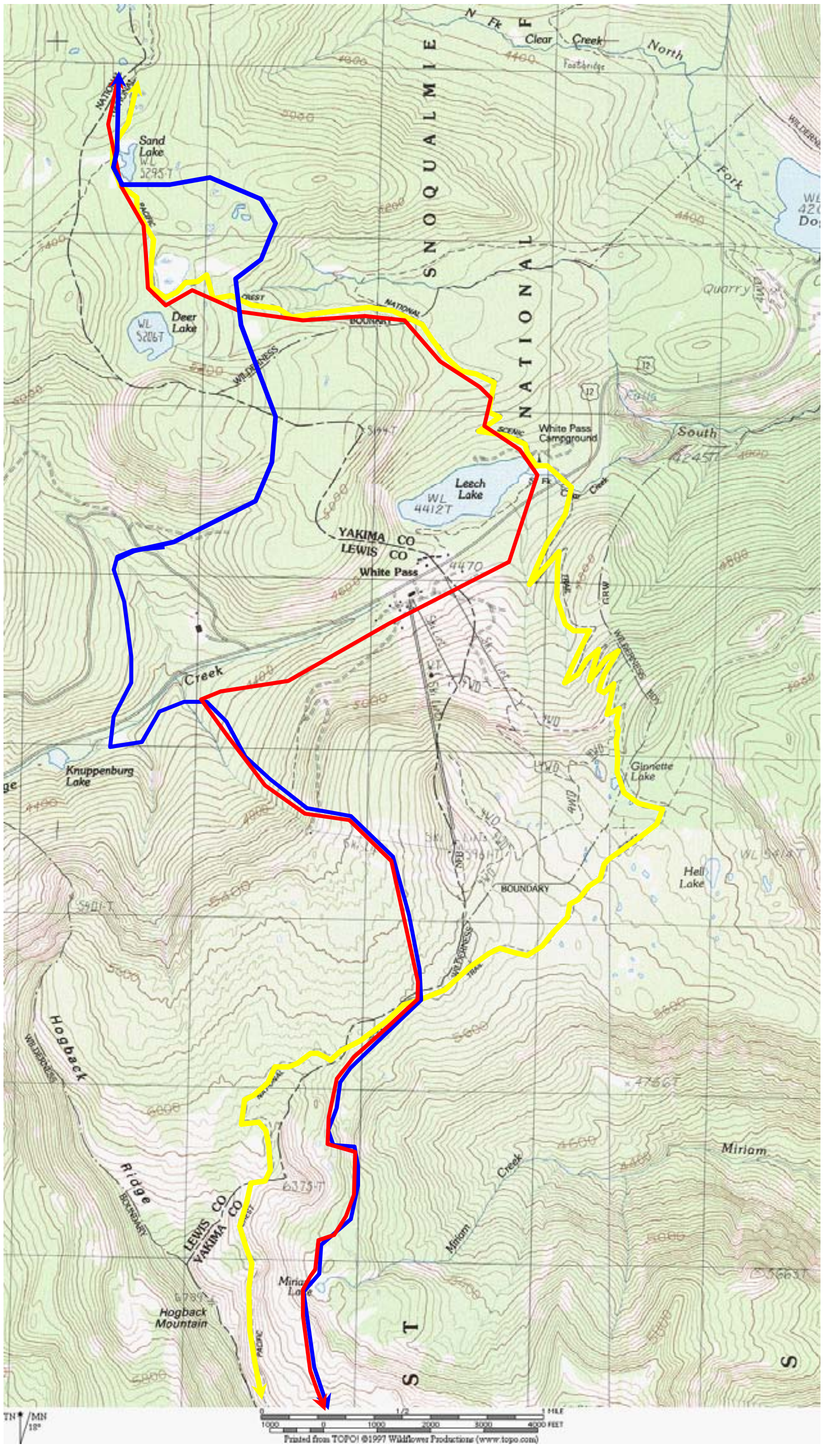
Though homestead claims were possible in the Washington Territory as early as 1853, it was not until the 1880s that settlement occurred in the Tieton Watershed. Even then, settlement in the watershed was sparse owing to a lack of arable land and the difficulty of wagon access into the drainage until the early 1900s. Several homesteaders entered McCallister Meadows (now Rimrock Lake) in 1884, following a trail from Cowiche which ended at Jump Off Peak, where they let their wagons down with ropes. No homestead claims were ever filed in immediate vicinity of White Pass.

The Project Area came under the jurisdiction of the federal government in 1893, first as part of the Pacific Forest Reserve and later as a southern subdivision known as the Mount Rainier Forest Reserve (1897). A conservation movement spearheaded by Gifford Pinchot, who believed that forest resources represented a vast wealth which could provide for the ‘greatest good and greatest number’ in perpetuity if managed properly, resulted in the transfer of the reserves to the Department of Agriculture in 1905. The Project area fell within the boundaries of the Rainier National Forest until 1933, when this Forest was divided in its entirety between the Columbia (Gifford Pinchot), Snoqualmie and Wenatchee National Forests.

Recreational use began to dominate use of the Project Area by the 1920s, when portions of the early trail systems through White Pass were incorporated into the Cascade Crest Trail System that was planned to extend the length of the Cascade Mountains from Canada to the Oregon-California border. Fred W. Cleator, the Forest Service's Pacific Northwest Region recreation planner and developer at this time, also called for the construction of trail-side shelters, with the vision that hikers would spend a night at a shelter, break camp the next morning, hike 6 to 8 miles to the next shelter, and set up camp by mid-afternoon. Money and manpower were lacking in the 1920s to construct these shelters, and it was not until the creation of the Civilian Conservation Corps (CCC) in the 1930s that these improvements could be made. In the White Pass area of the Cascade Crest Trail, the CCC built trail-side shelters at both Leech and Sand Lake.

The Cascade Crest Trail eventually became part of the championed "Pacific Crest Trail System" - extending from Canada to Mexico along the summit divides of the mountain ranges in Washington, Oregon and California. Clinton C. Clarke of Pasadena, California, is most often credited as "Father" of the Pacific Crest Trail. In 1932, Clarke organized the Pacific Crest Trail System Conference and wrote a proposal to National Forest and Park Service officials lobbying for a continuous wilderness trail. Clarke's vision of the trail was three fold: to preserve wilderness; to promote exploration and adventure that would create leadership, self reliance and sound physical development; and to lead youth back to simpler life and engender a love for nature and the outdoors (Clark 1937). The National Trails System Act (P.L. 90-543) was passed in 1968, and made the Pacific Crest Trail one of the initial components of this newly designated system of national recreation, scenic and historic trails. In Washington, portions of the original Cascade Crest Trail were officially designated as the Pacific Crest National Scenic Trail (Hollenbeck 2002; PCTA 2001). In the White Pass Area, the original trail system was relocated several times to achieve the objectives of a crest trail, so that very little of the Pacific Crest Trail today follows original trail routes (refer to the following map).

Illustration J-1:
Approximate Comparison of Circa 1900-1930 (Blue), 1930-1950 Trail System (Red) and 1950-Present Day (Yellow) Crest Trail System Through White Pass Ski Area Vicinity



Since completion of the Highway in the 1950s, much of the history in the Project Area has been directly tied to the White Pass Ski Area. The concept of the White Pass Ski Area originated in 1953. The project at that time was identified as "WS-2 White Pass Winter Sports Area" described as:

> "160 acres south of the highway which is under development of the Yakima Valley Ski Club. This is the closest area of good skiing readily accessible by a yearlong highway to the Yakima Valley and the Packwood-Randle area. Slopes are available for both beginners and experts and tows will make accessible miles of open alpine country to the south" (Snoqualmie National Forest, Tieton District Recreation Unit Plan 1953).

4.0 SUMMARY

Available archaeological, ethnographic and historic information indicate that a variety of prehistoric to historic activities occurred in the White Pass vicinity. The only heritage resources documented to date within the Project Area, however, include an historic recreational trail-side shelter at Leech Lake that was removed in the 1980s, and a segment of the Cascade Crest Trail that lacks the physical integrity for listing on the National Register. No cultural properties that are eligible, potentially eligible to, or listed on the National Register have been identified in the area of potential effect for this undertaking.

Appendix K

Additional Air Quality and Noise Information

SE GROUP

TECHNICAL MEMORANDUM

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TO:	White Pass MDP FEIS Project File
FROM:	Alex White
CC:	SE GROUP Project Files
DATE:	December 2, 2004
RE:	Additional Air Quality and Noise Information

1.0 INTRODUCTION

This memorandum consists of additional information about the air quality and noise level within the White Pass MDP project area including the source of background air pollutants at White Pass, the dBA scale and other factors affecting noise levels, construction site noise levels, and noise levels from snowmaking.

2.0 ADDITIONAL AIR QUALITY INFORMATION

2.1 SOURCE OF BACKGROUND AIR POLLUTANTS

Cars and Buses

Vehicle exhaust is a potential source of pollutants at White Pass. Because of the relatively rural nature of the White Pass Ski Area and the fact that the area is not experiencing existing air quality problems, vehicles are not expected to be a significant source of emissions.

Groomers and Other Maintenance Vehicles

White Pass has two diesel powered machine groomers to help ensure a high quality trail surface, especially during the early and late stages of the season when climate and snow conditions are less than optimal. The snow groomers are minor sources of emissions at White Pass.

Fireplaces and Wood Burning Devices

Air pollution from wood-burning stoves and fireplaces can be an air quality concern, especially during the autumn and winter seasons when air inversions are more likely. The 16 fireplaces in the White Pass Village Condominiums are minor sources of emissions at White Pass because they burn propane gas.

Particulate Matter

Particulate matter consists of fine particles of smoke, dust, pollen or other materials that remain suspended in the atmosphere for a substantial period of time. Particulate matter is measured in three forms: Total Suspended Particulate (TSP) as well as PM10 and PM2.5, both of which are subsets of TSP. PM10 is respirable or fine particulate matter, defined as smaller than 10 micrometers in diameter while PM2.5 is the same material smaller than 2.5 micrometers in diameter.

Visual observations in the White Pass Study Area indicate the largest source of suspended fine particles (PM10/2.5) appears to be re-entrained road dust from automobiles and trucks, particularly from traction sanding of US 12 during the winter months. The traction sand used has a large quantity of fine particles. The equation for calculating road dust emissions is directly dependent on vehicle miles traveled (VMT). Increases or decreases in miles traveled will produce the same percentage of change in emissions (Washington Dept. of Ecology 1997). Additional known minor sources of TSP in the White Pass area are smoke from local condominium fireplaces and occasional wildfires on nearby forestlands, which do not typically occur simultaneously.

Carbon Monoxide

Carbon monoxide (CO) is an air pollutant generally associated with transportation sources. Processes involving incomplete fuel combustion, such as home heating appliances and residential wood burning, also generate CO. Carbon monoxide is a pollutant whose impact is usually localized. The highest ambient CO concentrations often occur near congested roadways, intersections and parking lots during periods of low temperatures, light winds, and stable atmospheric conditions. No increments for carbon monoxide have been established for Class I and Class II Airsheds.

The primary source of CO in the vicinity of White Pass is US 12 traffic and cold start engines. Additional known CO sources at White Pass, are a backup diesel emergency generator that operates about 12 hours annually, 16 fireplaces inside the White Pass condominiums and the cooking facilities at the restaurant and day lodge.

Ozone

Ozone is primarily a product of regional (urban) motor vehicle traffic. It is created during warm sunny weather when photochemical reactions occur that involve hydrocarbons and nitrogen oxides. Unlike carbon monoxide, however, ozone and other reaction products do not reach their peak levels closest to the source of emissions, but rather at downwind locations affected by the urban air plume after the primary pollutants have had time to mix and react under sunlight.

The Washington Department of Ecology (WDOE) currently maintains an ozone monitor at the top of the *Pigtail lift*. Since the White Pass Study Area is not located in proximity to an ozone producing urban area and because of the cool, moist weather in the winter, the NAAQS for ozone is below allowable levels at White Pass. No increments for ozone have been established for Class I and Class II Airsheds.

Sulfur Dioxide

While non-road mobile and on-road mobile sources contribute to sulfur dioxide (Sox), the major contributors in the State of Washington are point sources, mainly the Centralia Power Plant. These sources of sulfur dioxide are mostly products of petroleum and coal combustion. As the mobile sources of sulfur dioxide are very small, sulfur dioxide is not considered a significant pollutant from White Pass anthropogenic activities. There are no monitoring facilities for sulfur dioxide in or near the White Pass Study Area, and there is no data to suggest that the NAAQS for sulfur dioxide is above allowable levels.

Lead

The past major source of lead as an air pollutant was emissions from vehicles using “lead-based” fuels. Stringent air quality regulations have eliminated the use of these fuels in Washington. There are no monitoring facilities for lead in or near the White Pass Study Area and lead is not above air quality standards in urban Yakima County. There is no data to suggest that lead is above the NAAQS of 1.5 µg/m3 per calendar quarter.

Visibility

The clarity of the air, or visibility, is another way to judge air quality. Visibility is affected by natural and human-caused materials in the air, such as fine particles of soot or dust, sulfates and nitrates. These materials alter visibility by changing the way light is transmitted through the atmosphere. Distant objects appear veiled by a haze that reduces both color and brightness. Even the gases that make up the air we breathe can affect visibility by scattering light. In the State of Washington, concerns about visibility range from views in urban areas, to views in parks and wilderness areas, and at scenic vistas.

Visibility is an important air quality value in the western United States, particularly for scenic and recreational areas. The Clean Air Act requires the EPA to promulgate regulations for the prevention of visibility impacts in Class I areas that result from human sources of air pollution. The agency has promulgated regulations that provide guidelines to states for including visibility protection in State Implementation Plans.

In the summer of 2003, the WDOE eliminated their visibility program so they no longer monitor or actively manage visibility in the state, although they do require visibility protection as part of the new source permitting process. The Forest Service, Park Service, and EPA sponsor the network of IMPROVE visibility monitoring sites in Washington State including the one located at the top of one of the lifts at White Pass. Other nearby IMPROVE monitoring sites include locations at Snoqualmie Pass in the Snoqualmie-Mt. Baker National Forest and at the Paradise Visitor Center in Mount Rainier National Park. Major air pollutants detected at the IMPROVE monitoring site receptors include sulfate, organic carbon, nitrates, and dust. The Forest Service has a long-standing philosophy that visibility is a value to be protected 365 days per year, 24 hours per day in the managed Class I areas, including Goat Rocks Wilderness. Currently, no stationary air pollution source or construction activities have been identified in the State of Washington that contribute to air quality/visibility impairments in mandatory Class I areas (Washington Dept. of Ecology 1997).

Monitoring data and published reports single out sulfur emissions as the single most significant source of visibility impairment (WA Dept. of Ecology 1997). As shown in Table 3.8-3, the existing sulfur emissions by uses within the White Pass Ski Area, most all from vehicles, are low (maximum 2.88 pounds per hour) and would not affect visibility in the nearby Class I Airsheds.

The federal strategy for visibility improvement calls for a two-phased effort. Thus far, visibility program efforts have focused on large sources, referred to as Phase I sources, that have obvious negative impacts on visibility. Obvious impacts mean visual plumes extending from a large source to the area of visibility impairment. There are no visual plume/large source areas in the vicinity of White Pass.

Phase II, regional haze, is more complex. While scientific and technical limitations to understanding regional haze have long prevented the EPA from proceeding with the development of a Phase II program to deal with regional haze, these issues have largely been overcome and the EPA is in the process of developing regulations.

3.0 ADDITIONAL NOISE INFORMATION

3.1 THE DBA SCALE AND OTHER FACTORS AFFECTING NOISE LEVELS

The A-weighted decibel (dBA) scale used to describe sound is a logarithmic scale that accounts for the large range of audible sound intensities. The nature of dBA scales is such that individual dBA ratings for different noise sources cannot be added directly to give the sound level for the combined noise source. For example, two noise sources producing equal dBA ratings at a given location will produce a combined noise level 3 dBA greater than either sound alone. When two noise sources differ by 10 dBA, the combined noise level will be 0.4 dBA greater than the louder source alone.

People generally perceive a 10 dBA increase in a noise source as a doubling of loudness. For example, a 70 dBA sound level will be perceived by an average person as twice as loud as a 60 dBA sound. People generally cannot detect differences of 1 to 2 dBA between noise sources; however, under ideal listening conditions, sound level differences of 2 or 3 dBA can be detected by some people. A 5 dBA sound level change would probably be perceived by most people under normal listening conditions.

When distance is the only factor considered, sound levels from isolated point sources of noise typically decrease by about 6 dBA for every doubling of distance from the noise source. When the noise source is continuous (e.g., vehicle traffic on a highway), sound levels decrease by about 3 dBA for every doubling of distance.

Sound levels at different distances can also be affected by factors other than the distance from the noise source. Topographic features and structural barriers that absorb, reflect, or scatter sound waves can increase or decrease noise levels. Atmospheric conditions (wind speed and direction, humidity levels, and temperatures) can also affect the degree to which sound is attenuated over distance.

For a given noise source, factors affecting the noise impact at a receiver include the distance from the noise source, the frequency of the sound, the absorbency of the intervening terrain, the presence or absence of obstructions, and the duration of the noise event. The degree of impact also depends on who is listening, existing sound levels, and when the noise event takes place. Typical sound levels of familiar noise sources and activities are shown in Table 1.

Table 1:
Weighted Sound Levels and Human Response

Sound Source	dBA[a]	Response Criteria
Carrier deck jet operation	140	Limit amplified speech
Limit of amplified speech	130	Painfully loud
Jet takeoff (200 feet)	120	Threshold of feeling and pain
Auto horn (3 feet)		
Riveting machine	110	
Jet takeoff (2,000 feet)		
Shout (0.5 foot)	100	Very annoying
New York subway station		
Heavy truck (50 feet)	90	Hearing damage (8-hour exposure)
Pneumatic drill (50 feet)		
Passenger train (100 feet)	80	Annoying
Helicopter (in-flight, 500 feet)		
Freight train (50 feet)		
Freeway traffic (50 feet)	70	Intrusive
Air conditioning unit (20 feet)	60	
Light auto traffic (50 feet)		
Normal speech (15 feet)	50	Quiet
Bedroom		
Library		
Soft whisper (15 feet)	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Threshold of hearing

[a] Typical A-weighted sound levels taken with a sound-level meter and expressed as A-weighted decibels (dBA) on the scale. The A scale approximates the frequency response of the human ear.
Source: CEQ, 1970

3.2 CONSTRUCTION SITE NOISE LEVELS

Construction equipment operation can vary from intermittent to fairly continuous, with multiple pieces of equipment operating concurrently. Assuming that a truck (90 dBA), a scraper-grader (87 dBA), a moveable crane (82 dBA), a tractor (85 dBA), and two saws (78 dBA) are operating in the same area, peak construction-period noise would generally be about 93 dBA at 50 feet from the construction site (EPA 1971).

To calculate the noise level at a given distance from a noise source, the noise levels are mathematically calculated using the Inverse Square Law of Noise Propagation. Briefly, this formulation states that noise decreases by approximately 6 dBA with every doubling of the distance from the source. Table 2 summarizes predicted construction noise levels at various distances from the construction site, conservatively assuming no atmospheric absorption or attenuation by trees (in column two) and accounting for attenuation of coniferous trees (in column three). Foliage and ground cover are assumed to provide attenuation of up to 14 dBA according to a study by the USFS (Harrison 1980). Daytime summer background noise levels in coniferous forest are typically 35-45 dBA (Harrison 1980).

Table 2:
Construction Noise Levels
Near a Typical Construction Site

Distance from Construction Site (ft)	Line-of-sight Noise Level (dBA)	Noise Level with Tree Attenuation (dBA)
50	93	93
100	87	75
200	81	69
400	75	61
800	69	55
1,600	63	49
3,200	57	43
6,400	51	37

3.3 NOISE LEVELS FROM SNOWMAKING

Ambient noise levels produced by one snowmaking gun are estimated at approximately 65 dBA at 150 feet. Currently, White Pass has a total of one gun. Noise produced by a snow gun nozzle is fairly directional, with the net impact on the surrounding area varying widely, depending upon wind velocity and direction, terrain, and the dampening effect of snow cover and vegetation.

Appendix L

WEPP Modeling Analysis

SE GROUP

TECHNICAL MEMORANDUM

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TO:	White Pass MDP FEIS Project File
FROM:	SE Group
CC:	
DATE:	9/21/2006
RE:	White Pass MDP WEPP Modeling Analysis

A modeling study was conducted in order to quantify sediment production due to changes in land cover associated with the proposed projects of the White Pass MDP. SE Group utilized the US Department of Agriculture – Agricultural Research Service Water Erosion Prediction Project (WEPP) model to compute sediment *detachment* for the various land cover types within each affected sub-watershed. The model was used to compute detachment only, and did not account for routing and buffering (which reduce actual yields to the stream system). Because the analysis did not account for factors that can result in the removal and deposition of sediment from water before reaching a surface water body, it represents a conservative analysis (i.e., it overestimates the contribution of sediment to the Upper Clear Fork Cowlitz and Upper Tieton sub-watersheds).

SE Group evaluated two modeling methodologies for application of the WEPP model to the White Pass project:

1) GeoWEPP: a GIS-enabled version of WEPP, which accounts for routing of detached sediment through a digital elevation model (DEM) derived stream channel network. Because GeoWEPP accounts for routing, its results can be considered an estimate of sediment yield.

2) Hillslope WEPP/GIS analysis: the hillslope version of the WEPP model is run for all combinations of representative land cover and slope combinations encountered within each DEM grid cell to compute a sediment detachment rate for each cell within the DEM grid. The results from WEPP are then input into a GIS database. The WEPP-computed detachment rates are summed over all DEM grid cells to produce an overall estimate of sediment detachment within the White Pass Study Area. This methodology does not account for routing of sediment within the watershed. After detachment, sediment may undergo a series of processes of re-deposition, filtration and re-entrainment and transport before reaching a water body. These processes tend to reduce actual *yields* of sediment to water bodies. Thus the results of the hillslope/GIS

methodology produce a somewhat conservative estimate of sediment production via detachment only, and not a result representing actual sediment yield and transport by surface waters.

SE Group conducted a preliminary modeling exercise in GeoWEPP in order to evaluate its potential effectiveness and suitability for application to the White Pass project by using it to compute sediment yields for Alternative 1 in the Upper Clear Fork Cowlitz sub-watershed. A landcover grid for the Upper Clear Fork Cowlitz sub-watershed was obtained from the USGS National Landcover Database, and refined using site-specific data. Soils information was obtained and edge-matched from both the USDA-Natural Resources Conservation Service (NRCS) and the Gifford Pinchot National Forest. However, the WEPP soils database does not contain soils properties files for the mapped soils units within the vicinity of the White Pass SUP. Therefore, the soils textural data present within available mapping was used to select an appropriate soil type from within the Forest Service Disturbed generic WEPP soils database: a gravelly sandy loam forested soil.

The GeoWEPP model is paired with a DEM and channel network analysis model called TOPAZ (Topographic Parameterization).[1] The TOPAZ process is utilized to interactively derive a channel network. The terrain analysis process also derives sub-catchments – which are incorporated into the GeoWEPP modeling process as hillslopes. GeoWEPP cross-queries the derived sub-catchments against the GIS DEM, landcover, and soils database, and derives a set of representative WEPP hillslope model projects, one for each sub-catchment. Each hillslope model contains one management prescription, soils representation, and slope profile that is considered representative of the entire sub-catchment.

The GeoWEPP model is computationally demanding. The 2,520-acre GeoWEPP modeling catchment that contains the SUP within the Upper Clear Fork Cowlitz watershed required individual WEPP model runs for 178 individual sub-catchments, and over 20,000 distinct flowpaths. A 30-year GeoWEPP simulation for this scenario required over 14 hours to complete on a 3.0 GHz dual-processor system. Thus, opportunities to experiment with the outcomes of different modeling assumptions upon the results were limited.

For baseline sediment yield within the Upper Clear Fork Cowlitz sub-watershed, GeoWEPP modeling produced a background value of approximately 19 tons per acre per year. For a watershed that is dominated by mature forest, which typically has background sediment yield rates of less than 1 ton per acre, this was judged to be unrealistically high. SE Group examined the model inputs and outputs for several representative individual hillslopes in order to assess the reason that the GeoWEPP simulations were producing comparatively high predictions for background sediment production.

The results of this examination indicate that this behavior may be a result of what appear to be implausibly long and linear sub-catchment derivations from the TOPAZ model as applied to the DEM

[1] http://grl.ars.usda.gov/topaz/TOPAZ1.HTM. Last Accessed 8/2006.

and channel system for the White Pass vicinity. Figure 1, attached, shows the sub-catchments derived by TOPAZ for the White Pass GeoWEPP model.

As shown in the figure, the sub-catchments derived by TOPAZ tend to be rather linear in shape. The resulting hillslopes in WEPP are quite long (many are over 1,500 feet in horizontal length). As a result it appears that the individual WEPP hillslope models that comprise the overall GeoWEPP analysis generate unrealistically high sediment yields. The reason for this behavior may be seen in Figure 2 by examining the slope profile and detachment results for a single representative WEPP hillslope (the hillslope of interest is highlighted by the red arrow in Figure 1).

In Figure 2, the color scale ranges from green (no sediment detachment) to white (moderate sediment detachment) to red (high sediment detachment), for a hillslope with mature forested land cover. As shown in Figure 2, no sediment detachment occurs along the first two-thirds of the slope profile. Note that detachment begins in an area that is of moderately gentle slope, and then accelerates through the steeper zone of the hillslope. Reviewing the hillslope model output in detail reveals that the length of the hillslope being modeled permits high surface sheet flow velocities to be attained as runoff accumulates along the hillslope, resulting in detachment at the slope toe for almost every hillslope in the model, even those that are fully forested. The fact that no detachment occurs at the top two-thirds of the slope, even where (as in Figure 2), the very top of the slope is quite steep, suggests that it is the attainment of high sheet flow velocities that is contributing to sediment productions in the hillslope model, and not the combination of landcover and topography. The high sheet flow velocities are a direct result of the length over which flow can accumulate for a very long hillslope. Due to these factors, as well as the constraints placed on the ability to refine the model inputs caused by the length of time required to complete each model run, SE Group chose to perform representative runs of the WEPP hillslope model for each combination of landcover, soil, and slope, and then analyze these results spatially utilizing GIS, as described in approach (2), above. This process is outlined in more detail following.

The USDA Forest Service has developed a set of forest simulation parameters for WEPP based on model calibration and validation to observed forested watershed behavior. These custom WEPP parameters are described in *Water Erosion Prediction Project Forest Applications*.[2] The WEPP model is a process-based, continuous computation, distributed parameter erosion prediction model implemented as a computer numerical simulation.[3]

The model is based on numerical representations of the physical processes influencing runoff and sediment yield. Thus, it permits a simulation of various actual watershed processes, including: rainfall/snowfall, infiltration, runoff, soil moisture accounting, snow accumulation/melt, evapotranspiration, plant growth and litter decomposition, and sediment detachment and deposition. The

[2] Elliot, William J and David E. Hall, 1997
[3] USDA Forest Service, 2000

model parameters include rainfall amounts and intensity, soil textural properties, slope shape, steepness, and orientation, and soil erodibility parameters. Soils are represented in multiple layers with parameters describing texture, rock content, moisture, permeability, organic content, and cation exchange capacity. The model uses a statistically generated synthetic climate dataset to drive its simulations. The synthetic dataset is derived by applying a probabilistic model using statistical parameters computed from observed climate trends. High resolution climate data (including temperature, wind speed and direction, relative humidity, and solar radiation) is derived via a sophisticated spatial algorithm. The PRISM climate data modeling process interpolates these variables based on both geographic position and elevation, from proximal NOAA, BLM remote automated weather stations, and NRCS-SNOTEL climate stations. Appropriate forested soil types and textures were chosen for simulation within WEPP based on available NRCS and Gifford Pinchot National Forest soils mapping.

The WEPP model was executed over a simulation period of 30 years. The model simulations were driven by climatic data derived from the PRISM model, corresponding to average-year conditions.[4] The event-based model output includes rainfall events statistically generated by the USDA-ARS CLIGEN package to produce the synthetic climate dataset, and runoff events resulting from either rainfall or snowmelt. The climate stations and derived climate data utilized in the PRISM interpolation methodology, and their relative weighting factors, are outlined in the following tables:

Table 1:
Prism Climate parameters for WHITE PASS WA
46.54oN 121.55oE; 4323 feet elevation
43 years of record

Month	Mean Maximum Temperature (ºF)	Mean Minimum Temperature (ºF)	Mean Precipitation (in)	Avg Number of wet days
January	31.8	19.1	13.36	14.7
February	37.4	20.9	8.11	12.3
March	42.0	22.9	7.60	13.6
April	48.5	26.7	5.28	12.0
May	56.1	32.0	4.11	10.8
June	61.7	38.2	2.71	8.2
July	68.1	41.6	1.36	4.8
August	68.2	41.1	1.76	5.7
September	62.7	35.0	3.49	7.8
October	52.5	28.4	6.51	10.3
November	38.2	23.7	11.65	14.2
December	32.1	20.3	12.21	14.7
Annual			78.15	129.1

[4] http://www.ocs.orst.edu/prism. Accessed 8/2006.

Table 2:
Climate Stations Used for Interpolated Data

Station	Weighting	Station	Weighting
Wind Stations		**Solar Radiation and Max .5 P Stations**	
Stampede Pass, WA	35.8 %	Stampede Pass, WA	47.8 %
Yakima, WA	32.3 %	Olympia, WA	36.7 %
Toledo, WA	31.9 %	Pendelton, OR	15.5 %
Dewpoint Stations		**Time-to-Peak Stations**	
Stampede Pass, WA	40.2 %	Stampede Pass, WA	40.2 %
Yakima, WA	36.3 %	Yakima, WA	36.3 %
Portland, OR	23.5 %	Portland, OR	23.5 %

The WEPP analysis focused on the modeling sediment detachment for the existing and proposed landcover types within the White Pass SUP (including the proposed SUP expansion). Detailed land use coverage was developed in GIS, assigning land use amongst the categories outlined in Table 3:

Table 3:
Land Use Categories Utilized in WEPP

Land Class	WEPP Management Prescription
Graded	Skid Trail
Ski Trail	Tall Grass
Forest	Forest
Roads – Native Surface	Native Surface Road
Roads – Gravel	Gravel Road
Rock	Short Grass

The land cover classes outlined in Table 3 were analyzed against GIS raster grids of slope and soils texture.

Next, in order to derive a sediment detachment rate for each combination of soil, slope, and land cover type present, the WEPP hillslope module was run for each combination of land cover class, slope, and soils texture (including WEPP:Road for the roads) associated with the land use changes proposed to occur for each of the Action Alternatives. Two model scenarios were executed:

- A “Post-Disturbance” landcover that represents conditions immediately after implementing the landcover change;
- An “After Recovery” landcover, that models likely long-term rates of sediment detachment after sites have had 2-5 years to stabilize and re-vegetate. For the differing disturbance mechanisms, the change in landcover was represented as follows:

Table 4:
Disturbance Mechanism Representations in WEPP

Disturbance	Post-Disturbance WEPP Prescription	After Recovery (2-5 years) WEPP Prescription
Grading	Skid Trail	Short Grass
Clearing and Grading	Skid Trail	Short Grass
Flush Cutting	Short Grass	Tall Grass
Road Construction – Native Surface	Roads – Native Surface	Roads – Native Surface
Road Construction – Gravel	Roads – Gravel	Roads – Gravel

Each treatment prescription was modeled for a representative 200-foot hillslope. Model runs for each of the above three prescriptions were performed for each of several slope gradient “bins”, as described below:

- 0 - 10 percent slope gradient
- 10 - 20 percent slope gradient
- 20 - 30 percent slope gradient
- 30 - 40 percent slope gradient
- Greater than 40 percent slope gradient

The WEPP model was executed over a 30-year period to provide a dataset of sufficient length to compute averages sediment detachment characteristics. The sediment detachment predictions from this simulation period offer an average value for soil detachment over the 30-year period. In some years (i.e., years with low surface runoff) no erosion takes place, while in high-runoff years, erosion may exceed the reported average values. In addition, it is important to note that the WEPP documentation cautions that “At best, any predicted runoff or erosion value, by any model, will be within only plus or minus 50 percent of the [actual] value. Erosion rates are highly variable, and most models can predict only a single value. Replicated research has shown that observed values vary widely for identical plots, or the same plot from year-to-year. Also, spatial variability…of soil properties add[s] to the complexity of erosion prediction.”[5]

The results of the WEPP analysis are outlined in the following Table. Maps of the WEPP-calculated sediment detachment are shown attached in Figures 3 through 11.

[5] USDA Forest Service, 2000

Table 5:
WEPP Sediment Detachment Results

Sub-Watershed	Alternative	Soil Detachment (Tons/year)		Short-Term	Long-Term
		Post-Disturbance	After Recovery (2-5 years)	% Increase	% Increase
Upper Clear Fork Cowlitz	1	N/A	103.1	N/A	N/A
	2	126.5	107.2	23%	4%
	Mod. 4	173.1	113.3	68%	10%
	6	112.7	107.8	9%	5%
	9	131.8	106.6	28%	3%
Upper Tieton	1	N/A	133.6	N/A	N/A
	2	133.7	133.7	0.0%	0.0%
	Mod. 4	133.8	133.9	0.1%	0.2%
	6	133.8	133.7	0.1%	0.1%
	9	150.8	134.8	12.8%	0.8%

It is important to note that the output of the process provides an estimate of *soil detachment*, and not actual delivery to the stream system. Due to the processes described above, the detachment-only analysis likely over-estimates the amount of sediment produced to the lower watershed.

As shown in Table 5, the long-term percentage change in sediment detachment is fairly similar amongst the alternatives. Long-term changes for the Upper Clear Fork Cowlitz sub-watershed would be greatest under Modified Alternative 4 at a 10 percent increase above Alternative 1. This would be due primarily to grading associated with the ski-back road/egress extending from the base of proposed *Chair 7* in Hogback Basin, to the base of the existing *Paradise Chair*, and then down to the base of the existing *Pigtail Chair*. Long-term changes would be greater for the Upper Clear Fork Cowlitz sub-watershed than for the Upper Tieton due to the greater area of proposed change in land use associated with the development of the trail system within the Hogback Basin. Long-term impacts to the Upper Tieton sub-watershed would be greatest under Alternative 9 at a 0.8 percent increase above Alternative 1.

Larger differences between alternatives are evident in the short-term post-disturbance increases in sediment detachment. Modified Alternative 4 exhibits an almost 70 percent increase in short-term detachment, primarily associated with grading that would occur to facilitate the development of ski-way access corridor traversing from the Hogback Basin terrain pod back to the existing trail network. As shown in the detachment maps, this increase in detachment would occur in close proximity to several streams, increasing the risk that this alternative could result in sedimentation to surface waters. Under Alternative 9, a short-term increase of almost 13 percent would occur within the Upper Tieton sub-watershed due to grading, which would occur to create ski-ways, skier bridges, and 7 trails within the *PCT* terrain pod.

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Appendix M

Conceptual Stormwater Management Plan

CONCEPTUAL STORMWATER MANAGEMENT PLAN
for the White Pass Ski Area
Master Development Plan Proposal
Environmental Impact Statement

December 8, 2006

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1.0 INTRODUCTION

This technical memorandum provides a description of the Conceptual Stormwater Management Plan (CSMP) for the proposed parking area within the Special Use Permit (SUP) boundary for White Pass. Two conceptual plans are presented in this memorandum as different parking areas are proposed under the alternatives. One concept has been developed for the parking area proposed under Modified Alternative 4, and a second for the configuration proposed in Alternatives 6 and 9. As this plan is conceptual in nature, no sizing of stormwater facilities has been undertaken. This step will be undertaken for the selected alternative parking area and detailed in the Final Construction Plans. Figure 1 provides a vicinity map of White Pass.

The remainder of this memorandum defines the objectives of the CSMP, presents concepts for the proposed facilities, and describes the flow of water through the system. Conceptual site plans are provided for Alternatives 4, 6 and 9. Snow management practices are also described and would be utilized for all alternatives. During the site-specific approval process, alternative means of achieving the desired stormwater management objectives may be evaluated.

2.0 DESIGN OBJECTIVES AND CRITERIA

The primary objective of the CSMP is to help attain the following water quality, sediment regime, and in-stream flow Aquatic Conservation Strategy Objectives (ACSOs; USDA et al.):

> Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities;
>
> Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include timing, volume, rate, and character of sediment input, storage, and transport; and maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

While maintaining the above primary objectives, additional quantitative criteria are proposed in an effort to complement the ACSOs and provide a measurable basis for assessing the CSMP performance. Performance should be measured at the basin scale, which can be accomplished as the design nears finalization. Table 1 provides a summary of the design goals used to develop this CSMP.

Table 1:
Proposed Quantitative CSMP Performance Goals For All Parking Lots Combined

Event	Water Quality	Sediment Regime	In-stream Flows
6-month, 24-hour	Maintain or reduce effluent concentrations of TSS[b] and oil and grease	Maintain or increase the sediment trap efficiency[c]	N/A
2-year, 24-hour	N/A	Same as for the 6-month, 24-hour event	Reduce the existing condition peak discharge by at least 50%[d]
10-year, 24-hour	N/A	Same as for the 6-month, 24-hour event	Maintain or reduce the existing condition peak discharge[d]
100-year, 24-hour with snowmelt[a]	N/A	Same as for the 6-month, 24-hour event	Maintain or reduce the existing condition peak discharge[d]

[a] Methods for calculating snowmelt are discussed in Section 3.
[b] Total Suspended Solids.
[c] Sediment trap efficiency (STE) is calculated: STE = (Tons sediment in – Tons sediment out)/Tons sediment in * 100% STE refers to the efficiency of the entire system, including swales, catch basins, and detention ponds.
[d] Standard water quantity criteria in the state of Washington for basins draining to Puget Sound (WSDOE, 2005).

2.1 TREATMENT OBJECTIVES

As previously stated, the design objective of the CSMP for the White Pass Ski Area is to address water quality parameters related to the ACSO. In an effort to achieve the design objective the following treatment objectives are proposed:

- collection, detention and routing of surface runoff,
- improvement of water quality /sediment retention, and
- treatment for petroleum hydrocarbon contaminants.

The following presents a brief description of each treatment objective.

Collection, Detention and Routing of Surface Runoff

Collection of stormwater would be accomplished by intercepting flows from impervious surfaces at intervals that are sufficient to minimize concentrated flows on the impervious surface (e.g., parking lot). Such collection methods include in-sloping the parking lots to drain to conveyance channels, as well as the establishment of curb and gutter to prevent runoff from leaving the parking area untreated.

Upon collection of the stormwater, the water is conveyed to a treatment facility that is designed to detain flow in a basin, vault or bioswale. Once the basin has filled to its design volume, the 6-month, 24-hour storm in this case, the water is released at a specified rate no more than the 2-year, 24-hour flow rate.

Released water is then routed to a designated discharge location via ditches, pipes or other means of conveyance.

Water Quality Treatment/ Sediment Retention

Reductions in sediment yield from the parking lot would be accomplished by routing surface runoff to catchments and/or detention basins, as described above, to allow fine sediments to settle out into the detention structure. These fine sediments would be retained in the basin along with other contaminants that are known to attach to these sediments. Retention of these sediments would significantly reduce the contribution of fine grained sediments from impervious surfaces into adjacent streams or wetlands.

Treatment for Petroleum Hydrocarbon Contaminants

Oil and grease contaminants are often present in stormwater from parking lots and roads. These contaminants can be removed through the installation of oil water separators (OWS) at each parking lot discharge location, after collection of stormwater and prior to detention. The OWS would be sized to treat anticipated runoff corresponding to the design criteria outlined in Section 1.0. Schematics of an OWS are provided as examples in Attachment A for various flow ratings.

The feasibility of the conceptual stormwater facilities proposed in this report is based on preliminary design assessments specific to the site. No site-specific topographic survey was available for this CSMP. A detailed topographical survey will be required to support the final design. Typical diagrams/schematics for individual stormwater facility components are provided in Attachment A.

3.0 PROPOSED STORMWATER MANAGEMENT PLAN

This conceptual CSMP presents recommendations for a treatment system for Alternatives 4, 6 and 9. Snow management strategies (Section 4) for effective stormwater management are also provided. The concepts presented herein are intended to be flexible, and may be modified and/or blended in the final CSMP design.

3.1 CONCEPTUAL TREATMENT SYSTEM

A basic treatment system is presented in order for each Alternative, which could be used in the final CSMP design. As previously stated, this basic system may be modified.

The basic treatment system consists of (in series) paved surfaces, drop inlets, conveyance pipes/ditches; OWS; detention pond with a rip-rap lined pipe inlet, passive riser to control outflow rates, and a rip-rap lined emergency spillway; and level spreaders to diffuse pond effluent and prevent stream bank erosion.

The basic treatment system focuses primarily on water quantity and sediment regime. By implementing the use of an oil-water separator and detention ponds within the system, water quality would maintain in it current state and/or improve.

The following modifications could be made to the facilities in order to enhance the treatment system:

- Place the OWS before the detention pond;
- Enlarge the swales as necessary to safely convey the 25-year, 24-hour event;
- Enlarge the detention ponds as necessary in order to meet the water quantity goals (Section 1); and
- Add catch basins at drop inlets.

3.2 RECOMMENDED TREATMENT SYSTEMS AND SITE PLANS BY EIS ALTERNATIVE

This section provides the conceptual layout of stormwater facilities for Alternatives 4, 6 and 9 of the White Pass FEIS. Alternatives 6 and 9 contain the same parking lot design and will be analyzed together. The Modified Alternative 4 parking lot design will be analyzed separately.

The final design of stormwater facilities will be determined during project-level review of the proposed resort. A topographical survey will be completed prior to design and construction of the stormwater facilities. Adjustments may be made to the site-specific plan if site topography or substrate is not suitable for the conceptual design as presented in the CSMP.

3.2.1 Modified Alternative 4

The proposed parking lot in Modified Alternative 4 is located approximately 250 feet east of the *Lower Cascade Chairlift* (refer to Figure 2). At approximately 7 acres, the parking lot would be insloped at 2-3 percent to route stormwater to an underground conveyance pipe. A series of drop inlets would be installed that would collect and route runoff to the pipe which would in turn convey water to an oil water separator. Water would be treated by the OWS before being released to a detention pond located on the north side of the parking lot. Snow storage would be located on the south and upslope side of the parking lot. A vegetated swale with 3:1 sideslopes would be constructed to contain the snow. A rock lined ditch would run along the east perimeter of the parking lot and route water from the snow storage area to the detention pond on the north side of the parking lot during the spring melt. Additionally, a curb and gutter would be placed around the parking lot to prevent stormwater runoff from entering nearby streams and riparian zones. The outlet of the detention pond would consist of several elements. These elements would include a riser, low-flow outlet, and an emergency overflow outlet. All flows out of the detention pond will be routed to a rock-lined ditch. Outlet protection would be incorporated at every outfall to reduce erosion. The proposed discharge for stormwater would be the roadside ditch adjacent to US 12. Alternative discharge points would be the streams to the East or West of the parking lot. The actual discharge point would be determined in the final construction plans and is subject to review and approval by the USFS.

3.2.2 Alternatives 6 and 9

The proposed parking lot in Alternatives 6 and 9 is located approximately 250 feet from the *Lower Cascade Chairlift.* (refer to Figure 3). At approximately 2.5 acres the parking lot would be insloped at 2-3 percent to convey stormwater to a pipe that would run through the center of the lot. An OWS would treat this stormwater prior to entering a detention pond on the north side. A curb and gutter would be placed around the parking lot to prevent stormwater runoff from entering nearby streams and riparian zones. Snow storage would be located on the south and upslope side of the parking lot. A vegetated swale with 3:1 sideslopes would be constructed on the south-east side to contain the snow. A rock lined ditch would run along the east perimeter of the parking lot and route water from the snow storage area to the detention pond on the north side of the parking lot during the spring melt. Water from the detention pond would then be routed through an outlet to a rock lined ditch. The outlet of the detention pond would consist of several elements. These elements would include a riser, low-flow outlet, and an emergency overflow outlet. All flows out of the detention pond will be routed to a rock-lined ditch. Outlet protection would be incorporated at this junction to reduce erosion. The proposed discharge for stormwater would be the roadside ditch adjacent to US 12. Alternative discharge points would be the streams to the East or West of the parking lot. The actual discharge point would be determined in the final construction plans and is subject to review and approval by the USFS.

4.0 SNOW MANAGEMENT

Managing snow represents one of the biggest challenges in the design of a stormwater management plan for cold climates (CWP 1997). Because the domain for the CSMP for White Pass consists of parking lots which receive abundant snowfall and are managed partly by frequent application of road sands, a well designed and executed snow management plan is essential for helping to meet the goals of the CSMP.

This section discusses a literature and regional agency regulations review conducted in order to gain a broad sense of how other cold climate regions design and manage CSMP's. Based on findings from this review preliminary snow management strategies for White Pass are recommended.

4.1 REVIEW OF LITERATURE AND REGIONAL PRACTICES

In the Stormwater Best Management Practice (BMP) Design Supplement for Cold Climates (CWP 1997), permeable, vegetated BMPs, such as dry grass-lined swales, infiltration basins, and/or vegetated filter strips (BMP which disperses flow along its width and provides treatment as runoff travels as sheetflow through the vegetation) are recommended to decrease peak snowmelt runoff rates and encourage infiltration. The authors note, however, with no recommended solution, that stockpiled snow with sand can cause plugging, and consequently, premature failure of the facility.

The Northwest Colorado Council of Governments (NCCG), Water Quality Protection Standards (1997) were also reviewed as a benchmark for this preliminary conceptual design. This document was deemed relevant due to climate similarities between White Pass and Northern Colorado, and the abundance of ski resorts in Northern Colorado which should be reflected in the stormwater management regulations. In summary, the NCCG standards require design of snow storage facilities, preferably vegetated, which cover 30 percent of the area to be developed (area may be modified to reflect site specific modeling) and meet the following hydrologic condition:

> Runoff from the storage facility must maintain the existing peak flow rates for storms up to and including the 25-year, 24-hour rainfall event, in combination with 2 inches of melt in 24 hours.

Several county regulations in Washington state were also reviewed, including Pierce County and Benton County. Pierce County uses an algorithm which is a function of elevation to compute a melt rate to be added to the 25-year and above storm. The algorithm produces 24-hour melt rates in excess of 12.5 inches for White Pass, which is considered to be unrealistic for the site. Benton County, WA suggests including snowmelt in the design of BMPs by increasing the design storm runoff flow rate by 10 percent.

4.2 PROPOSED STRATEGIES

Designated storage zones are proposed for stockpiling plowed snow from the parking lots. Figures 2 and 3 show the proposed snow storage zones. Criteria used to select the preliminary locations included:

- Locations should be close to parking lots;
- Snow storage should not impede automobile or pedestrian traffic;
- Snow storage areas should minimize loss of parking;
- When possible, use long, relatively flat, vegetated areas; and
- When possible, storage areas should drain into the detention ponds.

Because the snowmelt runoff typically contains a high concentration of sediment (mostly road sands) and oil, among other possible pollutants (CWP 1997), the storage areas should drain to the detention ponds when possible.

Additional recommendations for managing snow and snowmelt runoff include:

- Specifying a coarse-grained sand for parking lot maintenance to reduce the source of fine sediments – coordination with Lewis County may be necessary;
- When snow storage areas encroach on riparian areas, move snow before onset of major spring melt event (after ski season) to preferred locations consistent with stormwater management facilities; and
- Evaluate the use of de-icer and anti-icer products to reduce road sanding.

5.0 CONCLUSION

The White Pass CSMP is designed to address water quality related to the Aquatic Conservation Strategy Objectives. The two proposed parking lot designs described in this document both provide stormwater runoff control through collection and detention of water, and the treatment of water through sediment removal and hydrocarbon treatment. Both designs utilize designated snow management areas, complete with a rock-lined ditch that routes snow melt to the detention pond. The final stormwater management plan will be determined based on USFS approval of a selected alternative for the White Pass Expansion. Sizing of stormwater facilities (pipes, ditches, detention) will occur following approval of the selected alternative. As such, the stormwater design described for each alternative in this plan may change. Any changes to this CSMP are subject to review and approval by the USFS during the preparation of the final construction plans.

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Appendix N

Biological Assessment

BIOLOGICAL ASSESSMENT FOR THE WHITE PASS EXPANSION PROPOSAL

SEPTEMBER 2006

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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.

<u>Lifts</u>

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].

<u>Special Use Permit Boundary</u>

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.

<u>Pacific Crest National Scenic Trail Reroute</u>

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

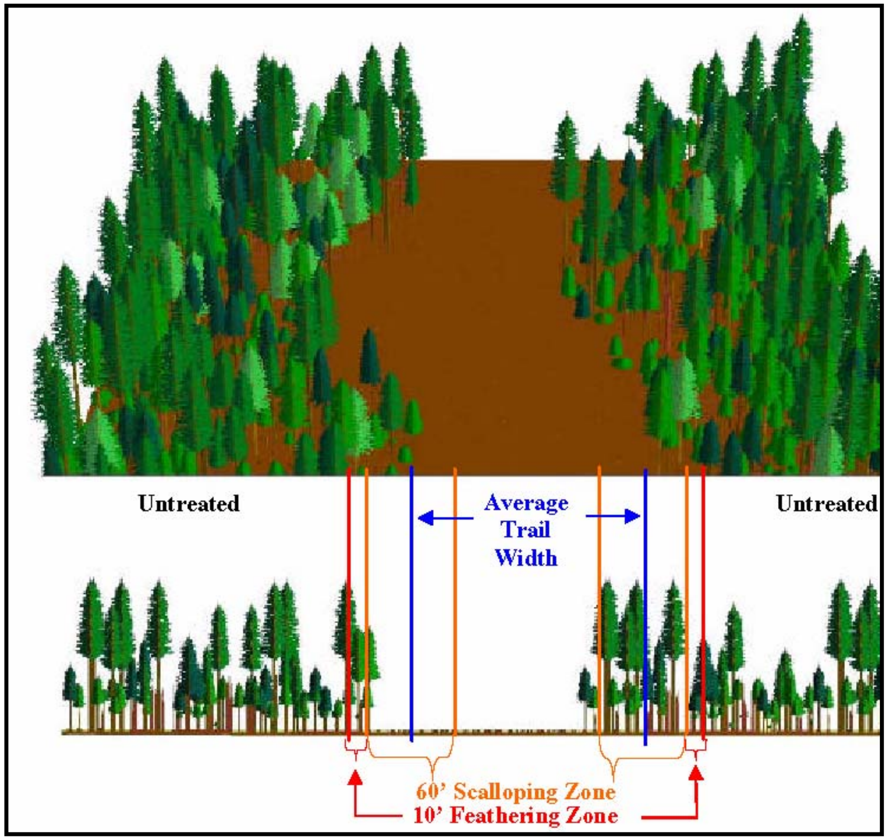
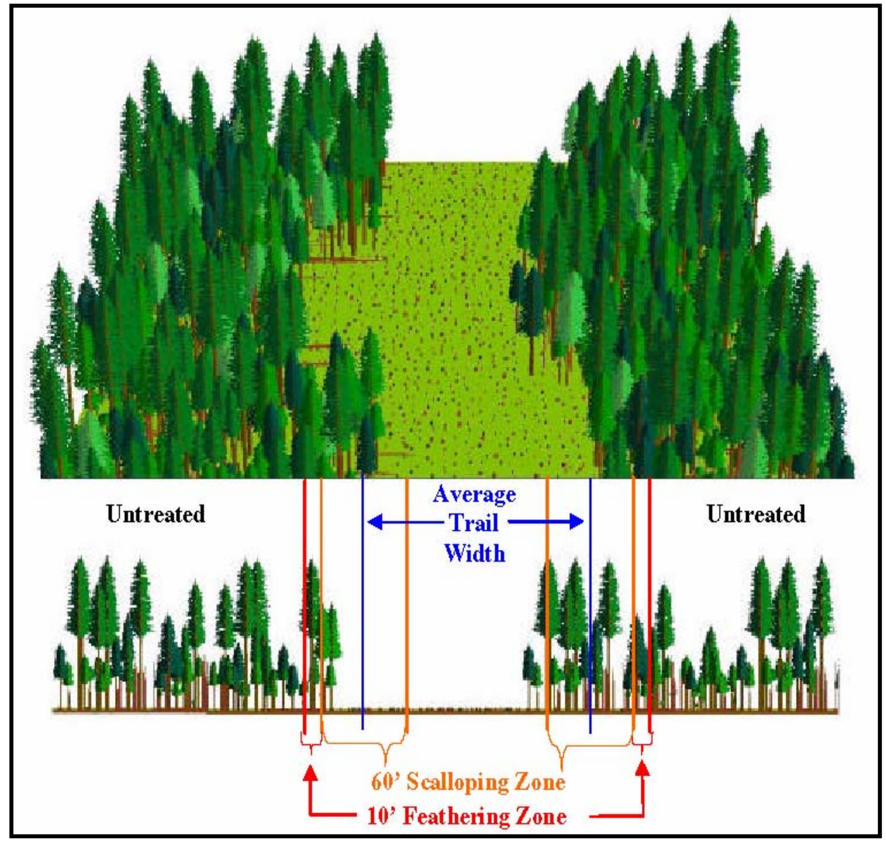


Illustration B
Typical Full Clearing Treatment – No Grading



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.

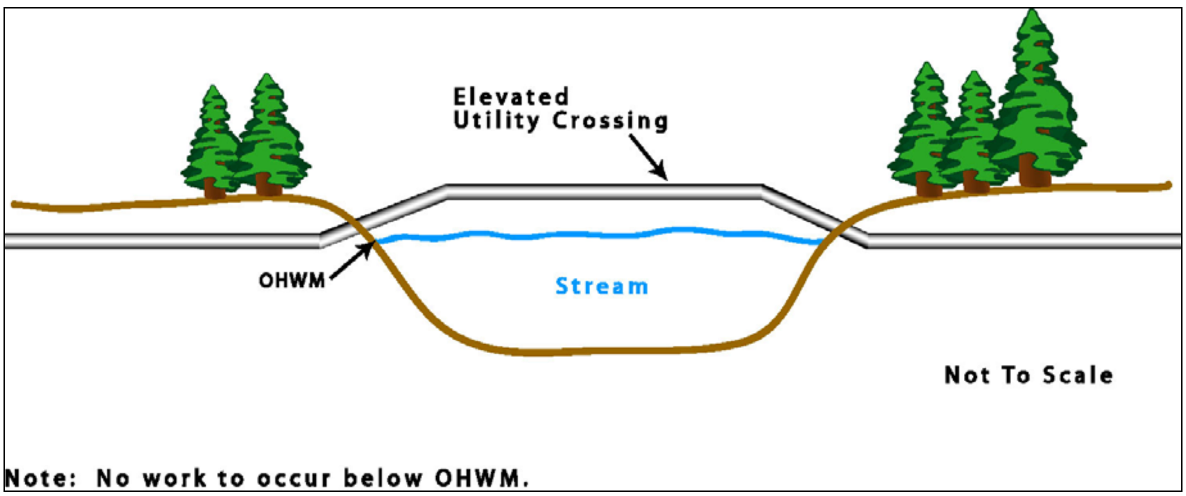
Utility lines (power, water, communication) would be installed in a common trench within existing or proposed trails to minimize overall disturbance. The trench would be excavated by a trackhoe and spoils would be stockpiled for backfilling the trench. The water supply line[3] would be trenched to the 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).

<u>Habitat Requirements and Ecology</u>

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).

<u>Occurrence within the Action Area</u>

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 utilized 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.

<u>Northern Spotted Owl Critical Habitat</u>

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.

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Appendix O

BMPs and Standards for Invasives Memo

SE GROUP

TECHNICAL MEMORANDUM

3245 146TH PLACE SE SUITE 360 BELLEVUE WA 98007

TEL: 425.653.5690 FAX: 425.653.5694

WWW.SEGROUP.COM

TO:	White Pass MDP FEIS Project File
FROM:	Kate Plant (via Jodi Leingang, USFS)
CC:	SE GROUP Project Files
DATE:	March 19, 2007
RE:	White Pass MDP FEIS BMPs for invasives from Okanogan and Wenatchee National Forest's Weed Management and Prevention Strategy and Best Management Practices 2002 and the 2005 ROD Standards from FEIS Preventing and Managing Invasive Plants – Pacific Northwest Region Invasive Plant Program Memo

The following presents the BMPs for invasives from the Okanogan-Wenatchee National Forest's Weed Management and Prevention Strategy and Best Management Practices 2002 and the 2005 ROD Standards from FEIS Preventing and Managing Invasive Plants – Pacific Northwest Region Invasive Plant Program. These management practices and standards were provided by the USFS (J. Leingang, personal communication March 19, 2007) to be referenced with Management Requirement MR7.

BMPs for invasives from Okanogan and Wenatchee National Forest's Weed Management and Prevention Strategy and Best Management Practices 2002

- Complete Weed Risk Assessments and Prevention Analysis for each project.

- Revegetate all disturbed soil (except the travel way on surfaced roads) in a manner that optimizes plant establishment for that specific site.

- Use only weed-free plant materials and mulch for revegetation and site stabilization (FSM 2081.03, 36 CFR 261.50 [a], 261.58 [f]). (Required) All seed purchased or otherwise designated or accepted for the Okanogan and Wenatchee National Forest's will be required to be tested for "all states noxious weeds" according to Association of Official Seed Analysts standards. Test results from all seed lots will be inspected to ensure that no noxious weeds are present prior to application. Seed lots containing noxious weeds will not be used.

- Utilize native species in revegetation projects wherever possible.

- Reduce the time lag between completion of an activity and rehabilitation of the area by: 1) developing better communication between all departments involved in creating and restoring disturbed areas, and 2) requiring seeding within ten days of activity completion.

- Incorporate mulch into revegetation efforts by utilizing weed-free straw, curlex matting, and wood chips or hyrdomulch whenever possible.

- Monitor and evaluate success of revegetation efforts. Mow, remove seedheads or remove weeds to reduce weed seed production (whenever) possible in areas that will experience disturbance.

- Do not draft water (e.g., for dust abatement) from weed infested water sources.

- Remove all mud, dirt, and plant parts from all off-road equipment before moving into project area. Cleaning must occur off National Forest lands (this does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area).

- Clean all equipment prior to leaving the project site, if operating in areas with new invaders (as determined by the Forest Weed Specialist).

- Inspect and approve all gravel, fill, sanding stockpiles, quarries, and borrow sources before use and transport.

- Revegetate disturbed soil due to construction and reconstruction activity.

- If straw is used for road stabilization and erosion control, it must be as weed-free or weed-seed-free as possible.

- Use education programs and signing to increase weed awareness and prevent weed-spread by recreationists.

- Revegetate bare soil resulting from special use activity.

2005 ROD Standards from FEIS Preventing and Managing Invasive Plants – Pacific Northwest Region Invasive Plant Program

1. Prevention of invasive plant introduction, establishment, and spread will be addressed in watershed analysis, roads analysis, fire and fuels management plans, Burned Area Emergency Recovery Plans, emergency wildland fire situation analysis, wildland fire implementation plans, grazing allotment management plans, recreation management plans, vegetation management plans, and other land management assessments.

2. Actions conducted or authorized by written permit by the Forest Service that will operate outside the limits of the road prism (including public works and service contracts), require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands.

3. Use weed-free straw and mulch for all projects conducted or authorized by the Forest Service, on National Forest System Lands. If State certified straw and/or mulch is not available, individual Forests should require sources certified to be weed free using the North American Weed Free Forage Program standards or a similar certification process.

6. Use available administrative mechanisms to incorporate invasive plant prevention practices into rangeland management. Examples of administrative mechanisms include, but are not limited to, revising permits and grazing allotment management plans, providing annual operating instructions, and adaptive management. Plan and implement practices in cooperation with the grazing permit holder.

7. Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be weed free by District or Forest weed specialists.

12. Develop a long-term site strategy for restoring/revegetating invasive plant sites prior to treatment.

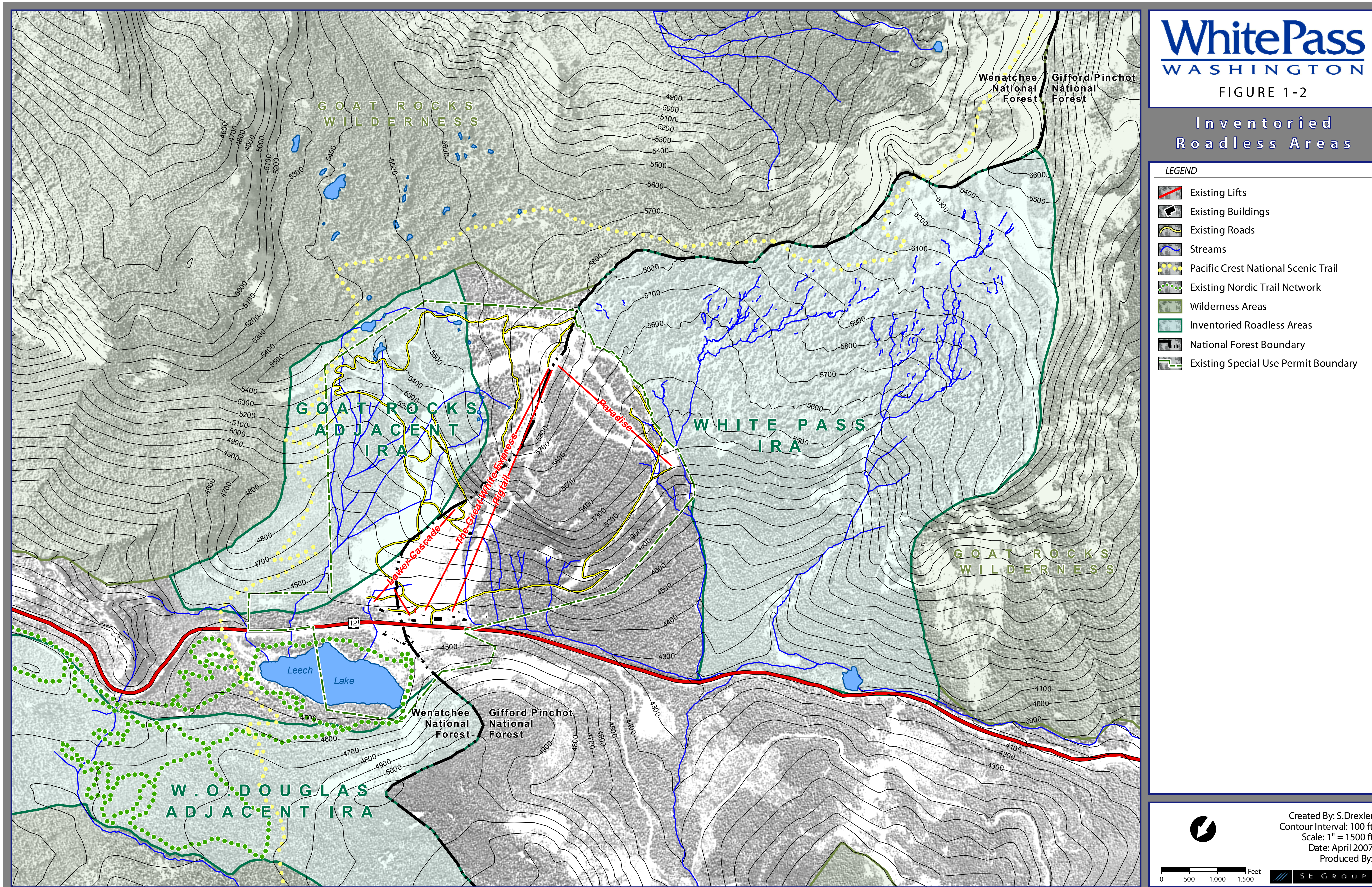
13. Native plant materials are the first choice in revegetation for restoration and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. Non-native, noninvasive plant species may be used in any of the following situations: 1) when needed in emergency conditions to protect basic resource values (e.g., soil stability, water quality and to help prevent the establishment of invasive species), 2) as an interim, non-persistent measure designed to aid in the reestablishment of native plants, 3) if native plant materials are not available, or 4) in permanently altered plant communities. Under no circumstances will nonnative invasive plant species be used for revegetation.

Figures

Chapter 1 Figures

FIGURE 1-1

Vicinity Map



WhitePass
WASHINGTON
FIGURE 1-2
Inventoried Roadless Areas
LEGEND
Existing Lifts
Existing Buildings
Existing Roads
Streams
Pacific Crest National Scenic Trail
Existing Nordic Trail Network
Wilderness Areas
Inventoried Roadless Areas
National Forest Boundary
Existing Special Use Permit Boundary
GOAT ROCKS WILDERNESS
GOAT ROCKS ADJACENT IRA
WHITE PASS IRA
W.O. DOUGLAS ADJACENT IRA
Wenatchee National Forest
Gifford Pinchot National Forest
Leech Lake
Paradise
The Great White Express
Pigtail
Lower Cascade
12
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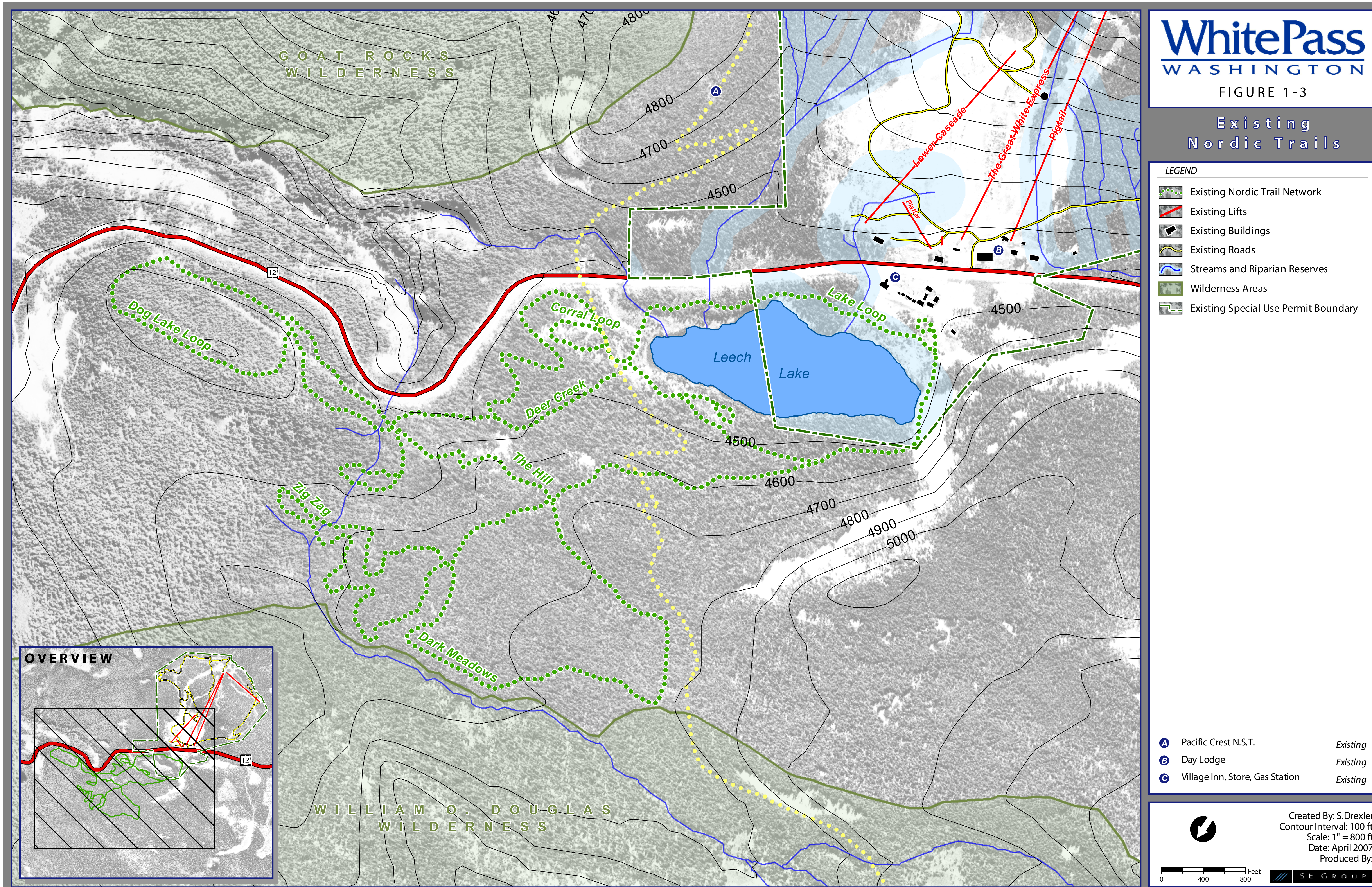
Scale: 1" = 1500 ft
Date: April 2007
Produced By:
0 500 1,000 1,500 Feet
SE GROUP



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WASHINGTON
FIGURE 1-3
Existing Nordic Trails
LEGEND
Existing Nordic Trail Network
Existing Lifts
Existing Buildings
Existing Roads
Streams and Riparian Reserves
Wilderness Areas
Existing Special Use Permit Boundary
A Pacific Crest N.S.T. Existing
B Day Lodge Existing
C Village Inn, Store, Gas Station Existing
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 800 ft
Date: April 2007
Produced By:
SE GROUP
Feet
0 400 800
GOAT ROCKS WILDERNESS
WILLIAM O. DOUGLAS WILDERNESS
Dog Lake Loop
Corral Loop
Deer Creek
Lake Loop
The Hill
Zig Zag
Dark Meadows
Leech Lake
Lower Cascade
The Great White Express
Pigtail
Platter
OVERVIEW
12

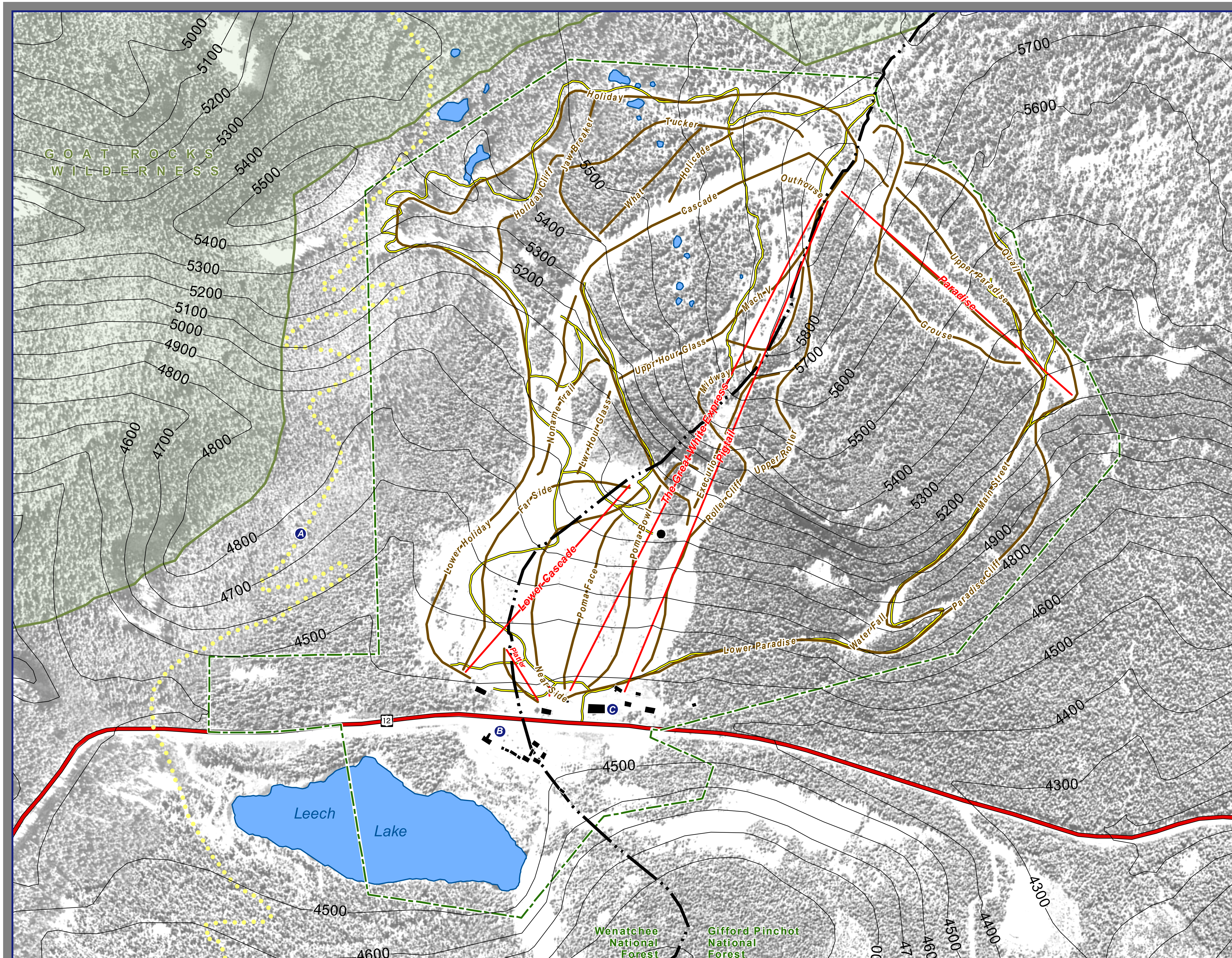

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FIGURE 1-4

Existing Alpine Facilities

LEGEND

- Existing Lifts
- Pacific Crest National Scenic Trail
- Ski Trail Centerline
- Existing Buildings
- Existing Roads
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary

A	Pacific Crest N.S.T.	Existing
B	Village Inn, Store, Gas Station	Existing
C	Day Lodge	Existing

Created By: S.Drexler
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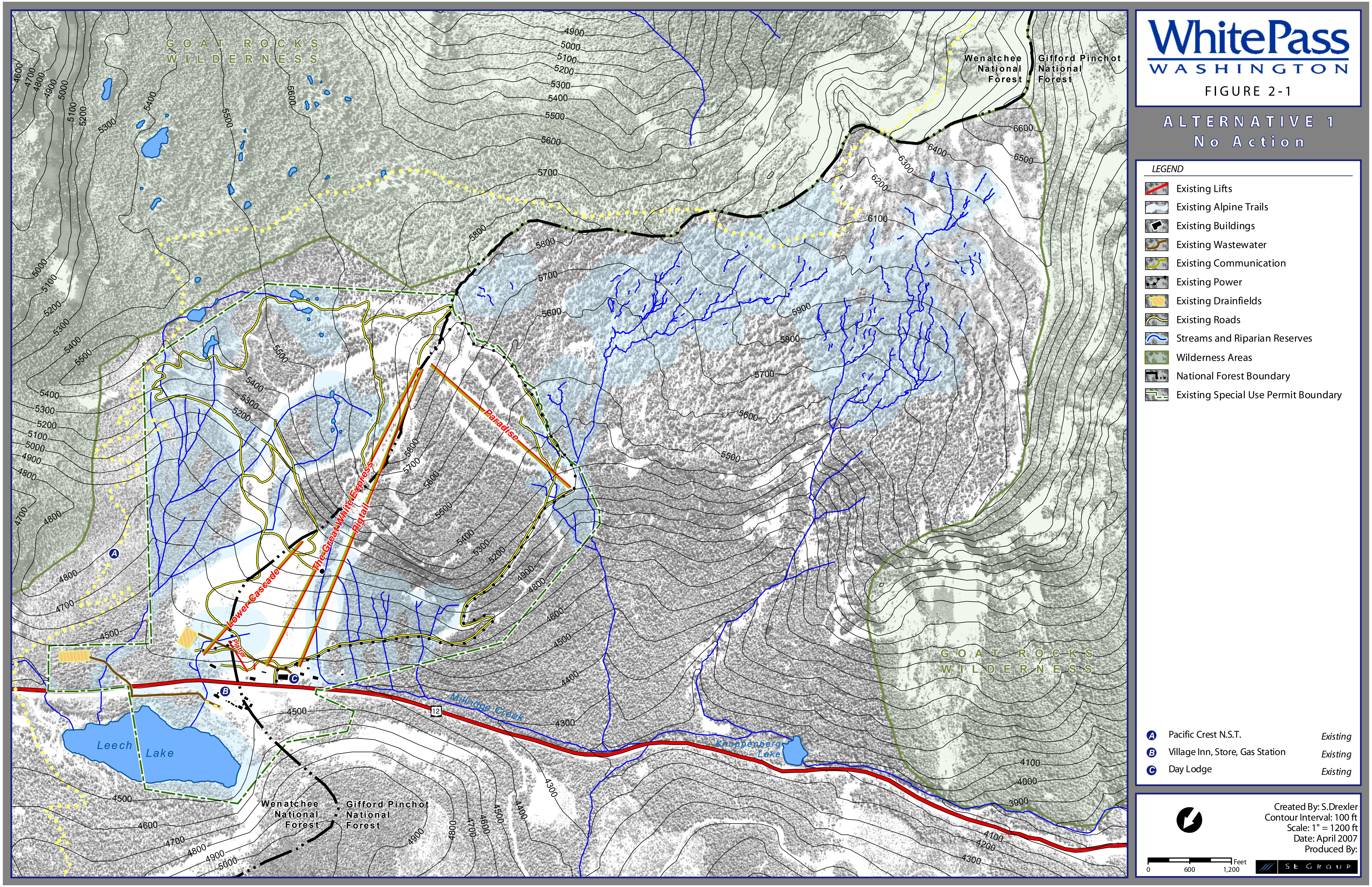
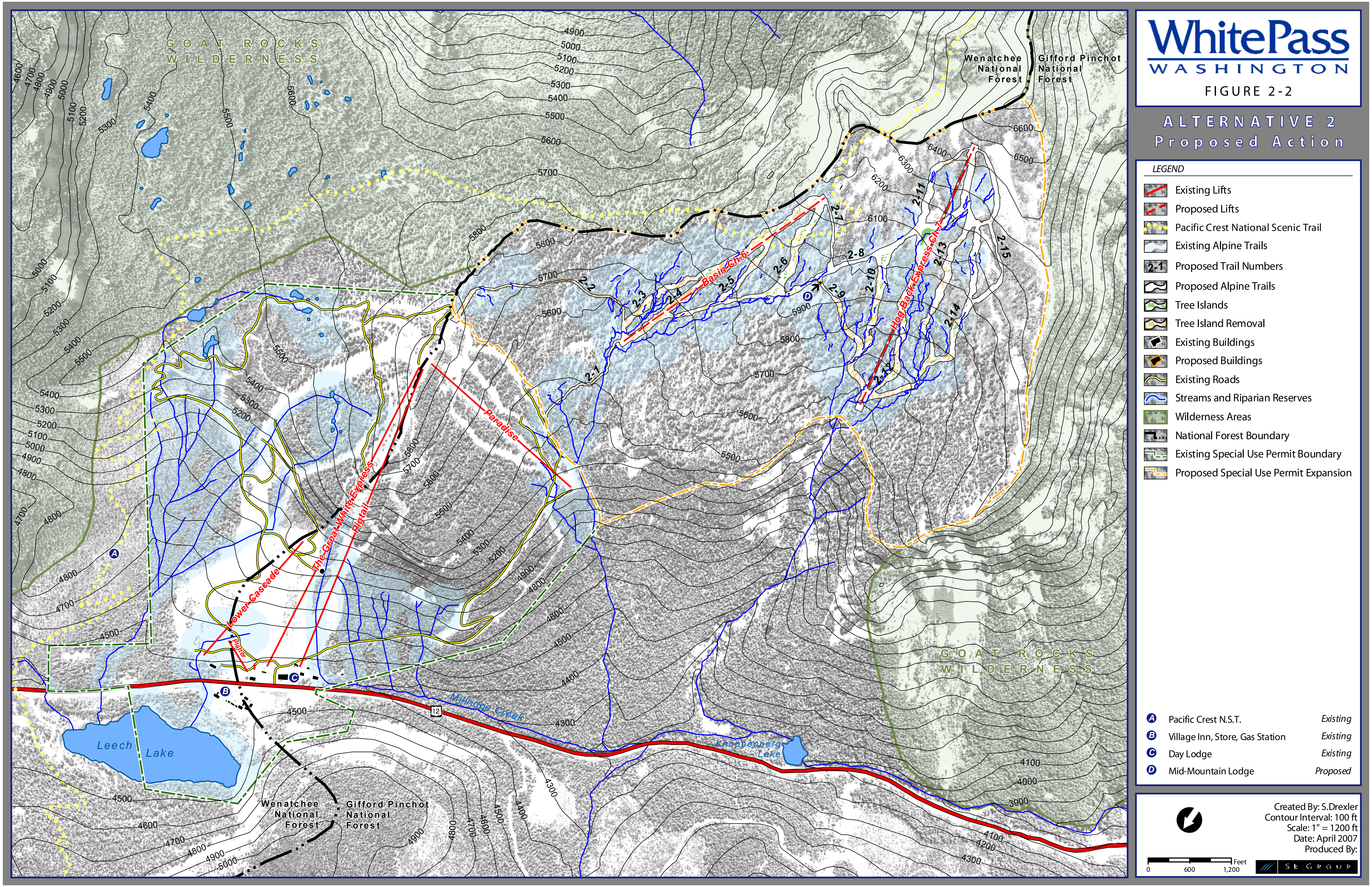
Scale: 1" = 800 ft
Date: April 2007
Produced By: SE GROUP

0 400 800 Feet

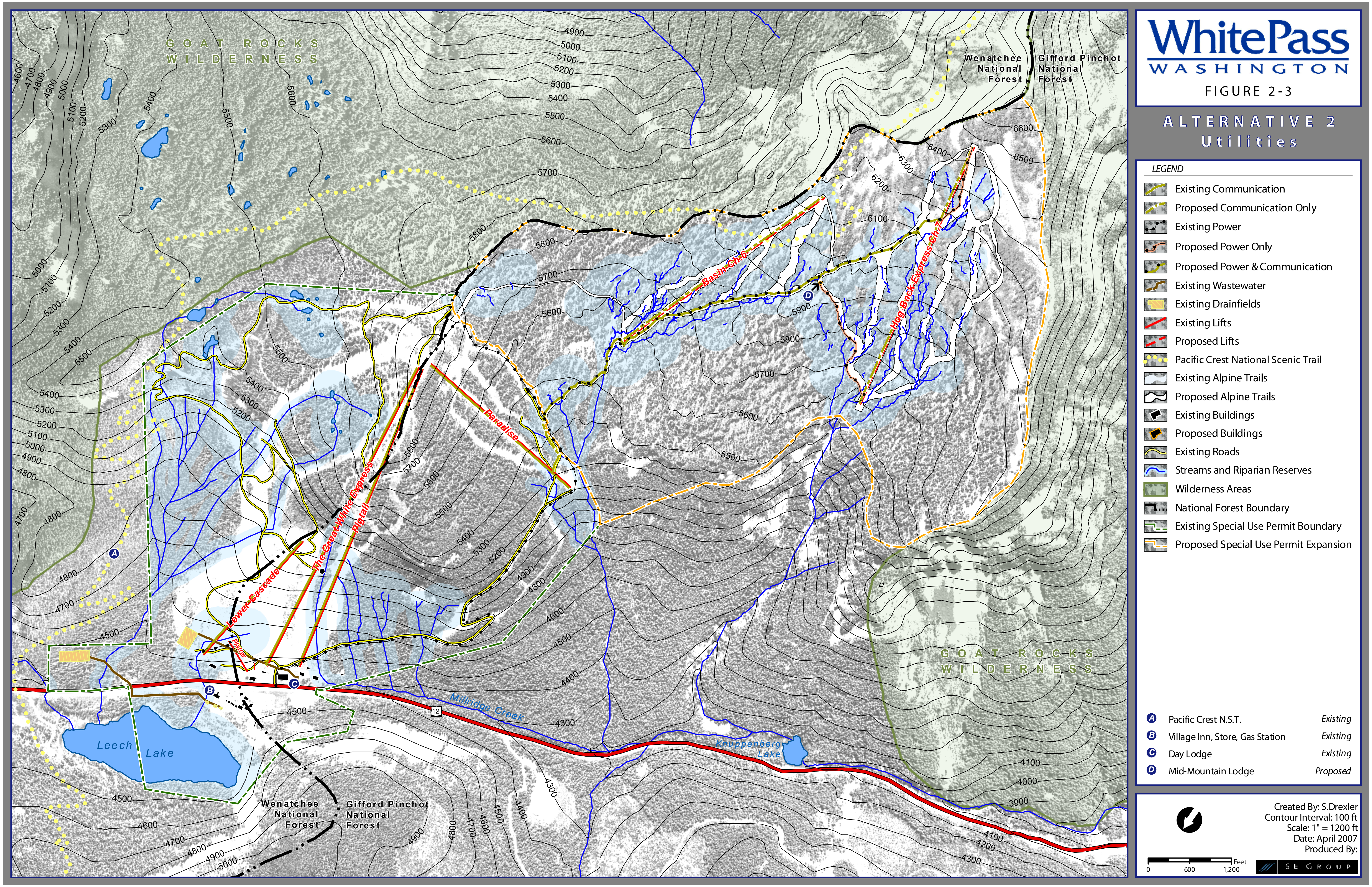
Chapter 2 Figures

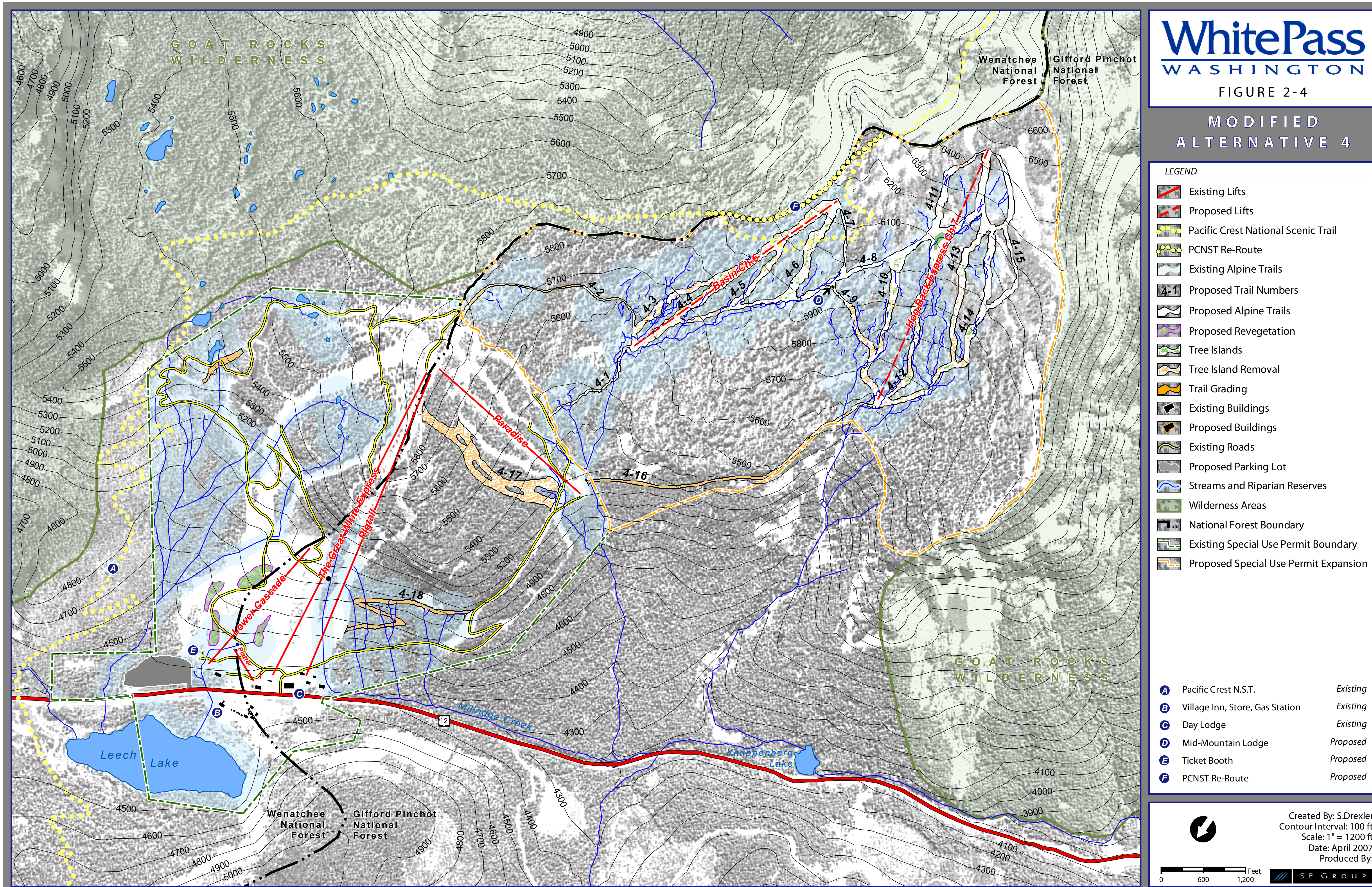


WhitePass
WASHINGTON
FIGURE 2-1
ALTERNATIVE 1
No Action
LEGEND
Existing Lifts
Existing Alpine Trails
Existing Buildings
Existing Wastewater
Existing Communication
Existing Power
Existing Drainfields
Existing Roads
Streams and Riparian Reserves
Wilderness Areas
National Forest Boundary
Existing Special Use Permit Boundary
A Pacific Crest N.S.T. Existing
B Village Inn, Store, Gas Station Existing
C Day Lodge Existing
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
0 600 1,200 Feet
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
Paradise
The Great White Express
Pigtail
Lower Cascade
Leech Lake
Millridge Creek
Knuppenberg Lake
12



WhitePass
WASHINGTON
FIGURE 2-2
ALTERNATIVE 2
Proposed Action
LEGEND
Existing Lifts
Proposed Lifts
Pacific Crest National Scenic Trail
Existing Alpine Trails
Proposed Trail Numbers
Proposed Alpine Trails
Tree Islands
Tree Island Removal
Existing Buildings
Proposed Buildings
Existing Roads
Streams and Riparian Reserves
Wilderness Areas
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
A Pacific Crest N.S.T. Existing
B Village Inn, Store, Gas Station Existing
C Day Lodge Existing
D Mid-Mountain Lodge Proposed
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
Feet
0 600 1,200
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
Leech Lake
Knuppenberg Lake
Millridge Creek
12
The Great White Express
Pigtail
Lower Cascade
Paradise
Basin Ch-6
Hog Back Express Ch-7
2-1
2-2
2-3
2-4
2-5
2-6
2-7
2-8
2-9
2-10
2-11
2-12
2-13
2-14
2-15


WhitePass
WASHINGTON
FIGURE 2-3
ALTERNATIVE 2
Utilities
LEGEND
Existing Communication
Proposed Communication Only
Existing Power
Proposed Power Only
Proposed Power & Communication
Existing Wastewater
Existing Drainfields
Existing Lifts
Proposed Lifts
Pacific Crest National Scenic Trail
Existing Alpine Trails
Proposed Alpine Trails
Existing Buildings
Proposed Buildings
Existing Roads
Streams and Riparian Reserves
Wilderness Areas
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
A Pacific Crest N.S.T. Existing
B Village Inn, Store, Gas Station Existing
C Day Lodge Existing
D Mid-Mountain Lodge Proposed
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
0 600 1,200 Feet
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
Basin Ch-6
Hog Back Express Ch-7
Paradise
The Great White Express
Pigtail
Lower Cascade
Leech Lake
Knuppenberg Lake
Millridge Creek
12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WASHINGTON
FIGURE 2-4
MODIFIED ALTERNATIVE 4
LEGEND
Existing Lifts
Proposed Lifts
Pacific Crest National Scenic Trail
PCNST Re-Route
Existing Alpine Trails
Proposed Trail Numbers
Proposed Alpine Trails
Proposed Revegetation
Tree Islands
Tree Island Removal
Trail Grading
Existing Buildings
Proposed Buildings
Existing Roads
Proposed Parking Lot
Streams and Riparian Reserves
Wilderness Areas
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
A Pacific Crest N.S.T. Existing
B Village Inn, Store, Gas Station Existing
C Day Lodge Existing
D Mid-Mountain Lodge Proposed
E Ticket Booth Proposed
F PCNST Re-Route Proposed
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
0 600 1,200 Feet
GOAT ROCKS WILDERNESS
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
Wenatchee National Forest
Gifford Pinchot National Forest
Leech Lake
Knuppenberg Lake
Millridge Creek
Basin Ch 6
Hog Back Express Ch 7
Paradise
The Great White Express
Pigtail
Lower Cascade
Platter
4-1
4-2
4-3
4-4
4-5
4-6
4-7
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4-17
4-18
12

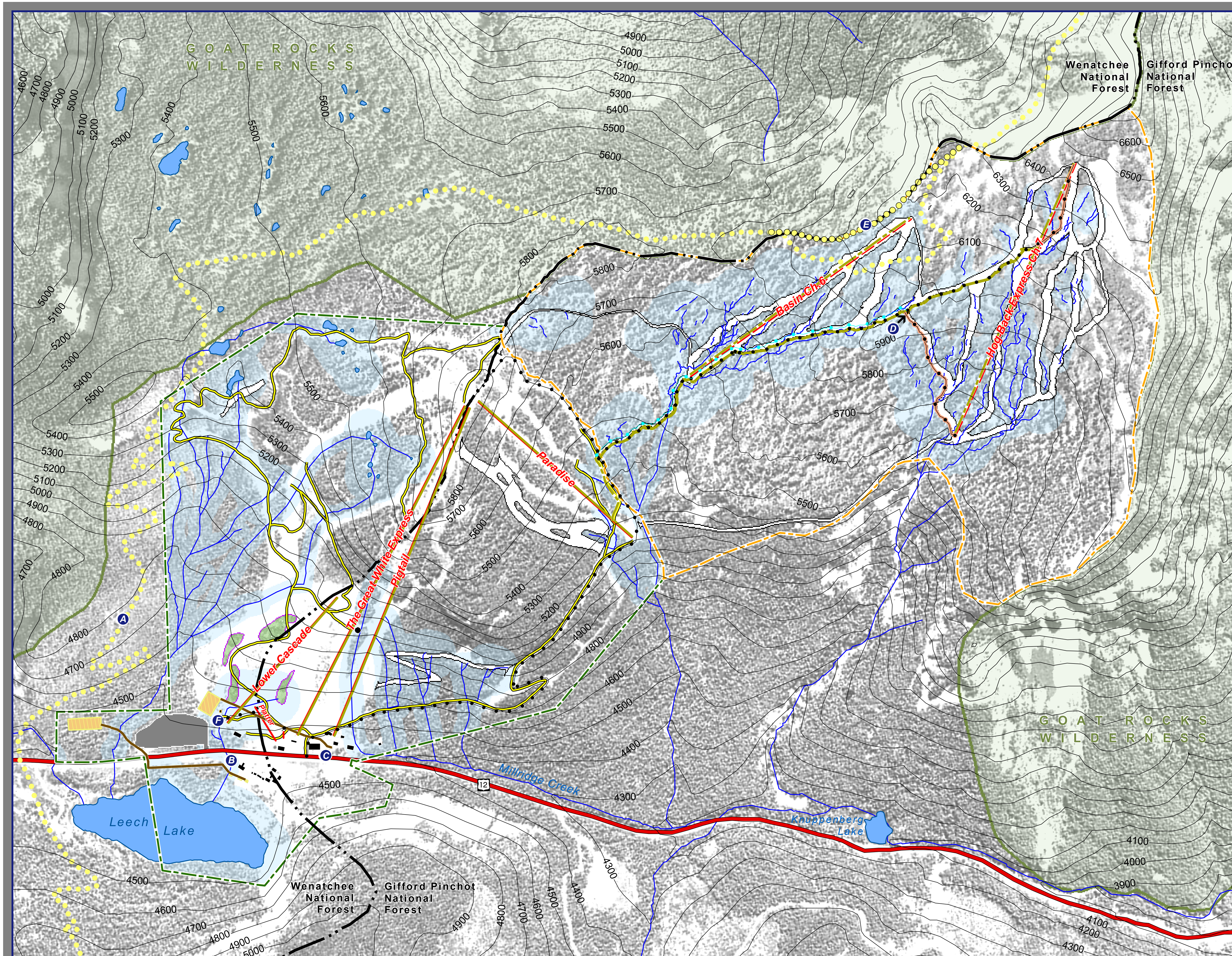

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FIGURE 2-5

MODIFIED ALTERNATIVE 4 Utilities

LEGEND

- Existing Communication
- Proposed Communication Only
- Proposed Water
- Existing Power
- Proposed Power Only
- Proposed Power & Communication
- Existing Wastewater
- Existing Drainfields
- Existing Lifts
- Proposed Lifts
- Pacific Crest National Scenic Trail
- PCNST Re-Route
- Existing Alpine Trails
- Proposed Alpine Trails
- Proposed Revegetation
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Parking Lot
- Streams and Riparian Reserves
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

A	Pacific Crest N.S.T.	*Existing*
B	Village Inn, Store, Gas Station	*Existing*
C	Day Lodge	*Existing*
D	Mid-Mountain Lodge	*Proposed*
E	Ticket Booth	*Proposed*
F	PCNST Re-Route	*Proposed*

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Date: April 2007
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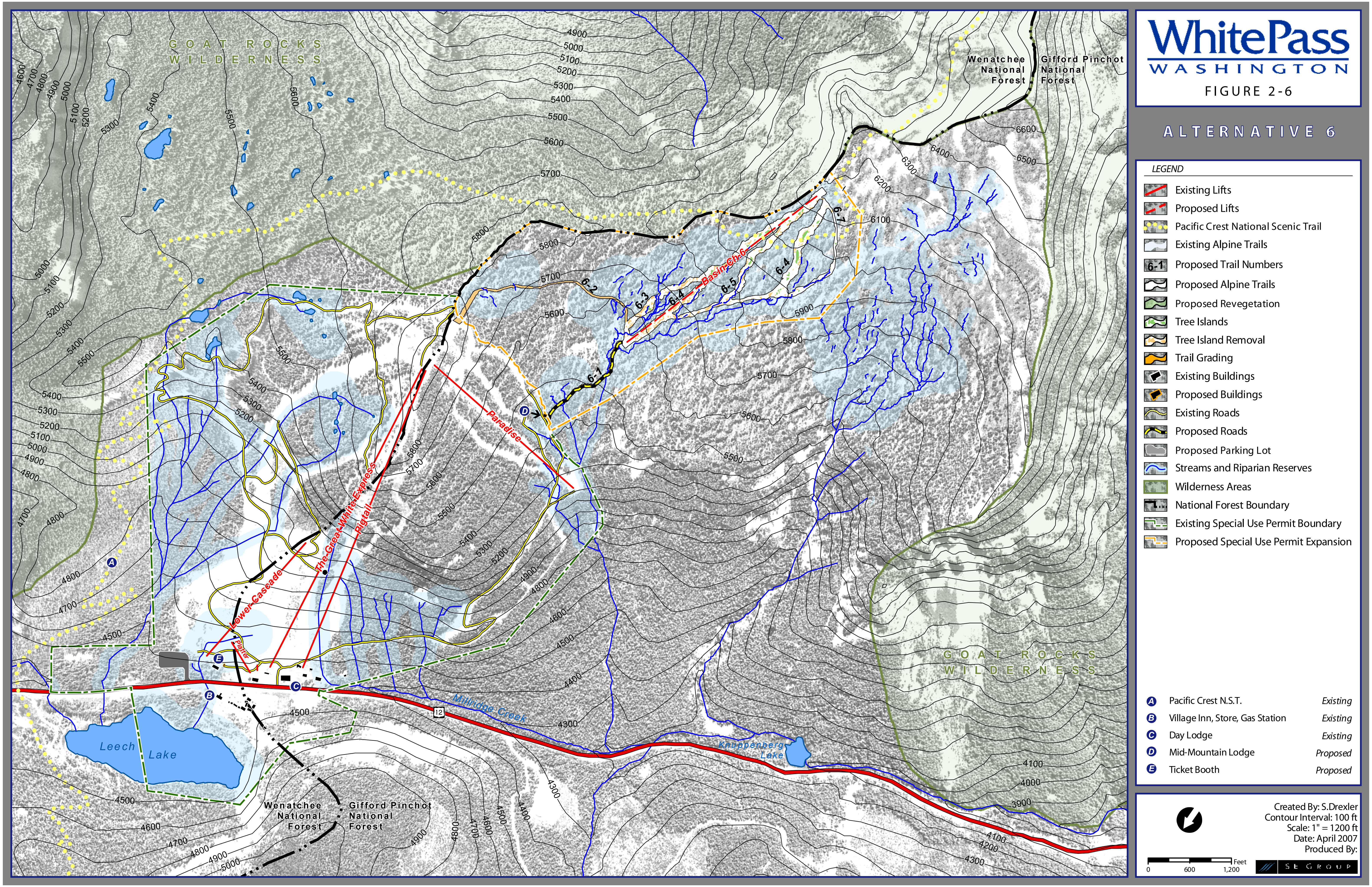
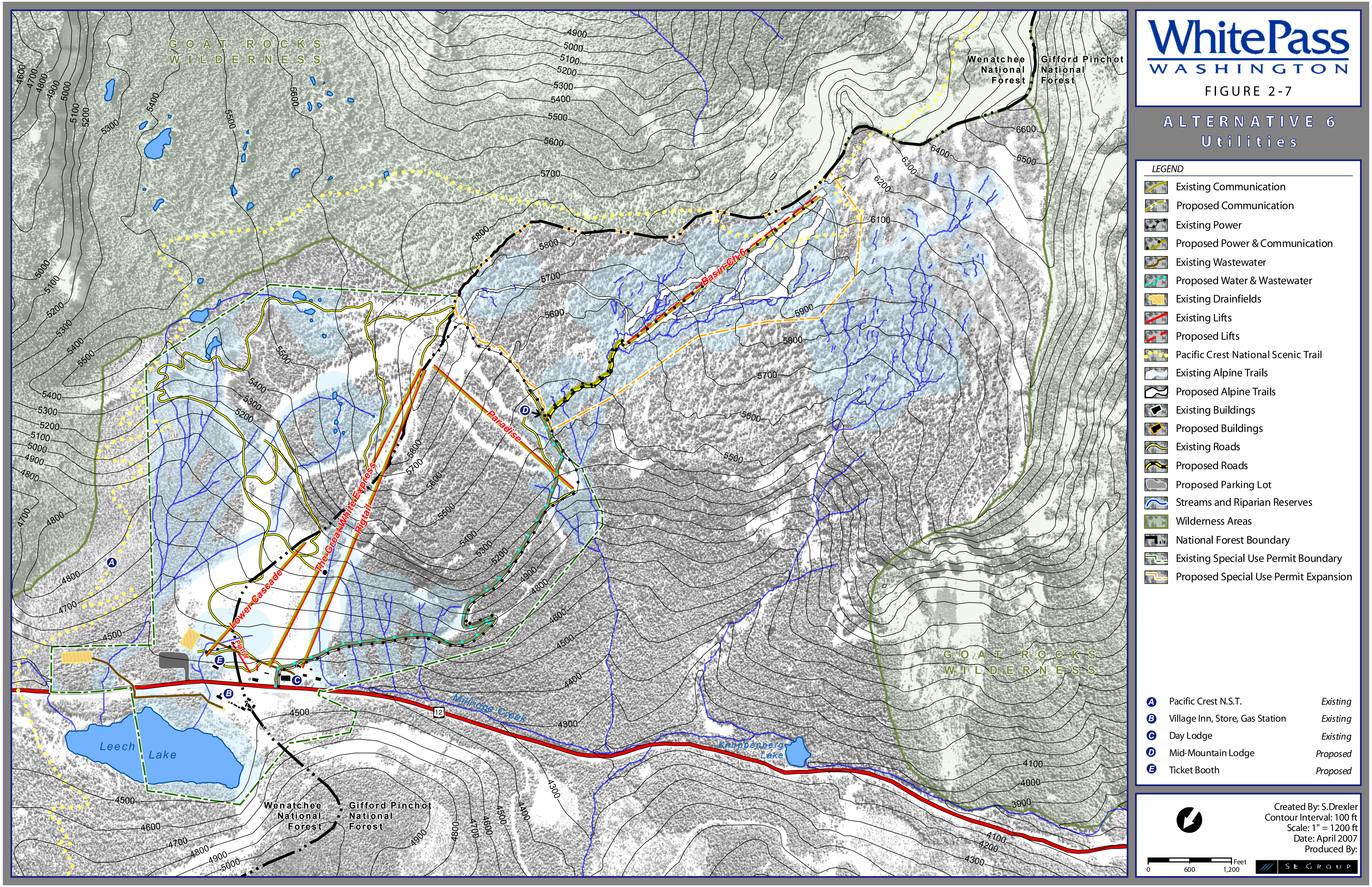

WhitePass
WASHINGTON
FIGURE 2-6
ALTERNATIVE 6
LEGEND
Existing Lifts
Proposed Lifts
Pacific Crest National Scenic Trail
Existing Alpine Trails
Proposed Trail Numbers
Proposed Alpine Trails
Proposed Revegetation
Tree Islands
Tree Island Removal
Trail Grading
Existing Buildings
Proposed Buildings
Existing Roads
Proposed Roads
Proposed Parking Lot
Streams and Riparian Reserves
Wilderness Areas
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
A Pacific Crest N.S.T. Existing
B Village Inn, Store, Gas Station Existing
C Day Lodge Existing
D Mid-Mountain Lodge Proposed
E Ticket Booth Proposed
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
Feet
0 600 1,200
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
Leech Lake
Knuppenberg Lake
Millridge Creek
12
Lower Cascade
The Great White Express
Pigtail
Paradise
Basin Ch-6
Platter
6-1
6-2
6-3
6-4
6-5
6-7


WhitePass
WASHINGTON
FIGURE 2-7
ALTERNATIVE 6
Utilities
LEGEND
Existing Communication
Proposed Communication
Existing Power
Proposed Power & Communication
Existing Wastewater
Proposed Water & Wastewater
Existing Drainfields
Existing Lifts
Proposed Lifts
Pacific Crest National Scenic Trail
Existing Alpine Trails
Proposed Alpine Trails
Existing Buildings
Proposed Buildings
Existing Roads
Proposed Roads
Proposed Parking Lot
Streams and Riparian Reserves
Wilderness Areas
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
A Pacific Crest N.S.T. Existing
B Village Inn, Store, Gas Station Existing
C Day Lodge Existing
D Mid-Mountain Lodge Proposed
E Ticket Booth Proposed
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
0 600 1,200 Feet
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
Basin Ch 6
Paradise
The Great White Express
Pigtail
Lower Cascade
Leech Lake
Millridge Creek
Knuppenberg Lake
12

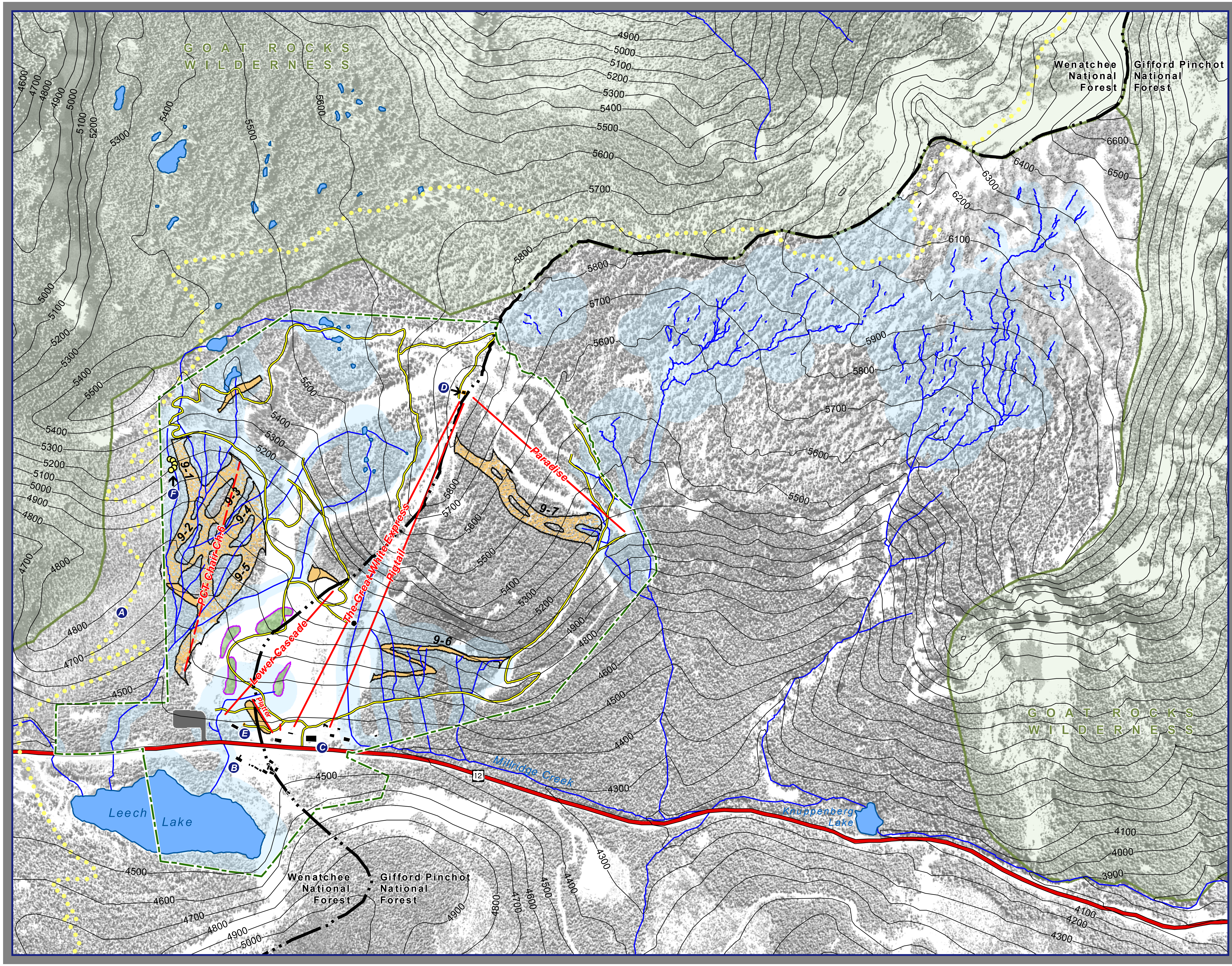


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FIGURE 2-8

ALTERNATIVE 9

LEGEND

- Existing Lifts
- Proposed Lifts
- Pacific Crest National Scenic Trail
- PCNST Re-Route
- Existing Alpine Trails
- 9-1 Proposed Trail Numbers
- Tree Island Removal
- Trail Grading
- Proposed Revegetation
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Parking Lot
- Streams and Riparian Reserves
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary

A	Pacific Crest N.S.T.	*Existing*
B	Village Inn, Store, Gas Station	*Existing*
C	Day Lodge	*Existing*
D	Mid-Mountain Lodge	*Proposed*
E	Ticket Booth	*Proposed*
F	PCT Re-Route	*Proposed*

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Scale: 1" = 1200 ft
Date: April 2007
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SE GROUP

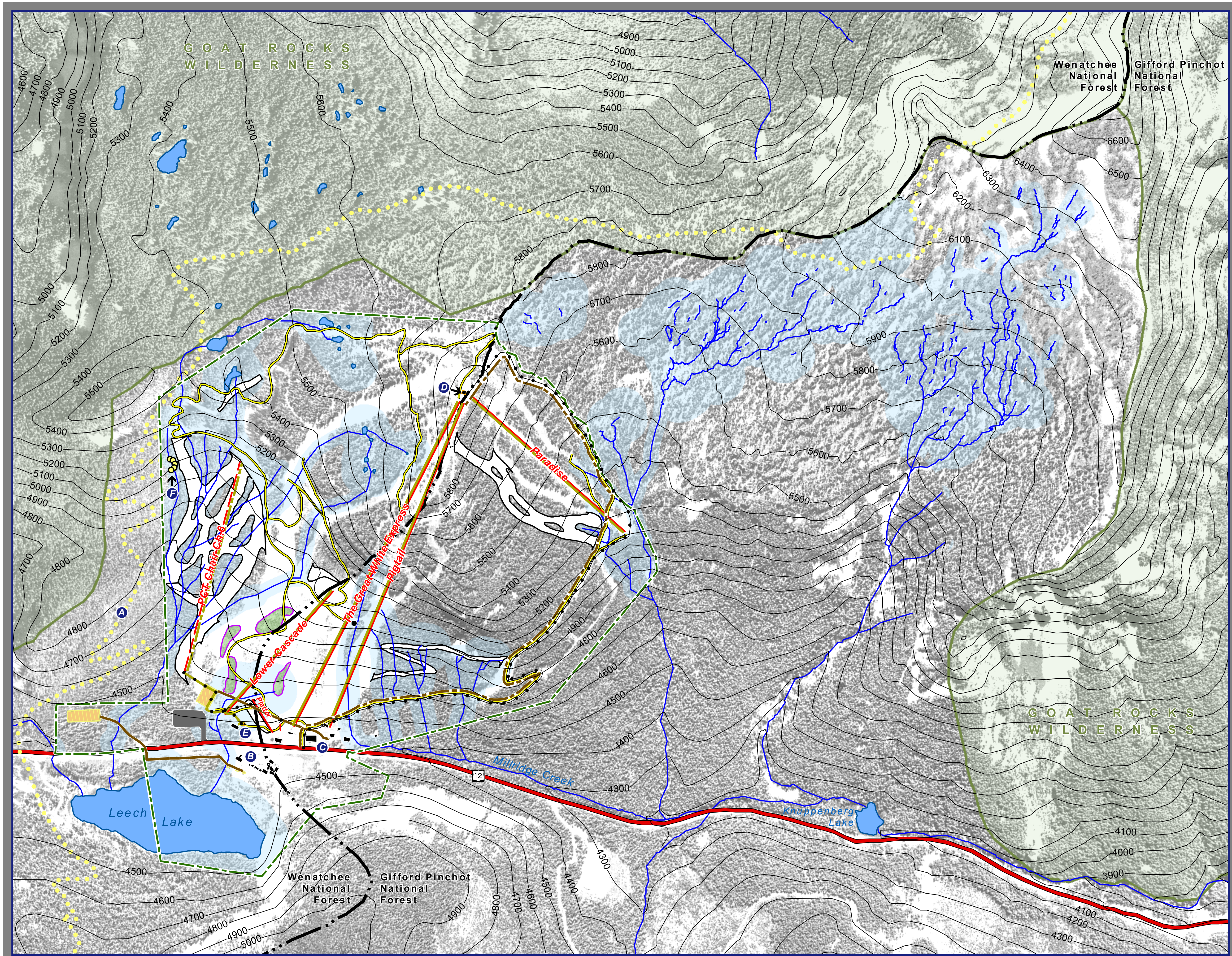

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FIGURE 2-9

ALTERNATIVE 9
Utilities

LEGEND

- Existing Communication
- Proposed Communication Only
- Existing Power
- Proposed Power & Communication
- Existing Wastewater
- Proposed Wastewater
- Existing Drainfields
- Existing Lifts
- Proposed Lifts
- Pacific Crest National Scenic Trail
- PCNST Re-Route
- Existing Alpine Trails
- Proposed Alpine Trails
- Proposed Revegetation
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Parking Lot
- Streams and Riparian Reserves
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary

A	Pacific Crest N.S.T.	Existing
B	Village Inn, Store, Gas Station	Existing
C	Day Lodge	Existing
D	Mid-Mountain Lodge	Proposed
E	Ticket Booth	Proposed
F	PCT Re-Route	Proposed

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Date: April 2007
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0 600 1,200 Feet

SE GROUP

Chapter 3 Figures

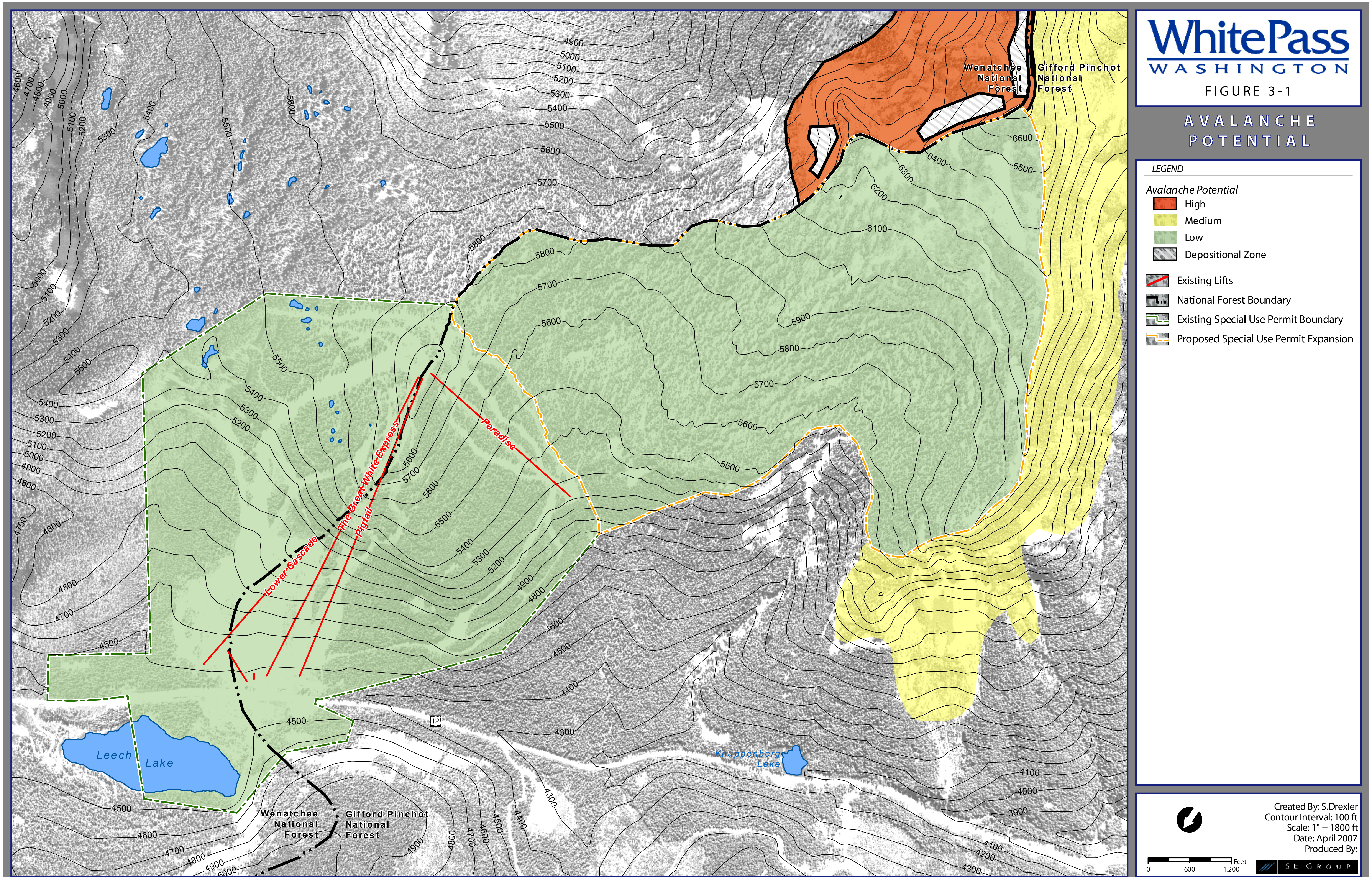

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FIGURE 3-1
AVALANCHE POTENTIAL
LEGEND
Avalanche Potential
High
Medium
Low
Depositional Zone
Existing Lifts
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
Wenatchee National Forest
Gifford Pinchot National Forest
Paradise
the Great White Express
Pigtail
Lower Cascade
Leech Lake
Knuppenberg Lake
12
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Scale: 1" = 1800 ft
Date: April 2007
Produced By:
0 600 1,200 Feet
SE GROUP

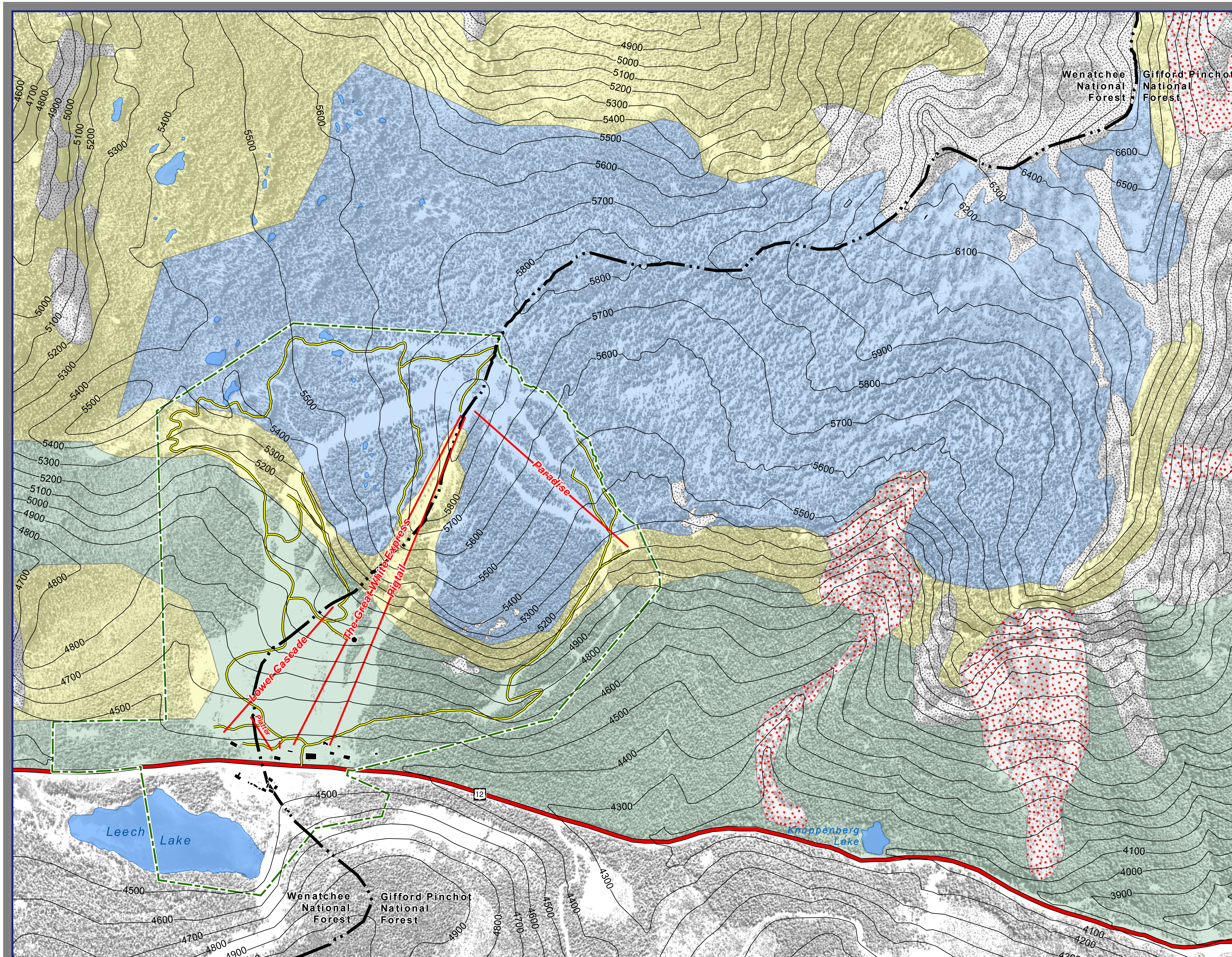

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FIGURE 3-2

GEOLOGY CONDITIONS
No Action

LEGEND

*Land Form Type **

- Land Type A
- Land Type B
- Land Type C
- Talus
- Landslide
- Existing Lifts
- Existing Buildings
- Existing Roads
- National Forest Boundary
- Existing Special Use Permit Boundary

Note: See Appendix F for a more detailed description of each Land Type.

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Scale: 1" = 1200 ft
Date: April 2007
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0 600 1,200 Feet

SE GROUP

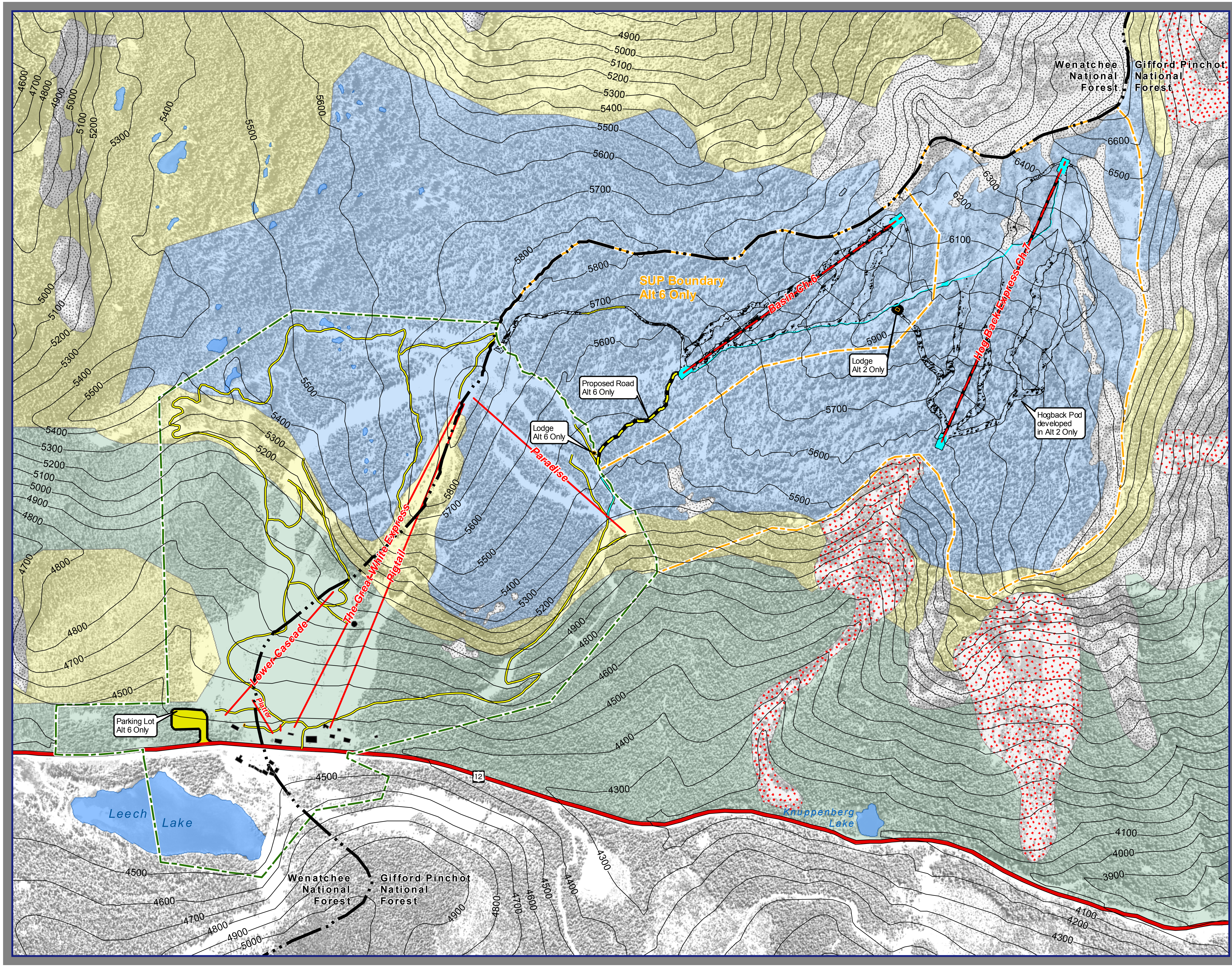

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FIGURE 3-3

GEOLOGY CONDITIONS Alternatives 2 & 6

LEGEND

Disturbance

- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

*Land Form Type **

- Land Type A
- Land Type B
- Land Type C
- Talus
- Landslide

Base Data

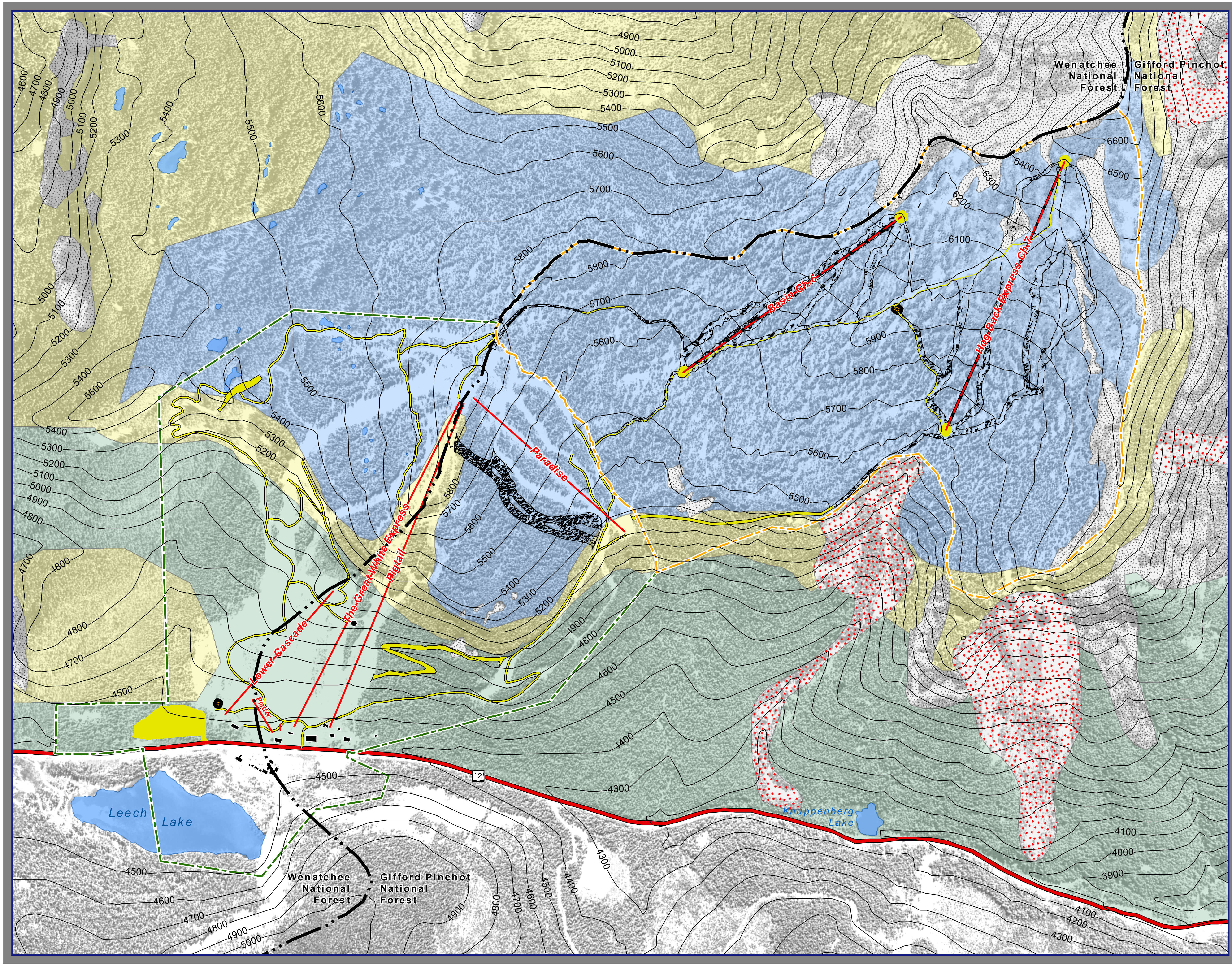
- Proposed Lifts
- Existing Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Road
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Note: See Appendix F for a more detailed description of each Land Type.

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP



White Pass WASHINGTON

FIGURE 3-4

GEOLOGY CONDITIONS
Modified
Alternative 4

LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

*Land Form Type **
- Land Type A
- Land Type B
- Land Type C
- Talus
- Landslide

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Note: See Appendix F for a more detailed description of each Land Type.

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

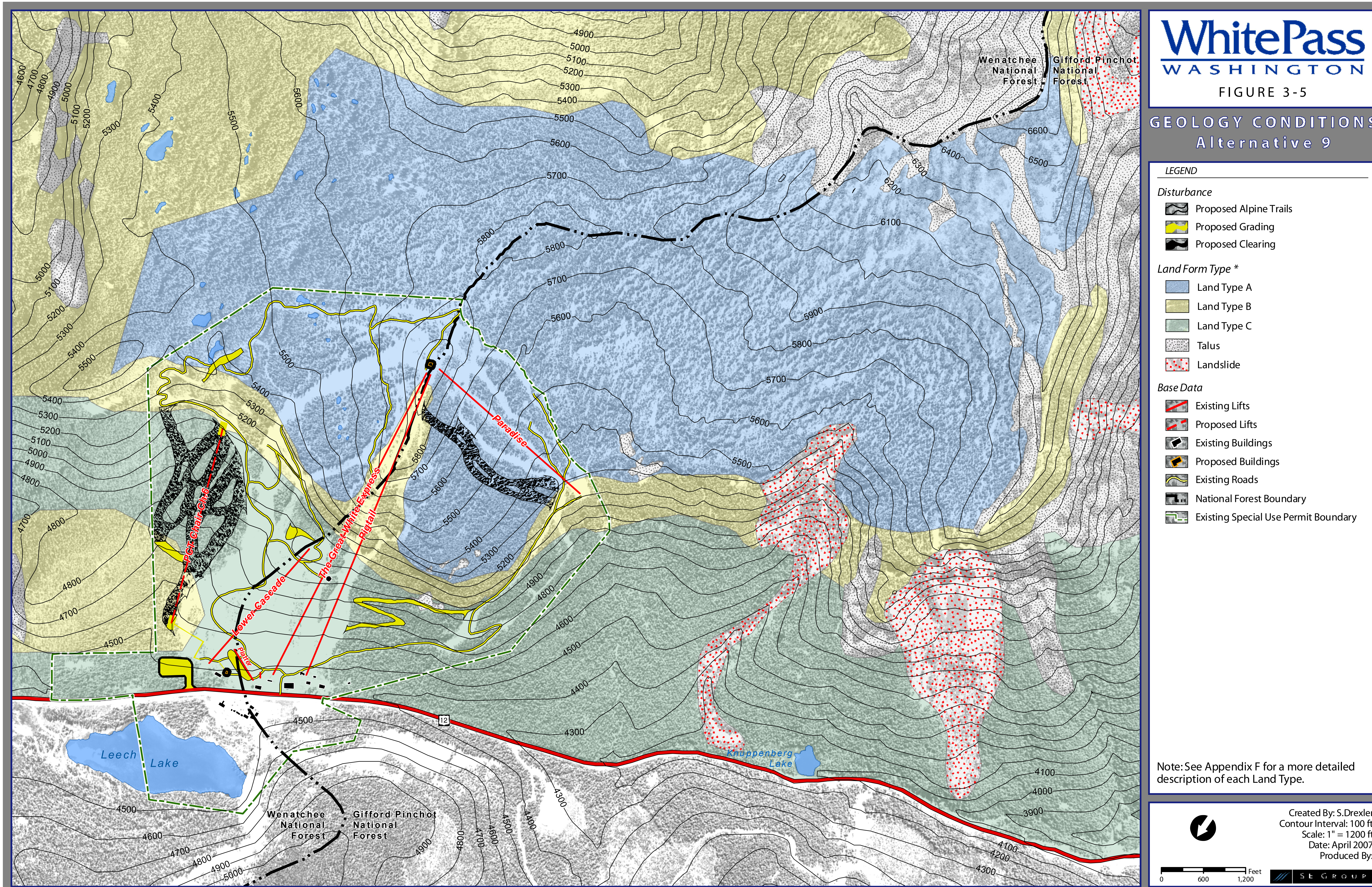


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FIGURE 3-5
GEOLOGY CONDITIONS
Alternative 9
LEGEND
Disturbance
Proposed Alpine Trails
Proposed Grading
Proposed Clearing
Land Form Type *
Land Type A
Land Type B
Land Type C
Talus
Landslide
Base Data
Existing Lifts
Proposed Lifts
Existing Buildings
Proposed Buildings
Existing Roads
National Forest Boundary
Existing Special Use Permit Boundary
Note: See Appendix F for a more detailed description of each Land Type.
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
Feet
0 600 1,200
Wenatchee National Forest
Gifford Pinchot National Forest
Leech Lake
Knuppenberg Lake
Paradise
The Great White Express
Pigtail
Lower Cascade
Pearly Gates
12

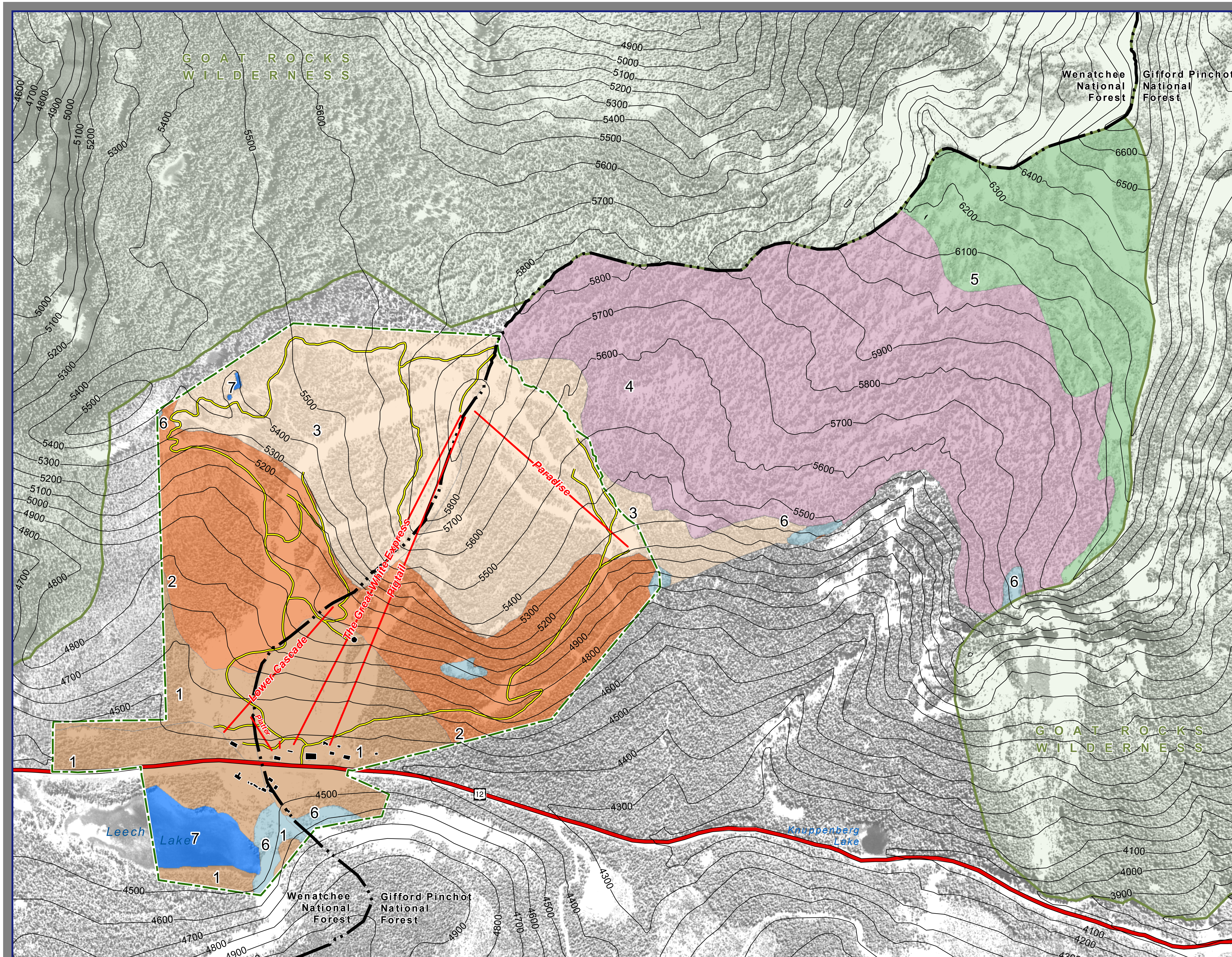

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FIGURE 3-6

SOIL GROUPS

LEGEND

*Soil Group Number **

- 1
- 2
- 3
- 4
- 5
- 6
- 7

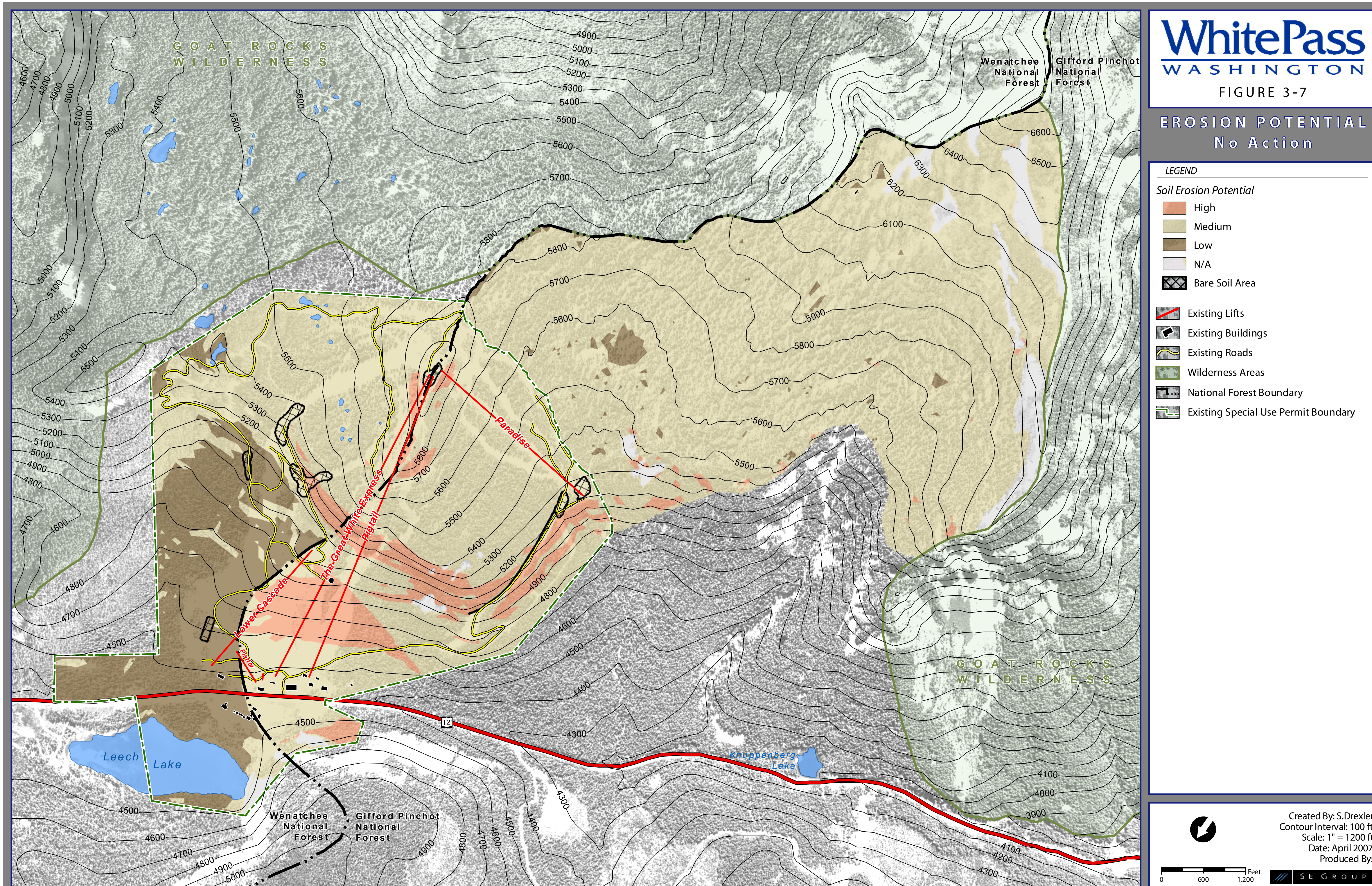
- Existing Lifts
- Existing Buildings
- Existing Roads
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary

Note: Refer to Appendix F for detailed descriptions of the Soil Groups.

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP



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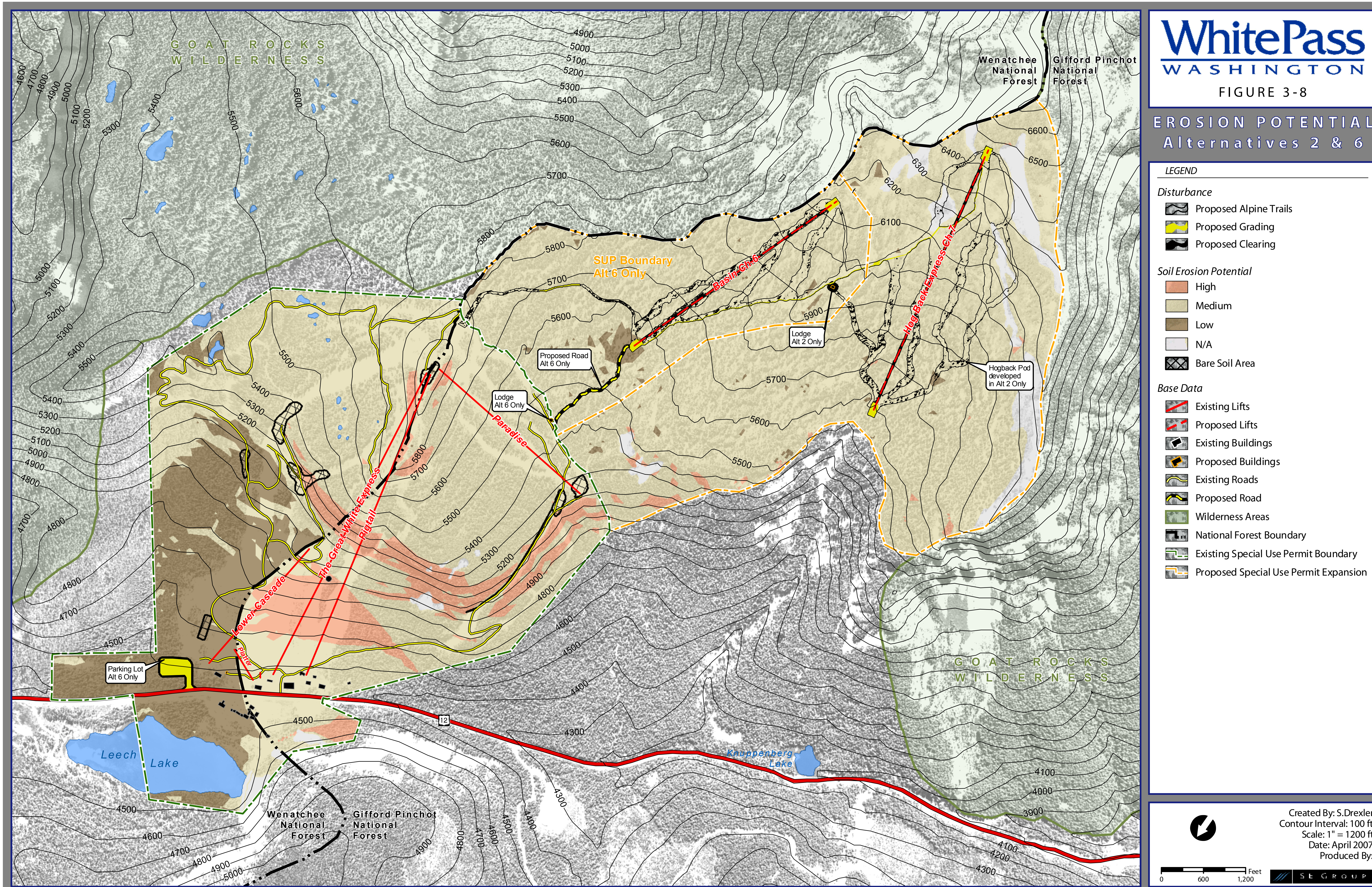
WASHINGTON
FIGURE 3-7
EROSION POTENTIAL
No Action
LEGEND
Soil Erosion Potential
High
Medium
Low
N/A
Bare Soil Area
Existing Lifts
Existing Buildings
Existing Roads
Wilderness Areas
National Forest Boundary
Existing Special Use Permit Boundary
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
Feet
0
600
1,200
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
Paradise
The Great White Express
Pigtail
Lower Cascade
Platter
Leech Lake
Knuppenberg Lake
12



WhitePass
WASHINGTON
FIGURE 3-8
EROSION POTENTIAL
Alternatives 2 & 6
LEGEND
Disturbance
Proposed Alpine Trails
Proposed Grading
Proposed Clearing
Soil Erosion Potential
High
Medium
Low
N/A
Bare Soil Area
Base Data
Existing Lifts
Proposed Lifts
Existing Buildings
Proposed Buildings
Existing Roads
Proposed Road
Wilderness Areas
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
Feet
0
600
1,200
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
SUP Boundary Alt 6 Only
Basin Ch 6
Hog Back Express Ch 7
Lodge Alt 2 Only
Hogback Pod developed in Alt 2 Only
Proposed Road Alt 6 Only
Lodge Alt 6 Only
Paradise
The Great White Express
Pigtail
Lower Cascade
Platter
Parking Lot Alt 6 Only
12
Leech Lake
Knuppenberg Lake

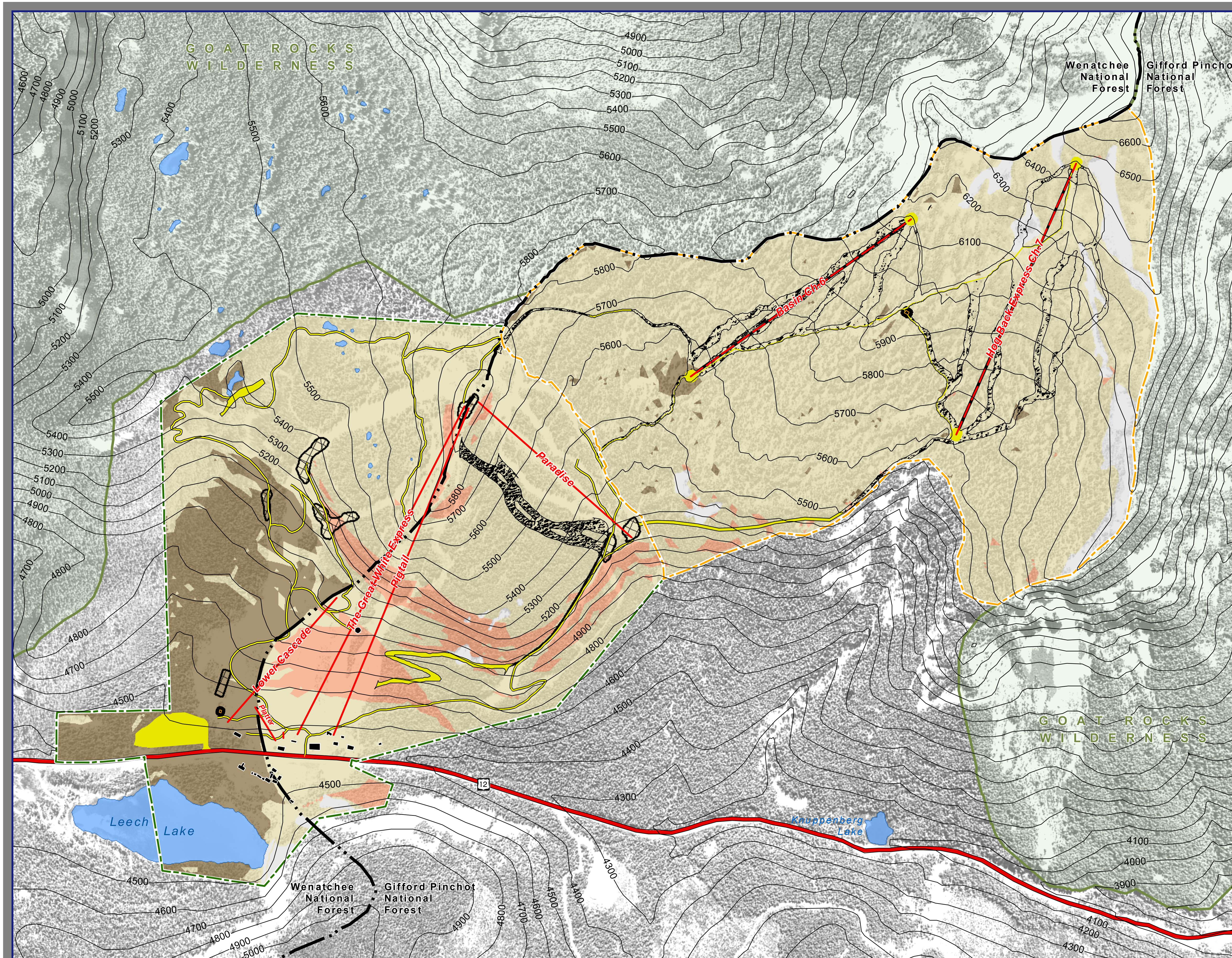


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FIGURE 3-9

EROSION POTENTIAL Modified Alternative 4

LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Soil Erosion Potential
- High
- Medium
- Low
- N/A
- Bare Soil Area

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By: SE GROUP

0 600 1,200 Feet

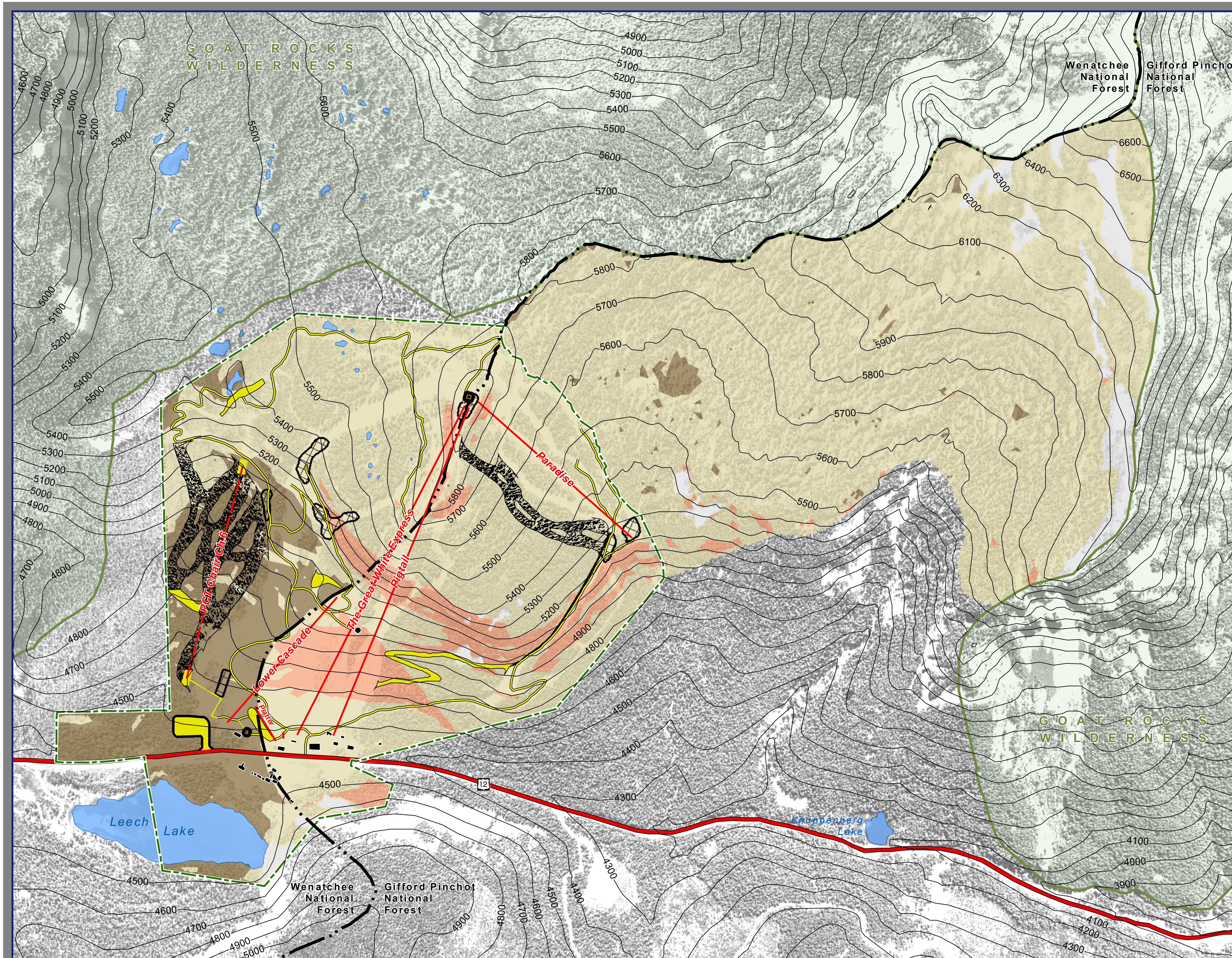

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FIGURE 3-10

EROSION POTENTIAL
Alternative 9

LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Soil Erosion Potential
- High
- Medium
- Low
- N/A
- Bare Soil Area

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

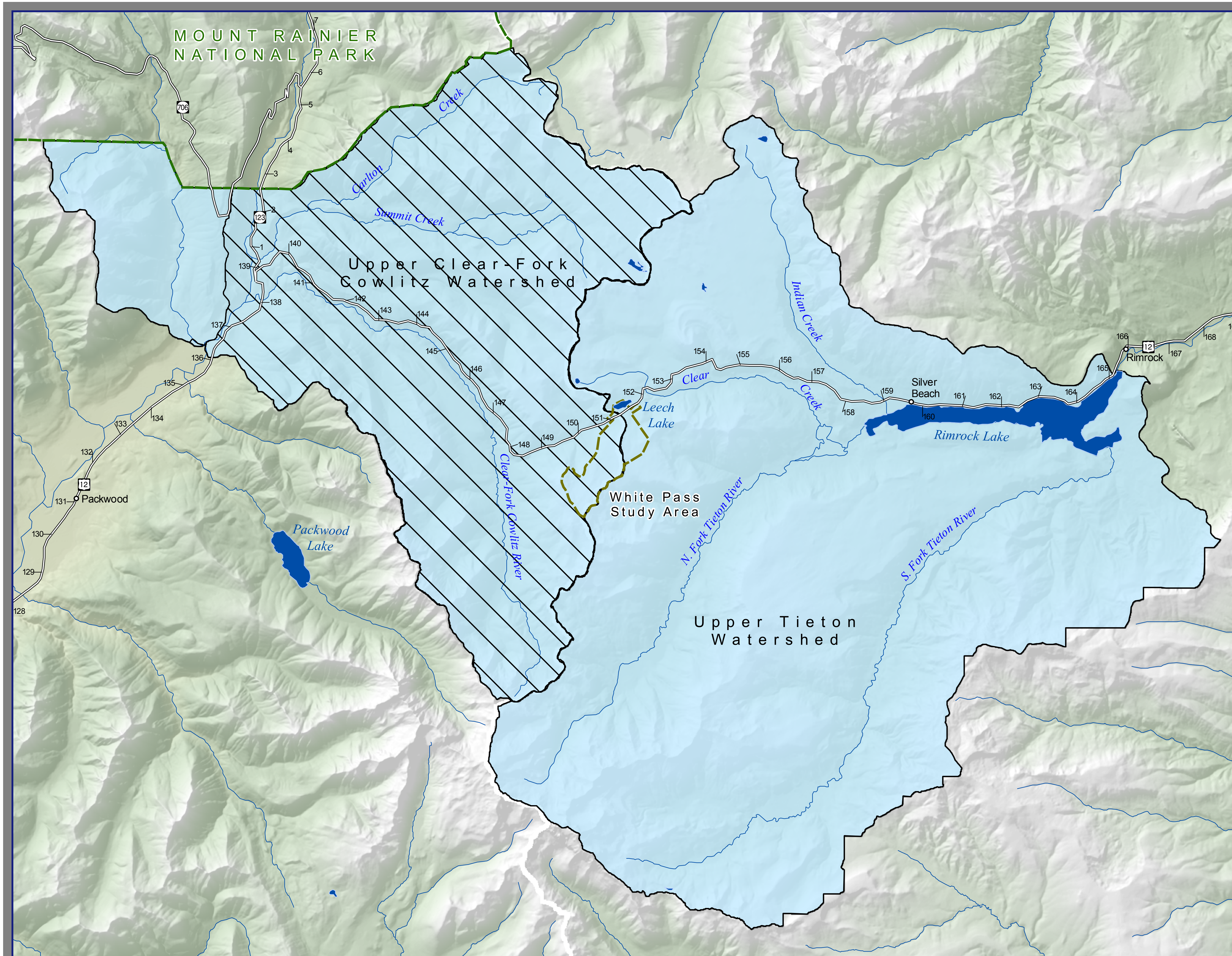

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FIGURE 3-11

Upper 5th Field Watersheds

LEGEND

Base Data

- US Highway Mile Markers
- US Highways
- Mt. Rainier Natl. Park
- White Pass Study Area
- Rivers
- Lakes
- Tier 2 Key Watershed Area
- Upper 5th Field Watershed

Created By: S.Drexler
Scale: 1" = 12,000 ft
Date: April 2007
Produced By:

0 6,000 12,000 Feet

SE GROUP

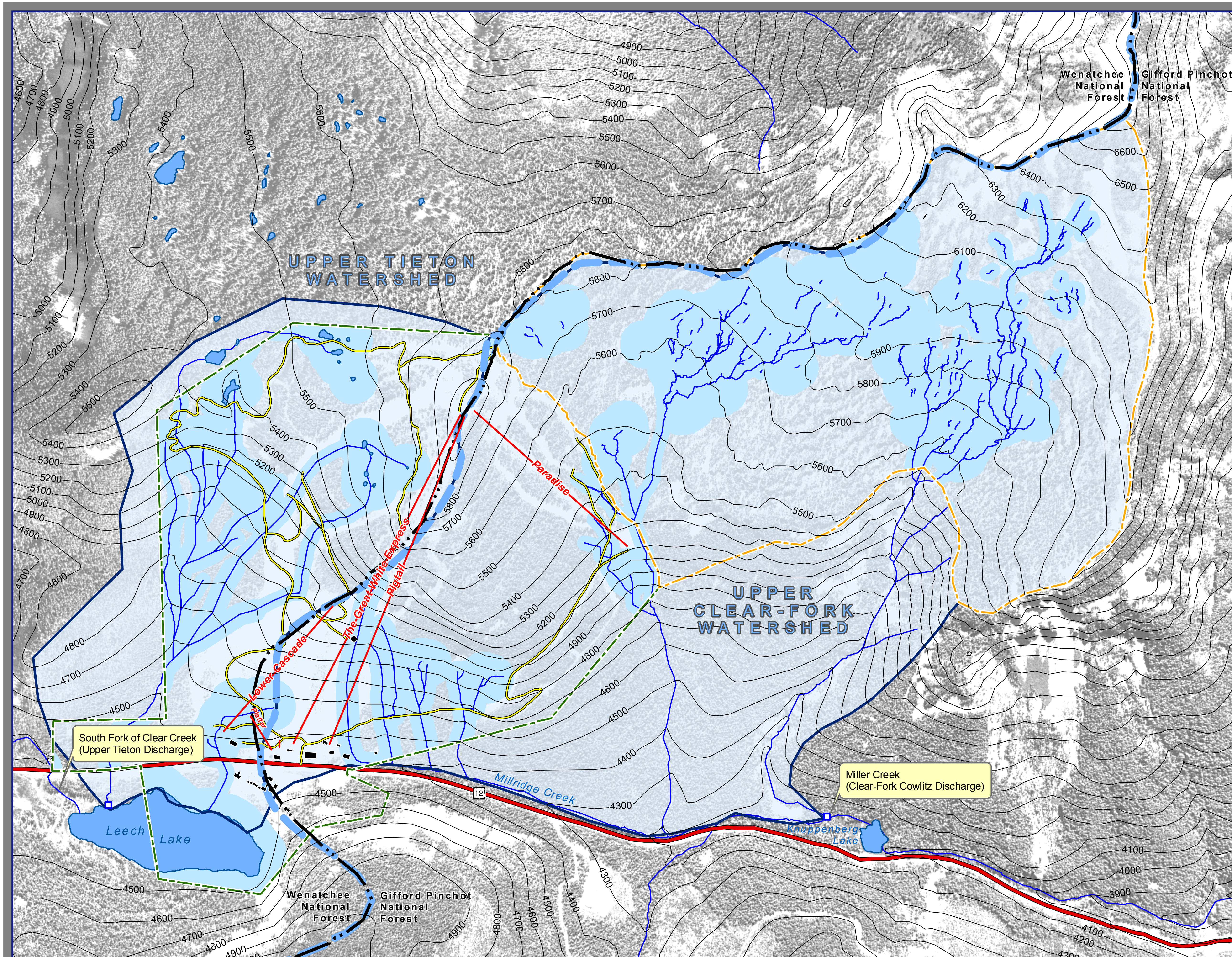

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FIGURE 3-12

FLOW MODEL ANALYSIS AREA

LEGEND

- Flow Model Analysis Area
- Streams and Riparian Reserves
- 5th Field Watershed Boundary
- Existing Lifts
- Existing Buildings
- Existing Roads
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Boundary

Created By: S.Drexler
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

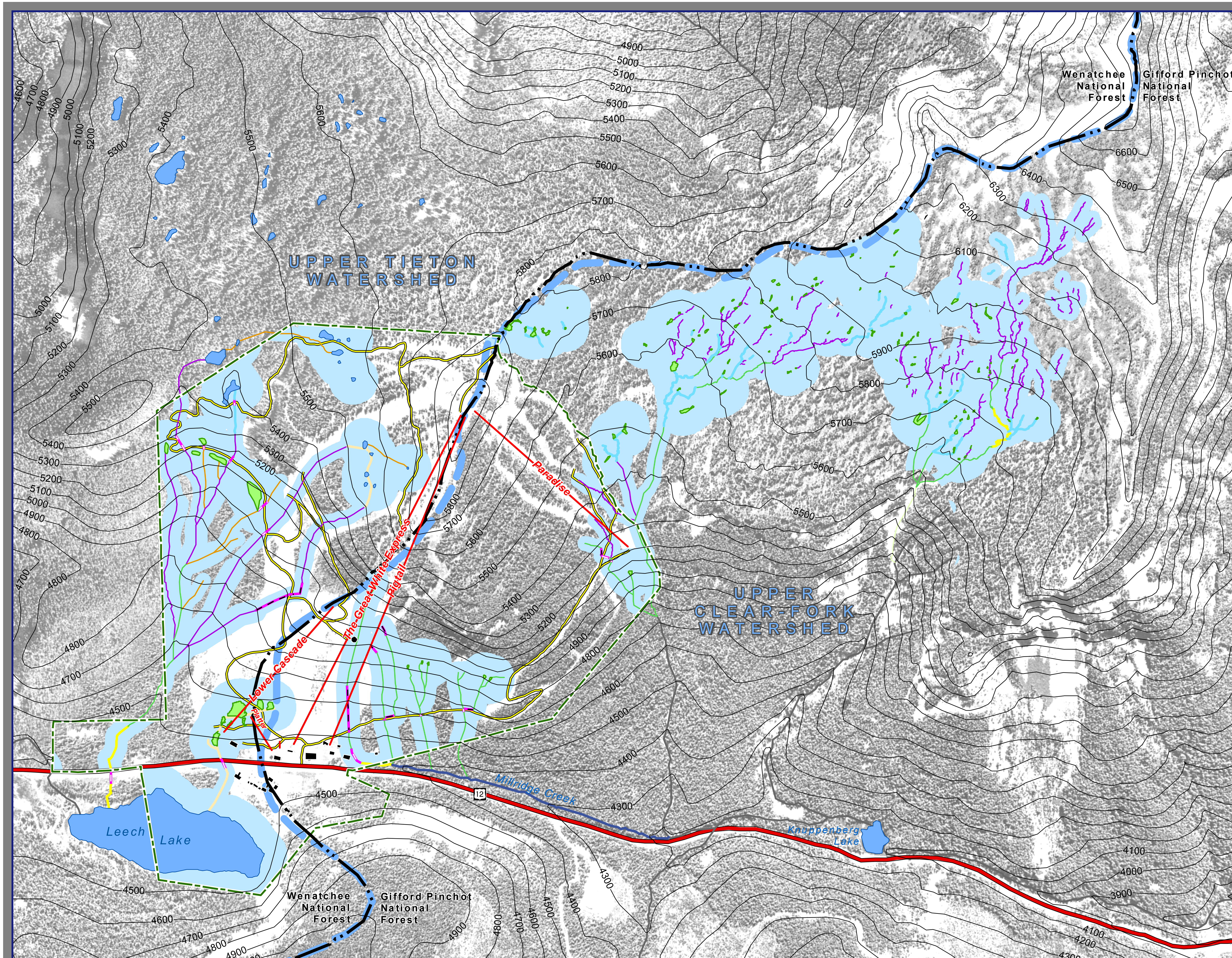

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FIGURE 3-13

STREAMS (ROSGEN TYPE)

No Action

LEGEND

*Streams (Rosgen Type) **

- A2
- A3
- A4
- A5
- A2a+
- A3a+
- A4a+
- A5a+
- Culvert
- Flume
- N/A

Base Data

- 5th Field Watershed Boundary
- Riparian Reserves
- Wetlands
- Existing Lifts
- Existing Buildings
- Existing Roads
- National Forest Boundary
- Existing Special Use Permit Boundary

Note: Detailed descriptions of stream Rosgen Types can be found in FEIS section 3.3 - Watershed Resources.

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

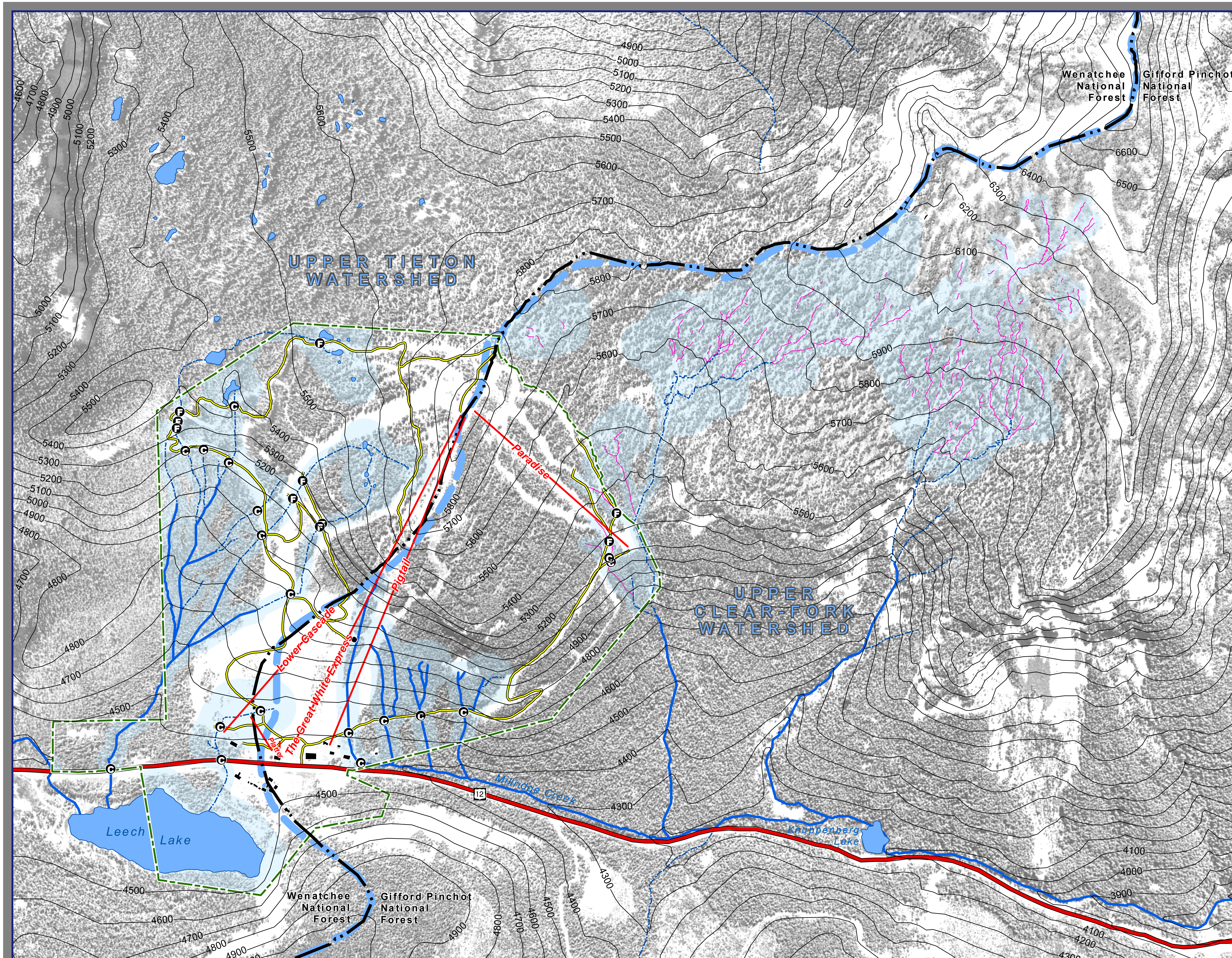

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FIGURE 3-14

STREAM IMPACTS
No Action

LEGEND

Existing Stream Crossings
- Culvert (18)
- Ford (10)

Stream Flow Regime
- Perennial
- Intermittent
- Ephemeral

Base Data
- 5th Field Watershed Boundary
- Riparian Reserves
- Existing Lifts
- Existing Buildings
- Existing Roads
- National Forest Boundary
- Existing Special Use Permit Boundary

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

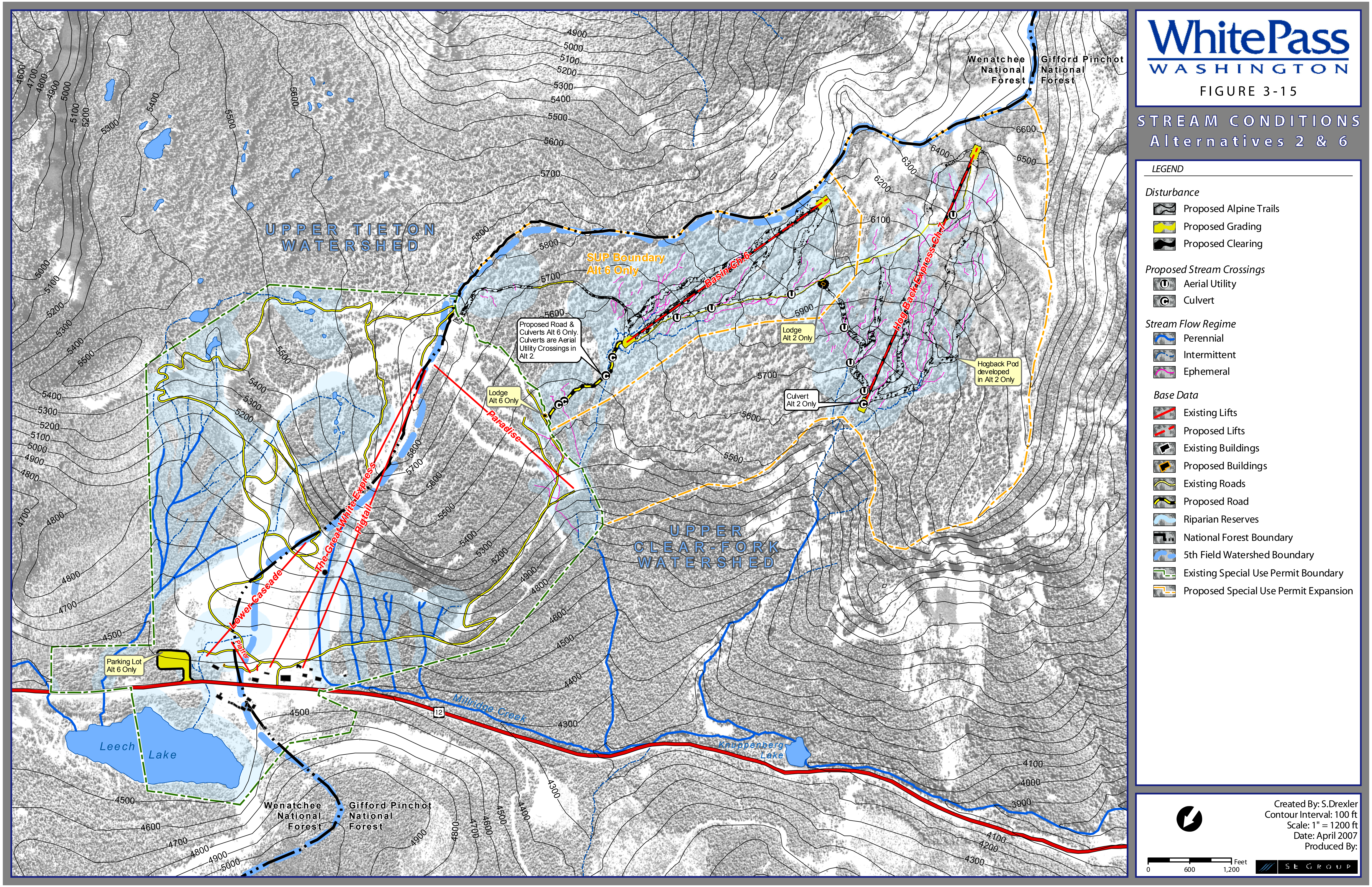

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FIGURE 3-15
STREAM CONDITIONS
Alternatives 2 & 6
LEGEND
Disturbance
Proposed Alpine Trails
Proposed Grading
Proposed Clearing
Proposed Stream Crossings
Aerial Utility
Culvert
Stream Flow Regime
Perennial
Intermittent
Ephemeral
Base Data
Existing Lifts
Proposed Lifts
Existing Buildings
Proposed Buildings
Existing Roads
Proposed Road
Riparian Reserves
National Forest Boundary
5th Field Watershed Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
Feet
0
600
1,200
UPPER TIETON WATERSHED
UPPER CLEAR-FORK WATERSHED
SUP Boundary Alt 6 Only
Wenatchee National Forest
Gifford Pinchot National Forest
Proposed Road & Culverts Alt 6 Only. Culverts are Aerial Utility Crossings in Alt 2.
Lodge Alt 6 Only
Lodge Alt 2 Only
Culvert Alt 2 Only
Hogback Pod developed in Alt 2 Only
Parking Lot Alt 6 Only
Basin Ch.6
Hog Back Express Ch.7
Paradise
The Great White Express
Pigtail
Lower Cascade
Platter
Millridge Creek
Leech Lake
Knuppenberg Lake
12

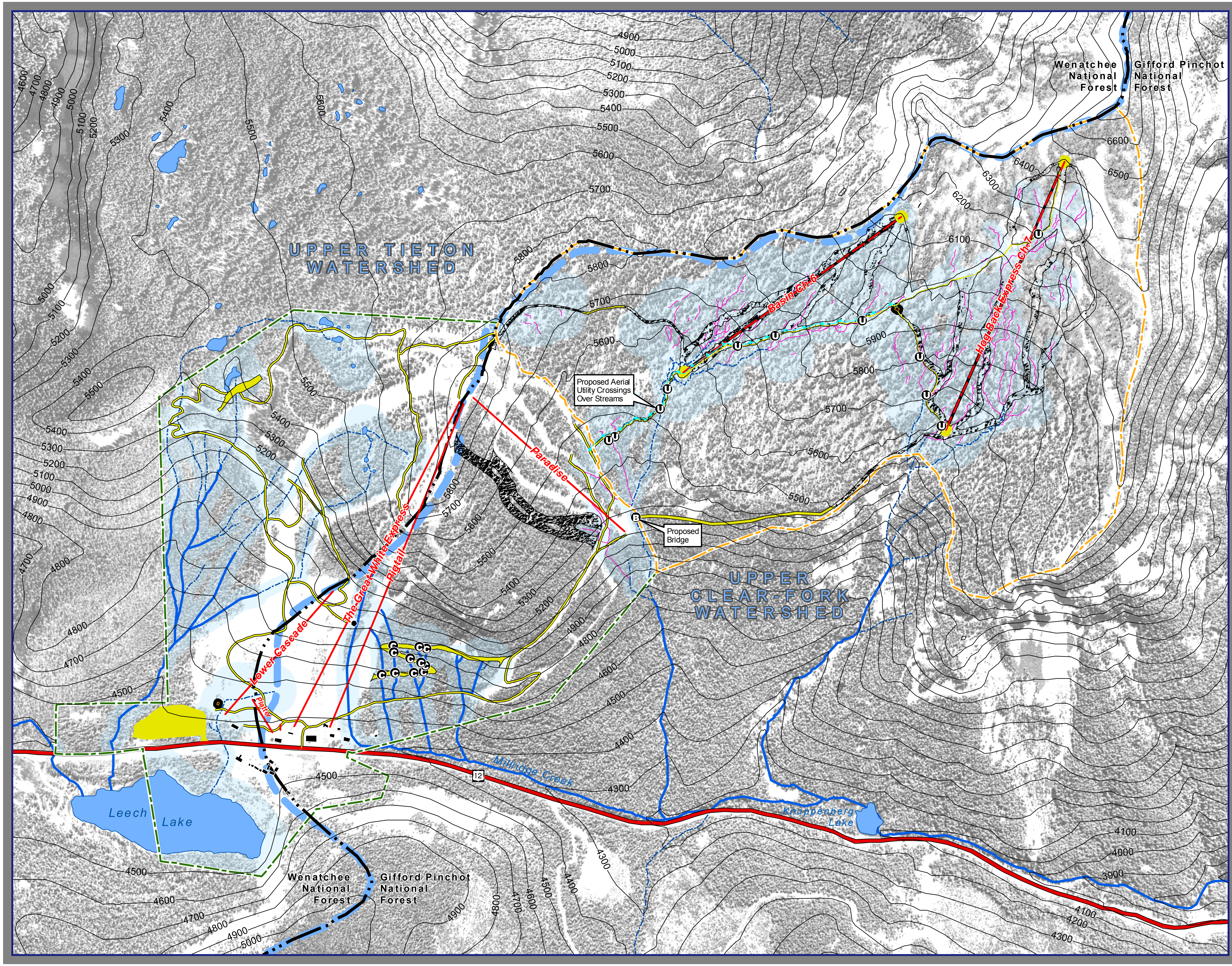

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FIGURE 3-16

STREAM CONDITIONS
Modified
Alternative 4

LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Proposed Stream Crossings
- U Aerial Utility
- B Bridge
- C Culvert

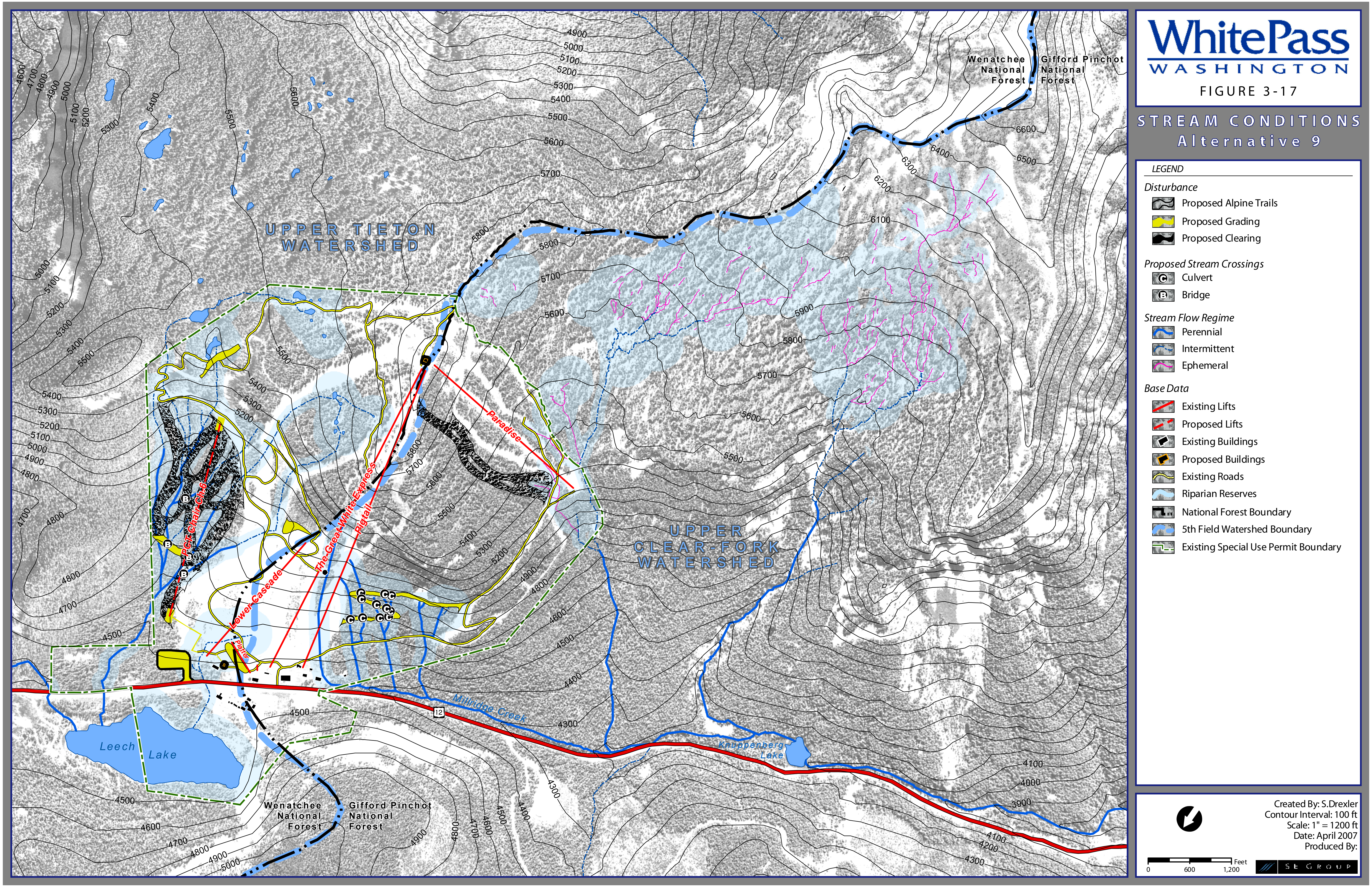
Stream Flow Regime
- Perennial
- Intermittent
- Ephemeral

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Water Line
- Riparian Reserves
- National Forest Boundary
- 5th Field Watershed Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP



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WASHINGTON
FIGURE 3-17
STREAM CONDITIONS
Alternative 9
LEGEND
Disturbance
Proposed Alpine Trails
Proposed Grading
Proposed Clearing
Proposed Stream Crossings
Culvert
Bridge
Stream Flow Regime
Perennial
Intermittent
Ephemeral
Base Data
Existing Lifts
Proposed Lifts
Existing Buildings
Proposed Buildings
Existing Roads
Riparian Reserves
National Forest Boundary
5th Field Watershed Boundary
Existing Special Use Permit Boundary
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
0 600 1,200 Feet
SE GROUP
UPPER TIETON WATERSHED
UPPER CLEAR FORK WATERSHED
Wenatchee National Forest
Gifford Pinchot National Forest
Leech Lake
Knuppenberg Lake
Millridge Creek
Paradise
Pigtail
The Great White Express
Lower Cascade
PCT Chair Ch 6
12

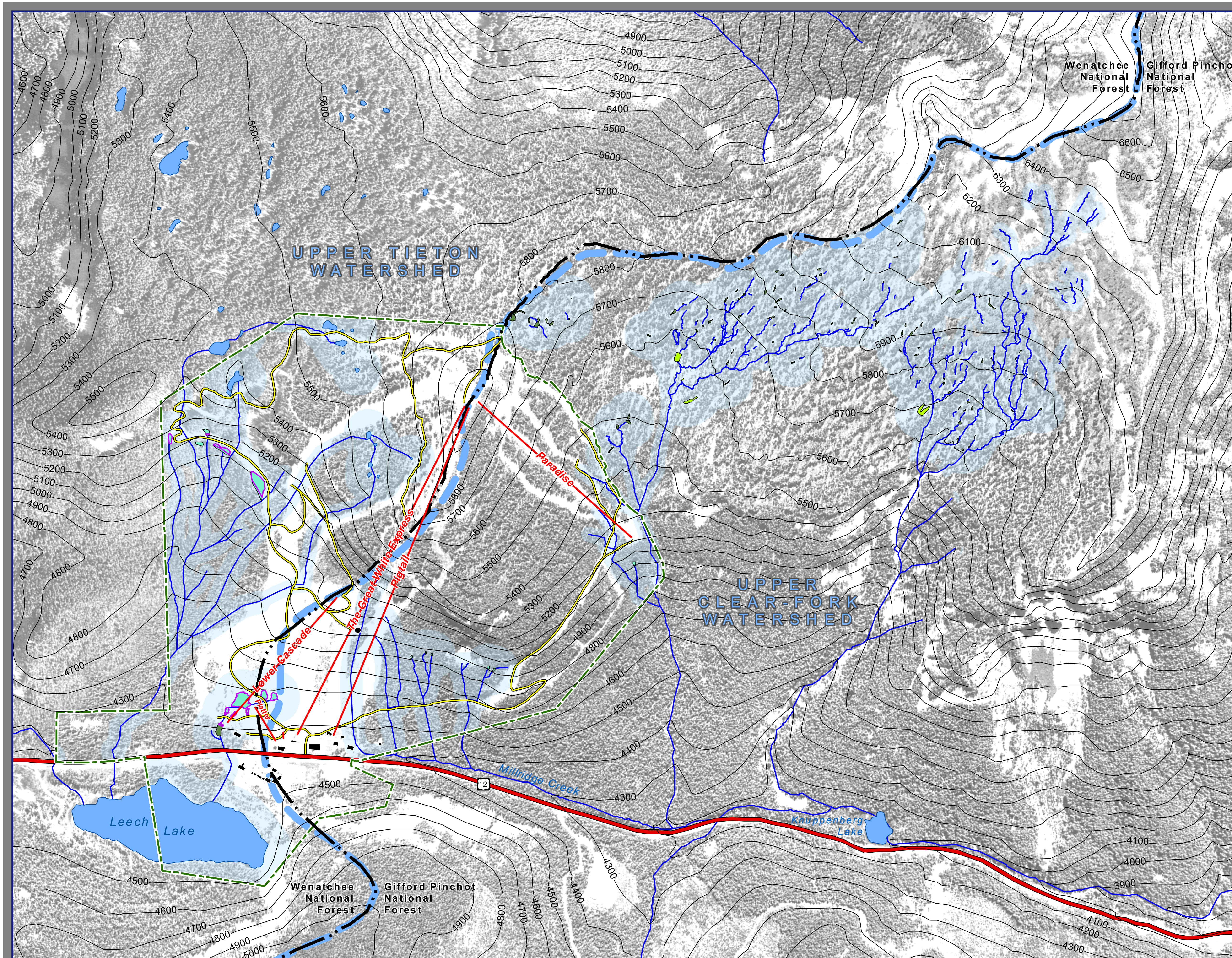

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FIGURE 3-18

WETLANDS
No Action

LEGEND

Wetlands

- Depressional
- Slope
- Riverine
- Existing Impacted Wetland

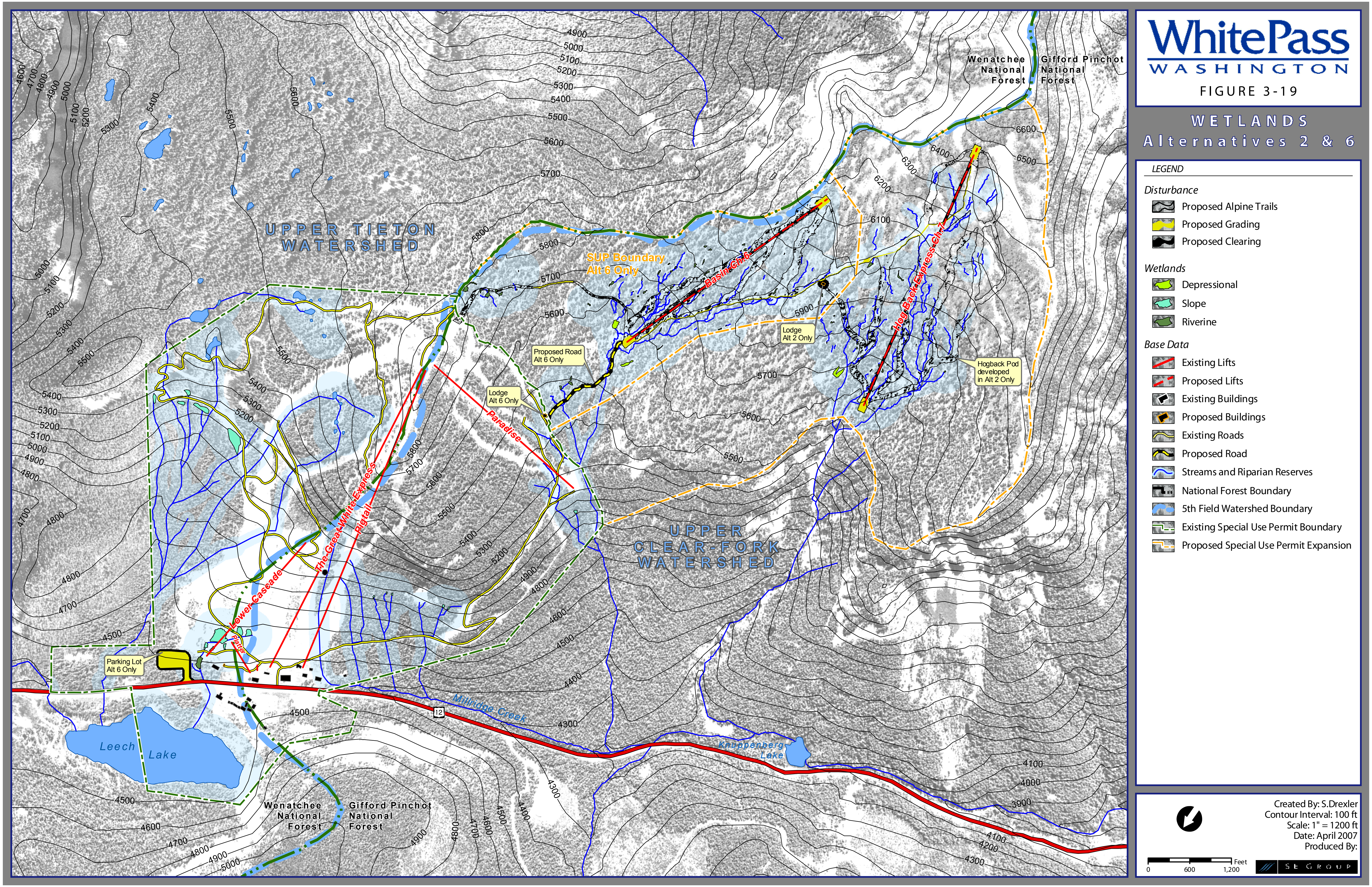
Base Data

- Existing Lifts
- Existing Buildings
- Existing Roads
- Streams and Riparian Reserves
- National Forest Boundary
- 5th Field Watershed Boundary
- Existing Special Use Permit Boundary

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP


WhitePass
WASHINGTON
FIGURE 3-19
WETLANDS
Alternatives 2 & 6
LEGEND
Disturbance
Proposed Alpine Trails
Proposed Grading
Proposed Clearing
Wetlands
Depressional
Slope
Riverine
Base Data
Existing Lifts
Proposed Lifts
Existing Buildings
Proposed Buildings
Existing Roads
Proposed Road
Streams and Riparian Reserves
National Forest Boundary
5th Field Watershed Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
Feet
0
600
1,200
SE GROUP
UPPER TIETON WATERSHED
UPPER CLEAR FORK WATERSHED
SUP Boundary Alt 6 Only
Wenatchee National Forest
Gifford Pinchot National Forest
Basin Ch.6
Hog Back Express Ch.7
Lodge Alt 2 Only
Hogback Pod developed in Alt 2 Only
Proposed Road Alt 6 Only
Lodge Alt 6 Only
Paradise
The Great White Express
Pigtail
Lower Cascade
Platter
Parking Lot Alt 6 Only
Millridge Creek
Knuppenberg Lake
Leech Lake
12

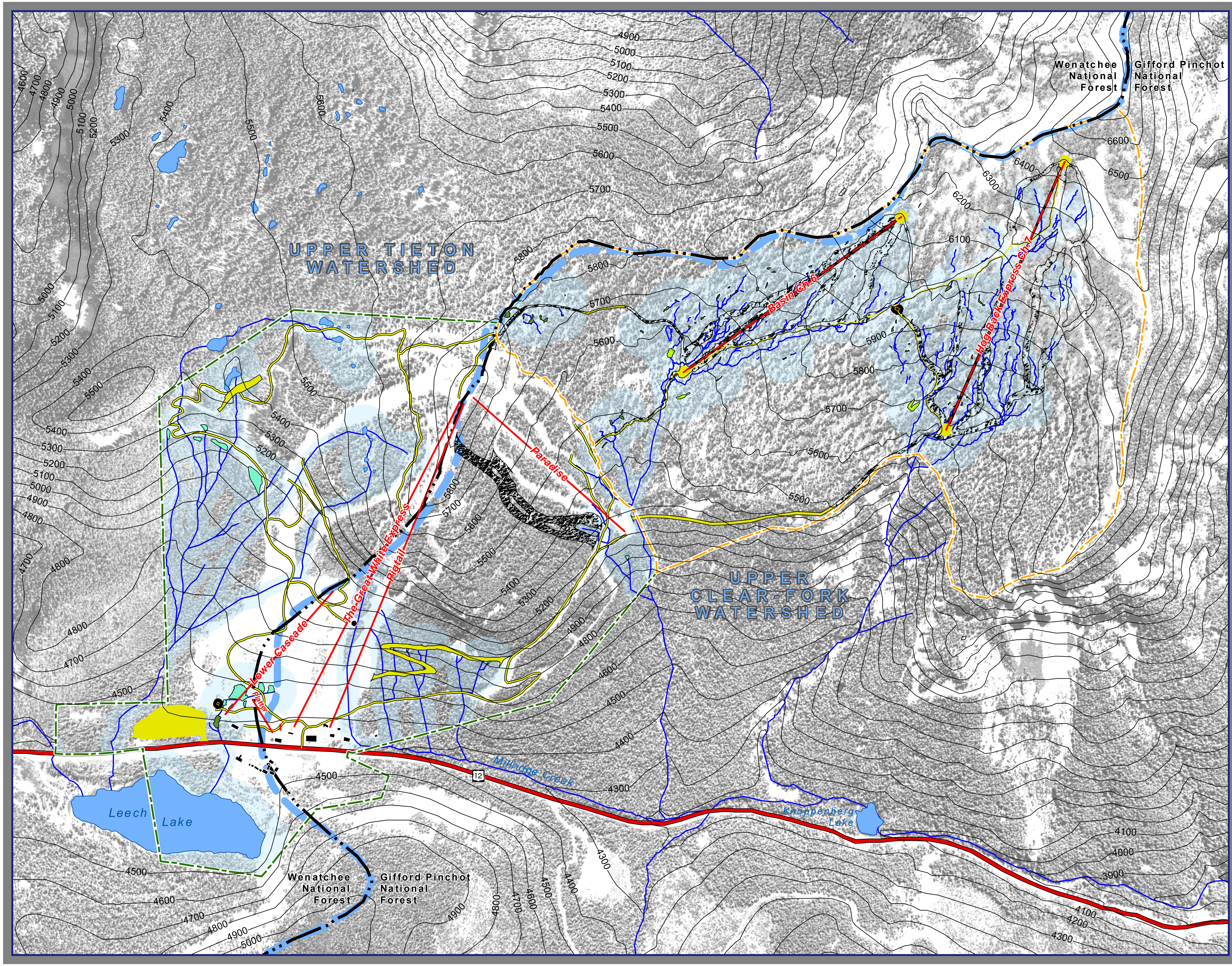


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FIGURE 3-20

WETLANDS Modified Alternative 4

LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Wetlands
- Depressional
- Slope
- Riverine

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Road
- Streams and Riparian Reserves
- National Forest Boundary
- 5th Field Watershed Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

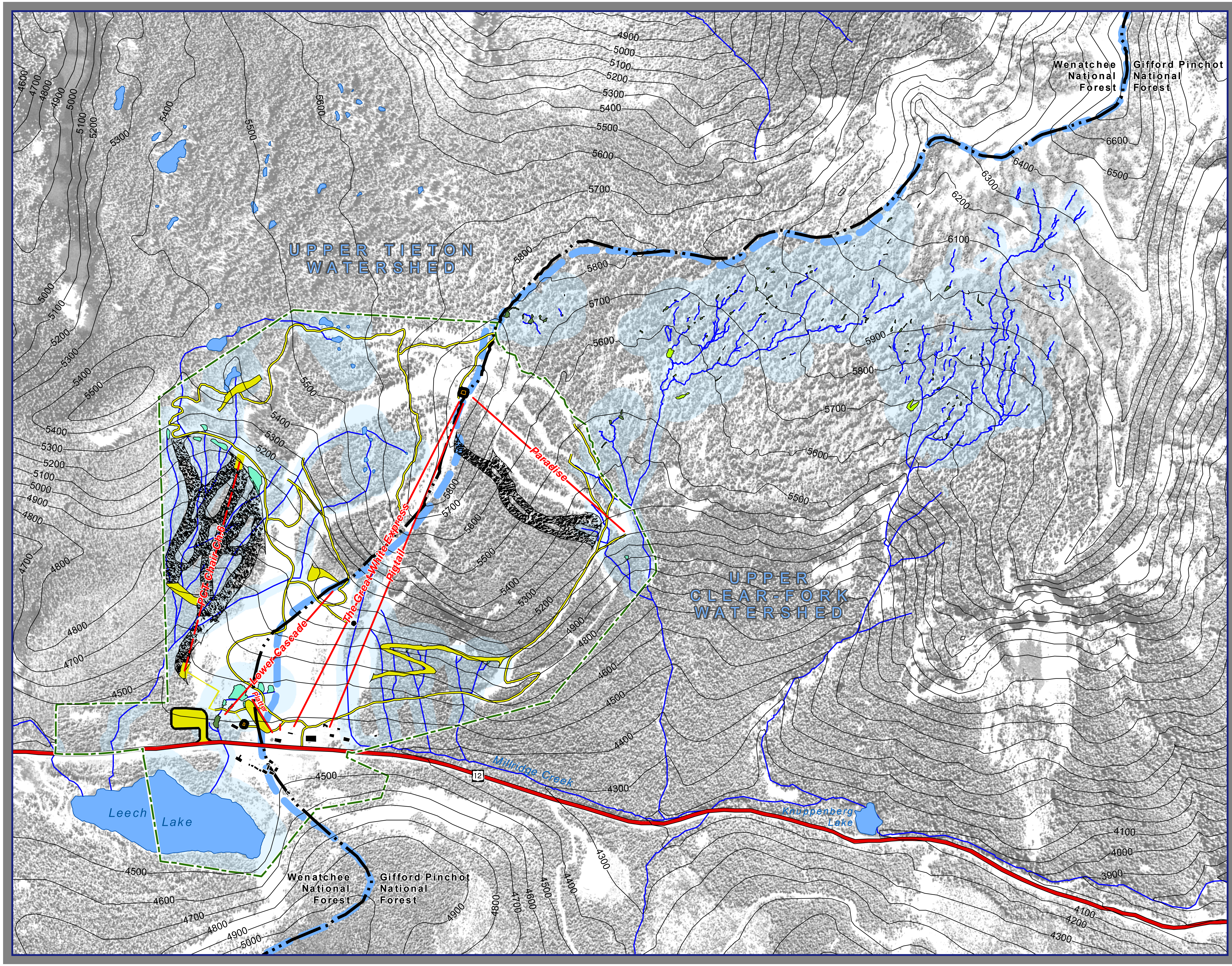

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FIGURE 3-21

WETLANDS Alternative 9

LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Wetlands
- Depressional
- Slope
- Riverine

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Road
- Streams and Riparian Reserves
- National Forest Boundary
- 5th Field Watershed Boundary
- Existing Special Use Permit Boundary

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

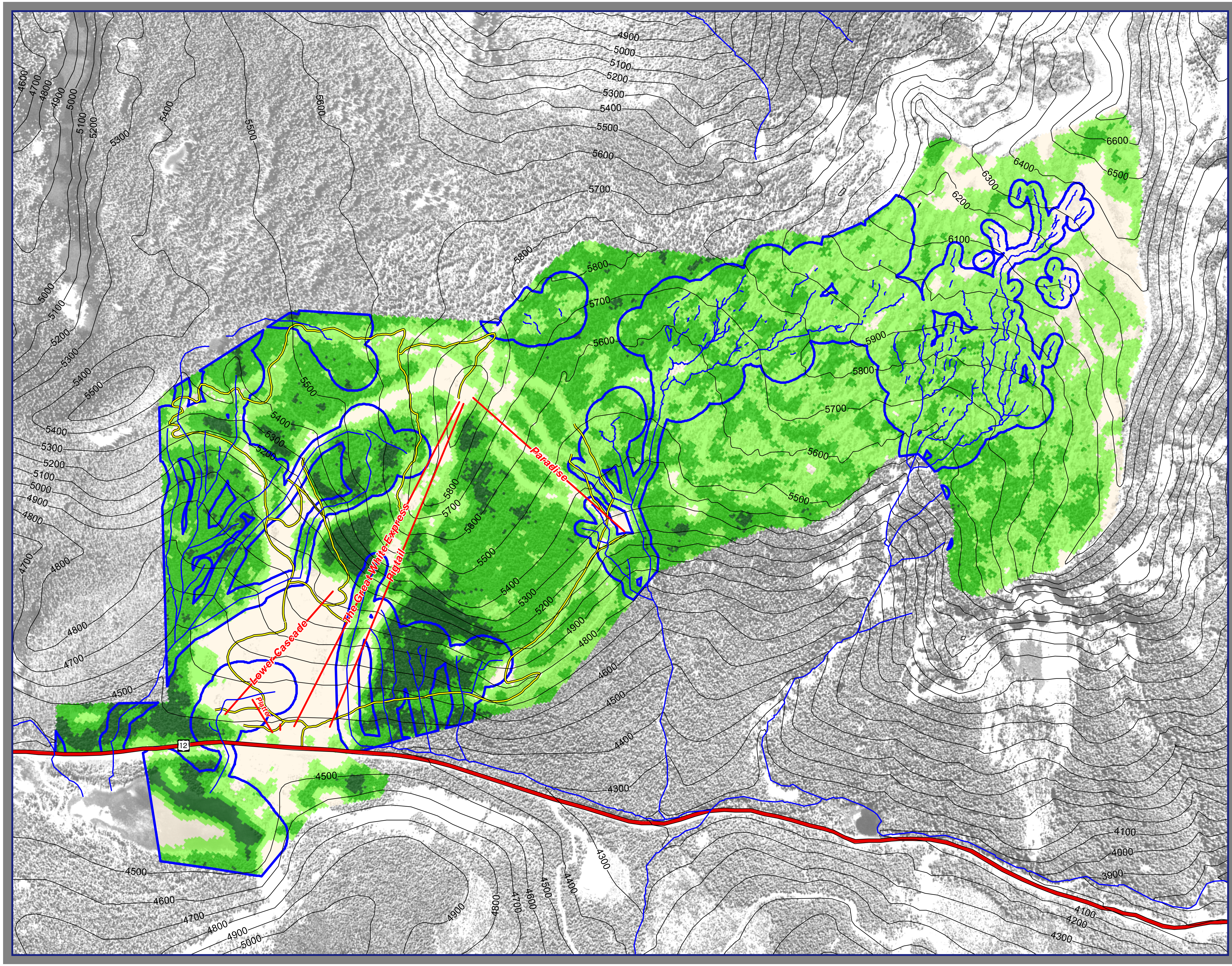

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FIGURE 3-22

PERCENT CANOPY COVER
Existing Conditions

LEGEND

Canopy Cover (%)

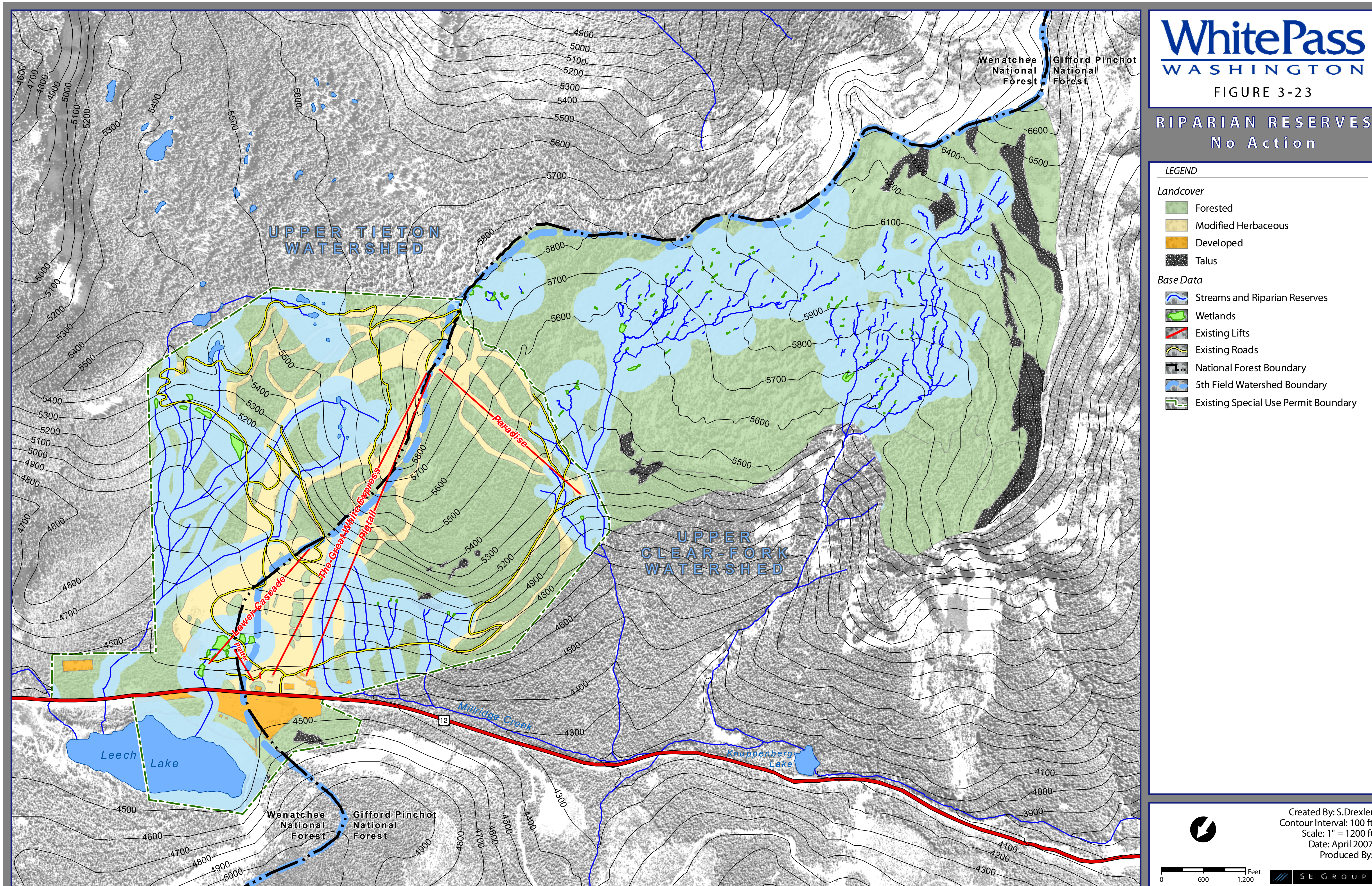
- 0 - 10%
- 11 - 39%
- 40 - 70%
- 71 - 100%

- Existing Lifts
- Existing Roads
- Streams
- Riparian Reserves

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP



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WASHINGTON
FIGURE 3-23
RIPARIAN RESERVES
No Action
LEGEND
Landcover
Forested
Modified Herbaceous
Developed
Talus
Base Data
Streams and Riparian Reserves
Wetlands
Existing Lifts
Existing Roads
National Forest Boundary
5th Field Watershed Boundary
Existing Special Use Permit Boundary
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
Feet
0
600
1,200
UPPER TIETON WATERSHED
UPPER CLEAR FORK WATERSHED
Wenatchee National Forest
Gifford Pinchot National Forest
Leech Lake
Knuppenberg Lake
Millridge Creek
Paradise
The Great White Express
Pigtail
Lower Cascade
Platter
12

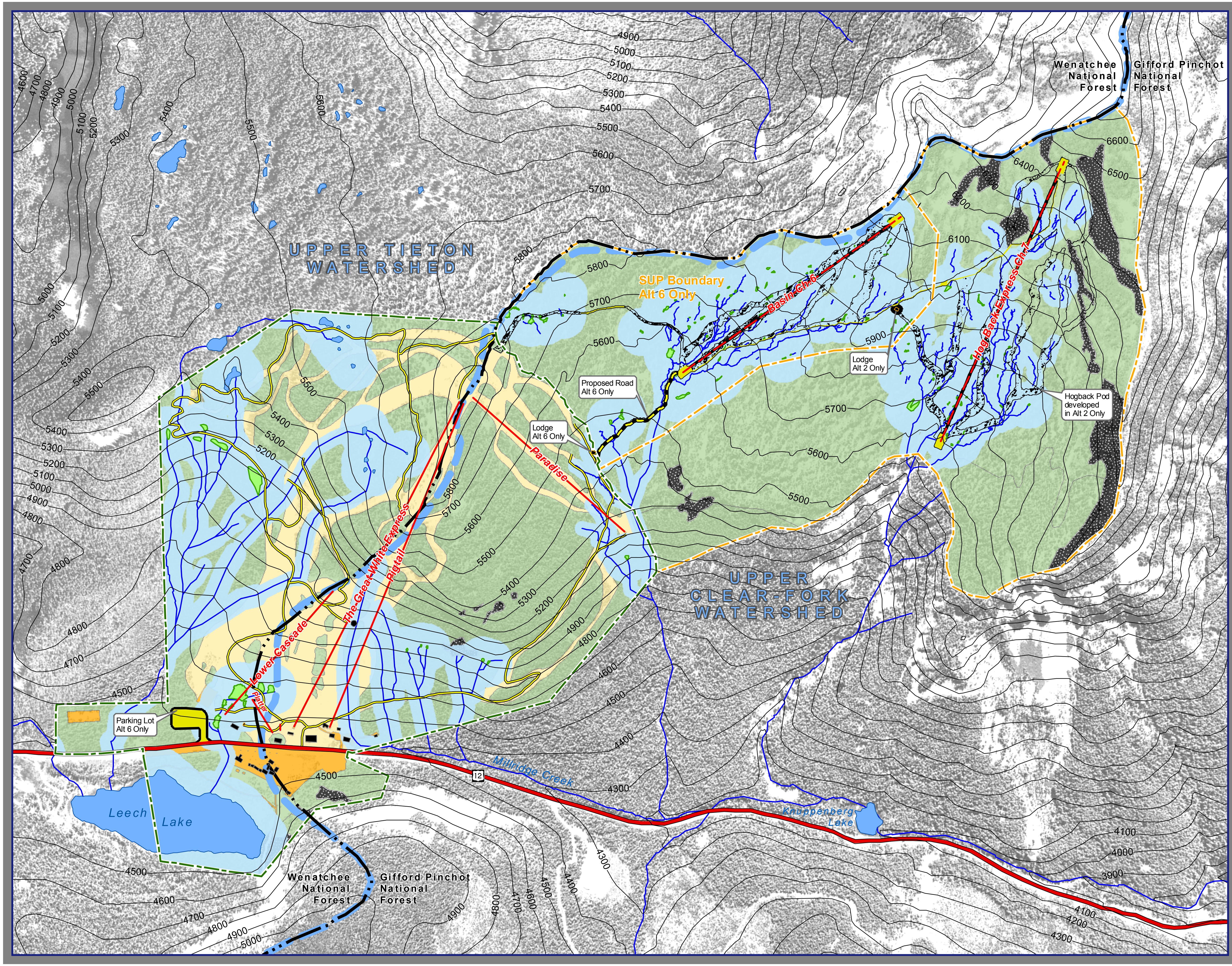

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FIGURE 3-24

RIPARIAN RESERVES Alternatives 2 & 6

LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

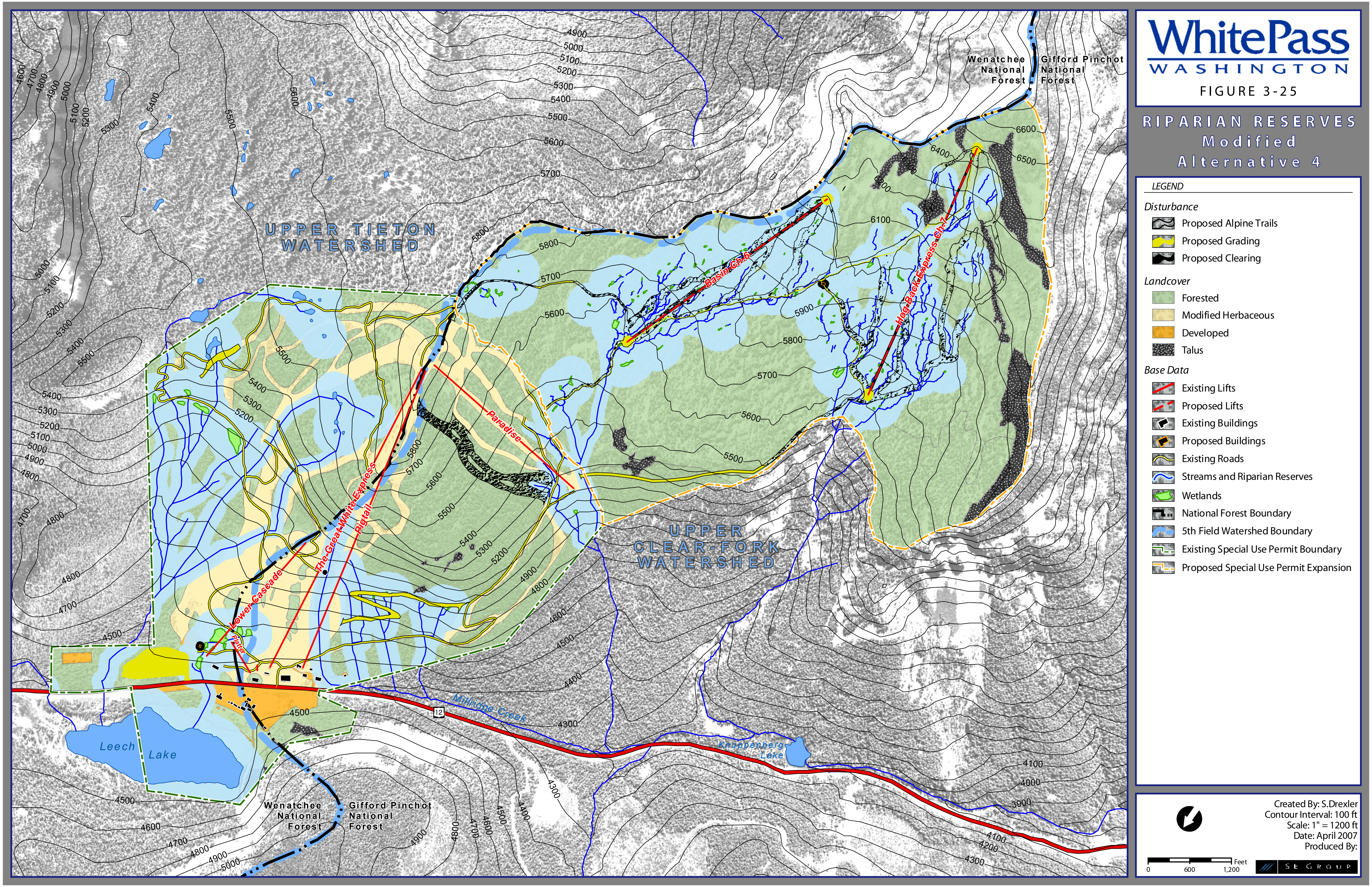
Landcover
- Forested
- Modified Herbaceous
- Developed
- Talus

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Road
- Streams and Riparian Reserves
- Wetlands
- National Forest Boundary
- 5th Field Watershed Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP


WhitePass
WASHINGTON
FIGURE 3-25
RIPARIAN RESERVES
Modified
Alternative 4
LEGEND
Disturbance
Proposed Alpine Trails
Proposed Grading
Proposed Clearing
Landcover
Forested
Modified Herbaceous
Developed
Talus
Base Data
Existing Lifts
Proposed Lifts
Existing Buildings
Proposed Buildings
Existing Roads
Streams and Riparian Reserves
Wetlands
National Forest Boundary
5th Field Watershed Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
0
600
1,200
Feet
UPPER TIETON
WATERSHED
UPPER
CLEAR-FORK
WATERSHED
Wenatchee
National
Forest
Gifford Pinchot
National
Forest
Leech Lake
Knappenberg
Lake
Millridge Creek
12
Basin Ch 6
Hog Back Express Ch 7
Paradise
The Great White Express
Pigtail
Lower Cascade
Platter

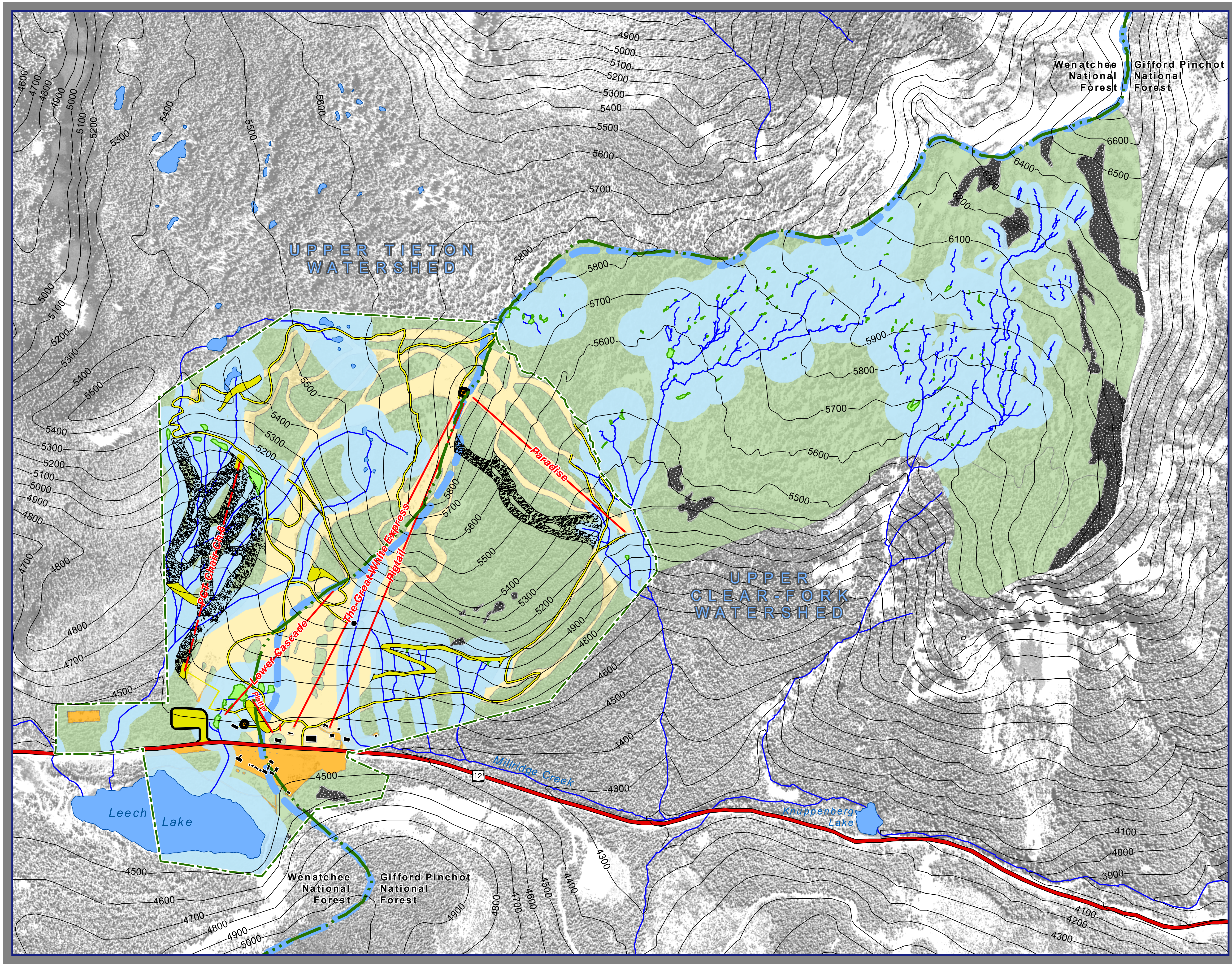


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FIGURE 3-26

RIPARIAN RESERVES
Alternative 9

LEGEND

Disturbance

- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Landcover

- Forested
- Modified Herbaceous
- Developed
- Talus

Base Data

- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Streams and Riparian Reserves
- Wetlands
- National Forest Boundary
- 5th Field Watershed Boundary
- Existing Special Use Permit Boundary

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

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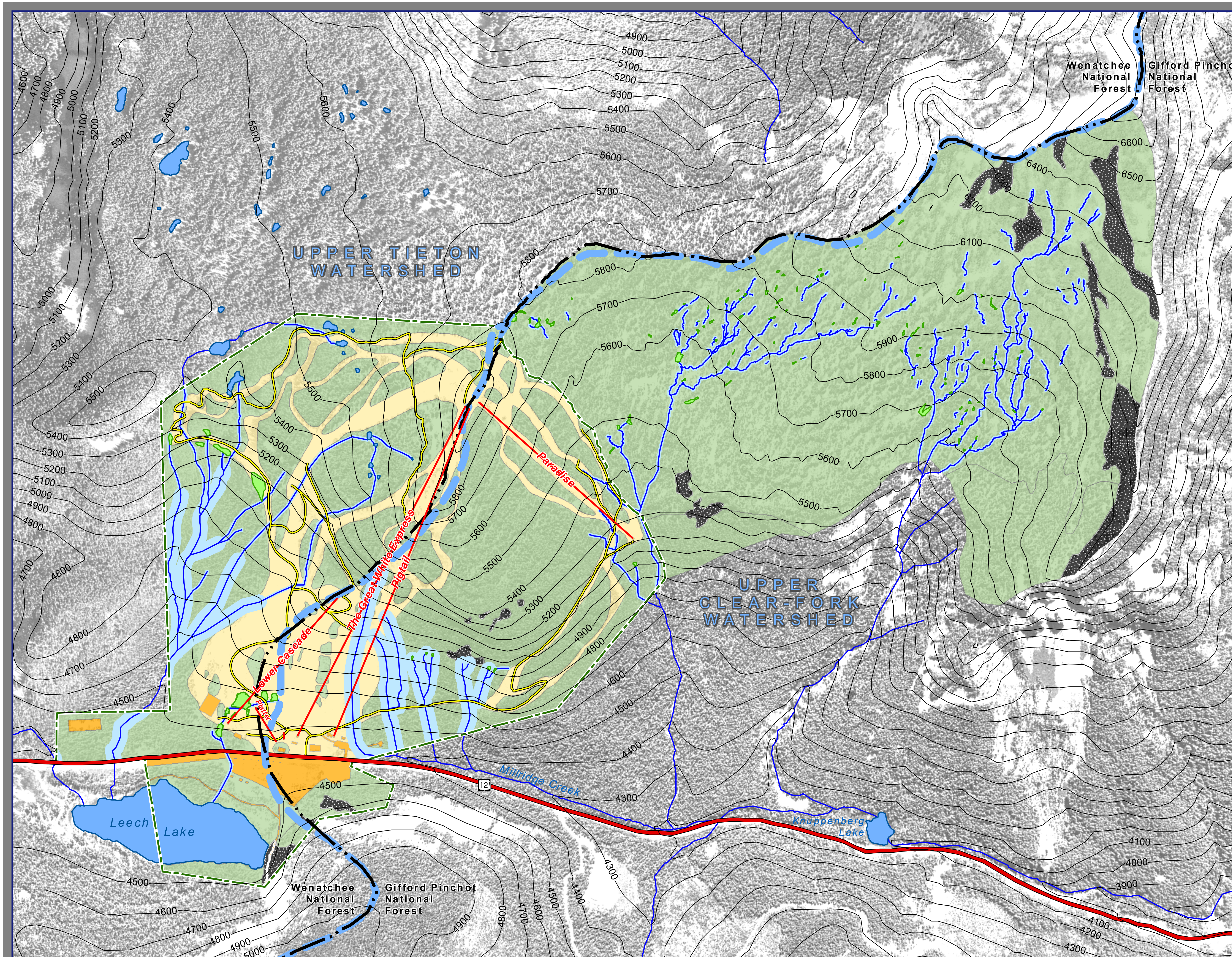
FIGURE 3-27

RIPARIAN INFLUENCE AREAS
No Action



LEGEND

Landcover
- Forested
- Modified Herbaceous
- Developed
- Talus

Base Data
- Streams and Riparian Influence Areas
- Wetlands
- Existing Lifts
- Existing Roads
- National Forest Boundary
- 5th Field Watershed Boundary
- Existing Special Use Permit Boundary

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

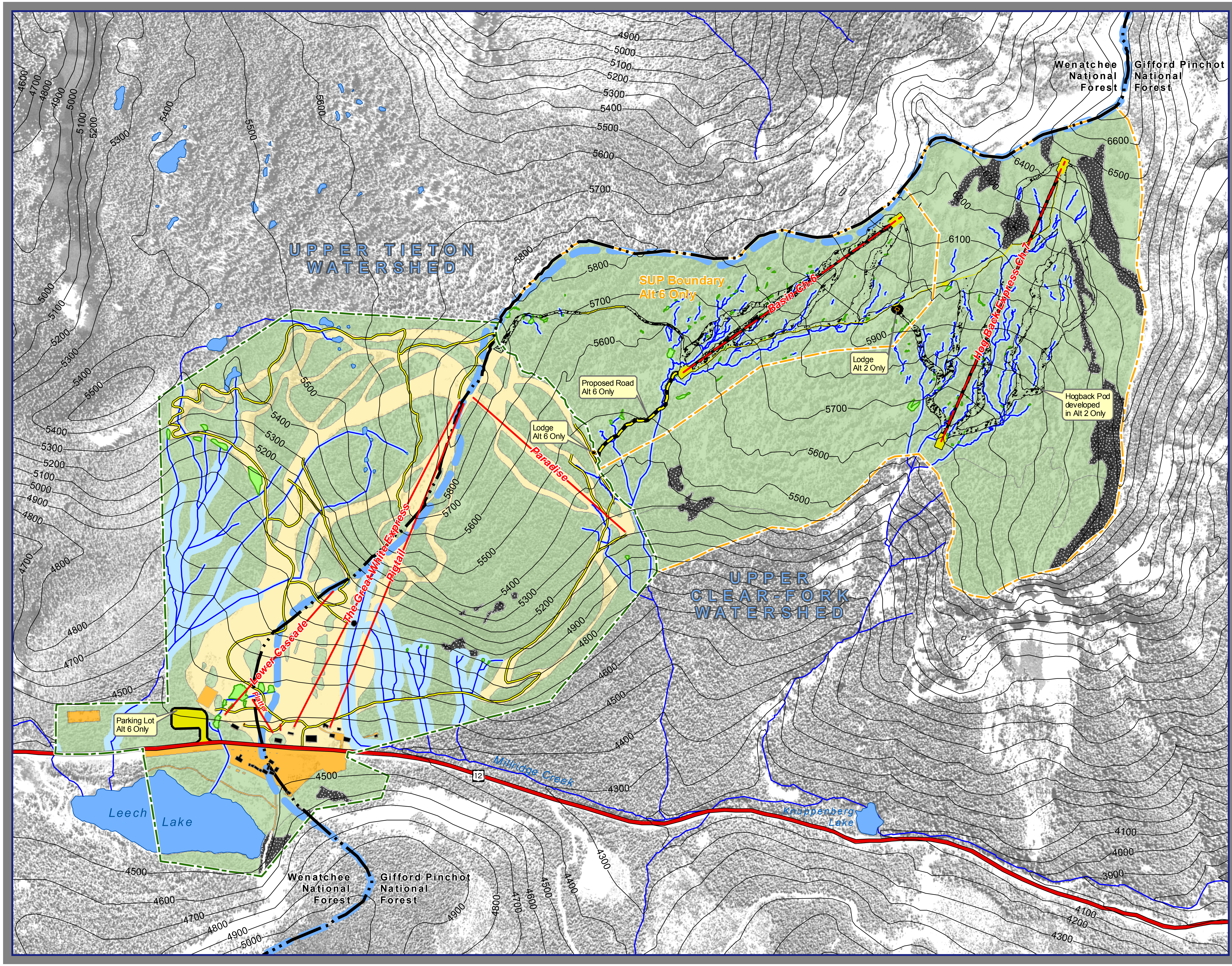


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FIGURE 3-28

RIPARIAN INFLUENCE AREAS
Alternatives 2 & 6

LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Landcover
- Forested
- Modified Herbaceous
- Developed
- Talus

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Road
- Streams and Riparian Reserves
- Wetlands
- National Forest Boundary
- 5th Field Watershed Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

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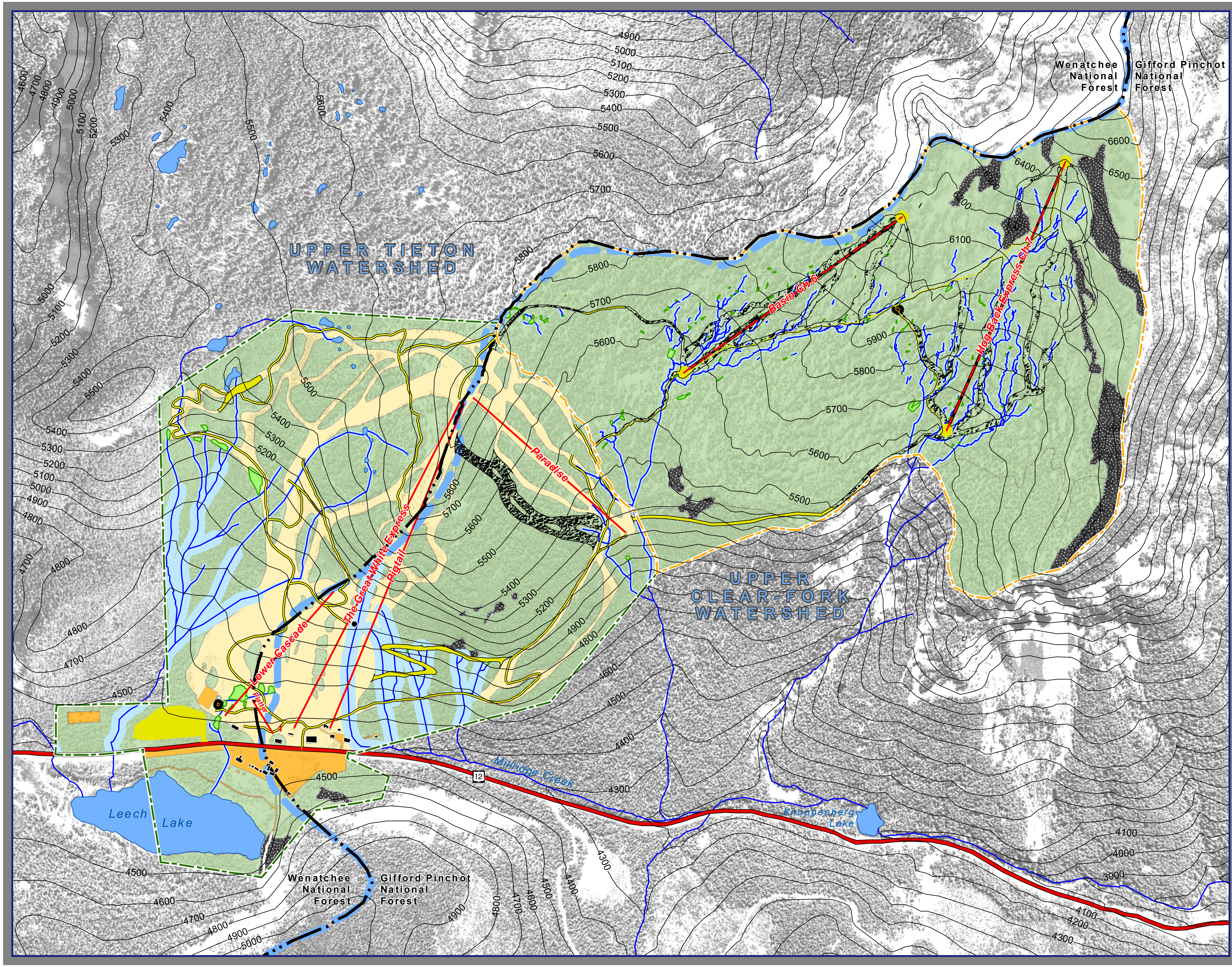
FIGURE 3-29

RIPARIAN INFLUENCE AREAS
Modified
Alternative 4



LEGEND

Disturbance

- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Landcover

- Forested
- Modified Herbaceous
- Developed
- Talus

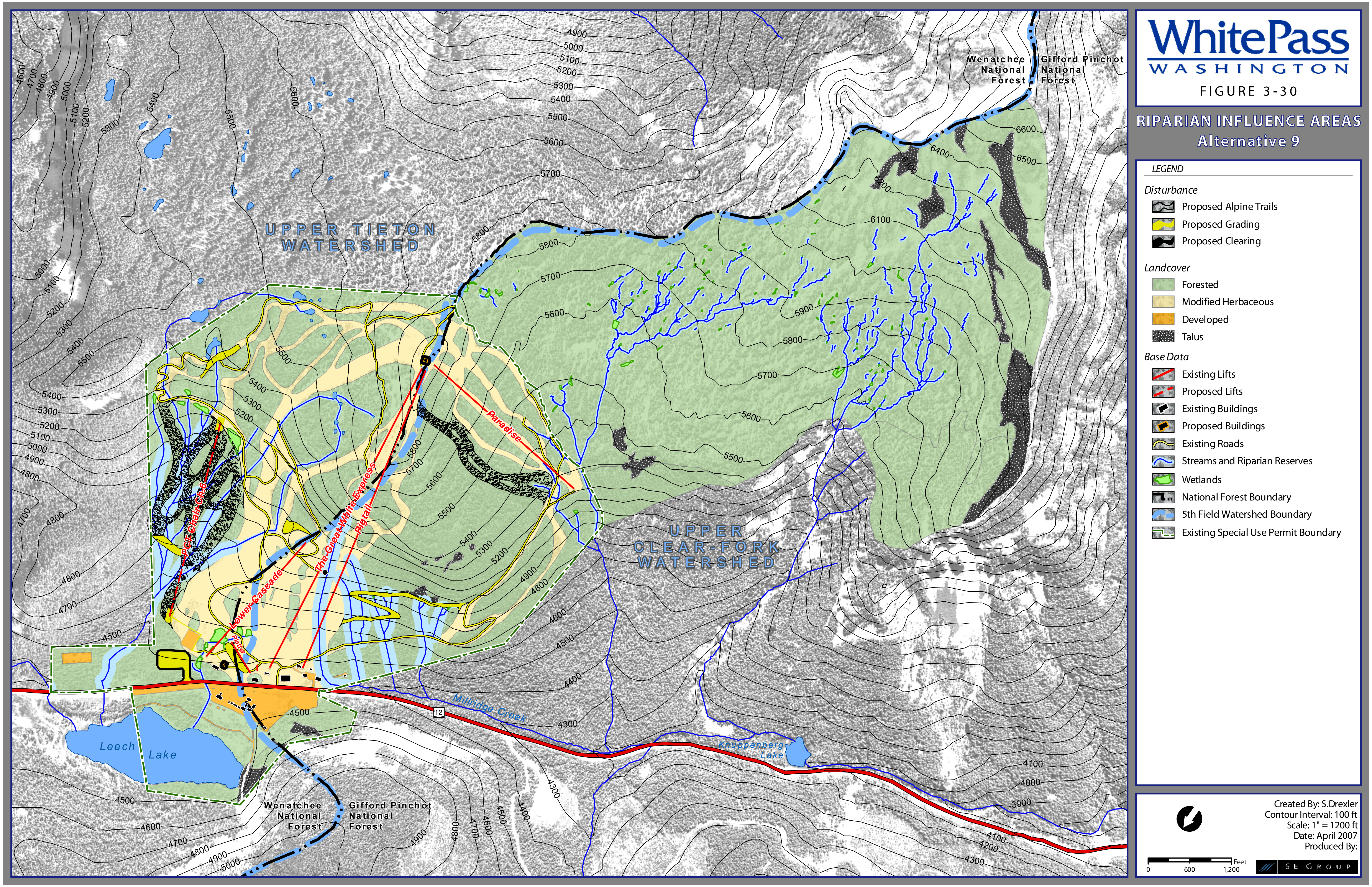
Base Data

- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Streams and Riparian Reserves
- Wetlands
- National Forest Boundary
- 5th Field Watershed Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP



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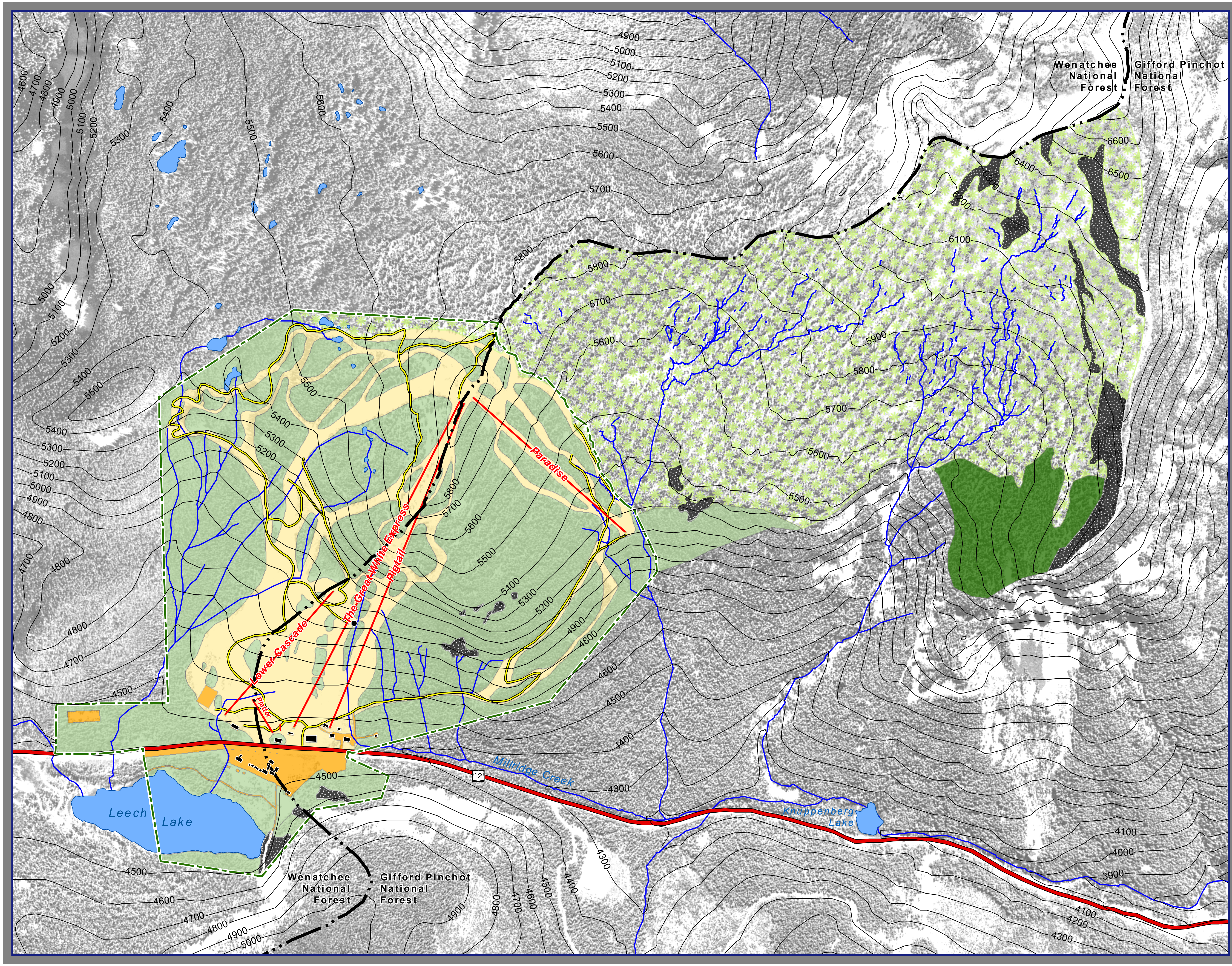
WASHINGTON
FIGURE 3-30
RIPARIAN INFLUENCE AREAS
Alternative 9
LEGEND
Disturbance
Proposed Alpine Trails
Proposed Grading
Proposed Clearing
Landcover
Forested
Modified Herbaceous
Developed
Talus
Base Data
Existing Lifts
Proposed Lifts
Existing Buildings
Proposed Buildings
Existing Roads
Streams and Riparian Reserves
Wetlands
National Forest Boundary
5th Field Watershed Boundary
Existing Special Use Permit Boundary
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
Feet
0
600
1,200
UPPER TIETON WATERSHED
UPPER CLEAR-FORK WATERSHED
Wenatchee National Forest
Gifford Pinchot National Forest
Leech Lake
Knuppenberg Lake
Millridge Creek
12
Paradise
The Great White Express
Pigtail
Lower Cascade
PCT Chair Ch 6

WhitePass
WASHINGTON

FIGURE 3-31

LANDCOVER



LEGEND

Landcover

- Mixed Conifer
- Mtn. Hemlock Parkland
- Mtn. Hemlock
- Modified Herbaceous
- Developed
- Talus
- Existing Lifts
- Existing Buildings
- Existing Roads
- Streams
- National Forest Boundary
- Existing Special Use Permit Boundary

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

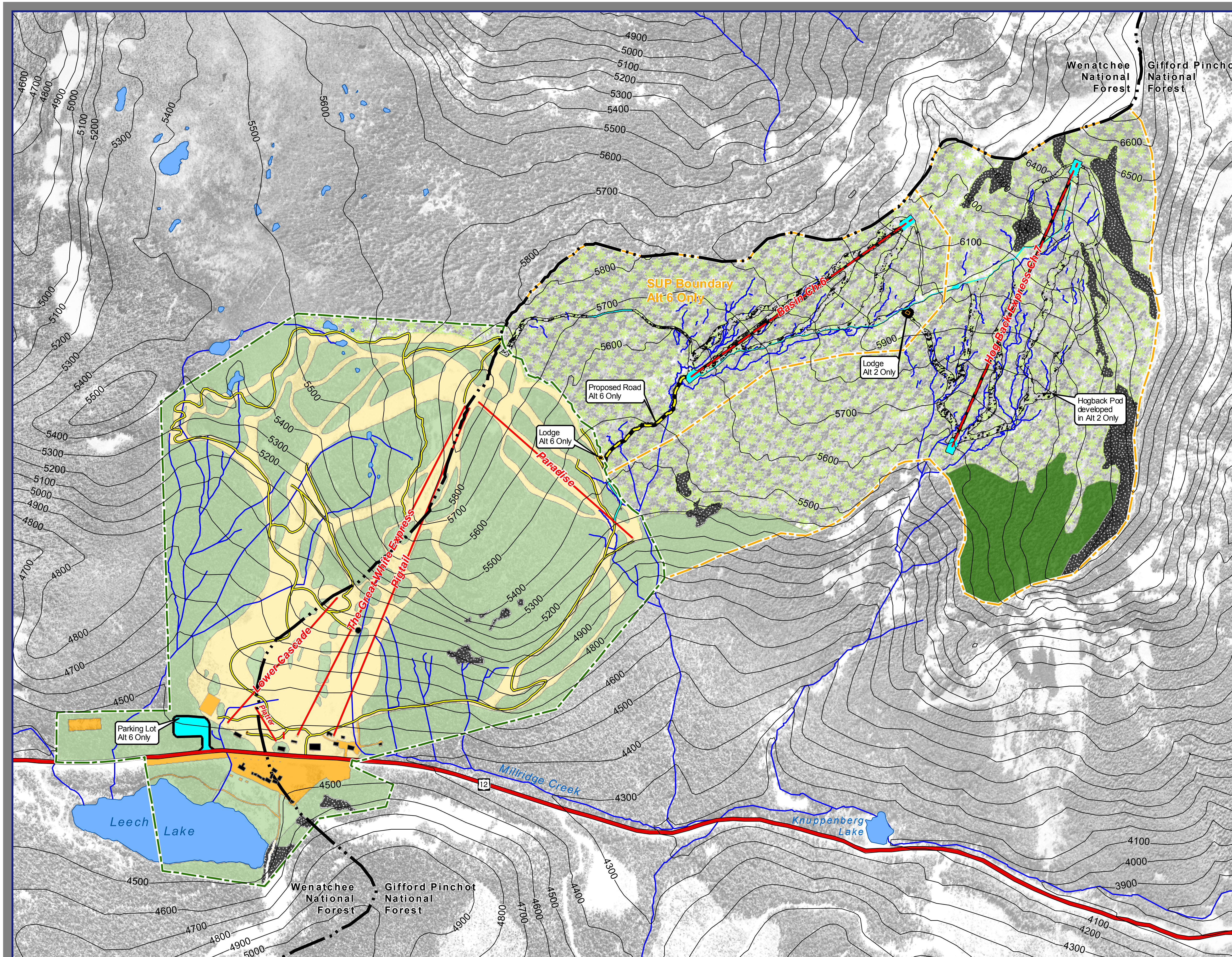


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FIGURE 3-32

LANDCOVER Alternatives 2 & 6

LEGEND

Disturbance

- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Landcover

- Mixed Conifer
- Mtn. Hemlock Parkland
- Mtn. Hemlock
- Modified Herbaceous
- Developed
- Talus

Base Data

- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Road
- Streams
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: 12.07.06
Produced By:

0 600 1,200 Feet

SE GROUP

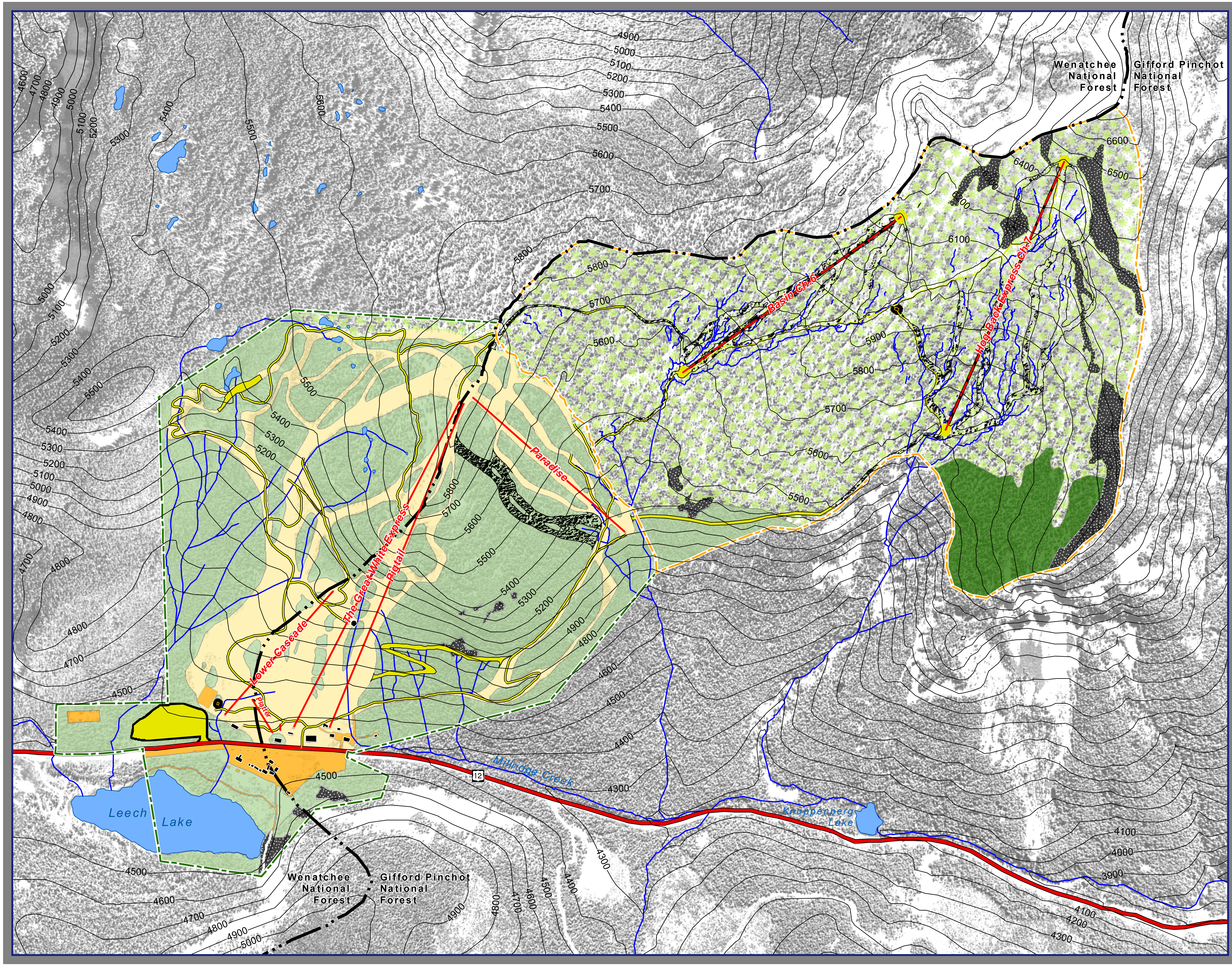

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FIGURE 3-33

LANDCOVER Modified Alternative 4

LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Landcover
- Mixed Conifer
- Mtn. Hemlock Parkland
- Mtn. Hemlock
- Modified Herbaceous
- Developed
- Talus

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Streams
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

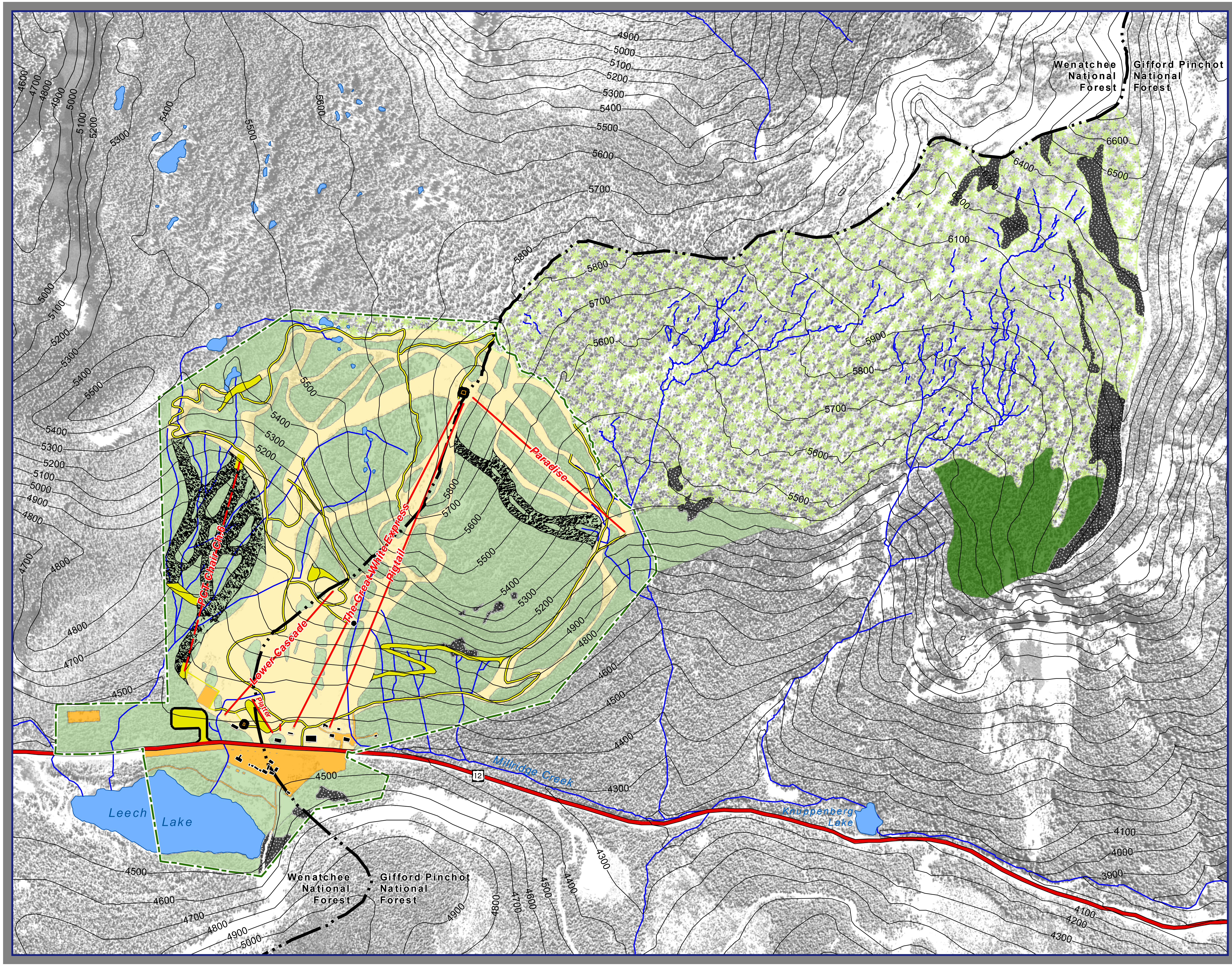

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FIGURE 3-34

LANDCOVER Alternative 9

LEGEND

Disturbance

- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Landcover

- Mixed Conifer
- Mtn. Hemlock Parkland
- Mtn. Hemlock
- Modified Herbaceous
- Developed
- Talus

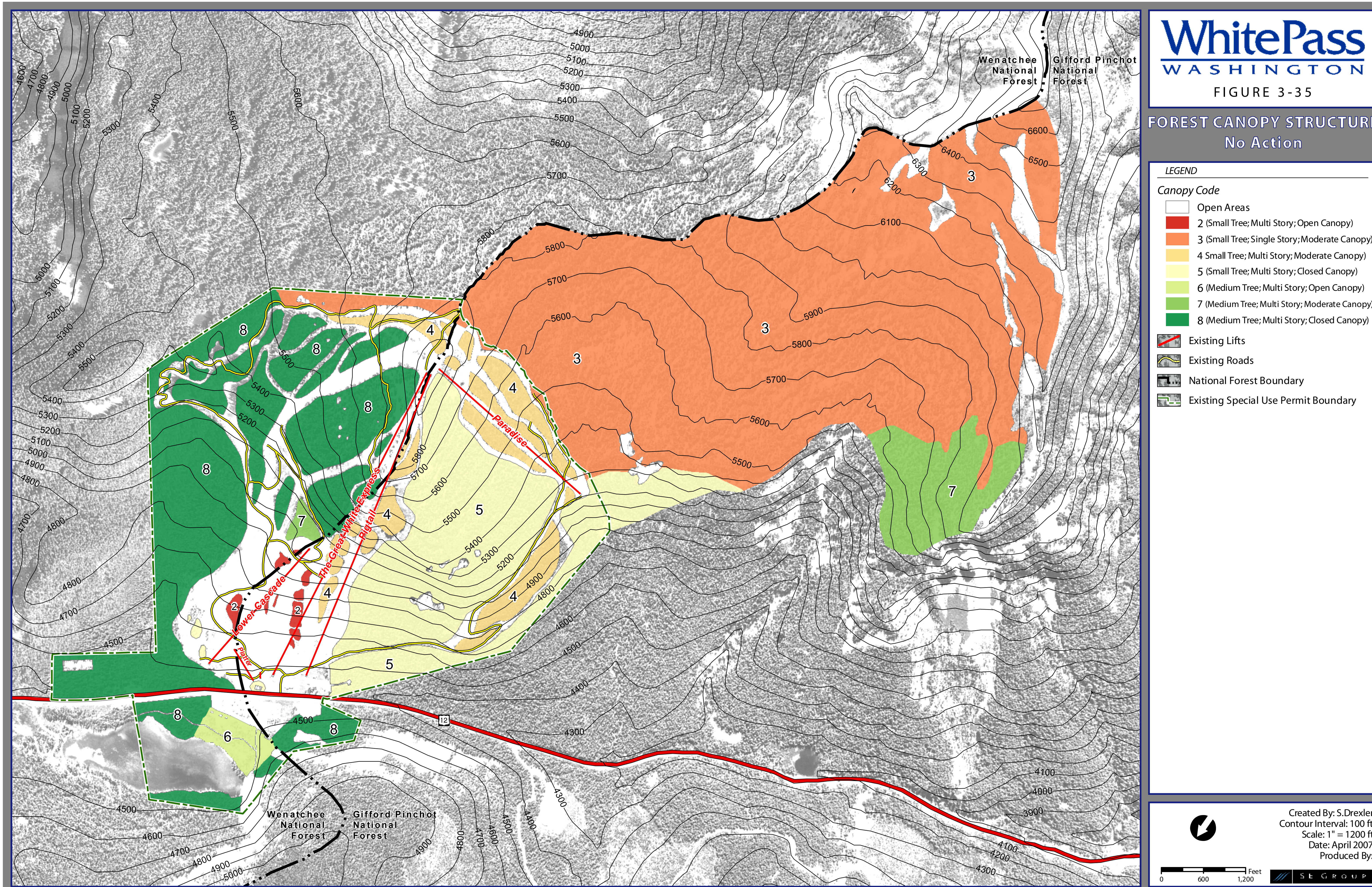
Base Data

- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Streams
- National Forest Boundary
- Existing Special Use Permit Boundary

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

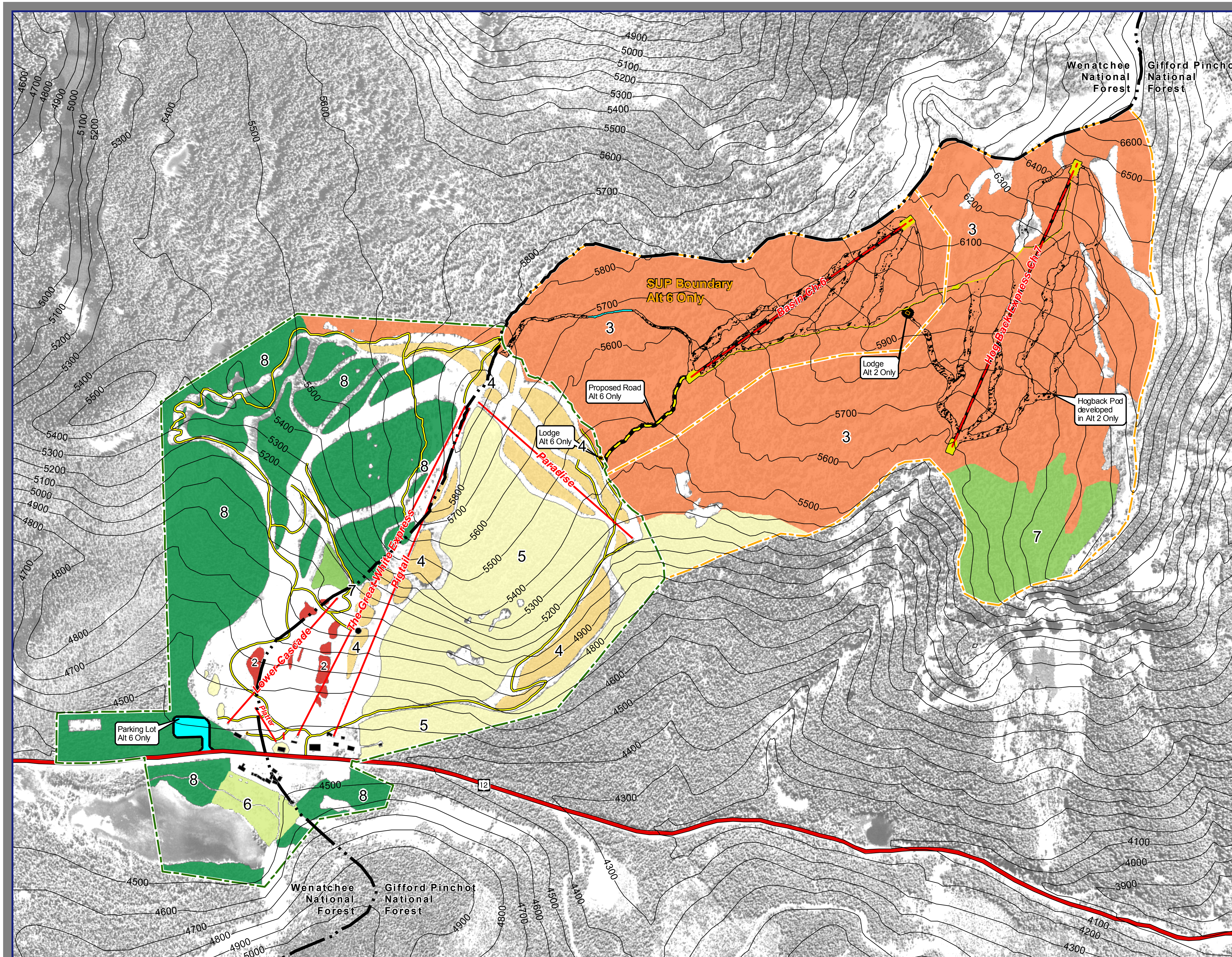
SE GROUP


WhitePass
WASHINGTON
FIGURE 3-35
FOREST CANOPY STRUCTURE
No Action
LEGEND
Canopy Code
Open Areas
2 (Small Tree; Multi Story; Open Canopy)
3 (Small Tree; Single Story; Moderate Canopy)
4 Small Tree; Multi Story; Moderate Canopy)
5 (Small Tree; Multi Story; Closed Canopy)
6 (Medium Tree; Multi Story; Open Canopy)
7 (Medium Tree; Multi Story; Moderate Canopy)
8 (Medium Tree; Multi Story; Closed Canopy)
Existing Lifts
Existing Roads
National Forest Boundary
Existing Special Use Permit Boundary
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
Feet
0
600
1,200
Wenatchee National Forest
Gifford Pinchot National Forest
Paradise
The Great White Express
Pigtail
Lower Cascade
Platter
12

WhitePass
WASHINGTON

FIGURE 3-36

FOREST CANOPY STRUCTURE
Alternatives 2 & 6



LEGEND

Disturbance
- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

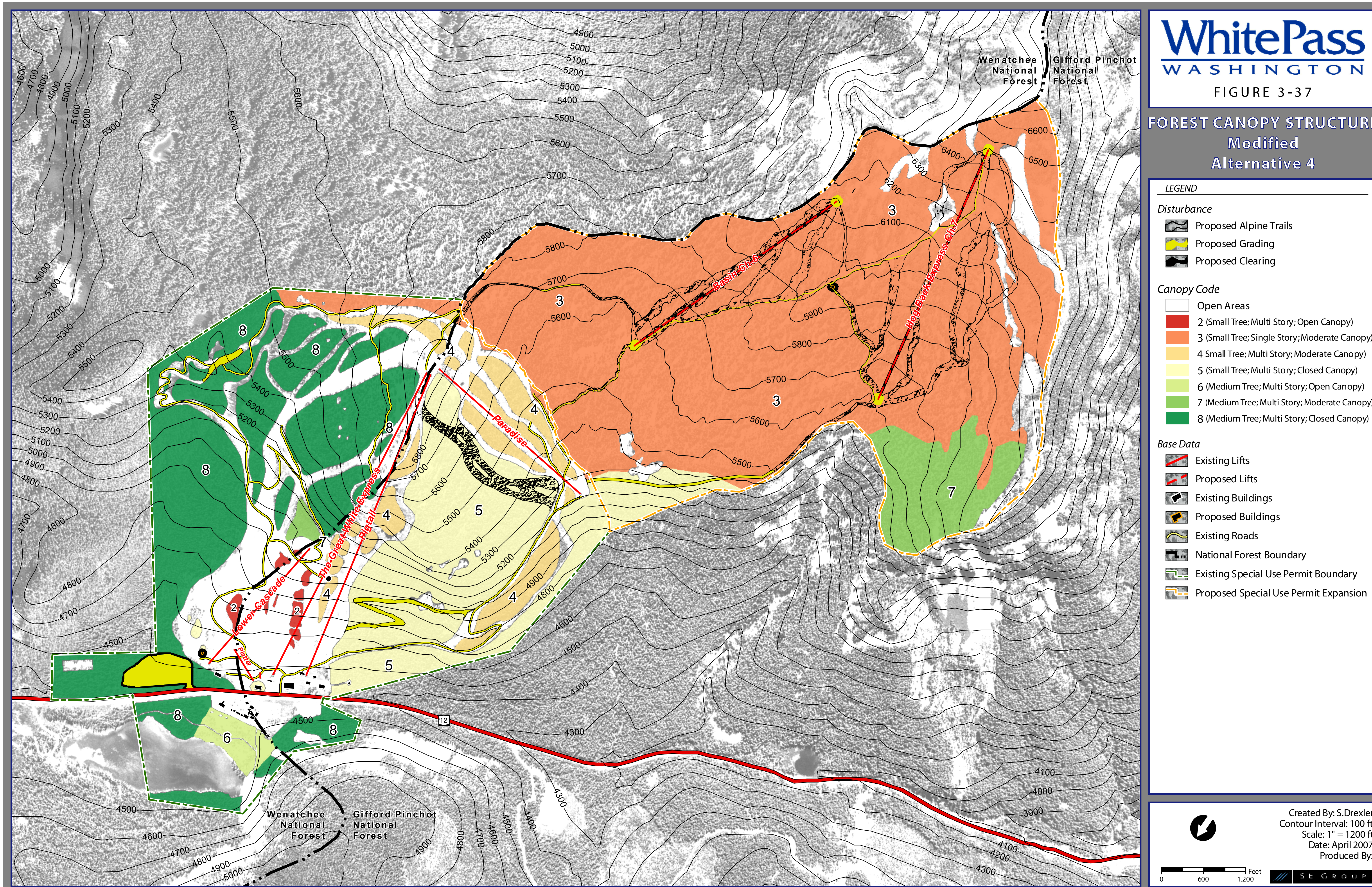
Canopy Code
- Open Areas
- 2 (Small Tree; Multi Story; Open Canopy)
- 3 (Small Tree; Single Story; Moderate Canopy)
- 4 Small Tree; Multi Story; Moderate Canopy)
- 5 (Small Tree; Multi Story; Closed Canopy)
- 6 (Medium Tree; Multi Story; Open Canopy)
- 7 (Medium Tree; Multi Story; Moderate Canopy)
- 8 (Medium Tree; Multi Story; Closed Canopy)

Base Data
- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Proposed Road
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP


WhitePass
WASHINGTON
FIGURE 3-37
FOREST CANOPY STRUCTURE
Modified
Alternative 4
LEGEND
Disturbance
Proposed Alpine Trails
Proposed Grading
Proposed Clearing
Canopy Code
Open Areas
2 (Small Tree; Multi Story; Open Canopy)
3 (Small Tree; Single Story; Moderate Canopy)
4 Small Tree; Multi Story; Moderate Canopy)
5 (Small Tree; Multi Story; Closed Canopy)
6 (Medium Tree; Multi Story; Open Canopy)
7 (Medium Tree; Multi Story; Moderate Canopy)
8 (Medium Tree; Multi Story; Closed Canopy)
Base Data
Existing Lifts
Proposed Lifts
Existing Buildings
Proposed Buildings
Existing Roads
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
Feet
0 600 1,200
Wenatchee National Forest
Gifford Pinchot National Forest
Basin Ch.6
Hog Back Express Ch.7
Paradise
The Great White Express
Pigtail
Lower Cascade
Platter
12

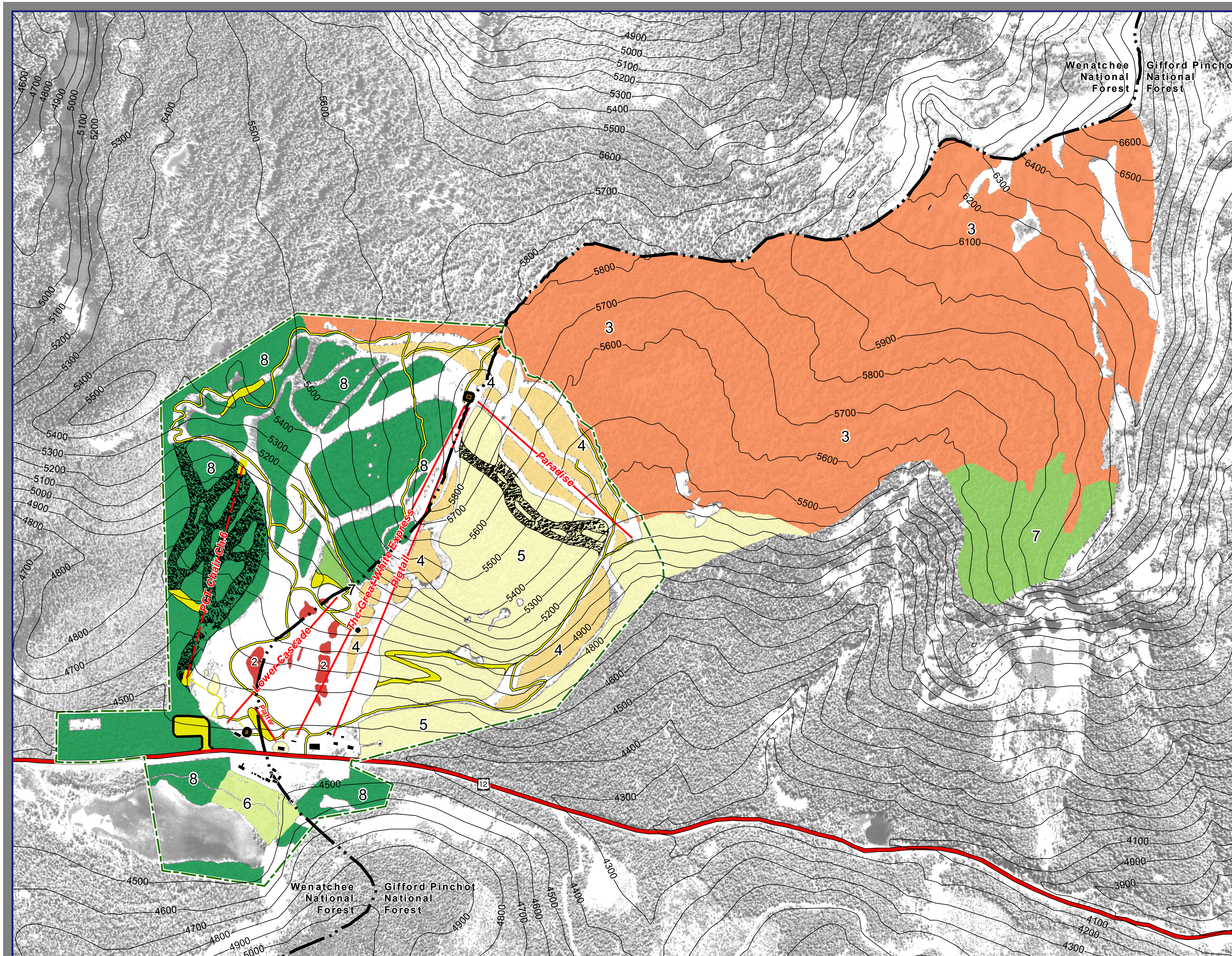


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FIGURE 3-38

FOREST CANOPY STRUCTURE
Alternative 9

LEGEND

Disturbance

- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

Canopy Code

- Open Areas
- 2 (Small Tree; Multi Story; Open Canopy)
- 3 (Small Tree; Single Story; Moderate Canopy)
- 4 Small Tree; Multi Story; Moderate Canopy)
- 5 (Small Tree; Multi Story; Closed Canopy)
- 6 (Medium Tree; Multi Story; Open Canopy)
- 7 (Medium Tree; Multi Story; Moderate Canopy)
- 8 (Medium Tree; Multi Story; Closed Canopy)

Base Data

- Existing Lifts
- Proposed Lifts
- Existing Buildings
- Proposed Buildings
- Existing Roads
- National Forest Boundary
- Existing Special Use Permit Boundary

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

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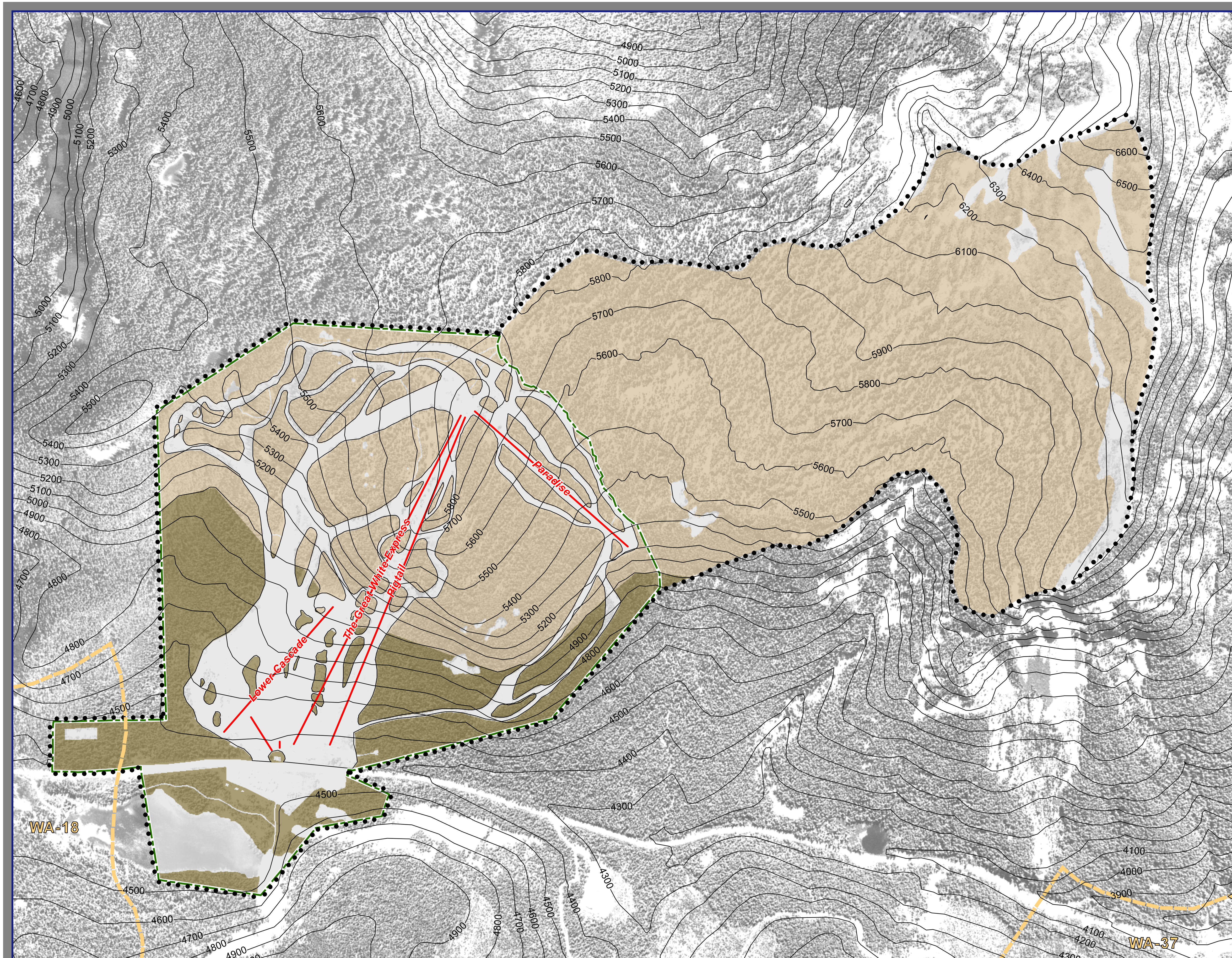
FIGURE 3-39

SPOTTED OWL HABITAT
No Action



LEGEND

Owl Habitat

- NRF (Nesting Roosting Foraging) Habitat
- Dispersal
- None
- Action Area Boundary
- Existing Lifts
- Alpine Trail Edge
- Existing Special Use Permit Boundary
- Northern Spotted Owl Critical Habitat Units

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP

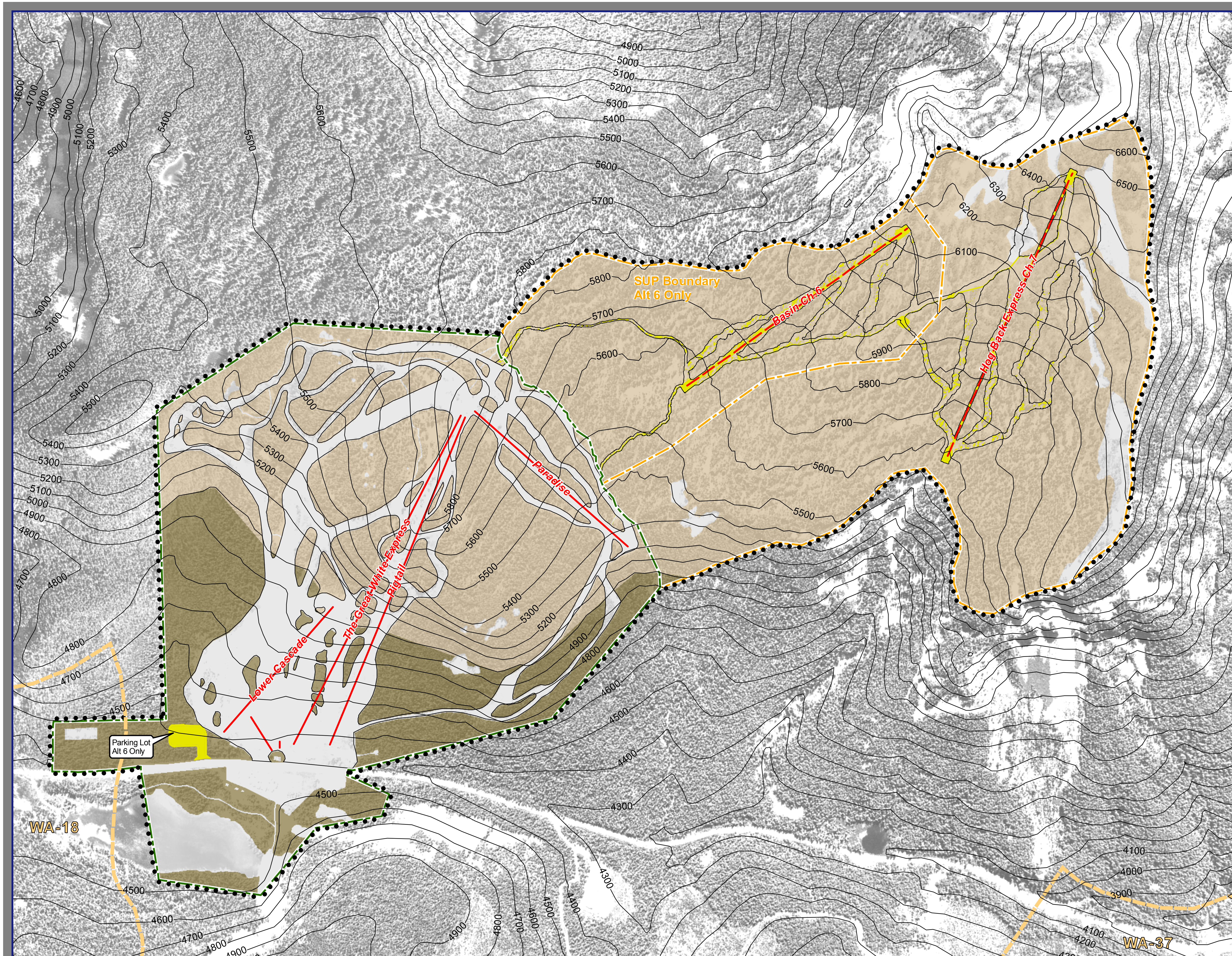


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FIGURE 3-40

SPOTTED OWL HABITAT
Alternatives 2 & 6

LEGEND

Owl Habitat
- NRF (Nesting Roosting Foraging) Habitat
- Dispersal
- None
- Action Area Boundary
- Existing Lifts
- Proposed Lifts
- Habitat Impacts from Developement
- Alpine Trail Edge
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion
- Northern Spotted Owl Critical Habitat Units

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP

0 600 1,200 Feet

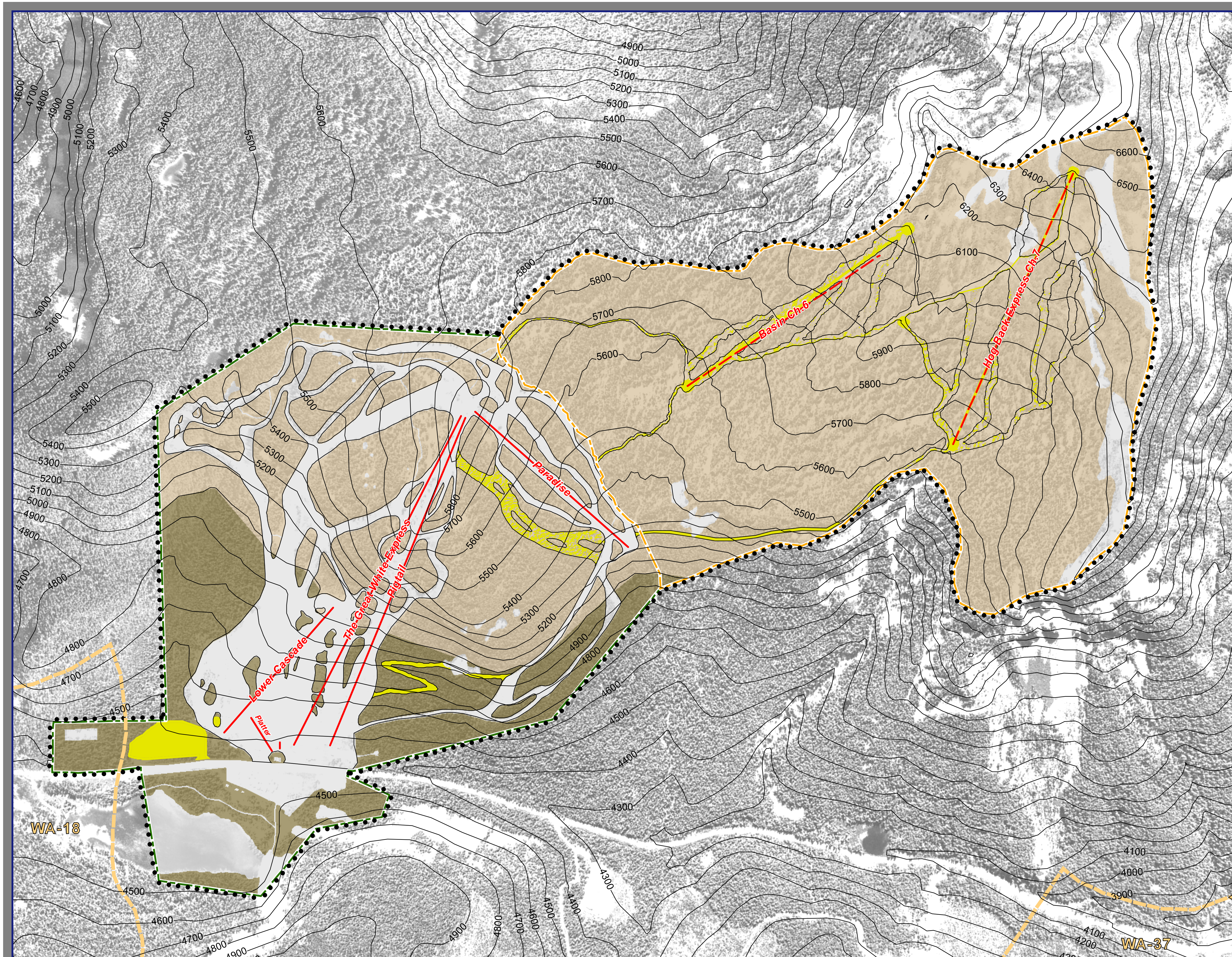

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FIGURE 3-41

SPOTTED OWL HABITAT Modified Alternative 4

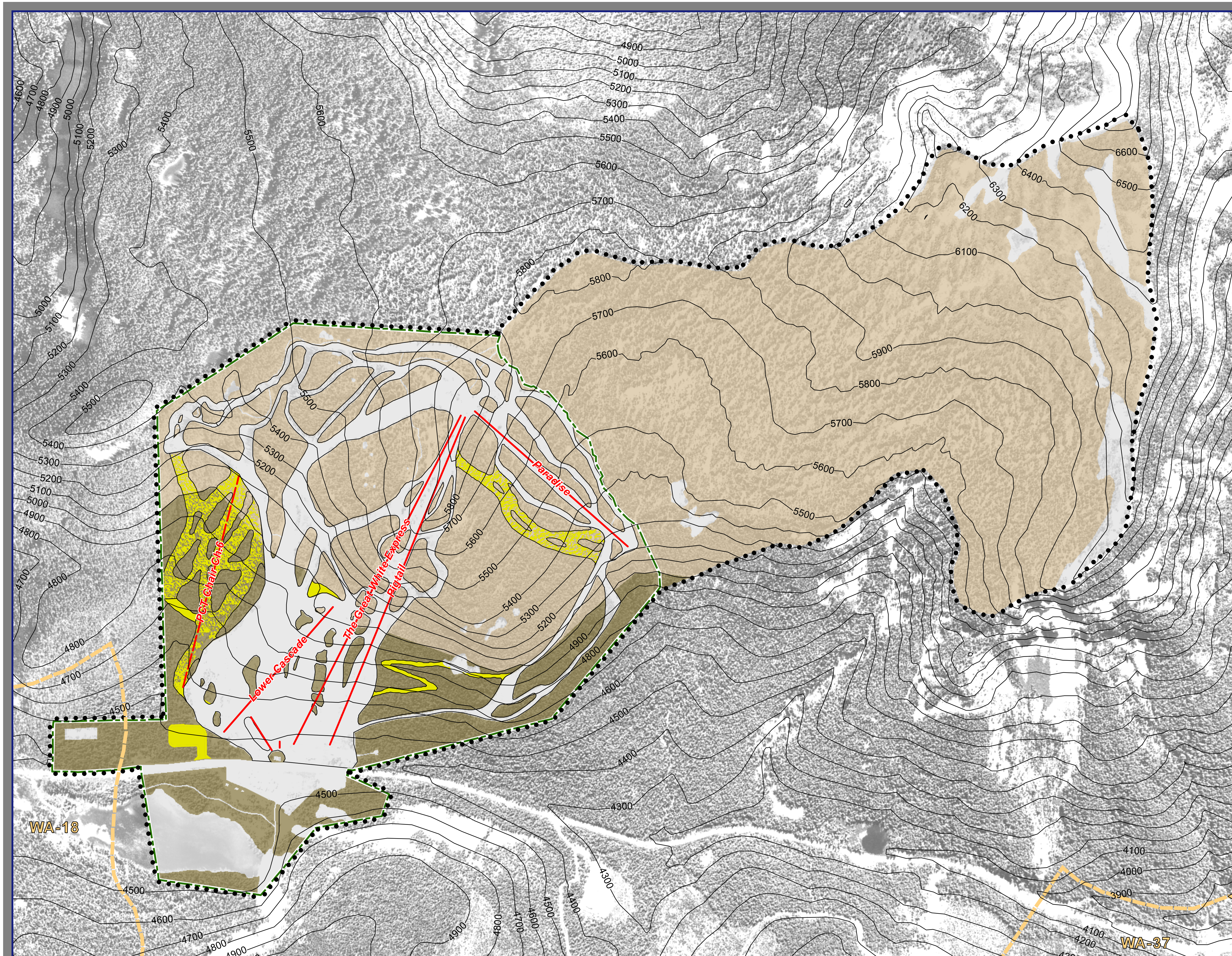
LEGEND

Owl Habitat
- NRF (Nesting Roosting Foraging) Habitat
- Dispersal
- None
- Action Area Boundary
- Existing Lifts
- Proposed Lifts
- Habitat Impacts from Development
- Alpine Trail Edge
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion
- Northern Spotted Owl Critical Habitat Units

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP



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WASHINGTON

FIGURE 3-42

SPOTTED OWL HABITAT Alternative 9

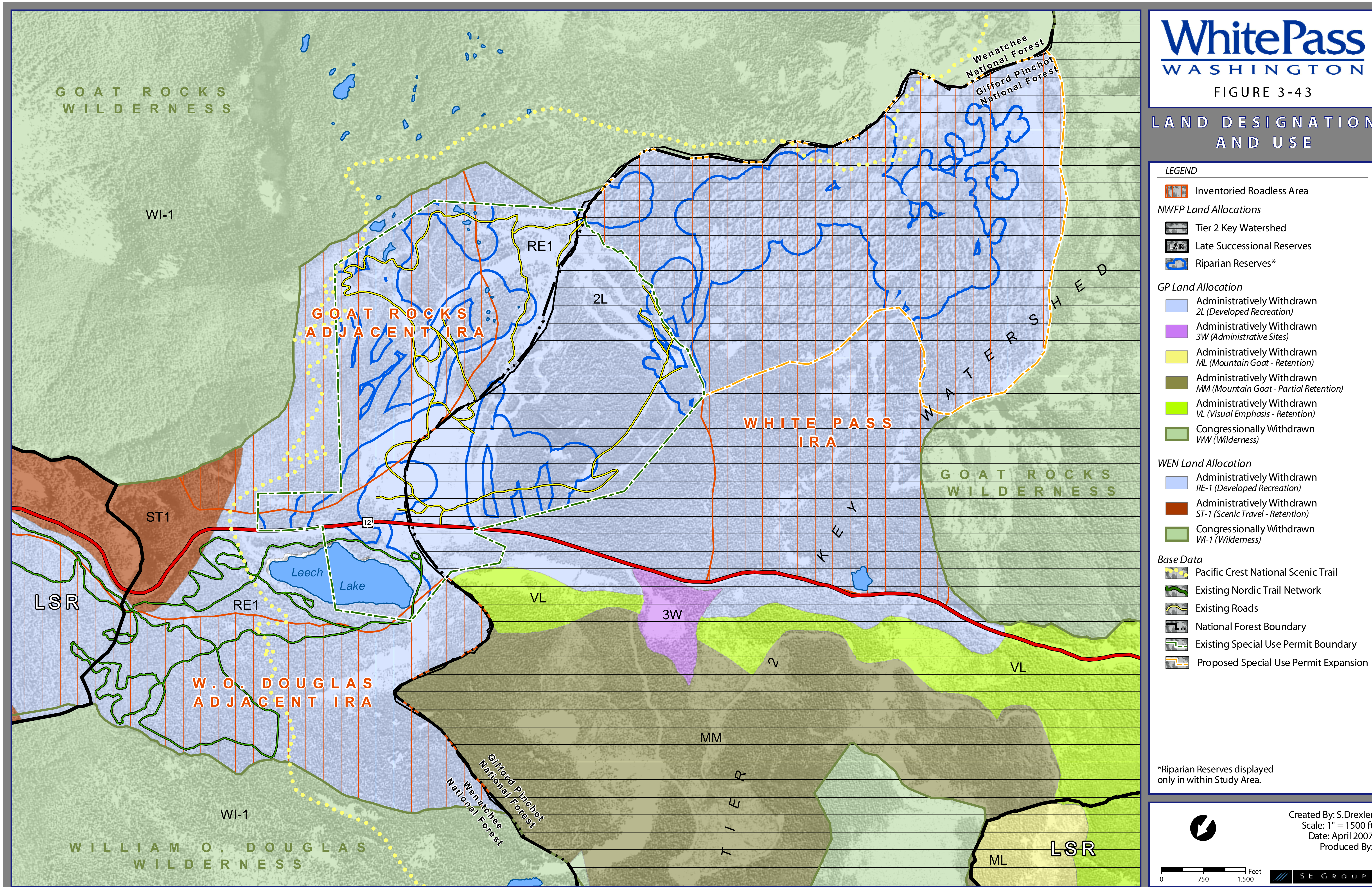
LEGEND

Owl Habitat
- NRF (Nesting Roosting Foraging) Habitat
- Dispersal
- None
- Action Area Boundary
- Existing Lifts
- Proposed Lifts
- Habitat Impacts from Development
- Alpine Trail Edge
- Existing Special Use Permit Boundary
- Northern Spotted Owl Critical Habitat Units

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP



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WASHINGTON
FIGURE 3-43
LAND DESIGNATION AND USE
LEGEND
Inventoried Roadless Area
NWFP Land Allocations
Tier 2 Key Watershed
Late Successional Reserves
Riparian Reserves*
GP Land Allocation
Administratively Withdrawn 2L (Developed Recreation)
Administratively Withdrawn 3W (Administrative Sites)
Administratively Withdrawn ML (Mountain Goat - Retention)
Administratively Withdrawn MM (Mountain Goat - Partial Retention)
Administratively Withdrawn VL (Visual Emphasis - Retention)
Congressionally Withdrawn WW (Wilderness)
WEN Land Allocation
Administratively Withdrawn RE-1 (Developed Recreation)
Administratively Withdrawn ST-1 (Scenic Travel - Retention)
Congressionally Withdrawn WI-1 (Wilderness)
Base Data
Pacific Crest National Scenic Trail
Existing Nordic Trail Network
Existing Roads
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
*Riparian Reserves displayed only in within Study Area.
Created By: S.Drexler
Scale: 1" = 1500 ft
Date: April 2007
Produced By:
0 750 1,500 Feet
SE GROUP
GOAT ROCKS WILDERNESS
WI-1
GOAT ROCKS ADJACENT IRA
RE1
2L
WHITE PASS IRA
KEY WATERSHED
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
ST1
LSR
Leech Lake
RE1
12
VL
3W
VL
W.O. DOUGLAS ADJACENT IRA
MM
TIER 2
WI-1
WILLIAM O. DOUGLAS WILDERNESS
Gifford Pinchot National Forest
Wenatchee National Forest
ML
LSR

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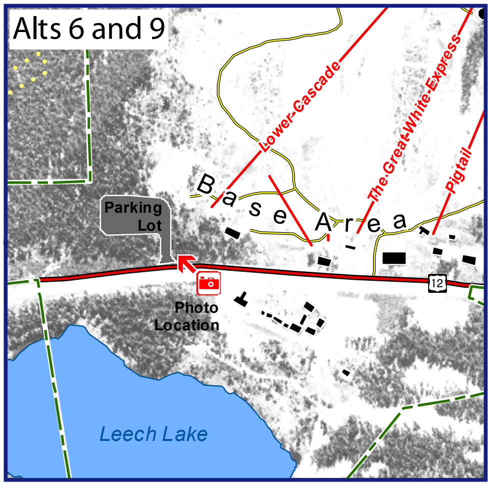
FIGURE 3-44

Conceptual Sketch

Proposed
Mid-Mountain Lodge

Alternatives 2 and 4

Note: Mid-mountain lodges
in Alternatives 6 and 9 would
carry a similar architectural style.



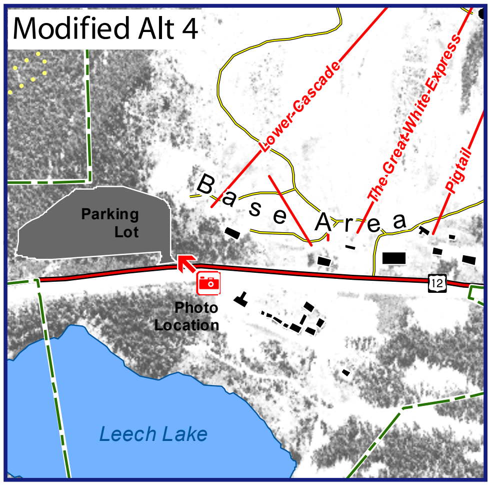


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FIGURE 3-45

Photo Simulation

Proposed
Parking Lot

- Modified Alternative 4
- Alternatives 6 and 9

No Action

- Modified Alternative 4
- Alternatives 6 and 9

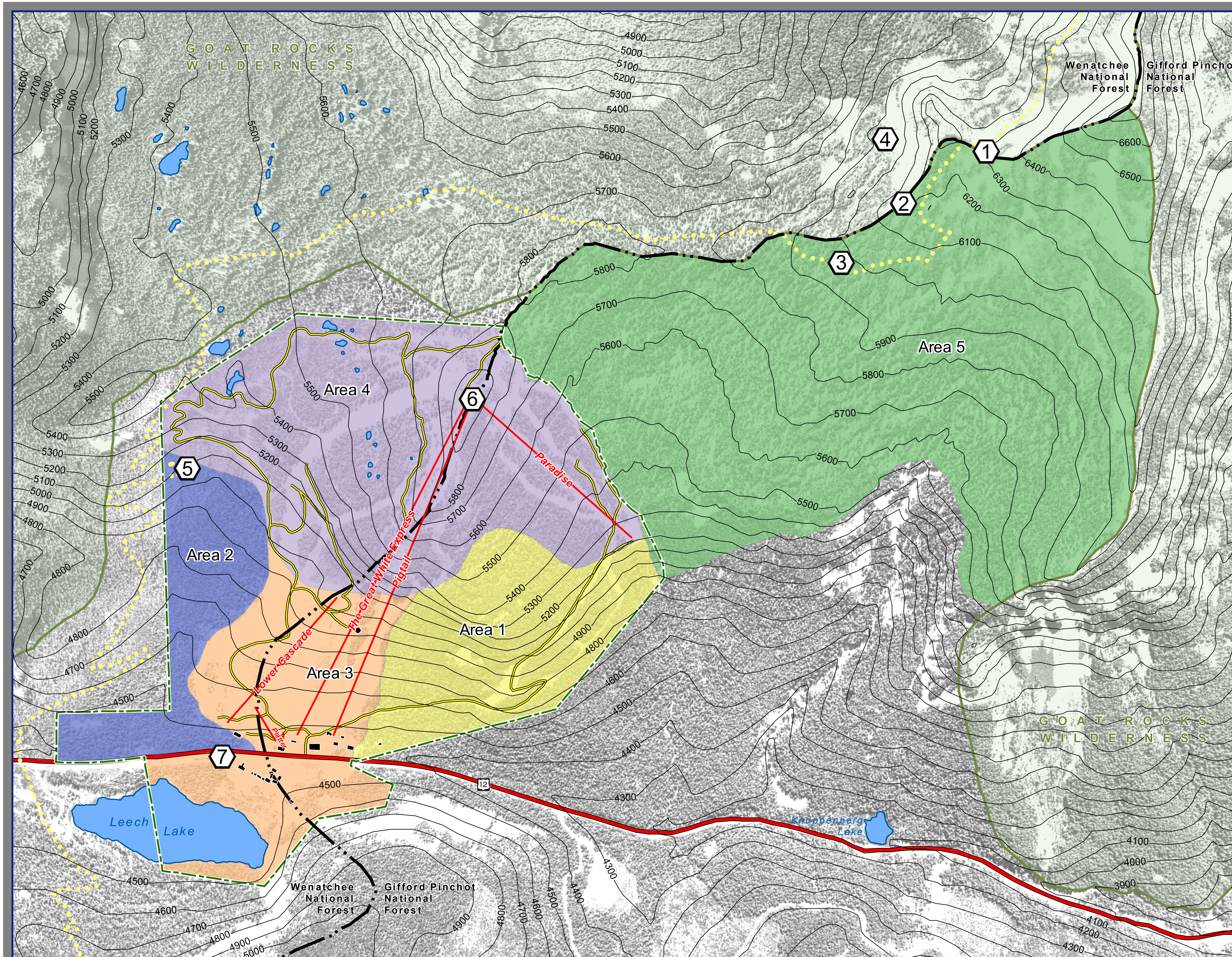

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FIGURE 3-46

VISUAL RESOURCES
No Action

LEGEND

Viewpoints

*Scenic Areas **

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5

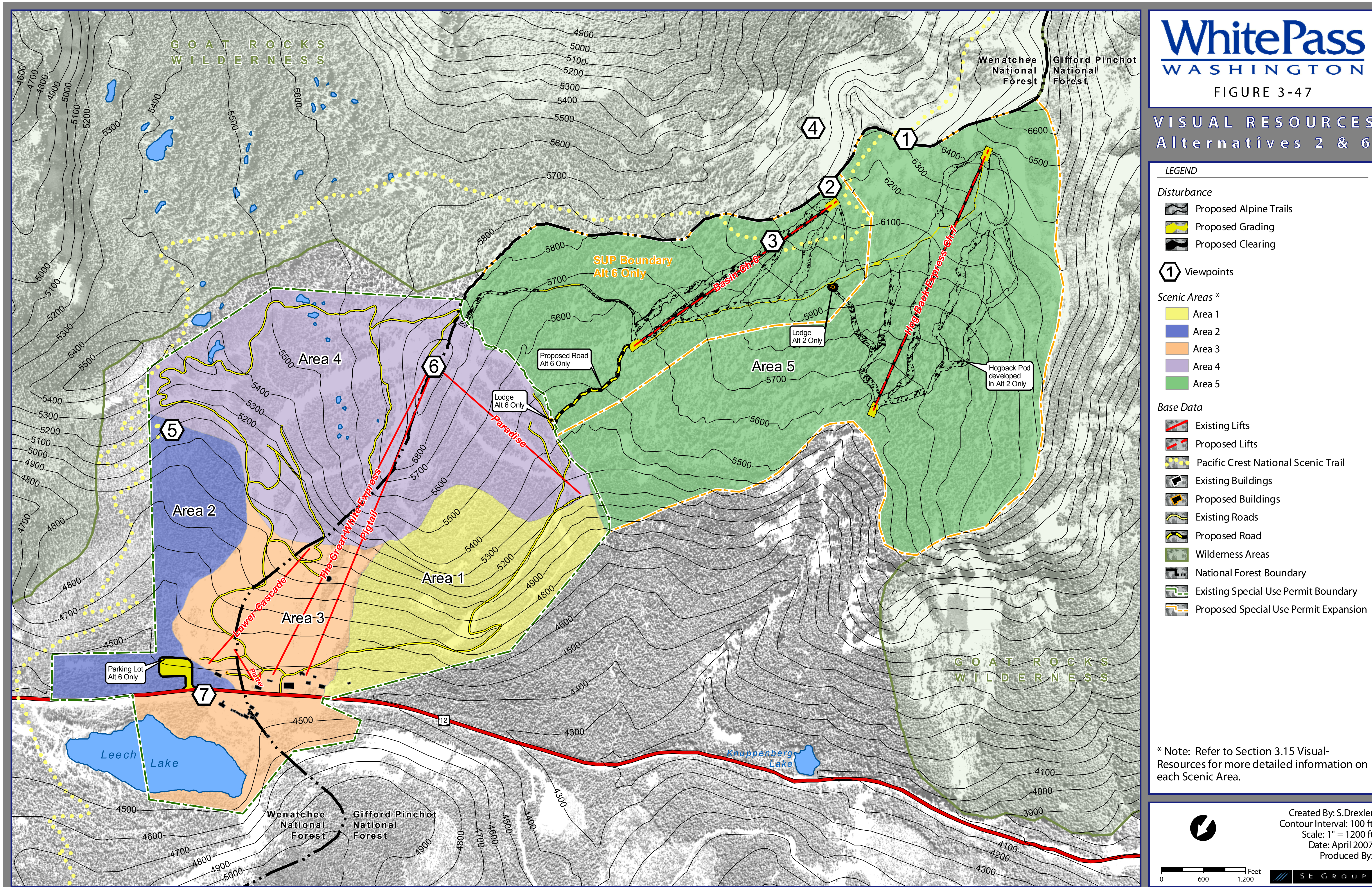
Base Data

- Existing Lifts
- Existing Buildings
- Pacific Crest National Scenic Trail
- Existing Roads
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary

* Note: Refer to Section 3.15 Visual-Resources for more detailed information on each Scenic Area.

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By: SE GROUP

0 600 1,200 Feet


WhitePass
WASHINGTON
FIGURE 3-47
VISUAL RESOURCES
Alternatives 2 & 6
LEGEND
Disturbance
Proposed Alpine Trails
Proposed Grading
Proposed Clearing
Viewpoints
Scenic Areas *
Area 1
Area 2
Area 3
Area 4
Area 5
Base Data
Existing Lifts
Proposed Lifts
Pacific Crest National Scenic Trail
Existing Buildings
Proposed Buildings
Existing Roads
Proposed Road
Wilderness Areas
National Forest Boundary
Existing Special Use Permit Boundary
Proposed Special Use Permit Expansion
* Note: Refer to Section 3.15 Visual-Resources for more detailed information on each Scenic Area.
Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP
0
600
1,200
Feet
GOAT ROCKS WILDERNESS
Wenatchee National Forest
Gifford Pinchot National Forest
SUP Boundary Alt 6 Only
Basin Ch.6
Hog Back Express Ch.7
Lodge Alt 2 Only
Proposed Road Alt 6 Only
Lodge Alt 6 Only
Hogback Pod developed in Alt 2 Only
Area 5
Area 4
Area 2
Area 1
Area 3
Paradise
The Great White Express
Pigtail
Lower Cascade
Parking Lot Alt 6 Only
Leech Lake
Knuppenberg Lake
12
1
2
3
4
5
6
7

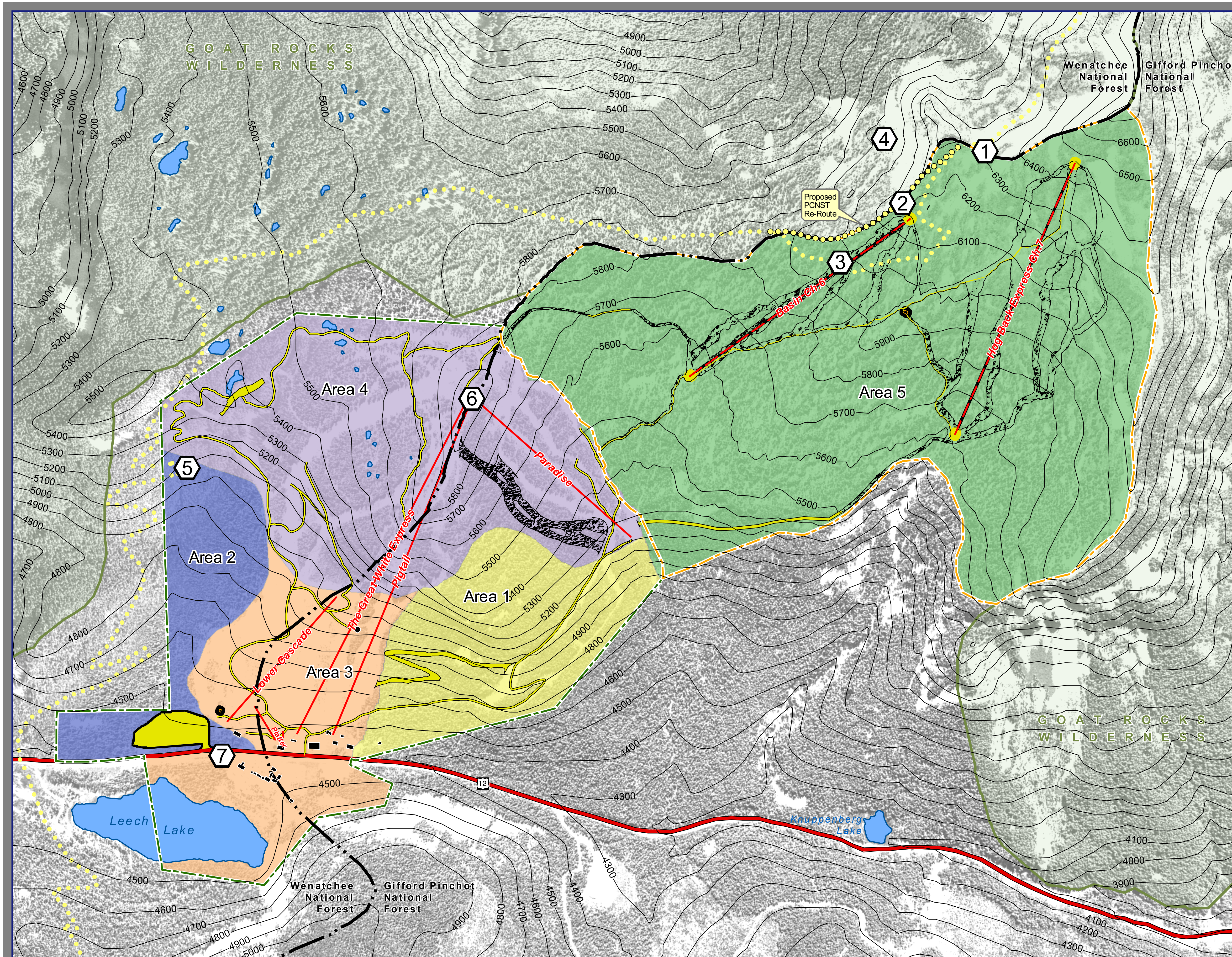


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FIGURE 3-48

VISUAL RESOURCES Modified Alternative 4

LEGEND

Disturbance

- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing

1 Viewpoints

*Scenic Areas **

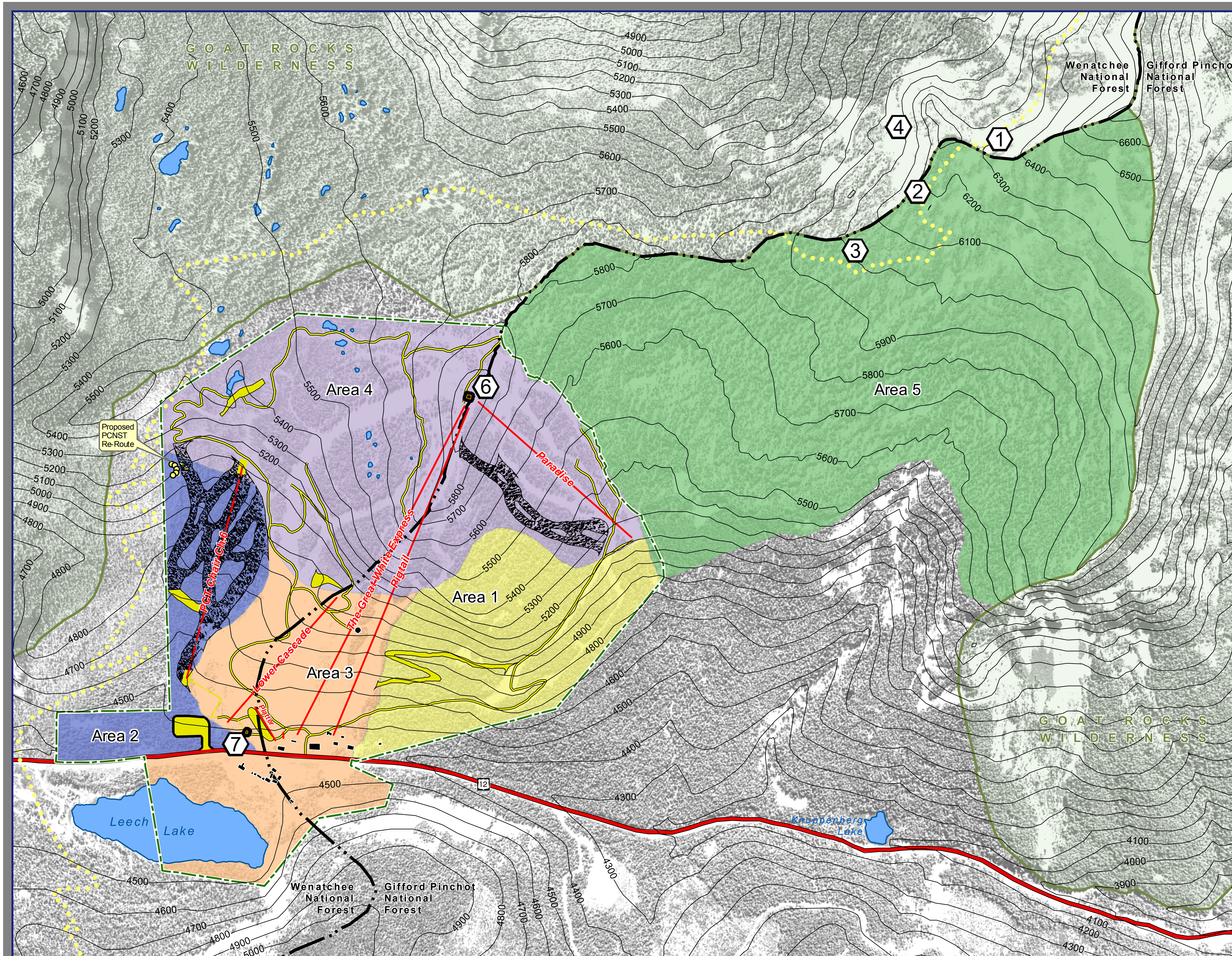
- Area 1
- Area 2
- Area 3
- Area 4
- Area 5

Base Data

- Existing Lifts
- Proposed Lifts
- Pacific Crest National Scenic Trail
- PCNST Re-Route
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary
- Proposed Special Use Permit Expansion

* Note: Refer to Section 3.15 Visual-Resources for more detailed information on each Scenic Area.

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:
SE GROUP



WhitePass WASHINGTON

FIGURE 3-49

VISUAL RESOURCES Alternative 9

LEGEND

Disturbance

- Proposed Alpine Trails
- Proposed Grading
- Proposed Clearing
- Viewpoints

*Scenic Areas **

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5

Base Data

- Existing Lifts
- Proposed Lifts
- Pacific Crest National Scenic Trail
- PCNST Re-Route
- Existing Buildings
- Proposed Buildings
- Existing Roads
- Wilderness Areas
- National Forest Boundary
- Existing Special Use Permit Boundary

* Note: Refer to Section 3.15 Visual-Resources for more detailed information on each Scenic Area.

Created By: S.Drexler
Contour Interval: 100 ft
Scale: 1" = 1200 ft
Date: April 2007
Produced By:

0 600 1,200 Feet

SE GROUP