3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Chapter 3 describes the physical and biological environment (e.g., water resources, wildlife) as well as the human (e.g., social and economic) environment, which may be affected by the range of alternatives, as described in Chapter 2. In this FEIS, Chapter 3 also includes the direct, indirect, short-term, long-term, and cumulative impacts associated with the implementation of the alternatives described in Chapter 2 on the physical and biological environment as well as the social and economic environments described. The analysis of these environmental consequences in Chapter 3 forms the basis for comparison of the different alternatives.

This FEIS incorporates by reference additional information on the affected environment and the environmental consequences from technical reports and other analyses prepared by the USFS and the project consultants. Some of these reports are attached to this FEIS as appendices. All reports are available for review as part of the Project File maintained for this project at the Naches Ranger District, Okanogan and Wenatchee National Forests (OWNF).

The White Pass Study Area includes the existing White Pass Ski Area Special Use Permit (SUP) boundary as well as the proposed SUP boundary modifications. Analyses provided in this FEIS use the common White Pass Study Area boundary; however, at times it is necessary to discuss areas outside the project boundary (e.g., wildlife, watershed resources, socio-economics, etc.) to provide a complete analysis of effects. In each case, the additional area of analysis is defined (e.g., 5th field watershed for analysis of effects relating to the Aquatic Conservation Strategy).

This FEIS discloses project specific and cumulative effects that are projected to occur during project build-out, and which would be present at the end of the implementation period. It is important to note that the disclosure of effects in this FEIS is meant to provide the maximum effect of each alternative, based on the assumptions in Chapter 2. The analysis also considers Mitigation Measures, Management Requirements, and Other Management Provisions that would be implemented in order to avoid, minimize, reduce, rectify or compensate for impacts to the physical, biological or human environments. Mitigation Measures and Management Requirements for each resource area are presented in Chapter 2, Table 2.4-2 and Table 2.4-3. Other Management Provisions are presented in Table 2.4-4.

An “impact” or “effect” is described as any change in physical, biological, social or economic factors, which directly or indirectly results from implementation of an action. Impacts may be adverse or beneficial, depending upon the type of change and the resource area being discussed. **To facilitate the reader’s ability to locate adverse impacts in the document, text that describes adverse effects, mitigated adverse effects, or effects that are specifically avoided, is highlighted in bold.** The following impact definitions are used in this FEIS:

Short-Term Impact – An impact that occurs during construction and/or for one to two growing seasons thereafter; or an impact that may occur after brief activities associated with operation and maintenance.

Long-Term Impact – An impact that continues for an extended period of at least three years, or that may be permanent.

Direct Impact – An impact that occurs as the direct result of an action, including construction, operations and maintenance. Direct impacts have immediate effects in the area of activity.

Indirect Impact – An impact that develops as the result of a direct impact and that would not have occurred otherwise. Indirect impacts have delayed or unforeseen effects that occur in the future or in a different location than the original action.

Past, Present, and Reasonably Foreseeable Actions

In addition to the impact definitions detailed above, CEQ regulations (40 CFR 1508.7) require that cumulative impacts be considered in the analysis of the alternatives. A cumulative effect is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions"(40 CFR 1508.7).

Therefore, the discussion of cumulative effects in Chapter 3 has considered all identified Action Alternatives within the context of past, present, and reasonably foreseeable actions that may occur in the project and surrounding area. The effects of past activities are represented in the baseline for each issue area consistent with the President's Council on Environmental Quality's Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ 2005), which is hereby incorporated by reference. This guidance states that "Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

Current guidance on cumulative effects analyses has been incorporated in the discussions of cumulative effects for each resource. Specifically, the strategy for preparing environmental effects analysis under NEPA and the NFMA provided in the course titled "Environmental Effects Analysis and Documentation" were incorporated (Glassford 2005). Additionally, the temporal and spatial overlap considerations in cumulative effects analysis (Hansen-Murray, pers. comm.) are included in the cumulative effects analysis. Discussion on the impacts to each resource area have been incorporated based on case-study analyses provided by the course "Writing the Perfect Cumulative Impact Assessment" (Schmidt 2006).

Cumulative effects applicable under each resource area of this FEIS are identified, along with an indication of the spatial and temporal scale of the relevant cumulative impact. Projects not related to the Action Alternatives are evaluated to determine whether their effects overlap in time or space with the effects of the Action Alternatives. In order to support the evaluation of cumulative effects in the White

Pass Study Area and to support the analysis of cumulative effects as they relate to the Aquatic Conservation Strategy (refer to Section 3.7 – Aquatic Conservation Strategy), cumulative actions and their effects are evaluated at both the White Pass Study Area scale and the 5th field watershed scale for the physical and biological resource areas. Specifically, watersheds for the White Pass Study Area are the Clear Fork Cowlitz and the Upper Tieton watersheds (refer to Figure 3-11). A customized 5th field watershed area of the Clear Fork Cowlitz watershed was used in the cumulative effects analysis because part of it is located within Mount Rainier National Park. This customized 5th field watershed area was termed the Upper Clear Fork Cowlitz within this FEIS. The portion of the watershed within the National Park was eliminated from the analysis area because no projects resulting in cumulative effects would occur within park boundaries. The vegetation and wildlife cumulative effects discussions consider both watersheds as the "Cumulative Effects Analysis Area (CEAA)." The geology and soils, watershed, and fisheries cumulative effects discussions consider effects in each watershed. Project effects that overlap temporally (in time) with the proposed White Pass Expansion or have ongoing effects are evaluated in the cumulative effects analysis. Projects whose effects do not overlap spatially or temporally with the effects of the Action Alternatives may be eliminated from cumulative effect analysis in certain resource areas. For example, the Zig Zag Nordic ski trail construction resulted in short-term impacts to soils (i.e., compaction, displacement) to accommodate the trail clearing. The trail has since effectively stabilized and the short-term soil effects are no longer present. In this case, the effects of the trail on soils would not be included in the cumulative effects analysis because the effects do not overlap in time with the Action Alternatives. However, the Zig Zag Nordic trail would warrant discussion in the analysis of cumulative effects under vegetation (forest remains cleared for the trail) and recreation (the trail has been used through the 2006-07 season) because the effects of the ski trail do overlap with the effects of the Action Alternatives.

Table 3.0-FEIS1 and Table 3.0-FEIS2 summarize the past, present, and reasonably foreseeable projects in the vicinity of the White Pass Study Area. The cumulative effects of these projects are evaluated within each specific resource area (e.g., Section 3.2 – Geology and Soils).

Table 3.0 FEIS1:
Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed Considered in the Cumulative Effects Analysis

Number	Project	Description	Timeframe[a]
UCFC-1	Coyote Slide/Clear Fork Trail Relocation	A 0.5 mile portion of Trail #61 was rerouted to more stable ground after being obliterated by a landslide. Approximately 0.3 acre of clearing and grading with hand tools occurred in Riparian Reserves for trail construction.	Past (1997-1998)
UCFC-2	Forest Road 4600 Stabilization	A fill slope was stabilized by placing rip rap at the culvert inlet to Lava Creek at Mile Post 7.3. Approximately 0.1 acre was affected.	Past (1998)
UCFC-3a	Palisades Scenic Viewpoint Project	A scenic overlook was reconstructed on approximately 2 acres adjacent to Highway 12 at Mile Post 148. The project resulted in less than 0.5 acre of new impervious surface over the 2 previously disturbed acres.	Past (2004-2005)
UCFC-3b	Palisades Scenic Viewpoint Project Vegetation Mgmt	About 1 acre of trees may be treated in the future to improve the view from this existing viewpoint. Trees would be felled, with boles left on-site. Slash would be lopped and scattered, chipped, or burned.	Future
UCFC-4	Mt Rainier/Goat Rocks Scenic Viewpoint	An existing scenic overlook on Highway 12 at Mile Post 147.2 will be reconstructed to highlight views of Mt. Rainier. Approximately 0.75 acre of late-seral forest will be affected. Trees will be felled and left on-site to improve the view. Improvements include installation of rail fencing, interpretive signs, and improved drainage by spot hardening with rock. The project is scheduled for 2007.	Current or Future
UCFC-5	White Pass Wildfire	A wildfire occurred along the trail to Sand Lake in 1998 within the William O. Douglas Wilderness. Approximately 204 acres of forest was affected.	Past (1998)
UCFC-6	Knuppenberg Lake Bridge Removal	A decommissioned and collapsed bridge was removed from the site at Knuppenberg Lake. The area affected during removal was approximately 0.24 acre within Riparian Reserves.	Past (2004-2005)
UCFC-7	Wilderness Trail Maintenance	Approximately 20.5 miles of trail maintenance occurs on Trails 61, 76, 79, 60 every other year. Maintenance activities include clearing the corridors of downed logs, brushing woody shrubs and herbaceous vegetation and maintenance of drainage structures. All work is accomplished with hand tools. A maximum of 7.5 acres of disturbance would occur with this project.	Ongoing

Table 3.0 FEIS1:
Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed Considered in the Cumulative Effects Analysis

Number	Project	Description	Timeframe[a]
UCFC-8	Ongoing Road Maintenance	Approximately 9 miles of road surface maintenance occurs on Roads 46, 1284, 1276 every 5 years. Maintenance activities include brush removal, grading, and repairing stream crossings. Assuming an average road width of 40 feet, approximately 46.3 acres of disturbance would occur with this project.	Ongoing
UCFC-9	Dispersed Camp Site Maintenance	26 inventoried camp sites (approximately 2 acres total) within the Upper Clear Fork Cowlitz drainage are maintained on an annual basis. Maintenance activities include litter removal and removal of incidental structures such as user constructed meat poles and rock fire rings. All work is accomplished with hand tools.	Ongoing
UCFC-10	Clear Fork Trail Puncheon Installation	Approximately 0.1 mile of puncheon (elevated wooden walkway) was constructed using hand tools on Trail 61 within a Riparian Reserve. Approximately 0.07 acres were affected through creation of this semi-impervious surface.	Past (2003-2004)
UCFC-11	Air Quality Monitoring Building	The construction of an air quality monitoring station on Pigtail Peak occurred in 1999. Construction resulted in approximately 0.02 acre of new impervious surface.	Past (1999)
UCFC-12	Rockfall Mitigation (between Mile Posts 143 and 149)	WSDOT mitigated five slopes of rockfall on Highway 12 between Mile Posts 143 and 149. Mitigation was completed in 2004 by removing debris and stabilizing adjacent side slopes on approximately 2.5 acres.	Past (2003-2004)
UCFC-13	Highway 12 Paving Project (between Mile Posts 140.3 to 151.2)	WSDOT resurfaced approximately 10.9 miles of Highway 12 in the Upper Clear Fork Cowlitz watershed in 2004 (18.7 miles total in the vicinity of White Pass-refer to Upper Tieton Table 3.0-FEIS2). Approximately 87 total acres of roadway were resurfaced in this watershed.	Past (2004)
UCFC-14	Unstable Slope Repair Projects (between Mile Posts 145.61 and 145.77)	WSDOT will repair approximately 1 acre of unstable slopes on approximately 0.1 mile of Highway 12 between Mile Posts 145.61-145.71 in 2007.	Current
UCFC-15	Unstable Slope Repair Projects (between Mileposts 141.8 and 144.4)	WSDOT would repair unstable slopes on approximately 0.5 miles of Highway 12 between Mile Posts 141.8 and 144.4. Approximately 4.5 acres of rocky slopes would be affected. These four separate projects would be implemented between 2009 and 2012.	Future (2009-2012)

Table 3.0 FEIS1:
Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed Considered in the Cumulative Effects Analysis

Number	Project	Description	Timeframe[a]
UCFC-16	Highway 12 Hazard Tree Removal	Annual hazard tree removal occurs within the 15-mile Highway 12 right-of-way corridor. Over the approximately 545 acres within this corridor, individual trees would be removed as needed for safety and protection of property, both within and outside of Riparian Reserves.	Ongoing
UCFC-17	White Pass Ski Area Yurt Construction	A 30 foot diameter yurt with deck and composting toilet was constructed near the bottom terminal of Chair 4. This resulted in approximately 0.01 acre of new impervious surface.	Past (2002)
UCFC-18	Special Forest Product Permits	Bear grass and boughs are collected under permit on several hundred acres each year.	Ongoing
UCFC-19	Fiber Optics Lin	Approximately 16 miles of fiber optics line were installed on approximately 12 acres within the existing Highway 12 right-of-way corridor. These areas were immediately stabilized.	Past (2003)
UCFC-20	Benton Rural Electric Association (REA) Power Line Maintenance	Approximately 1 mile of power line is maintained annually from the summit of White Pass to the WSDOT maintenance shed. Maintenance includes clearing fallen trees, removing new undergrowth, and line maintenance over the approximately 28 acres within the corridor.	Ongoing
UCFC-21	White Pass Ski Area Day Lodge Remodel	The capacity of the existing day lodge was increased by 180-200 seats. The expansion enclosed much of an existing outdoor concrete patio. Ground disturbance was approximately 0.25 acres within previously disturbed areas, including creation of approximately 0.05 acre of additional impervious surface.	Past (2003)

[a] Timeframes are defined as current – a one time project occurring in 2007; future – a project occurring in 2008 or beyond, ongoing – a project occurring at periodic intervals, or past – a project that occurred in 2006 or before.

Table 3.0-FEIS2:
Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed Considered in the Cumulative Effects Analysis

Number	Project	Description	Timeframe[a]
UT-1	White Pass Ski Area Half Pipe Construction	A new half pipe was constructed in a previously disturbed area in 2003 that affected approximately 1 acre. A five foot deep trench was excavated and dirt was backpiled on the perimeter during construction. The area was revegetated after project completion and has stabilized.	Past (2003)
UT-2	White Pass Ski Area Sewer Line Replacement	The proposed replacement of approximately 0.4 miles of existing sewer line from the condominiums to the drainfield would impact approximately 0.73 acre, some of which would occur within Riparian Reserves.	Future
UT-3	White Pass Ski Area Generator Shed and Propane Tank	A new generator shed and propane tank were constructed adjacent to the condominiums, affecting approximately 0.004 acre and converting it to an impervious surface.	Past (2001)
UT-4	White Pass Ski Area Relocation of Chair 3 and Platter Lift	The existing Platter Lift and Chair 3 were realigned to better access terrain. Disturbance occurred within Riparian Reserves as a result of additional clearing and grading to construct lift towers and terminals. This project was completed in 2000. Approximately 0.5 acre of previously disturbed soils within and outside of Riparian Reserves was affected and converted to 0.01 acre of impervious surface.	Past (2000)
UT-5	US Cellular Tower	US Cellular constructed a new tower on Pigtail Peak in 2000. Approximately 0.004 acre of new impervious surface was constructed in association with the 55 foot tall tower base.	Past (2000)
UT-6	White Pass Ski Area Restaurant/Condo Conversion	An existing restaurant was converted into 3 condominiums in 1999. The restaurant building that occupied 0.25 acre was demolished and a new building was constructed on the original building site, including additional sidewalks, resulting in an increase of 0.01 acre of impervious surface.	Past (1999)

Table 3.0-FEIS2:
Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed Considered in the Cumulative Effects Analysis

Number	Project	Description	Timeframe[a]
UT-7	White Pass Ski Area Cross Country Yurt	A new 30 foot diameter yurt with a flush toilet was constructed in 2001 in a previously disturbed area. Approximately 0.25 acres were affected, including the creation of approximately 0.02 acre of impervious surface.	Past (2001)
UT-8	White Pass Ski Area Manager's Cabin	A new manager's cabin was constructed in 1998 totaling approximately 1,825 square feet of living space. Approximately 0.25 acre was affected during construction, including the creation of approximately 0.04 acre of impervious surface.	Past (1998)
UT-9	White Pass Ski Area Manager's Office	A 1,094 square foot office was constructed in 1998, affecting approximately 0.25 acre, including the creation of 0.03 acre of additional impervious surface.	Past (1998)
UT-10	Dog Lake Campground/Four Trailhead Reconstruction	The Dog Lake Campground and four trailheads are currently undergoing reconstruction to upgrade and repair existing facilities. The project affects approximately 5.0 acres of previously disturbed soils, some within Riparian Reserves. This project also includes areas that will be rehabilitated. This project will be completed in 2007.	Current
UT-11	Clear Creek Overlook Reconstruction	The Clear Creek scenic overlook will be reconstructed and an interpretive trail will be added. Approximately 1 acre will be affected by the project, primarily on previously disturbed soils, including the creation of approximately 0.1 acre of impervious surface. This project is expected to be completed in 2007.	Current
UT-12	Fiber Optic Line	Approximately 14 miles of fiber optic line were installed within approximately 10 acres of the existing Highway 12 right-of-way corridor.	Past (2003)
UT-13	White Pass Horse Camp CXT Toilets	Existing vault toilets at the camp were replaced with ADA accessible CXT toilets. Approximately 0.25 acre of previously disturbed ground was affected.	Past (2002)
UT-14	Dog Lake Eurasion Water Milfoil Control Project	Divers hand pull milfoil plants from approximately 3 acres of the lake bottom, sending the plants through a suction line onto a boat where fragments can be trapped and appropriately disposed of 2-3 times annually, during mid to late summer.	Ongoing

**Table 3.0-FEIS2:
Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed Considered in the Cumulative Effects Analysis**

Number	Project	Description	Timeframe[a]
UT-15	PCNST Reconstruction	Segments of the Pacific Crest National Scenic Trail were reconstructed from Highway 12 south to Hidden Springs. Approximately 1 acre of previously disturbed soils was affected during construction, which was completed using hand tools only.	Past (2004)
UT-16	Trail 1106 Water Crossing	An existing 15 foot long trail bridge will be repaired, or removed and the resulting ford hardened with rock. Only hand tools will be used. Any abandoned trail segment would be disguised and allowed to revegetate. Approximately 0.1 acre of Riparian Reserves, including the stream, will be affected during activities. This project is expected to be implemented in 2007.	Current
UT-17	North Fork Tieton System Ski Trail Grooming	Up to 8 miles of grooming occurs between December and March, affecting approximately 16 acres within and outside of Riparian Reserves. All grooming takes place over the snow.	Ongoing
UT-18	Benton Rural Electric Association (REA) Power line Maintenance	Approximately 8 miles of power lines are maintained annually from the summit of White Pass through the Clear Creek drainage to the Study Area boundary. Maintenance includes clearing fallen trees, removing new undergrowth, and line maintenance within the 223 acre corridor, both within and outside of Riparian Reserves.	Ongoing
UT-19	Highway 12 Hazard Tree Removal	Annual hazard tree removal occurs within the 14 mile Highway 12 right-of-way corridor. Individual trees would be removed as needed for safety and protection of property, both within and outside of Riparian Reserves over approximately 509 acres (within this corridor).	Ongoing

Table 3.0-FEIS2:
Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed Considered in the Cumulative Effects Analysis

Number	Project	Description	Timeframe[a]
UT-20	Clear Lake Recreation Projects	Several small construction projects are currently being implemented in the vicinity of Clear Lake. Approximately 2 acres of soils will be affected, primarily on previously disturbed ground. Projects include Campground Host site improvements, North Clear Lake Campground access road improvements, and the Three Day Campground camp spur modification. These projects are located within Riparian Reserves.	Current
UT-21	Fish Hawk/Spillway Campground Improvements	Approximately 1 acre of previously disturbed ground within a Riparian Reserve was affected from CXT toilet installation, access road and site improvements during construction.	Past (2001-2002).
UT-22	McCall Basin Trail Reconstruction	Reconstruction of the existing McCall Basin trail included culvert removal and ford hardening on approximately 0.25 acre of trail. All work was completed using hand tools.	Past (2004)
UT-23	System Trail Maintenance	Approximately 48.5 miles of annual trail maintenance occurs within the Upper Tieton River watershed. Maintenance activities include clearing corridors of downed logs, brushing of woody shrubs and herbaceous vegetation, and maintenance of drainage structures. All work is completed with hand tools. Up to approximately 36 acres would be affected within and outside of Riparian Reserves.	Ongoing
UT-24	Snoqueen Mine	The mining operation is located on portions of two patented mining claims (private land) and one unpatented claim immediately west of Dog Lake Campground on the north side of Highway 12. Operations consist of extracting building stone from a quarry that extends into a ridge. The clearing for the quarry is approximately 12 acres with a nearly vertical 75 foot face at the back. Over the past decade, active operations have traditionally been confined to a relatively short season during the summer.	Ongoing

**Table 3.0-FEIS2:
Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed Considered in the Cumulative Effects Analysis**

Number	Project	Description	Timeframe[a]
UT-25	*Zig Zag* Nordic and Snowshoe Trails	The approximately 2.1 km *Zig Zag* Nordic Trail and 11.6 km snowshoe trail system have been in use for several years and are currently approved for the 2006-2007 winter season under an annual Special Use Permit. Approximately 4.4 acres of Nordic trail are groomed with machinery and 3.5 acres of snowshoe trail are packed using snow shoes several times weekly.	Past and Current
UT-26	Highway 12 Rock Stabilization (at Mile Post 155)	Removal of debris and stabilization of rocky talus side slopes on Highway 12 at Mile Post 155 is currently under way. Approximately 1 acre will be affected. Project completion is expected in 2007.	Current
UT-27	Highway 12 Rock Stabilization (at Mile Post 155)	WSDOT performed emergency repairs on Highway 12 due to a road washout in 2002. Approximately 0.5 acre, located on rocky talus slopes, was repaired.	Past (2002)
UT-28	Camp Prime Time Accessible Trail, Wagon Ride Route and Tree House	Camp Prime Time has proposed constructing an accessible tree house, improving an existing trail to ADA standards with interpretive signs, and converting approximately one mile of existing closed road into a wagon ride route. These projects will affect approximately 3 acres within and outside of Riparian Reserves. Implementation of these projects is expected in 2007.	Current
UT-29	Clear Lake Boat Launch Heavy Maintenance	The boat launch dock will be repaired in accordance with a hydraulic project approval (HPA) permit issued by WDFW. Less than 1 acre will be affected within a Riparian Reserve.	Current or Future
UT-30	US Cellular Backup power at White Pass Communications Site	Placement of a propane tank adjacent to a building on Pigtail Peak to power a generator (installed inside the building) was completed in 2006, affecting approximately 0.01 acre of previously disturbed soils.	Past (2006)
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	A formal proposal to improve cellular phone service has been received for further analysis. The proposal includes possible cell tower replacement and building addition on Pigtail Peak at the White Pass communications site. This project would affect up to 0.3 acre, including less than 0.1 acre of new impervious surface.	Future

Table 3.0-FEIS2:
Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed Considered in the Cumulative Effects Analysis

Number	Project	Description	Timeframe[a]
UT-32	Camp Site Maintenance	Maintenance, including litter pickup and incidental structure removal occurs annually at approximately 20 dispersed camp sites adjacent to Clear Lake and Dog Lake. A total of approximately 10 acres within Riparian Reserves are affected. Occasional hazard trees are removed at developed sites. Work is done using hand tools.	Ongoing
UT-33	Highway 12 Paving project (between Mile Posts 151.2 and 159)	WSDOT resurfaced approximately 7.8 miles of Highway 12 in the Upper Tieton River watershed (18.7 miles total in the vicinity of White Pass-refer to Upper Clear Fork Cowlitz table). Approximately 63 acres of roadway were resurfaced in this watershed.	Past (2004)
UT-34	Unstable Slope Repair Projects (between Mile Posts 156.32 and 156.56)	WSDOT stabilized approximately 4 acres of unstable rocky talus slopes on approximately 0.24 mile of Highway 12 between Mile Posts 156.32 and 156.56.	Past (2006)
UT-35	Unstable Slope Repair Projects (between Mile Posts 161.93 and 165.02)	WSDOT would repair approximately 0.53 acres of unstable rocky talus slopes on 0.58 miles of Highway 12 between Mile Posts 161.93 and 165.02.	Future (2009-2013)

[a] Timeframes are defined as current – a one time project occurring in 2007; future – a project occurring in 2008 or beyond, ongoing – a project occurring at periodic intervals, or past – a project that occurred in 2006 or before.

3.1 CLIMATE AND SNOW

3.1.1 Summary of Existing Conditions

3.1.1.1 National and Regional Climate

The White Pass Study Area is located between the elevation of approximately 4,400 feet and 6,700 feet within the Pacific Coastal Ecoregion, which has a climate that is characterized by moist, cool winters and warm, dry summers. The mild climate in this region is moderated by the close proximity to the Pacific Ocean. The variation in summer and winter precipitation patterns in this region is due to the seasonal changes in the location of semi-permanent high and low pressure systems and the path of prevailing westerly winds (i.e., the jet stream). In the summer, the Pacific High Pressure system moves northward to a location off the California and Oregon coast, which protects the Pacific Northwest from storms and keeps the summer dry and warm (Ahrens 1993). Occasional thunderstorms develop along the crest of the Cascade Mountain Range as a result of moist marine air from the Pacific Ocean converging with dry unstable air from the east of the crest.

During the winter, weather patterns in this region are dominated by the combined influences of the Aleutian Low Pressure system that is located in the Gulf of Alaska and the path of the jet stream that moves these storm systems from their genesis point to the Pacific Northwest (Ahrens 1993). Once these storm systems reach the mainland, they are uplifted by the Cascade Mountain Range causing significant precipitation. Cold interior air masses commonly move into Western Washington and Oregon during the winter from Canada. Moist air masses that are carried by the westerlies from the Gulf of Alaska converge with these cold air masses along the crest of the Cascade Mountain range, resulting in considerable snowfall. The Pacific Northwest has a greater average annual snowfall than any other region within the continental United States due, in large part, to the climate phenomenon described above (RRC Associates 2002). Additionally, year-to-year climate variations correlate with two large-scale climate oscillations: El Niño/Southern Oscillation and Pacific Decadal Oscillation, both of which are associated with warm years tending to be dry, and cool years tending to be wet (National Assessment Synthesis Team 2000). Therefore, the Cascades would continue to witness variable weather conditions, resulting in low snow deposition during some weather cycles and excessive snowfall during other periods. Specifically, refer to the Northwest Weather and Avalanche Center or www.skimountaineer.com for White Pass snow depth data from 1976 to 2006 (Andalkar 2006), which shows snow depth oscillations during this period.

The global warming hypothesis has been generally accepted by the scientific community and is a significant concern of ski area operators throughout the United States. According to the *Climate Change 2001: Synthesis Report*, it is likely that precipitation will increase over high-latitude regions in both summer and winter with larger year-to-year variations in precipitation, and nearly all land areas will very likely experience warming (Watson et al. 2001). In a more recent report, the Climate Impacts Group examined climate change scenarios for the Pacific Northwest generated by ten different climate models.

All models projected temperature increases throughout the year, and most predicted the largest temperature changes would occur during the summer (June-August). The majority of models projected small decreases in precipitation during the summer, and slight increases in winter (December-February), but little change is projected in the annual mean through mid-century. However, precipitation predictions were more variable and less certain than temperature forecasts, and the precipitation change projections fell within the range of year-to-year variability observed during the 20th century (Climate Impacts Group 2006).

According to the Pacific Northwest National Laboratory (PNNL) climate change model, snow cover in Washington State will be lost within the existing snowline, resulting in a projected rise of the average Cascade snowline from its current 3,000 feet to approximately 4,100 feet in the next 50-80 years (PNNL 2004).

However, the localized affects caused by global warming are still being debated. Climate predictions are frequently based on averages of many climate models, which are often based on single runs using the same emissions scenario, resulting in varied climate projections. The National Assessment Synthesis Team of the U.S. Global Change Research Program notes that:

> "a more reliable regional assessment would require controlled regional-level comparison of several state-of-the-art models, each with a statistical ensemble of multiple similar runs under each of several emissions scenarios" (National Assessment Synthesis Team 2000).

The global warming hypothesis was not used as an integral part of the climate and snow analysis or in the planning for this analysis due to crucial unknowns, the need for more research, the inherent uncertainty of the ability of regional climate models to predict the localized impacts associated with global warming, and the typical 50-80 year timeframes of the projections. As previously described, the White Pass Study Area is located between the elevation of approximately 4,400 feet and 6,700 feet and, according to the PNNL climate change model, snow cover in Washington State will be lost within the existing snowline, resulting in a projected rise of the average Cascade snowline from its current 3,000 feet to approximately 4,100 feet in the next 50-80 years (PNNL 2004). Even with the projected snowline rise, the proposed terrain expansion under Alternative 2, Modified Alternative 4 and Alternative 6 is designed to provide terrain opportunities above 4,100 feet in elevation prior to 2050. Furthermore, the planning period for this analysis and the proposed operation period is 10-20 years. Additionally, the Cascades would continue to witness variable weather conditions, resulting in low snow deposition during some weather cycles and excessive snowfall during other periods (www.skimountaineer.com; Andalkar 2006).

White Pass Climate Data

Two SNOTEL stations are located within the existing White Pass Study Area, defined as the existing SUP area and the proposed SUP expansion area. One site (Pigtail Peak, Station ID 21c33s) is located on Pigtail Peak at approximately 5,900 feet elevation, and is within the proposed expansion area. The other station (White Pass E.S., Station ID 21c28s) is located at approximately 4,500 feet elevation, near the base of the existing ski area. These stations provide site specific climate data over a short period of record, when compared to global climate monitoring. Data is recorded at the station according to the hydrologic water year (October through September), which overlaps calendar years.

According to the SNOTEL Data Network (maintained by the Natural Resource Conservation Service), average annual precipitation at the Pigtail Peak station is 79.6 inches. The average snowpack between January and March is 37.6 inches, measured as a snow water equivalent (SWE). The SWE represents the amount of liquid water contained in the snow. The average maximum snow depth at Pigtail Peak is approximately 58.6 inches measured as SWE. SWE depends largely on the snow density to calculate the snow depth. Snow density within the Cascades averages 20-30 percent during the winter months (Natural Resource Conservation Service 2004). The snowpack typically forms in mid-October and persists until late June or early July. Average yearly temperature within the Pigtail Peak portion of the White Pass Study Area was 35.8 degrees Fahrenheit during the period of record from 1989 through 2003. Temperature ranged from an average high of 51.2 degrees Fahrenheit in August to an average low of 24.2 degrees Fahrenheit in February.

At the White Pass E.S. station, average annual precipitation is 44 inches. The average snowpack between January and March is 17.8 inches, measured as a SWE. The average maximum snow depth at the White Pass E.S. is approximately 24.11 inches measured as SWE. The snowpack at this location typically forms during late October and persists until late May. Average yearly temperatures within the base area portion of the White Pass Study Area were 37.4 degrees Fahrenheit during the period of record from 1989 through 2003. Temperature ranged from an average high of 53.5 degrees Fahrenheit in August to an average low of 24.5 degrees Fahrenheit in December.

3.1.2 Affected Environment

3.1.2.1 Snow Conditions

The quality of the snow, from a skiing perspective, varies considerably during the winter operating season. Snow conditions are typically good (e.g., dry powder, packed powder) during the months of December, January, and February when temperatures average 27 degrees Fahrenheit. Snow conditions can vary from dry powder to spring corn snow during the remainder of the operating season, due to the temperature fluctuations described above.

Avalanche Hazard Areas

The White Pass Study Area is located in a Class C avalanche area according to *The Avalanche Handbook* (USDA 1990c). According to *The Avalanche Handbook* (McClung and Schaerer 1993), Class C means a low incidence of avalanches and a low risk. White Pass has a maritime snow climate, which is distinguished by relatively heavy snowfall, comparatively mild temperatures (for mountainous terrain), deep snow accumulations, rainfall at any time throughout the winter, and cold arctic air that appears several times per year. Maritime snowpacks can be relatively unstable and can have rapidly fluctuating degrees of stability. According to *The Avalanche Handbook* (McClung and Schaerer 1993),

> "Avalanche formation in maritime snow climates usually takes place during or immediately following storms, with failures occurring in the new snow near the surface. The prevalence of warm air temperatures promotes rapid stabilization of the snow near the surface once it falls, thereby limiting the time over which instability persists. A significant cause of major avalanching can be rain if it immediately follows deep, new snowfall. Rainfall may also cause formation of ice layers, which can act as future sliding layers when buried by subsequent snow storms. Due to the deep snow covers and warm snowpack temperatures, the persistence of buried structural weaknesses deep in the snowpack is not usually as common in maritime snow climates as in continental snow climates. Weather observations are primary tools for predicting avalanches in a maritime snow climate."

According to Section 2343.12 of the USFS Manual, the USFS authorizes control of avalanche areas at ski areas by other than Forest Service personnel through a special use authorization. Avalanche control is undertaken on an as-needed basis at the White Pass Ski Area to ensure that the public is protected from avalanche related conditions. Currently, White Pass uses explosives for avalanche control on an as needed basis in certain areas (i.e., trails crossing the cliff band).

Slide areas within the existing White Pass Study Area are readily accessible to control personnel from the upper terminals of Chairs 1 and 2. No control work is currently done in Pigtail or Hogback Basins. Avalanche hazards within the Pigtail and Hogback Basins are negligible due to the combination of terrain and stable snow conditions (refer to Figure 3-1). The basin's north aspect minimizes conditions associated with high solar radiation and springtime instability. The uniform temperature through the season contributes to snowpack stability during the ski season. Additionally, average slope angle is between 10 and 15 degrees and most avalanche activity occurs on slopes from 30 to 45 degrees.

The avalanche hazard to the south of the White Pass Study Area in Miriam Basin is high. Miriam Basin contains slopes of 20 to 30 degrees, with steep rock outcrops at the head of the basin (refer to Figure 3-1). Wind is the primary factor creating hazard, resulting in heavy, unstable snow deposits and cornices along the ridgeline.

Other areas outside the White Pass Study Area are considered to be moderate. This is primarily due to weather-induced changes within the snowpack. The temperature of the snow itself is generally near freezing and this causes the snow crystals to bind together. Freezing and thawing cycles also contribute to stable conditions. However, there are cycles of extreme instability caused by wind-deposited snow, especially during and immediately following storms.

3.1.3 Environmental Consequences

The actions associated with the alternatives and their potential to affect climate and snow conditions comprise the impact mechanisms. These actions are related to the operation of the White Pass Ski Area and represent short-term impacts that affect climate and snow conditions during the course of one or more operating seasons, within the timeframe of the alternatives.

3.1.3.1 Snow Conditions

Alternative 1

Under Alternative 1, no new development would take place at White Pass. White Pass would continue to witness variable weather conditions, resulting in low snow deposition during some weather cycles and excessive snowfall during other periods. As predicted by climate models (PNNL 2004), in the event of an average Cascade snowline increase to the projected 4,100 feet prior to 2050, the White Pass Ski Area (with a base elevation of approximately 4,500 feet), would remain above the average snowline and would not be adversely affected. Additionally, the planning period for this analysis and the proposed operation period is 10-20 years.

Existing grooming operations at White Pass would continue to artificially compact the snow. This snow compaction tends to result in a two to three week persistence of the snowpack into the summer months compared to undisturbed areas (Rixen and Stockli 2000; Rixen et al. 2001).

Alternative 2, Modified Alternative 4 and Alternative 6

Due to the inherent uncertainty in the prediction of localized impacts associated with global warming, no changes are expected in the local climatic regime. In both the short and long-term, there would be no changes expected to the macro-climatic regime that would significantly influence snow deposition and skiing conditions within the White Pass Study Area.

Under Alternative 2, Modified Alternative 4 and Alternative 6, grooming operations would be introduced in Pigtail and/or Hogback Basin, in association with the new lift(s) and trails. As a result, increased skier use of the basins and grooming operations would alter the natural snowpack, as compared to existing conditions. As described under Alternative 1, the snowpack would be artificially compressed through grooming and would likely extend the persistence of the snowpack two to three weeks.

White Pass would continue to witness variable weather conditions, resulting in low snow deposition during some weather cycles and excessive snowfall during other periods. As predicted by climate models (PNNL 2004), in the event of an average Cascade snowline increase to the projected 4,100 feet prior to 2050, the White Pass Ski Area (with a base elevation of approximately 4,500 feet), would remain above the average snowline and would not be adversely affected. Additionally, Alternative 2, Modified Alternative 4, and Alternative 6 would provide terrain opportunities above the predicted 4,100 feet snowline elevation prior to 2050 (PNNL 2004). Additionally, the planning period for this analysis and the proposed operation period is 10-20 years.

Alternative 9

Under Alternative 9, climate change would be as described for Alternative 2, Modified Alternative 4, and Alternative 6. Pigtail and Hogback Basins would not be included in the White Pass operation, so snow conditions would remain unchanged from the existing condition in Pigtail and Hogback Basins. Additional terrain in the current SUP area would be developed (*PCT* lift and trails and new trail in the *Paradise* pod; refer to Figure 2-8). As a result, increased skier use and grooming operations in the eastern portion of the SUP area (*PCT* pod) and the new trail in the *Paradise* pod, would alter the snow conditions in these areas. As described under Alternative 1, the snowpack would be artificially compressed through grooming and would likely extend the persistence of the snowpack two to three weeks.

White Pass would continue to witness variable weather conditions, resulting in low snow deposition during some weather cycles and excessive snowfall during other periods. As predicted by climate models (PNNL 2004), in the event of an average Cascade snowline increase to the projected 4,100 feet prior to 2050, the White Pass Ski Area (with a base elevation of approximately 4,500 feet), would remain above the average snowline and would not be adversely affected. Additionally, the planning period for this analysis and the proposed operation period is 10-20 years.

3.1.3.2 Avalanche Hazard Areas

Alternative 1

No changes to avalanche control practices within the White Pass Study Area would occur under Alternative 1. The White Pass Ski Patrol would continue to assess the avalanche conditions within the existing ski area on an as-needed basis and post their assessment to all skiers.

Alternative 2, Modified Alternative 4 and Alternative 6

Under Alternative 2, Modified Alternative 4 and Alternative 6, White Pass would expand operations into Pigtail and/or Hogback Basin, an area of low avalanche hazard. Avalanche control work would continue to be done on an as-needed basis to ensure that the public is protected from avalanche related conditions.

The current use of the Pigtail and Hogback Basins for Nordic and backcountry skiing would be altered by the operations of groomers and alpine ski facilities (refer to Section 3.11-Recreation). Consequently, the current users of the Pigtail and Hogback Basins would be displaced, perhaps to recreate in Miriam Basin, where avalanche hazard is higher. With increased use, the potential for skier-released avalanches in Miriam Basin would be increased, as compared to Alternatives 1 and 9. Alternative 6 would increase the potential for skier-released avalanches in Miriam Basin slightly less than Alternative 2 and Modified Alternative 4 because only Pigtail Basin would be developed, leaving Hogback Basin available for backcountry skiing.

The use of ungroomed, unpatrolled and unevaluated areas is a risk that is inherent in any winter backcountry activity (refer to Section 3.11 – Recreation). To offset this potential risk, a Boundary Management Plan would be developed as described in Mitigation Measure MM15 (refer to Table 2.4-2). This plan would include designation of no more than two signed gated ski area exit points along the boundary between Pigtail Basin and Miriam Basin, and one exit point downslope of the proposed expansion area. Additionally, the plan would include signage indicating that skiers would be responsible for any search and rescue costs, and inform users of the risks outside the permit area.

Alternative 9

Under Alternative 9, White Pass would develop new trails within the existing ski area. No expansion into the Pigtail or Hogback Basins would occur. Avalanche control work would continue to be done on an as-needed basis within the existing ski area to ensure that the public is protected from avalanche related conditions.

Nordic and backcountry use of Pigtail and Hogback Basins would continue as in Alternative 1. Therefore, the avalanche potential in the Pigtail, Hogback, and Miriam Basins would remain unchanged.

3.1.4 Cumulative Effects

No past, present, or reasonably foreseeable actions or projects that would result in a cumulative effect to climate and snow conditions have been identified. Similarly, implementation of the Action Alternatives would not affect climate and snow conditions in the White Pass Study Area, outside of the two to three week extension of snowpack persistence. White Pass would likely continue to witness variable weather conditions, resulting in low snow deposition during some weather cycles and excessive snowfall during other periods. There would be no cumulative effects to avalanche hazards from the proposed expansion.

3.2 GEOLOGY AND SOILS

3.2.1 Introduction

The study area for the geology and soil analysis in this FEIS is approximately 1,572 acres in size and encompasses the existing White Pass SUP area and the proposed SUP expansion areas ("White Pass Study Area").[22] This section describes the existing condition of geological and soil resources within the White Pass Study Area and the potential impacts from the proposed activities related to the Action Alternatives. The White Pass Study Area encompasses the upper portions of the Upper Tieton River and Upper Clear Fork Cowlitz River watersheds. References frequently used in this section include the *Naches Area Soil Survey* (USDA USFS 1996), *Wenatchee National Forest Land and Resource Management Plan* (WNF Forest Plan) (USDA 1990b), *Gifford Pinchot National Forest Land and Resource Management Plan* (GPNF Forest Plan) (USDA 1990a), and *A Geotechnical Assessment of the White Pass Proposed Expansion* (Wooten 1985). This geology and soil analysis is divided into the following topics: soil compaction, soil productivity, and soil erosion. Geology, soil types and mass wasting are discussed in Appendix F.

3.2.2 Affected Environment

The locations of Soil Groups found within the White Pass Study Area are depicted in Figure 3-6. More detailed descriptions, acreages, underlying geology and landtypes of the Soil Groups found within the White Pass Study Area are located in Appendix F. To evaluate the effects of the Proposed Action on soils, the existing soil compaction, productivity, and soil erosion that currently exist within the White Pass Study Area are described below.

3.2.2.1 Soil Compaction and Productivity

Soil productivity is defined in the GPNF Forest Plan as the capacity of a soil to produce a specific crop such as fiber or forage under defined levels of management (USDA 1990a). Soil productivity is dependant on many factors, such as available soil moisture, soil nutrients, and length of the growing season. Soil productivity is impacted or altered when the topsoil is excessively eroded, covered by an impervious surface, or the topsoil is compacted or mechanically removed by grading or excavation. For the purposes of this FEIS, grading impacts include both the construction of impervious surfaces, as well as other earthwork for site preparation. Site stabilization would include revegetation of exposed soils following the completion of construction, and would not contribute to an area of decreased productivity. Areas where soil productivity has been impacted by the above mentioned activities are defined as "detrimental soil conditions" for the purposes of this document. Impacts such as soil compaction and erosion caused by historic construction of ski lifts and ski trails are measured as a percent of the White

[22]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 this NEPA process, of which this FEIS is a part, the acreage has been re-calculated based on the best available data.

Pass Study Area that is currently in a detrimental soil condition. According to the GPNF Forest Plan and WNF Forest Plan, the total acreage of detrimental soil conditions should not exceed 20 percent within an activity area (USDA 1990a, 1990b). The White Pass Study Area is considered the activity area for purposes of evaluating detrimental soil conditions.

Based on field mapping and GIS analysis, the White Pass Study Area contains eight bare soil areas covering a combined area of approximately 9.2 acres (refer to Table 3.2-1 and Figure 3-7). These bare soil areas were caused by human activities related to ski area management and are all greater than 0.5 acre in size.[23] These bare soil areas are included in calculations of detrimental soil condition. The White Pass Study Area also contains approximately 35.9 acres of existing impervious surfaces that are comprised of existing roads, buildings, and parking lots (refer to Table 3.2-1). The total area of existing detrimental soil conditions is approximately 45.1 acres, which is approximately 2.9 percent of the White Pass Study Area. Since the GPNF Forest Plan and WNF Forest Plan standard for detrimental soil conditions is 20 percent, the White Pass Study Area is currently in compliance with these standards (USDA 1990a, 1990b).

Table 3.2-1:
Existing Soil Productivity Conditions
within the White Pass Study Area

Parameter	Existing Conditions
White Pass Study Area (acres)	1570.0
Bare Soil Areas (acres)[a]	9.2
Impervious Surfaces (acres)[b]	35.9
Area of Detrimental Conditions (acres)[c]	**45.1**
Percent of White Pass Study Area in Detrimental Conditions	**2.9%**

[a] Bare soil areas are existing, human-caused unvegetated areas larger than 0.5 acre.
[b] Impervious surfaces are long-term impacts such as buildings, roads, and lift terminal.
[c] Detrimental soils include all developed areas (roads, building, etc.) and bare soil areas

3.2.2.2 Soil Erosion

Soil erosion and sediment deposition are indirect effects to soil productivity whose extent is dependent on the intensity of the impact and the presence of a transport mechanism such as water, wind, or gravity. Soil surfaces that are temporarily or constantly maintained in a non-vegetated condition are generally more erodible than vegetated soil. Vegetation growth increasingly stabilizes soil, thus sharply reducing the potential for soil erosion and sediment deposition. To describe the range of erodible conditions within the

[23] Based on best available data (field and GIS analysis) the 0.5-acre threshold was determined to be appropriate. Bare soil areas smaller than 0.5 acre may exist on-site, however the sum total of these smaller areas would not increase the percentage of White Pass Study Area in detrimental conditions above the GPNF and WNF Forest Plan compliance standard of 20 percent.

White Pass Study Area, three soil erosion hazard classes were evaluated. Low erosion hazard soil has few erosive properties, is typically located on flat slopes, and poses the lowest risk of surface erosion. Moderate erosion class soil typically occurs on slopes of moderate steepness and has an intermediate erosion hazard. High erosion hazard soil is typically more erosive and is located on steeper slopes, and poses the highest risk of surface erosion. This analysis is intended to describe the risk of surface erosion and does not imply that low and moderate stability soil would not erode under specific management activities, nor does it imply that high erosion hazard soil will always severely erode following clearing and grading activities. All management activities in forested mountainous landscapes generate some increased risk of erosion. Actual erosion, however, also depends on the degree of impact and the effectiveness of Mitigation Measures used.

The acreage of each erosion hazard class within the White Pass Study Area is given in Table 3.2-2 and the distribution of the soil erosion hazard classes within the White Pass Study Area is shown in Figure 3-7. The majority of the soil within the White Pass Study Area (77 percent) is classified as medium erosion hazard, covering approximately 1,201.1 acres. Medium erosion hazard soil is generally found on low to moderate gradient slopes in the upper elevation portions of the existing and proposed SUP areas. Approximately 98.0 acres of high erosion hazard soil is generally located on steep to very steep slopes near the cliff band in the existing ski area (Landtype B) and in some of the lower elevation ski trails (refer to Figure 3-7). Soil that has a low erosion hazard covers approximately 191.0 acres within the White Pass Study Area and is located primarily in low to moderate gradient forested areas and in some very flat meadows in the proposed SUP expansion area.

Table 3.2-2:
Summary of Soil Erosion Hazard
Within the White Pass Study Area

Erosion Hazard	Alt. 1 Existing Conditions	Alt. 1 Existing Impacts
High (acres)	98.0	1.7
Medium (acres)	1,201.1	29.3
Low (acres)	191.0	14.1
N/A (acres)	79.1	0.0
Total (acres)	**1569.2**	**45.1**

Note: Totals may vary due to rounding.

Approximately 45.1 acres of existing developed areas (e.g., roads, buildings, and chairlifts) and bare soil areas within the White Pass Study Area are located predominantly (approximately 65 percent) on medium erosion hazard soils. The remaining developed and bare soil areas in the White Pass Study Area have impacted approximately 1.7 acres of high erosion hazard soils (4 percent) and approximately 14.1 acres (31 percent) of low hazard soils. The distribution of existing developed areas within the White Pass Study Area indicates that many of the potential impacts to high erosion hazard soils have been avoided and that the White Pass Ski Area has not significantly increased the erosion hazard within the White Pass Study Area. Field observations of ski trails and roads within the existing ski area did not identify any areas with significant erosion or gullying and most of the ski trails were in a well vegetated condition. Approximately 9.2 acres of bare soils were identified and mapped within the existing ski area, but most of these areas did not have excessive erosion, and revegetation and erosion control measures were in place.

The Watershed Erosion Prediction Project (WEPP) model developed by the US Department of Agriculture's Agricultural Research Service was used to estimate soil detachment within the Upper Tieton and Upper Clear Fork Cowlitz watersheds in the White Pass Study Area. As described in Appendix L, the WEPP analysis is based on generic hillslopes that have been customized with climate, soil, and vegetation data specific to the White Pass Study Area.

3.2.3 Environmental Consequences

Impact mechanisms to soil resources within the White Pass Study Area include direct, indirect, short-term, and long-term impacts to soil resources. Direct impacts typically have immediate effects in the area of activity and would include construction of impervious surfaces, clearing, and grading activities that would result in the modification of the topography and soils, utility trenching, and restoration activities. Indirect impacts are delayed or unforeseen effects that occur in the future or in a different location than the original action, and include impacts such as altered drainage patterns from construction activities that may increase erosion, clearing activities which may increase erosion and/or nutrient inputs, road and trail maintenance, and restoration activities. Short-term impacts to soil would include temporary disturbances such as the clearing of vegetation, grading areas that would be revegetated, and utility trenching. Long-term impacts include road construction, parking lot construction, lift terminal and tower construction, and building construction.

3.2.3.1 Soil Compaction and Productivity

Alternative 1

There are no proposed activities in the White Pass Study Area under Alternative 1. Currently, approximately 45.1 acres (2.9 percent) of the White Pass Study Area has existing detrimental soil conditions resulting from historic ski area development. There would be no additional direct or indirect impacts to soil productivity under Alternative 1, and the White Pass Study Area would remain consistent with GPNF Forest Plan and WNF Forest Plan standards.

Alternative 2

Under Alternative 2, construction of the mid-mountain lodge, lift terminals and lift towers would have the greatest impact on soil productivity as compared to other proposed activities (such as the clearing of vegetation), because soil production would be eliminated by the creation of new impervious surfaces. **The total area of long-term soil impacts from the creation of impervious surfaces under Alternative 2**

would be approximately 0.1 acre. Soil productivity would also be reduced over the short-term within the White Pass Study Area by approximately 4.8 acres of proposed grading, which would include utility trenching, that would be revegetated with native vegetation after construction is completed. Grading impacts to soil productivity would be caused by removing and/or mixing the top soil, which changes the physical properties of the soil and slows the recovery of vegetation. The potential impacts from grading would be minimized to ensure that impacts are only short-term through the implementation of Mitigation Measure MM11 (refer to Table 2.4-2),development of a Travel Route Plan (TRP), use of low impact construction equipment, and other methods to reduce incidental soil compaction and mechanical disturbance. Other Management Provisions that would be implemented include the creation of a SWPPP to reduce erosion impacts, preservation and reapplication of topsoil in graded areas, and not allowing construction during unfavorable weather conditions (refer to OMP1, OMP2, and OMP4 in Table 2.4-4).

Due to the development of a TRP as part of the SWPPP, and other Mitigation Measures such as transporting equipment over the snow and/or slash and downed logs, there would be no new soil compaction within the White Pass Study Area (refer to Appendix F). The TRP would also specify conditions that must be met for over-ground access for construction equipment (refer to MM11 in Table 2.4-2). Other Management Requirements that would be implemented in conjunction with the TRP include the use of low pressure tires on construction equipment and the prohibition of vehicles driving over ground in the White Pass Study Area during inclement weather (refer to MR16 and MR17 in Table 2.4-3). Because of these Mitigation Measures and Management Requirements, there would be no soil compaction within the White Pass Study Area that would lead to additional detrimental soil conditions during implementation of Alternative 2.

Under Alternative 2, approximately 0.1 acre of impervious surfaces would be added to the approximately 45.1 acres of existing detrimental soil conditions. Therefore, the total area of detrimental soil conditions within the White Pass Study Area would remain at 2.9 percent under Alternative 2, well below the 20 percent threshold, consistent with GPNF Forest Plan and WNF Forest Plan standards.

Table 3.2-3:
Potential Impacts to Soil Resources Within the White Pass Study Area

Parameter	Alt. 1 Existing Condition	Alt. 2 Impacts	Mod. Alt. 4 Impacts	Alt. 6 Impacts	Alt. 9 Impacts
Short-term Soil Impacts from Clearing (acres)[a]	N/A	14.9	23.6	9.6	27.0
Short-term Soil Impacts from Grading (acres)[a]	N/A	4.8	12.8	1.2	1.2
Long-term Soil Impacts (acres)[b]	35.9	0.1	8.1	4.5	10.7
Total Soil Impacts (acres)	**35.9**	**19.8**	**44.4**	**15.3**	**38.9**
Area of Detrimental Soil Conditions (acres)	**45.1**[c]	**45.2**	**53.2**	**49.6**	**55.8**
Percent of White Pass Study Area w/ detrimental soil conditions	**2.9%**	**2.9%**	**3.4%**	**3.2%**	**3.6%**

[a]Short-term soil impacts are equivalent to proposed clearing and grading, including trenching that would be revegetated.
[b]Long-term soil impacts are equivalent to all proposed impervious surfaces (buildings, new roads, parking lots, etc.).
[c]The area of detrimental soil conditions for Alternative 1 includes both impervious surfaces and bare soil area.
Note: Totals may vary due to rounding.

The proposed 14.9 acres of tree clearing for tree island removal and full clearing to construct the trails for the *Basin* pod and the *Hogback Express* pod would also result in short-term impacts to soil productivity. Short-term soil productivity impacts from tree clearing are lower intensity impacts as compared to short-term impacts from grading and could be caused by incidental soil compaction from the operation of logging equipment and disturbing the duff layer from tree felling and related activities. Implementation of a TRP, as specified in Mitigation Measure MM11 (refer to Table 2.4-2), and Other Management Provisions, such as the creation of a SWPPP to reduce erosion impacts and not allowing construction during inclement weather conditions (OMP1 and OMP4 in Table 2.4-4), would reduce potential short-term clearing impacts to soil.

Under Alternative 2, approximately 19.8 acres of total land would be cleared and/or graded to create the lift corridors and ski trails in the proposed expansion area. The removal of tree islands in the mountain hemlock parkland vegetation community would also indirectly impact soil quality, and therefore soil productivity by reducing litter and woody debris inputs and slowing the formation of the organic duff layer. Vehicles and equipment operating near the perimeter of constructed impervious surfaces and proposed clearing could further reduce soil productivity through the compaction and puddling of soil. Restoration of this lost productivity could be very slow due to the cold soil temperatures, short growing season, and low fertility. Through the use of the construction techniques listed in Table 2.4-1 and the creation of a TRP, as specified in Mitigation Measure MM11 (refer to Table 2.4-2), as well as following

Other Management Provisions OMP1 and OMP4, which call for a creation of a SWPPP to reduce erosion impacts and not allowing construction during inclement weather conditions (refer to Table 2.4-4), potential soil compaction, erosion, and overall loss of soil productivity would be reduced.

Modified Alternative 4

The construction of the proposed parking lot and grading for Trail *4-16* and Trail *4-18* would have the greatest relative impact on soil productivity, as compared to other proposed activities under Modified Alternative 4, due to the larger area of impervious surfaces and extensive cut and fill excavation proposed. **The total area of long-term soil impacts from the creation of impervious surfaces under Modified Alternative 4 would be approximately 8.1 acres**, which would be the second largest increase in impervious surfaces, after Alternative 9, of all Action Alternatives. Soil productivity would also be reduced over the short-term within the White Pass Study Area by approximately 12.8 acres of proposed grading that would be revegetated with native vegetation after construction is completed. The short-term grading impacts from Modified Alternative 4 are the largest as compared to the other Action Alternatives due primarily to the addition of trails 4-16, 4-17, 4-18, minimal grading to Holiday, the 7-acre parking lot, the perimeter grading around the proposed parking lot, and the additional trenching width for the water utility line (unless it is determined that installation of a waterline in conjunction with the utility trenching would significantly impact streams and wetlands, in which case an on-site well would be located upslope of the mid-mountain lodge, within the 50-foot disturbance corridor surrounding the lodge). For further discussion on the addition of these trails, refer to Chapter 2 and Section 3.11. The potential impacts from grading would be minimized to ensure that impacts are only short-term through the implementation of Mitigation Measure MM11 (refer to Table 2.4-2). This would reduce grading impacts to soil productivity through the development of a TRP, use of low impact construction equipment, and other methods to reduce incidental soil compaction and mechanical disturbance. Other Management Provisions that would be implemented include the creation of a SWPPP to reduce erosion impacts, preservation and reapplication of topsoil in graded areas, and not allowing construction during inclement weather conditions (refer to OMP1, OMP2, and OMP4 in Table 2.4-4).

Under Modified Alternative 4, approximately 8.1 acres of impervious surfaces would be added to the 45.1 acres of existing detrimental soil conditions. Therefore, the total area of detrimental soil conditions within the White Pass Study Area would increase from approximately 2.9 percent to 3.4 percent under Modified Alternative 4. However, the percent of detrimental soil conditions under Modified Alternative 4 would remain below the GPNF Forest Plan and WNF Forest Plan standard of 20 percent (USDA 1990a, 1990b; USDA and USDI 1994).

Approximately 23.6 acres of proposed tree clearing under Modified Alternative 4 (associated with the construction of the trails for the *Basin* pod, the *Hogback Express* pod, and trails 4-17 and 4-18) would result in short-term impacts to soil productivity. Modified Alternative 4 would result in the second largest short-term clearing impact to soils, after Alternative 9, because of the addition of trails 4-

16, 4-17, 4-18, grading to the Holiday trail, the PCNST re-route, and the proposed new 7-acre parking lot in this alternative. Proper implementation of a TRP, as specified in Mitigation Measure MM11 (refer to Table 2.4-2), through use of low impact construction equipment and methods would reduce incidental soil compaction and mechanical disturbance. Other Management Provisions would also reduce potential short-term, clearing impacts to soil via the creation of a SWPPP and not allowing construction during inclement weather conditions (OMP1 and OMP4 in Table 2.4-4).

The total area of new soil impacts under Modified Alternative 4 would be approximately 44.4 acres, which would create indirect impacts to soil productivity in the immediate vicinity of these direct impacts. Through the use of construction techniques listed in Table 2.4-1 and the creation of a TRP as specified in Mitigation Measure MM11 (refer to Table 2.4-2), as well as following Other Management Provisions OMP1 and OMP4, which call for the creation of a SWPPP to reduce erosion impacts and not allowing construction during inclement weather conditions (refer to Table 2.4-4), potential soil compaction, erosion, and overall loss of soil productivity would be reduced.

Under Modified Alternative 4, a 2,000-foot segment of the PCNST would be rerouted to the south of the proposed upper terminal of the *Basin* chairlift, as described in Section 2.3.4.7. Rerouting would consist of constructing a 24-inch tread within a 6-foot wide corridor cleared of woody vegetation, resulting in 0.12 acre of soil disturbance. This impact to soils would indirectly affect the soil productivity in these areas through compaction, by reducing litter and woody debris inputs, and slowing the formation of the organic duff layer.

Alternative 6

The greatest relative impact to soil productivity, as compared to other proposed activities under Alternative 6, would be the construction of the proposed parking lot and road to the bottom terminal of the *Basin* chairlift due to the larger area of impervious surfaces proposed. **Under Alternative 6, the total area of long-term soil impacts from the creation of impervious surfaces would be approximately 4.5 acres. Soil productivity would also be reduced over the short-term within the White Pass Study Area by approximately 1.2 acres due to proposed grading that would be revegetated with native vegetation after construction is completed.** The short-term grading impacts from Alternative 6 are lower than from Alternative 2 and Modified Alternative 4 because the additional length of utility trenching for the construction of the *Hogback Express* chairlift would not be necessary. The proposed impacts from grading would be minimized to ensure that impacts are only short-term through the implementation of Mitigation Measure MM11 (refer to Table 2.4-2), which would reduce grading impacts to soil productivity though the creation of a TRP, low impact construction equipment, and methods to reduce incidental soil compaction and mechanical disturbance. Other Management Provisions that would be implemented include the creation of a SWPPP to reduce erosion impacts, preservation and reapplication of topsoil in graded areas, and not allowing construction during inclement weather conditions (refer to OMP1, OMP2, and OMP4 in Table 2.4-4).

Under Alternative 6, approximately 4.5 acres of impervious surfaces would be added to the 45.1 acres of existing detrimental soil conditions. Therefore, the total area of detrimental soil conditions within the White Pass Study Area would increase from approximately 2.9 percent to 3.2 percent under Alternative 6. As a result, Alternative 6 would maintain detrimental soil conditions below 20 percent and would be consistent with the GPNF Forest Plan and WNF Forest Plan standards.

The proposed 9.6 acres of tree clearing under Alternative 6 for construction of the trails for the *Basin* pod would create short-term impacts to soil productivity. However, implementation of Alternative 6 would create the smallest increase in short-term clearing impacts to soils of all the Action Alternatives, because it does not include the *Hogback Express* chair and associated trails. Proper implementation of a TRP as specified in Mitigation Measure MM11 (refer to Table 2.4-2) and Other Management Provisions, such as the creation of a SWPPP to reduce erosion impacts and not allowing construction during inclement weather conditions (OMP1 and OMP4 in Table 2.4-4), would reduce potential short-term clearing impacts to soil.

The total area of new soil impacts under Alternative 6 would be approximately 15.3 acres, and would create indirect impacts to soil productivity in the immediate vicinity of these direct impacts. Implementation of the methods and techniques specified in Table 2.4-1, Mitigation Measure MM11 (refer to Table 2.4-2) and Other Management Provisions OMP1 and OMP4 (refer to Table 2.4-4) would reduce the potential short-term clearing impacts to soils.

Under Alternative 6, 0.6 mile of road obliteration is proposed before the construction of the 0.25-mile proposed new road. This road decommissioning would be addressed at a later time when more details are known, and would be addressed in a separate NEPA analysis.

Alternative 9

The construction of the *PCT* chairlift and associated trails, proposed parking lot, grading for the alternate egress trail near the base area, and additional trails within the Paradise pod would have the greatest relative impact on soil productivity, as compared to the other proposed activities under Alternative 9, due to the large area of impervious surfaces and extensive cut and fill excavation proposed for these components. **The total area of long-term soil impacts from the creation of impervious surfaces under Alternative 9 would be approximately 10.7 acres,** the largest increase in impervious surfaces among the Action Alternatives. **Soil productivity within the White Pass Study Area would be reduced over the short-term by the grading of approximately 1.2 acres**. The proposed impacts from grading would be minimized to ensure that impacts are only short-term through the implementation of Mitigation Measure MM11 (refer to Table 2.4-2), which would reduce grading impacts to soil productivity though the creation of a TRP, the use of low impact construction equipment, and implementation of methods to reduce incidental soil compaction and mechanical disturbance. Other Management Provisions that would be implemented include the creation of a SWPPP to reduce erosion impacts, preservation and reapplication of topsoil in graded areas, and not allowing construction during inclement weather conditions (refer to OMP1, OMP2, and OMP4 in Table 2.4-4).

Under Alternative 9, approximately 10.7 acres of impervious surfaces would be added to the 45.1 acres of existing detrimental soil conditions. Therefore, the total area of detrimental soil conditions within the White Pass Study Area would increase from approximately 2.9 percent to 3.6 percent under Alternative 9. As a result, Alternative 9 would maintain detrimental soil conditions below 20 percent and would remain consistent with the GPNF Forest Plan and WNF Forest Plan standards.

The proposed 27.0 acres of tree clearing under Alternative 9 for construction of the *PCT* pod would create short-term impacts to soil productivity. Alternative 9 would create the largest short-term clearing impact to soils because of the extensive full clearing prescription required for this ski pod, relative to the selective tree island removal that would be required under the other Action Alternatives for construction of trails in the proposed SUP expansion area. Proper implementation of a TRP as specified in Mitigation Measure MM11 (refer to Table 2.4-2) and Other Management Provisions, such as the creation of a SWPPP to reduce erosion impacts and not allowing construction during inclement weather conditions (OMP1 and OMP4 in Table 2.4-4), would reduce potential short-term, clearing impacts to soil.

Under Alternative 9, a 225-foot segment of the PCNST would be rerouted to the east to avoid passing through a proposed ski trail in the northeastern side of the existing SUP area, as described in Section 2.3.6.7. Rerouting would consist of constructing a 24-inch tread within a 6-foot wide corridor cleared of woody vegetation, resulting in 0.1 acre of soil disturbance. This impact to soils would indirectly affect the soil productivity in these areas through compaction, by reducing litter and woody debris inputs, and slowing the formation of the organic duff layer.

The total area of new soil impacts under Alternative 9 would be 38.9 acres, which would also create indirect impacts to soil productivity in the immediate vicinity of these direct impacts. Through the use of construction techniques listed in Table 2.4-1 and the creation of a TRP as specified in Mitigation Measure MM11 (refer to Table 2.4-2), as well as following Other Management Provisions OMP1 and OMP4, which call for the creation of a SWPPP to reduce erosion impacts and not allowing construction during inclement weather conditions (refer to Table 2.4-4), soil compaction, erosion, and overall loss of soil productivity would be reduced.

3.2.3.2 Soil Erosion

The U.S. Department of Agriculture Agricultural Research Service's WEPP model has been used to quantify sediment production due to changes in land cover associated with the alternatives. The model was used to compute detachment only, and does not account for routing and buffering, which reduce actual yields to streams. Since 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 watersheds). For additional information regarding the WEPP model, refer to Appendix L. Also, additional information on soil detachment can be found in Section 3.3 – Watershed Resources.

Alternative 1

There are no proposed activities in the White Pass Study Area under Alternative 1. Therefore, soil erosion conditions would remain unchanged, as shown in Table 3.2-2. As described in Appendix L, WEPP modeling estimated a soil detachment of approximately 103.1 tons per year within the Upper Clear Fork Cowlitz watershed and 133.6 tons per year in the Upper Tieton watershed.

Alternative 2

Under Alternative 2, approximately 0.1 acres of tree clearing and 4.8 acres of grading would occur to construct two new lifts, build the mid-mountain lodge, trench in the utilities. Within the 4.8 acres of proposed grading, the majority of it, approximately 4.5 acres, would occur on moderate erosion hazard soil (refer to Table 3.2-4). Under Alternative 2, no proposed grading would occur on high erosion hazard soil. The proposed grading at the bottom lift terminals of both the *Basin* and *Hogback Express* chairlifts represents the largest potential source of sediment to waterbodies under Alternative 2, and would be the primary management concern. However, the erosion hazard in the vicinity of the bottom terminals is low due to the low slope gradients in the area. Since no permanent or temporary roads are proposed under Alternative 2, the permanent road density in the White Pass Study Area would not change, and there would be no new stream crossings by roads, resulting in no new sediment yield to streams from roads. Mitigation Measure MM11 in Table 2.4-2, Management Requirement MR15 in Table 2.4-3, and Other Management Provisions OMP1, OMP2, OMP3, and OMP4 in Table 2.4-4 would be implemented to minimize soil erosion impacts.

Table 3.2-4:
Grading Impacts to Soils by Erosion Hazard Class within the White Pass Study Area

Erosion Hazard	Alt. 1 Existing Impacts	Alt. 2 Impacts	Mod. Alt. 4 Impacts	Alt. 6 Impacts	Alt. 9 Impacts
High (acres)	1.7	0.0	1.4	0.0	1.2
Medium (acres)	29.3	4.5	10.8	2.5	4.5
Low (acres)	14.1	0.3	7.5	3.1	6.2
N/A (acres)	0.0	0.0	0.0	0.0	0.0
Total (acres)	**45.1**[a]	**4.8**	**19.6**	**5.6**	**11.9**

[a]Refer to Section 3.2.3.1 describing that grading impacts to soils are pre-existing detrimental soil conditions resulting from historic ski area development. Note that totals may vary due to rounding.

It is anticipated that temporary minor increases in soil erosion and sediment delivery to streams would probably occur with trail grading and possibly other ground disturbances, such as utility trenching, although the use of sediment control BMPs and Other Management Provisions OMP1, OMP2, and OMP4 listed in Table 2.4-4 would minimize this risk.

As described in Appendix L, the WEPP model estimated approximately 126.5 tons per year of soil detachment following construction activities in the Upper Clear Fork Cowlitz watershed, a short-term increase of approximately 23 percent over existing detachment (refer to Table 3.2 FEIS1). Following the stabilization of exposed soils and allowing for recovery (approximately two to five years), long-term soil detachment would increase approximately 4 percent to 107.2 tons per year. Within the Upper Tieton watershed, there would be no change to the estimated soil detachment as no construction activities would occur in that watershed under Alternative 2.

Table 3.2 FEIS1:
WEPP Model Estimates of Soil Detachment

Soil Detachment	Alt. 2		Mod. Alt. 4		Alt. 6		Alt. 9	
	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton
Short-term (tons/yr)	126.5	133.7	173.1	133.8	112.7	133.8	131.8	150.8
Short-term Increase (%)	23%	0.0%	68%	0.1%	9%	0.1%	28%	12.8%
Long-term (tons/yr)	107.2	133.7	113.3	133.9	107.8	133.7	106.6	134.8
Long-term Increase (%)	4%	0.0%	10%	0.2%	5%	0.1%	3%	0.8%

Note: WEPP model estimates of soil detachment for Alternative 1 are described in Table 3.3 FEIS 3

Disturbed areas resulting from construction activities would most likely be difficult to revegetate because of the short growing season, cold climate and low soil fertility. Implementation of Other Management Provisions to protect exposed soil surfaces, including the use of seeding and protective mulches, is most important to prevent increased sedimentation and overland flow under all Action Alternatives. These management provisions have been successful in other high elevation ski areas such as The Summit at Snoqualmie (SE Group 2003), Mount Ashland (USDA 2003), and Mount Bachelor (SE Group unpublished data) in the Cascade Range (refer to Other Management Provisions OMP1 and OMP2).

Modified Alternative 4

Under Modified Alternative 4, approximately 19.6 acres of grading, the most of any Action Alternative, would occur to construct two new lifts, the mid-mountain lodge, trench in utilities (including a waterline), grade trails 4-2, 4-16, 4-18 and Holiday, and construct a new parking lot. Within the 19.6 acres of proposed grading, the majority, approximately 10.8 acres, would occur on moderate erosion hazard soil (refer to Table 3.2-4). Under Modified Alternative 4, approximately 1.4 acres of grading would occur on high erosion hazard soil, the most of all Action Alternatives. The proposed grading for Trail 4-16 from the *Hogback Express* chairlift and Trail 4-18 represents the largest potential source of sediment to waterbodies due to the steep, erosion-prone soil and proximity to streams. However, Management

Requirements MR4 and MR5 (refer to Table 2.4-3) along with Other Management Practice OMP1 (refer to Table 2.4-4) would be implemented to minimize soil erosion impacts.

Since no permanent or temporary roads are proposed under Modified Alternative 4, the permanent road density in the White Pass Study Area would not change. As there would be no new road stream crossings, there would be no new sediment yield to streams from road crossings. However, a 7-acre parking lot would be constructed under Modified Alternative 4 in the northeast corner of the SUP area adjacent to two streams and a wetland. The soil in this area has a low erosion hazard and the slope gradient is low, therefore, implementation of Mitigation Measure MM11 in Table 2.4-2, Management Requirement MR15 in Table 2.4-3, and Other Management Provisions OMP1, OMP2, OMP3, and OMP4 from Table 2.4-4 would likely reduce or eliminate the potential for sediment delivery to these streams.

It is anticipated that temporary minor increases in soil erosion and sediment delivery to streams would probably occur due to trail grading and possibly other ground disturbances, such as utility trenching. However, the use of sediment control BMPs and Other Management Provisions OMP1, OMP2, and OMP4 listed in Table 2.4-4 would minimize this risk.

Short-term soil detachment within the Upper Clear Fork Cowlitz watershed under Modified Alternative 4 would increase approximately 68 percent, the most of any alternative, to 173.1 tons per year (refer to Table 3.2 FEIS1). Long-term soil detachment would increase by approximately 10 percent to 113.3 tons per year. Within the Upper Tieton watershed, short-term soil detachment would increase by approximately 0.1 percent to 133.8 tons per year. Long-term soil detachment in the Upper Tieton watershed would increase approximately 0.2 percent to 133.9 tons per year.

Under Modified Alternative 4, the PCNST would be rerouted around the proposed upper terminal of the *Basin* chairlift as described in Section 2.3.4.7. Rerouting would consist of 24-inch tread within a 6-foot corridor cleared of woody vegetation, resulting in approximately 0.12 acre of soil disturbance. This impact to soils would be on moderate erosion hazard soil, so through the use of BMPs and Mitigation Measures, Management Requirements, and Other Management Provisions, any erosion occurring would be minimized.

An on-site well would be drilled to provide a water supply for the proposed mid-mountain lodge if the installation of a waterline in conjunction with the utility trenching would significantly impact streams and wetlands. The well would be located upslope of the mid-mountain lodge, within the 50-foot disturbance corridor surrounding the lodge (refer to Section 3.13 – Utilities and Infrastructure).

Alternative 6

Under Alternative 6, approximately 5.6 acres of grading would occur to construct one new lift, build the mid-mountain lodge, trench in utilities, construct a road to the bottom terminal of the *Basin* chairlift, build a parking lot, and grade Trail 6-1. Of the 5.6 acres of proposed grading, the majority of it, approximately

3.1 acres, would occur on low erosion hazard soil (refer to Table 3.2-4). Under Alternative 6, no grading would occur on high erosion hazard soil, but approximately 2.5 acres of medium erosion hazard soil would be graded. The construction of the proposed road to the bottom terminal of the *Basin* chairlift represents the greatest potential source of sediment to waterbodies under Alternative 6, due to the four proposed stream crossings and indirect impacts to adjacent wetlands. While some additional sediment yield is anticipated from this project, the proposed road would only be located in low and moderate erosion hazard soils and Mitigation Measure MM11 (refer to Table 2.4-2) and Other Management Provisions OMP1, OMP2, OMP3, and OMP4 (refer to Table 2.4-4) would be implemented to minimize soil erosion impacts.

Additionally, under Alternative 6, a 2.5-acre parking lot would be constructed in the northeast corner of the SUP area, adjacent to two streams and a wetland. BMPs and Mitigation Measures (refer to Table 2.4-2) would be implemented to eliminate additional sediment delivery to nearby streams from construction impacts. The soil in this area has a low erosion hazard and the slope gradient is low, therefore, implementation of Mitigation Measure MM11 in Table 2.4-2, Management Requirement MR15 in Table 2.4-3, and Other Management Provisions OMP1, OMP2, OMP3, and OMP4 from Table 2.4-4 would likely reduce or eliminate the potential for sediment delivery to these streams.

Temporary minor increases in soil erosion and sediment delivery to streams would probably occur with trail grading and possibly other ground disturbances, such as utility trenching. However, the use of sediment control BMPs and Other Management Provisions OMP1, OMP2, and OMP4 listed in Table 2.4-4 would minimize this risk.

Short-term soil detachment within the Upper Clear Fork Cowlitz watershed under Alternative 6 would increase approximately 9 percent, the least of any alternative, to 112.7 tons per year (refer to Table 3.2 FEIS1). Long-term soil detachment would increase by approximately 5 percent to 107.8 tons per year. Within the Upper Tieton watershed, short and long-term soil detachment would increase by approximately 0.1 percent to 133.8 tons per year.

Under Alternative 6, 0.6 mile of road obliteration is proposed to occur prior to the construction of the 0.25-mile proposed new road. This road decommissioning would be addressed at a later time when more details are known and would require a separate NEPA analysis.

Alternative 9

Under Alternative 9, approximately 11.9 acres of grading would occur to construct one new lift within the existing SUP area, build a 2.5-acre parking lot, build a mountain-top lodge, trench for utilities, and construct/regrade trails (including trails 9-2, 9-6, Platter, Holiday and Farside). Of the 11.9 acres of proposed grading, the majority of it, approximately 6.2 acres, would occur on low erosion hazard soil and approximately 4.5 acres would occur on medium erosion hazard soil (refer to Table 3.2-4). Under

Alternative 9, approximately 1.2 acres of grading would occur on high erosion hazard soil. The proposed grading for the alternate egress trail from the Paradise pod and for ski trails that cross streams near the bottom of the *PCT* pod represent the largest potential source of sediment to waterbodies under Alternative 9, and would be a primary management concern. Mitigation Measure MM11 in Table 2.4-2, Management Requirement MR15 in Table 2.4-3, and Other Management Provisions OMP1, OMP2, and OMP3, from Table 2.4-4 would be implemented to minimize soil erosion impacts.

Since no permanent or temporary roads are proposed under Alternative 9, the permanent road density in the White Pass Study Area would not change. As there would be no new road stream crossings, there would be no new sediment yield to streams from road crossings. However, in Alternative 9, a 2.5-acre parking lot would be constructed in the northeast corner of the SUP area, adjacent to two streams and a wetland. The soil in this area has a low erosion hazard and the slope gradient is low, therefore, implementation of Mitigation Measure MM11 in Table 2.4-2, Management Requirement MR15 in Table 2.4-3, and Other Management Provisions OMP1, OMP2, OMP3, and OMP4 from Table 2.4-4 would likely at least reduce, if not eliminate, the potential for sediment delivery to these streams.

Under Alternative 9, 225 feet of the Pacific Crest National Scenic Trail would be rerouted to a nearby forested area to avoid passing through a new ski trail, as described in Section 2.3.6.7. The trail reroute would result in the construction of approximately 225 feet of trail with 24-inch tread that would be created through the middle of a 6-foot corridor cleared of woody vegetation. The new trail construction would require approximately 0.01 acre of ground disturbance, while the retired portion of the PCNST would be incorporated into a new ski trail and would not be restored to original forested conditions. This acreage of impacts to soil would be on moderate erosion hazard soil, and through the use of BMPs and Mitigation Measures, any erosion occurring would be minimized.

It is anticipated that temporary minor increases in soil erosion and sediment delivery to streams would probably occur with trail grading and possibly other ground disturbances, such as utility trenching. However, the use of sediment control BMPs and Other Management Provisions OMP1, OMP2, and OMP4 listed in Table 2.4-4 would minimize this risk.

Short-term soil detachment within the Upper Clear Fork Cowlitz watershed under Alternative 9 would increase approximately 28 percent to 131.8 tons per year (refer to Table 3.2 FEIS1). Long-term soil detachment would increase by approximately 3 percent to 106.6 tons per year. Within the Upper Tieton watershed, short-term soil detachment would increase by approximately 12.8 percent to 150.8 tons per year, the most of any Action Alternative. Long-term soil detachment within the Upper Tieton watershed would increase by approximately 0.8 percent to 134.8 tons per year.

3.2.4 Cumulative Effects

A cumulative effects analysis was performed for each watershed at the site scale (White Pass Study Area) and 5th field watershed scale (Upper Clear Fork Cowlitz and Upper Tieton). Within the discussions below, cumulative impacts to geology and soils are considered for short-term and long-term impacts. Cumulative impacts are evaluated on a short-term basis using increases in erodible soil, which is considered a short-term detrimental soil condition. As construction sites stabilize and revegetate, the detrimental soil condition is lessened. Typically, construction documents and permit requirements necessitate the revegetation and stabilization of exposed soils to promote quick stabilization, thereby reducing the potential for long-term detrimental soil conditions. Increased detrimental soil conditions have the potential to affect sediment mobilization and impact areas downstream in the watershed.

Long-term effects to geology and soil resources occur from a loss of geologic stability or soil productivity. The construction of impervious surfaces serves as a surrogate for measuring long-term losses in soil productivity. The replacement of soils with impervious surfaces also alters the soil permeability and its ability to absorb water. No identified cumulative effects would alter geologic stability, therefore geologic stability is not discussed in this cumulative effects analysis.

3.2.4.1 Upper Clear Fork Cowlitz Watershed

A list of all projects occurring within the Upper Clear Fork Cowlitz (refer to Table 3.2-5) and the effects to geology and soil resources are presented below. For a description of project actions, refer to Table 3.0-FEIS1.

Table 3.2-5:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Geology and Soils

Project Number	Project Name	Cumulative Effects
UCFC-2	Forest Road 4600 Stabilization	Approximately 0.1 acre of short-term, direct impacts to soils occurred through the installation of riprap at the culvert inlet. Although the site has been stabilized (i.e., no short-term detrimental soil conditions overlap temporally with the effects of the White Pass expansion), the effects of the loss of soil productivity due to this project temporally overlap with the effects of the White Pass expansion. There is no spatial overlap with the White Pass Study Area. Combined with the other projects identified in this table, in the long-term, this project contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil by rip rap.
UCFC-3a	Palisades Scenic Viewpoint Project	Long-term direct impacts to soils occurred through the creation of less than 0.5 acre of impervious surfaces within the existing disturbed area. There is no spatial overlap with the White Pass Study Area. Long-term project effects would temporally overlap with the effects of the White Pass expansion. In the long-term, this project contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil by impervious surface.

**Table 3.2-5:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Clear Fork Cowlitz Watershed on Geology and Soils**

Project Number	Project Name	Cumulative Effects
UCFC-3b	Palisades Scenic Viewpoint Project Vegetation Mgmt	Approximately 1 acre of trees will be felled and left onsite as woody material. Spatially this project does not overlap with the White Pass Study Area. Project effects would overlap in time with the effects of the White Pass expansion and cumulatively add to soil disturbance within the Upper Clear Fork Cowlitz watershed. Any decrease in soil productivity or increases in detrimental soil conditions from this project (i.e., immediately under any felled trees) would not be measurable at the 5th field watershed scale.
UCFC-4	Mt Rainier/Goat Rocks Scenic Viewpoint	Installation of fence posts will result in small (several square feet each) areas of soil disturbance in the short-term during construction. This project would not overlap in space with the White Pass expansion. Project effects would overlap in time with the effects of the White Pass expansion. The placement of fence posts will reduce soil productivity in the long-term, at the location of each fencepost. Any decrease in soil productivity or increases in detrimental soil conditions from this project (i.e., immediately under any felled trees) would not be measurable at the 5th field watershed scale. These effects will not be measurable at the site of 5th field scales.
UCFC-5	White Pass Wildfire	Approximately 204 acres of overstory and ground vegetation was consumed or killed by the wildfire. Although the event occurred in 1998, the effects temporally overlap with the White Pass expansion. The fire did not occur within the White Pass Study Area (i.e., no spatial overlap). Loss of vegetative cover/duff temporarily resulted in loss of soil productivity. Partial natural regeneration of the vegetation has occurred since the fire. With continued revegetation, the potential for long-term effects will be eliminated. 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 soil productivity at the 5th field watershed scale.
UCFC-6	Knuppenberg Lake Bridge Removal	Beneficial, long-term direct impact to soils occurred through the removal of 0.24 acre of impermeable surface associated with the bridge footings. Long-term project effects would temporally overlap with the White Pass expansion. Spatially, there is no overlap with the Study Area. Coupled with projects UCFC-12, UCFC-14 and UCFC-15, the removal of the bridge would improve soil productivity at the 5th field watershed scale. These projects will partially offset the cumulative effects to soils associated with the White Pass expansion.
UCFC-7	Wilderness Trail Maintenance	Approximately 20.5 miles of trail are maintained every other year, which would directly impact soils over the short-term through periodic soil displacement from treating sites along the corridor (i.e., removing downed logs and maintenance of drainage structures) with hand tools. A portion of this project would overlap spatially with the White Pass Study Area (i.e., PCNST in Hogback Basin). Temporally, the effects of annual maintenance work will overlap with the effects of the White Pass expansion. Maintenance would result in an increase in short-term detrimental soil condition along the trail, on a maximum of 7.5 acres. Over the long-term, treatment areas along the trail edge will naturally revegetate. Any increase in detrimental soil conditions from this project would not be measurable at the 5th field watershed scale.

Table 3.2-5:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Geology and Soils

Project Number	Project Name	Cumulative Effects
UCFC-8	Ongoing Road Maintenance	Approximately 9 miles of road surface maintenance occurs every five years. Grading associated with road maintenance would directly impact soils over the short-term by creating erodible surfaces (detrimental soil conditions) along the edge of the road surface. This project would not overlap spatially with the White Pass Study Area. Ongoing maintenance activities in the 5th field watershed would overlap in time with the effects of the White Pass expansion, resulting in an increase in short-term detrimental soil conditions at the 5th field watershed scale on up to 46.3 acres. Regular maintenance and revegetation along the road prism will reduce the potential for long-term detrimental soil conditions. Any increase in detrimental soil conditions from this project would not be measurable at the 5th field watershed scale and would be offset by the long-term benefit of the maintenance.
UCFC-10	Clear Fork Trail Puncheon Installation	The installation of puncheon along 0.1 mile (0.07 acre) of braided trail (in a detrimental soil condition) directly affected soils by eliminating user trails and reducing the detrimental soil conditions. Spatially, this project did not overlap with the White Pass Study Area. Coupled with project UCFC-6, the puncheon would improve soil conditions at the 5th field watershed scale. These projects will partially offset the cumulative effects to soils associated with the White Pass expansion.
UCFC-11	Air Quality Monitoring Building	The creation of 0.02 acre of impervious surfaces for a building directly impacted soils over the long-term. Project effects would temporally and spatially overlap with the effects of the White Pass expansion. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the building addition.
UCFC-12	Rockfall Mitigation (between mileposts 143 and 149)	The mitigation of five areas of rock fall (approximately 2.5 acres total) directly impacted soils over the short-term by creating detrimental soil conditions until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to a loss of soil productivity at the 5th field watershed scale. In the long- term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the detrimental soil condition in the 5th field watershed.
UCFC-14	Unstable Slope Repair Projects (between mileposts 145.61 and 145.77)	The repair of approximately 1 acre of unstable slopes will directly impact soils over the short-term, by creating detrimental soil conditions, until the slopes are stabilized. Spatially, this project will not overlap with the White Pass Study Area. Temporally, the short-term project effects will contribute to a loss of soil productivity at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the detrimental soil condition in the 5th field watershed.

Table 3.2-5:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Geology and Soils

Project Number	Project Name	Cumulative Effects
UCFC-15	Unstable Slope Repair Projects (between mileposts 141.8 and 144.4)	Repair of unstable slopes on approximately 0.5 mile (4.5 acres) will directly impact soils over the short-term, by creating detrimental soil conditions, until the slopes are stabilized. Spatially, this project will not overlap with the White Pass Study Area. Temporally, the short-term project effects will contribute to a loss of soil productivity at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the detrimental soil condition in the 5th field watershed.
UCFC-16	Highway 12 Hazard Tree Removal	The periodic removal of occasional hazard trees within this 545-acre, 15-mile long corridor will directly impact soils. Hazard tree removal will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the hazard tree removal will overlap with the effects of the White Pass expansion. Short-term soil compaction (detrimental soil condition) will occur in areas immediately under and adjacent to the felled trees, where the use of heavy equipment is required. No long-term impacts to soils are expected.
UCFC-17	White Pass Ski Area Yurt Construction	Long-term, direct impact to soils resulted from approximately 0.01 acre of new impervious surfaces from construction of the yurt. Spatially, this project overlaps with the White Pass expansion. Temporally, the effects of the yurt will overlap with the effects of the White Pass expansion. In the long-term, this project contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil by impervious surface.
UCFC-20	Benton Rural Electric Association (REA) Power Line Maintenance	The periodic power line right-of-way maintenance within this 28-acre, 1-mile long corridor will directly impact soils. Power line maintenance will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the power line maintenance will overlap with the effects of the White Pass expansion. Short-term soil compaction (detrimental soil condition) will occur in areas immediately under and adjacent to fallen trees and where the use of heavy equipment is required for maintenance. No long-term impacts to soils are expected.
UCFC-21	White Pass Ski Area Day Lodge Remodel	Grading of 0.25 acre of previously disturbed ground resulted in short-term detrimental soil conditions. In addition, the lodge increased the impervious surface (loss of soil productivity) associated with the lodge by 0.05 acre. Temporally, the effects of the grading have been stabilized and do not overlap with the effects of the White Pass expansion. Spatially, the effect of the building construction overlaps with the effects of the White Pass expansion. In the long-term, the effects of the impervious surface, in conjunction with the other projects that include impervious surface, contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil.

As described in Table 3.2-5, numerous projects would contribute to a short-term increase in detrimental soil conditions within the White Pass Study Area.[24] The cumulative effects on detrimental soils from these projects are not expected to be measurable as project activities would be localized to specific areas within a larger management area and to varying timeframes within the short-term. The implementation of any Action Alternative would not increase detrimental soil conditions with the White Pass Study Area above the threshold of concern of 20 percent established by the Forest Plans. At the site scale, the maximum cumulative effects to detrimental soil conditions would occur over approximately 4.4 percent of the White Pass Study Area (refer to Table 3.2-6). Due to the spatial and temporal distribution of these projects, the cumulative effects are not projected to exceed any standards.

Similarly, within the 5th Field Upper Clear Fork Cowlitz watershed, detrimental soil conditions resulting from the projects described in Table 3.2-5 would not exceed the 20 percent threshold of concern for the entire watershed (refer to Table 3.2-6). The effect of detrimental soil conditions are not expected to be measurable at the 5th field scale. Cumulative impacts to soil productivity within the White Pass Study Area would result from implementation of any Action Alternative through the construction of impervious surfaces for buildings, lift terminals, and lift towers. Projects UCFC 11, 17, and 21, which overlap in the space and time with the White Pass expansion, would increase impervious surfaces by an additional 0.08 acre. Within the 5th Field Upper Clear Fork Cowlitz watershed, project UCFC 3a would add an additional 0.05 acre of impervious surface. Conversely, project UCFC 6 would remove 0.24 acre of impervious surface and restore soil productivity to this localized area. The cumulative effects of impervious surfaces (i.e., loss of soil productivity) are not expected to be measurable at the 5th Field as less than one percent of the watershed would be affected (refer to Table 3.2-6).

[24] Detrimental soil conditions discussed in the cumulative effects section assumes the worst-case scenario of soil impacts at the 5th field scale. Namely, that all soil impacts will result in detrimental soil conditions.

Table 3.2-6
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed on Geology and Soils

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	17.50	1.56	37.30	3.33	49.14	4.39	28.97	2.59	27.57	2.46
Projects Not Associated with the White Pass Expansion	0.28	0.03	0.28	0.03	0.28	0.03	0.28	0.03	0.28	0.03
Cumulative Impacts	**17.78**	**1.59**	**37.58**	**3.36**	**49.42**	**4.42**	**29.25**	**2.61**	**27.85**	**2.49**
Fifth Field Scale										
White Pass Projects	17.50	0.02	37.30	0.05	49.14	0.07	28.97	0.04	27.57	0.04
Projects Not Associated with the White Pass Expansion	312.44	0.44	312.44	0.44	312.44	0.44	312.44	0.44	312.44	0.44
Cumulative Impacts	**329.94**	**0.47**	**349.74**	**0.49**	**361.58**	**0.51**	**341.41**	**0.48**	**340.01**	**0.48**

3.2.4.2 Upper Tieton River Watershed

A list of all projects occurring within the Upper Tieton watershed and the effect to geology and soil resources is presented in Table 3.2-7. For a description of each project, refer to Table 3.0-FEIS2.

Table 3.2-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Geology and Soils

Project Number	Project Name	Cumulative Effects
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 detrimental soil conditions in the short-term. 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 soils are expected because the disturbed soil areas will be immediately stabilized after construction. Combined with other projects identified in this table, this project would add to an increase in short-term detrimental soil conditions within and outside the White Pass Study Area within the 5th field watershed.
UT-3	White Pass Ski Area Generator Shed and Propane Tank	The installation of 0.004 acre of impervious surfaces to build the shed and install the tank directly impacted soils over the long-term. Spatially the project effects occurred within the White Pass Study Area. The impervious surfaces and associated loss of productivity overlap temporally with the expansion. The increase in impervious surfaces will result in long-term lost soil productivity. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil.
UT-4	White Pass Ski Area Relocation of Chair 3 and Platter Lift	Approximately 0.5 acre of grading occurred for new lift towers and terminals, directly impacting soils and creating approximately 0.01 acre of impervious surface. Temporally, the grading impacts did not overlap with the White Pass expansion, but the impervious surfaces and associated loss of productivity overlap with the effects of the White Pass expansion. Spatially this project occurred within the White Pass Study Area. The grading increased short-term detrimental soil conditions but has since stabilized. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the lift towers and terminals.
UT-5	US Cellular Tower	The installation of 0.004 acre of impermeable surfaces (tower footing) to build a cell tower directly impacted soils (lost soil productivity) over the long-term. Spatially the effects of this project occurred within the White Pass Study Area. Temporally, the long-term loss of soil productivity will overlap with the effects of the White Pass expansion. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the cell tower footing.

**Table 3.2-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Tieton Watershed on Geology and Soils**

Project Number	Project Name	Cumulative Effects
UT-6	White Pass Ski Area Restaurant/Condo Conversion	A restaurant building that occupied 0.25 acre was demolished and a new building was constructed on the original building site, including additional sidewalks, resulting in an increase of 0.01 acre of impervious surface. Spatially and temporally, the effects of the building overlap with the effects of the White Pass expansion. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the building and surrounding sidewalks.
UT-7	White Pass Ski Area Cross Country Yurt	Approximately 0.25 acre of grading took place in a previously disturbed area (parking lot) resulting in approximately 0.02 acre of new impervious surfaces from the yurt and infrastructure. Spatially, the effects of this project overlap with the effects of the White Pass expansion. Temporally, the effects of the yurt will overlap with the effects of the White Pass expansion. In the short-term, the disturbed soil has been stabilized and returned to use as a parking lot. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the yurt and infrastructure.
UT-8	White Pass Ski Area Manager’s Cabin	Approximately 0.25 acre of ground was cleared and graded resulting in short-term detrimental soil conditions. The construction of the cabin resulted in 0.04 acre of impervious surfaces. The graded areas have been stabilized. Spatially the effects of this project occurred within the White Pass Study Area. Temporally, the short-term detrimental soil conditions have been stabilized and therefore do not overlap with the effects of the White Pass expansion. The long-term loss of soil productivity will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the cabin.
UT-9	White Pass Ski Area Manager’s Office	Approximately 0.25 acre of previously disturbed ground was graded, creating short-term direct impacts to soils. The creation of 0.03 acre of impervious surfaces directly impacted soils over the long-term. Spatially, the effects of this project occurred within the White Pass Study Area. Temporally, the short-term detrimental soil conditions have been stabilized and therefore do not overlap with the effects of the White Pass expansion. The long-term loss of soil productivity will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the manager’s office.

Table 3.2-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Geology and Soils

Project Number	Project Name	Cumulative Effects
UT-10	Dog Lake Campground/Four Trailhead Reconstruction	The reconstruction of the Dog Lake Campground and four trailheads directly impacted previously disturbed soils due to approximately 5 acres of grading, resulting in detrimental soil conditions, and removal of 1 acre of vegetation. This project does not overlap spatially with the White Pass Study Area. It is expected that the site will be stabilized immediately, but that the short-term effects will overlap with the effects of the White Pass expansion and other projects in this table that include detrimental soil conditions, as the site becomes revegetated and stable. No long-term effects are anticipated. The project includes traffic control and areas of revegetation which would aid in decreasing detrimental soil conditions that are currently present at the site.
UT-11	Clear Creek Overlook Reconstruction	The reconstruction of the Clear Creek Overlook will directly impact soils over the short-term due to approximately 1 acre of grading on previously disturbed soils. Creation of 0.1 acre of additional impervious surface will directly impact soils over the long-term. There is no spatial overlap with the White Pass Study Area. The short-term project effects associated with grading are expected to be stabilized immediately. Long-term project effects associated with the new impervious surfaces (i.e., lost soil productivity) will temporally overlap with the effects of the White Pass expansion. In the long-term, this project will contribute to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil by impervious surface.
UT-16	Trail 1106 Water Crossing	Re-construction or rerouting of the crossing (with hand tools) would likely result in a short-term increase in detrimental soil conditions on up to 0.1 acre. Any abandoned trail segment would be disguised and allowed to revegetate. This project does not overlap spatially with the White Pass Study Area. It is expected that the site will be stabilized immediately, but that the short-term effects will overlap with the effects of the White Pass expansion and other projects in this table that include detrimental soil conditions, as the site becomes revegetated and stable. No long-term effects are anticipated.
UT-18	Benton Rural Electric Association (REA) Power line Maintenance	The periodic power line right-of-way maintenance within this 223-acre, 8-mile long corridor will directly impact soils. Power line maintenance will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the power line maintenance will overlap with the effects of the White Pass expansion. Short-term soil compaction (detrimental soil condition) will occur in areas immediately under and adjacent to fallen trees and where the use of heavy equipment is required for maintenance. No long-term impacts to soils are expected.

**Table 3.2-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Tieton Watershed on Geology and Soils**

Project Number	Project Name	Cumulative Effects
UT-19	Highway 12 Hazard Tree Removal	The periodic removal of occasional hazard trees within this 509-acre, 14-mile long corridor will directly impact soils. Hazard tree removal will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the hazard tree removal will overlap with the effects of the White Pass expansion. Short-term soil compaction (detrimental soil condition) will occur in areas immediately under and adjacent to the felled trees, where the use of heavy equipment is required. No long-term impacts to soils are expected.
UT-20	Clear Lake Recreation Projects	Construction of the access road and other site improvements over approximately 2 acres would directly impact soils. Short-term detrimental soil conditions will occur during construction. Spatially this project occurs outside the White Pass Study Area. Temporally, the long-term loss of soil productivity associated with remaining impervious surfaces will overlap with the effects of the White Pass expansion. Combined with the other projects identified in this table, in the long-term, this project contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil by impervious surfaces.
UT-21	Fish Hawk/Spillway Campground Improvements	Construction of CXT toilet and access road directly impacted approximately 1 acre of soils. Short-term detrimental soil conditions occurred during construction, but the site has since stabilized, eliminating the short-term effects. Spatially this project occurred outside the White Pass Study Area. Temporally, the long-term loss of soil productivity associated with remaining impervious surfaces associated with the toilet (tens of square feet) will overlap with the effects of the White Pass expansion. Combined with the other projects identified in this table, in the long-term, this project contributed to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil by impervious surfaces.
UT-23	System Trail Maintenance	Approximately 48.5 miles of trail are maintained every other year, which would directly impact soils over the short-term through periodic soil displacement from treating sites along the corridor (i.e., removing downed logs and maintenance of drainage structures) with hand tools. A portion of this project would overlap spatially with the White Pass Study Area (i.e., PCNST at White Pass). Temporally, the effects of annual maintenance work will overlap with the effects of the White Pass expansion. Maintenance would result in an increase in short-term detrimental soil condition along the trail, on a maximum of 36 acres. Over the long-term, treatment areas along the trail edge will naturally revegetate. Any increase in detrimental soil conditions from this project would not be measurable at the 5th field watershed scale due to the dispersed nature of the soil impacts.

Table 3.2-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Geology and Soils

Project Number	Project Name	Cumulative Effects
UT-24	Snoqueen Mine	Over the past decade, active operations have been confined to a limited season during the summer. Mining operations would result in short- and long-term impacts to soils due to grading, which is not stabilized (i.e., reclaimed). Spatially, the mine does not overlap with the White Pass Study Area. Temporally, the detrimental soils effects have overlapped and will continue to overlap in time. In the short- and long-term, the detrimental soil condition effects will overlap with the effects of the White Pass expansion and other projects in this table that include detrimental soil conditions.
UT-26	Highway 12 Rock Stabilization (at Mile Post 155)	The stabilization of 1 acre of unstable talus slopes will directly impact soils over the short-term by creating detrimental soil conditions until the slopes are stabilized. Spatially, this project does not overlap with the White Pass Study Area. Temporally, the short-term project effects will contribute to a loss of soil productivity at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the detrimental soil condition in the 5th field watershed.
UT-27	Highway 12 Rock Stabilization (at Mile Post 155)	The stabilization of 0.5 acre of unstable talus slopes in 2002 directly impacted soils over the short-term by creating detrimental soil conditions until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects, contributed to a loss of soil productivity at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the detrimental soil condition in the 5th field watershed.
UT-28	Camp Prime Time Accessible Trail, Wagon Ride Route and Tree House	Construction of the trail, wagon ride route, and tree house will result in short-term detrimental soil conditions on up to 3 acres. Depending on the surfacing used for the trail, it could create additional impervious surfaces. Spatially, this project does not overlap with the White Pass Study Area. Temporally, the short-term detrimental soil conditions associated with the project are expected to overlap with the White Pass expansion. The long-term loss of soil productivity will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the impervious surfaces.
UT-29	Clear Lake Boat Launch Heavy Maintenance	Maintenance of the boat launch will result in short-term detrimental soil conditions on less than 1 acre during placement of more secure foundations for the access dock. Spatially, this project does not overlap with the White Pass Study Area. Temporally, the short-term detrimental soil conditions are expected to be immediately stabilized, and therefore not to overlap with the White Pass expansion. In the long-term, no impacts to soil productivity will occur as the site is on the lake bed.

**Table 3.2-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Tieton Watershed on Geology and Soils**

Project Number	Project Name	Cumulative Effects
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	The replacement of an existing cell tower and building addition will result in a short-term increase in detrimental soil conditions during construction on up to 0.3 acre and impervious surface of up to 0.1 acre. Spatially, this project overlaps with the White Pass Study Area. Temporally, the short-term detrimental soil conditions associated with the project will overlap with the White Pass expansion and other projects in this table that cause detrimental soil conditions. The long-term loss of soil productivity will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative reduction in soil productivity at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the impervious surfaces.
UT-32	Camp Site Maintenance	The periodic removal of occasional hazard trees will directly impact soils. Hazard tree removal will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the hazard tree removal will overlap with the effects of the White Pass expansion. Short-term soil compaction (detrimental soil condition) will occur in areas immediately under the felled trees. No long-term impacts to soils are expected from hazard tree removal. Other maintenance activities are not expected to result in effects to soils.
UT-34	Unstable Slope Repair Projects (between Mile Posts 156.32 and 156.56)	The stabilization of approximately 4 acres of unstable talus slopes directly impacted soils over the short-term by creating detrimental soil conditions until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to a loss of soil productivity at the 5th field watershed scale. In the long- term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the detrimental soil condition in the 5th field watershed.
UT-35	Unstable Slope Repair Projects (between Mile Posts 161.93 and 165.02)	The stabilization of approximately 0.53 acre of unstable talus slopes directly impacted soils over the short-term by creating detrimental soil conditions until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to a loss of soil productivity at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the detrimental soil condition in the 5th field watershed.

As described in Table 3.2-7, several projects would contribute to a short-term increase in detrimental soil conditions with the White Pass Study Area. The cumulative effects on detrimental soils from these projects are not expected to be measurable as project activities would be localized to specific areas within a larger management area and to varying timeframes within the short-term. The implementation of any Action Alternative would not increase detrimental soil conditions with the White Pass Study Area above the threshold of concern of 20 percent established by the Forest Plans. Within the site scale, the maximum cumulative effects to detrimental soil conditions would occur over approximately 13.5 percent of the White Pass Study Area (refer to Table 3.2-8). As a result of the special and temporal distribution of the projects, the cumulative effects are not expected to be measurable.

Similarly, within the 5th Field Upper Tieton River watershed, detrimental soil conditions resulting from the projects described in Table 3.2-5 would not exceed the 20 percent threshold of concern for the entire watershed (refer to Table 3.2-7). The effect of detrimental soil conditions is not expected to be measurable at the 5th field scale. Cumulative impacts to soil productivity within the White Pass Study Area would result from implementation of any Action Alternative through the construction of impervious surfaces for building, lift terminals, and lift towers. Projects UT - 3, 4, 5, 6, 7, 8, 9 and 31, which overlap in the space and time with the White Pass expansion, would increase impervious surfaces by an additional 0.2 acre within the site scale. This represents a maximum area of impact of approximately 13.5 percent of the site scale. Within the 5th Field Upper Tieton River watershed, project UT 11 would add an additional 0.1 acre of impervious surface. The cumulative effects of impervious surfaces (i.e., loss of soil productivity) are not expected to be measurable at the 5th Field as less than one percent of the watershed would be affected (refer to Table 3.2-8).

Table 3.2-8
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Geology and Soils

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	18.40	4.08	18.40	4.08	31.16	6.91	22.19	4.92	47.23	10.47
Projects Not Associated with the White Pass Expansion	13.54	3.00	13.54	3.00	13.54	3.00	13.54	3.00	13.54	3.00
Cumulative Impacts	**31.94**	**7.08**	**31.94**	**7.08**	**44.70**	**9.91**	**35.73**	**7.93**	**60.77**	**13.48**
Fifth Field Scale										
White Pass Projects	18.40	0.02	18.40	0.02	31.16	0.03	22.19	0.02	47.23	0.04
Projects Not Associated with the White Pass Expansion	314.17	0.27	314.17	0.27	314.17	0.27	314.17	0.27	314.17	0.27
Cumulative Impacts	**332.57**	**0.28**	**332.57**	**0.28**	**345.33**	**0.29**	**336.36**	**0.28**	**361.40**	**0.31**

3.3 WATERSHED RESOURCES

3.3.1 Introduction

The White Pass Study Area for the watershed resources analysis is approximately 1,572 acres in size and encompasses the existing White Pass SUP area and the proposed SUP expansion area.[25] The White Pass Study Area encompasses the upper portions of the Upper Tieton River and Upper Clear Fork Cowlitz River watersheds. This section presents the analysis of watershed resources as five distinct topics: Streams, Wetlands, Riparian Reserves, Water Quality, and Flow Regime. Documents that were commonly used for references during this analysis include: *Wetland and Stream Survey for the White Pass Expansion Proposal* (SE Group 2004), *Wenatchee National Forest Land and Resource Management Plan* (USDA 1990b), *Gifford Pinchot National Forest Land and Resource Management Plan* (GPNF Forest Plan) (USDA 1990a), *The Clear Fork Watershed Analysis* (USDA 1998a) and *The Upper Tieton Watershed Assessment* (USDA 1998b).

The primary focus of the analysis of the affected environment and potential impacts to watershed resources from the Action Alternatives is at the site scale (White Pass Study Area). Since impacts at a given point in a watershed may be transmitted downstream, potential effects to watershed resources are also analyzed at the fifth field watershed scale at the end of this section under the heading of Cumulative Effects. Since the streams in the White Pass Study Area drain into two different watershed networks, site scale analysis by watershed is provided for impact types that have the potential to affect resources downstream (e.g., water quality and flow regime).

Clear Creek drains east into the Columbia River Basin via the Tieton River, while Millridge Creek drains west into the Columbia River via the Cowlitz River. Specifically, watersheds occurring within the White Pass Study Area are made up of portions of two 5th field watersheds, and labeled for the purposes of this FEIS as the Upper Clear Fork Cowlitz and the Upper Tieton watersheds (refer to Figure 3-11). A customized 5th field watershed area of the Clear Fork Cowlitz watershed was used in the cumulative effects analysis because part of it is located within Mount Rainier National Park. Therefore, this customized 5th field watershed area was termed the Upper Clear Fork Cowlitz River watershed, and the portion of the watershed within the National Park was eliminated from the analysis area because no projects resulting in cumulative effects would occur within park boundaries. The Upper Clear Fork Cowlitz watershed incorporates Carlton Creek, Summit Creek, the Clear Fork Cowlitz River, and their tributaries, while the Upper Tieton watershed incorporates Rimrock Lake, the North and South Fork Tieton Rivers, Clear Creek, and their tributaries. A watershed analysis was completed in 1998 for the Upper Tieton watershed portion of the Yakima River Basin (USDA 1998b) and the Clear Fork Cowlitz

[25] 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 has been re-calculated based on the best available data.

River Basin including Millridge Creek (USDA 1998a). The Clear Fork Cowlitz watershed is classified as a Tier 2 Key Watershed under the Northwest Forest Plan (USDA and USDI 1994).

Direct impacts include clearing trees and vegetation (over 3 feet high) for ski trails that cross streams and wetlands, the placement of utility lines across streams and wetlands, construction activities within streamside areas that would interrupt riparian functions, and any restoration activities.

Indirect impacts include construction of impervious surfaces, removal of natural vegetation (affecting hydrologic function), removal or maintenance of vegetation in wetlands or Riparian Reserves, construction activities that result in water quality degradation in streams and wetlands, introduction of noxious weeds from construction activities, changes in land cover that alter flow rates and discharge timing, and windthrow impacts.

3.3.2 Affected Environment

3.3.2.1 Streams

The streams in the eastern part of the existing SUP area flow into Clear Creek and the Upper Tieton River watershed. The Upper Tieton River watershed is a 5th field watershed that encompasses 52,190 acres. According to the Northwest Forest Plan (USDA and USDI 1994), the Upper Tieton River watershed is not designated as a Key Watershed. The SUP area contains a cliffband that separates the upper and lower portions of the SUP area. The primary source of hydrology to ephemeral and intermittent stream channels above the cliff band is runoff from snow melt and seasonal storm events. Below the cliff band, groundwater seeps and springs feed perennial stream reaches. Additional information on stream flow can be referenced in the Flow Regime discussion in this section.

The Upper Clear Fork Cowlitz River watershed is fed by streams located in the proposed expansion area and in the western portion of the existing SUP area that drain into Millridge Creek. The Clear Fork Cowlitz River watershed is a 21,712-acre, Tier 2 Key Watershed. As defined in the Northwest Forest Plan, Tier 2 Key Watersheds are those watersheds “where high water quality is important”. Small ephemeral and intermittent stream channels have formed above the cliff band within Pigtail and Hogback Basins that are best characterized as snowmelt channels (USDA 1998a; SE Group 2004). Water from snowmelt and seasonal storm events on the upper slopes collectively drain to a low-gradient bench near 5,400 feet elevation, where it flows down to Millridge Creek in small surface channels. This bench area in Pigtail Basin supports a small meadow with small wetlands (less than 0.5 acre) (refer to Appendix C – Wetland and Stream Survey). Below the cliff band, a series of groundwater seeps and springs feed perennial streams that flow into Millridge Creek.

The White Pass Study Area contains approximately 15.3 miles of natural streams that meet the definition of "Waters of the United States" provided in 33 CFR 328.3 (a)(1)-(8) (refer to Table 3.3-1). Drainage density in the White Pass Study Area is 6.2 miles of stream per square mile of drainage area (mi/mi^2), with a drainage density of 6.6 mi/mi^2 in the Upper Tieton watershed and 6.1 mi/mi^2 in the Upper Clear Fork Cowlitz watershed. The small variation in drainage densities for the Upper Clear Fork Cowlitz and the Upper Tieton watersheds indicates the White Pass Study Area streams are evenly distributed across these areas (refer to Table 3.3-1). Ditches and water bars in the White Pass Study Area that provide surface water drainage along roads and parking lots and on ski trails during runoff-producing storm events have not been mapped as Waters of the U.S., unless they convey flow from regulated streams.

Table 3.3-1:
Summary of Existing Stream Characteristics within the White Pass Study Area

Parameter	Upper Clear Fork Cowlitz	Upper Tieton	White Pass Study Area Total
Watershed Area (acres)	1119.1	450.9	**1570.0**
Watershed Area (miles^2)	1.7	0.7	**2.5**
Drainage Density (mi/mi^2)	6.1	6.6	**6.2**
Stream Length (miles) by Rosgen Type:			
A3	0.2	0.0	**0.2**
A3a+	2.8	0.4	**3.2**
A4	2.0	0.2	**2.2**
A4a+	5.0	2.0	**7.0**
A5	0.0	0.5	**0.5**
A5a+	0.0	0.9	**0.9**
Culvert	0.3	0.3	**0.6**
Flume	0.3	0.1	**0.4**
Ford	0.0	0.3	**0.3**
Total Stream Length (miles)	**10.6**	**4.6**	**15.3**
Stream Length (miles) by Flow Regime:			
Ephemeral	6.9	0.0	**6.9**
Intermittent	2.0	3.3	**5.3**
Perennial	1.8	1.3	**3.1**
Total Stream Length (miles)	**10.6**	**4.6**	**15.3**

Note: Totals may vary due to rounding.

Streams can be classified in a way that provides consistency in describing channel characteristics and understanding potential responses to land management activities. The Rosgen stream classification system (Rosgen 1994) is a method commonly used on NFSL. Rosgen classification uses a letter designation to indicate the channel type based on gradient, entrenchment, width to depth ratio, and sinuosity. A number designation is used to indicate the dominant substrate type in the channel. Within the White Pass Study Area, Rosgen type Aa+ and A streams are the most prevalent (refer to Figure 3-13 – Streams by Rosgen Types – Existing Conditions).

Type Aa+ streams are characterized as debris transport streams with high gradients, and deeply entrenched channels that usually lack a floodplain. Type Aa+ streams in the White Pass Study Area are typically intermittent and ephemeral, headwater streams located on steep, medium erosion potential slopes. The primary hydrology source to most Aa+ streams in the White Pass Study Area is surface water runoff during snowmelt and storm events. Additionally, Type Aa+ streams originating below the cliff band are fed by groundwater seeps and springs. Due to the steep channel gradient of Type Aa+ streams, channel sinuosity is very low and channel migration is naturally limited. Riffles and cascades are the dominant segment types, with pools and glides occurring very infrequently.

Type A streams have similar channel dimensions and patterns to Type Aa+ streams, but are not as steep and slightly less confined. Type A streams are also located on steep, medium erosion potential slopes, but are usually fed by Type Aa+ streams and can be either intermittent or perennial. The primary hydrologic input to Type A streams in the White Pass Study Area is surface flow from tributary streams.

The number designation indicates the dominant substrate type within the stream channel. Within the White Pass Study Area, the main substrate types are sand (5), gravel (4), and cobble (3). When combined with the letter designation, a complete stream type is formed, for example a Type A4a+ stream, typically found within the Hogback Basin, is a steep, incised channel with a low width to depth ratio and a dominant substrate of gravel.

Rosgen type A and Aa+ streams have a naturally high sediment transport potential and a low sediment storage capacity due to their inherent steepness, high entrenchment ratio and typically unconsolidated channel materials (Rosgen 1996). These channel types are typically associated with high energy flow and naturally function for sediment transport and debris flow. Therefore, a large proportion of the natural and human induced sediment yield to Type A and Aa+ streams is transported downstream. While naturally sensitive to disturbance, human induced management practices adjacent to Type A and Aa+ streams could potentially increase the risk and amount of downstream sedimentation impacts, particularly during peak flow events. Potential impacts of this downstream transport include, but are not limited to decreased water quality from increased turbidity, and increased sedimentation resulting in decreased spawning habitat for fish.

In addition to the Rosgen classification, stream segments modified as a result of human induced management activities have resulted in three artificial channel types; culverted segments, flumes, and fords. The following provides a brief discussion of each type and how they were classified within the White Pass Study Area.

- Culverted: Culverted segments were identified in existing ski trails and road crossings where the stream has been contained within metal or concrete structures or segments covered by timbers or similar material for extended lengths for the purpose of maintaining contiguous, skiable terrain.

- Flume: Flumes were identified in areas where the stream has been contained in an excavated, lined channel, with a cover and fill material placed over the channel to maintain contiguous, skiable terrain.

- Ford: Fords were identified where management activities have resulted in an altered stream channel through grading and subsequent armoring (e.g., riprap). Fords typically occur where unpaved roads cross streams. Fords are generally used when culverts and bridges are not an option because of high debris loading in the stream channel, or because the crossing is too difficult to maintain.

In the existing stream network, approximately 0.6 mile of stream (4 percent) have been placed in extended lengths of metal or concrete culverts, or have been completely overlaid with railroad ties, timbers, or other materials side-by-side in corduroy fashion making up the 0.4 mile of flume (refer to Table 3.3-1). In all cases, these streams have been isolated from many riparian processes that provide aquatic habitat and downstream channel stability, including large woody debris (LWD) recruitment, bank cover and stability, and inputs of fine organic matter, nutrients and insects.

Road-stream crossings provide opportunities for road-related sediment to be delivered directly to streams. There are 28 existing stream crossings within the White Pass Study Area (refer to Table 3.3-2). Approximately 70 percent of the stream crossings in the White Pass Study Area occur in the Upper Tieton watershed within the existing SUP area.

Table 3.3-2:
Existing Road Network and Stream Crossings within the White Pass Study Area

Parameter	Upper Clear Fork Cowlitz	Upper Tieton	White Pass Study Area
Number of Perennial Stream Crossings:			
Aerial Utilities	0	0	**0**
Culverts	5	1	**6**
Fords	0	0	**0**
Bridges	0	0	**0**
Number of Non-perennial Stream Crossings:			
Aerial Utilities	0	0	**0**
Culverts	2	10	**12**
Fords	2	8	**10**
Bridges	0	0	**0**
Total Stream Crossings	**9**	**19**	**28**
Permanent Road length by Surface:			
Paved (miles)	0.2	0.3	**0.5**
Unpaved (miles)	2.3	3.9	**6.2**
Total Road Length (miles)	**2.6**	**4.2**	**6.6**
White Pass Study Area Road Density (mi/mi^2)	1.5	6.0	**2.7**
5^{th} Field Road Density (mi/mi^2)	0.7	0.6	**N/A**

Note: Totals may vary due to rounding.

As indicated in Table 3.3-2, there are 28 existing stream crossings in the White Pass Study Area, 18 are culverts and 10 are open channel road crossings (fords) (refer to Figure 3.14). However, open channel ski trail crossings do not typically include channel modifications, while fords generally result in grading the channel bed and bank and the placement of rock armoring to prevent channel erosion.

As shown in Table 3.3-2, the road density in the entire White Pass Study Area is 2.7 miles of roads per square mile of land area. According to road density thresholds developed by the USFS, the White Pass Study Area density is considered a moderate road density (USFS 1993). High road densities can cause indirect impacts to streams by increasing sediment yield, increasing the magnitude of peak flows, and intercepting groundwater. While evaluating road densities in the White Pass Study Area is informative, road density is intended to be evaluated at the 5th field watershed scale (USFS 1993). The road density in the Upper Tieton River watershed portion of the White Pass Study Area is 6.0 miles per square mile, which indicates a high potential for impacts to watershed function. The road density in the Upper Clear Fork Cowlitz River watershed portion of the White Pass Study Area is 1.5 miles per square mile, which indicates a low potential for impacts to watershed function.

3.3.2.2 Wetlands

Executive Order 11990, Protection of Wetlands, calls for the identification, assessment, and protection of wetlands by requiring federal agencies to avoid, if possible and practicable, adverse impacts to wetlands and to preserve and enhance the natural and beneficial values of wetlands. Section 401 of the Clean Water Act includes provisions that ensure compliance with the Clean Water Act and state water quality laws with respect to activities that are federally permitted. Jurisdictional wetlands and streams are subject to the regulations of the Clean Water Act, in particular, Section 404, which regulates discharges of fill to wetlands and streams.

A 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 or state agency, or tribe implementing provisions of the Clean Water Act that apply the definition of “Waters of the U. S.”.

In order to satisfy conditions of Executive Order 11990, wetlands were identified and mapped throughout the entire White Pass Study Area for impact analysis. Wetlands were identified and mapped using the three-parameter approach outlined in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987). Wetlands within the White Pass Study Area were also classified using the hydrogeomorphic approach to wetland classification (Brinson 1993). The wetlands in this FEIS analysis are grouped according to their hydrogeomorphic class: slope wetland, depressional wetland, or riverine wetland. Additional information regarding the methods used for delineating and classifying the wetlands within the White Pass Study Area can be found in the document entitled the Wetland and Stream Survey for the White Pass Expansion Proposal (refer to Appendix C).

The White Pass Study Area contains 114 wetlands that encompass a total area of 5.3 acres (refer to Figure 3-18). Historic impacts to wetlands in the White Pass Study Area include the creation of lift terminals, ski trails, and roads within the existing SUP area. Wetlands found in Pigtail and Hogback Basins are pristine and exhibit no historic impacts. Table 3.3-3 summarizes the area, hydrogeomorphic class, condition, and watershed location of the wetlands in the White Pass Study Area.

Table 3.3-3:
Summary of Existing Wetland Characteristics in the White Pass Study Area

Details	Parameter	Upper Clear Fork Cowlitz	Upper Tieton River	White Pass Study Area
Wetland Acreage (acres)	Depressional Wetlands	0.6	0	**0.6**
	Riverine Wetlands	1.6	0.2	**1.9**
	Slope Wetlands	0.1	2.7	**2.8**
	Total Wetland Area	**2.3**	**2.9**	**5.3**
Existing Wetland Impacts (acres)		**0**	**2.3**	**2.3**
Number of Wetlands	Number of Depressional Wetlands	4	0	**4**
	Number of Riverine Wetlands	92	1	**93**
	Number of Slope Wetlands	6	11	**17**
	Total Number of Wetlands	**102**	**12**	**114**

Note: Totals may vary due to rounding.

Of the total 114 wetlands within the White Pass Study Area, there exist 17 slope wetlands which total 2.8 acres. Most of the slope wetlands are generally located within the existing SUP (refer to Table 3.3-3 and Figure 3-18). The vegetation in the slope wetlands is typically dominated by herbaceous plant communities with limited shrub and tree dominated components along the margins of the wetlands. The composition of the soils observed in the slope wetlands ranges from mucky organic soils to mineral soils with sandy loam texture classes. Most of the slope wetlands in the White Pass Study Area originate from a series of groundwater seeps that form when Landtype B converges with Landtype C (refer to Section 3.2 – Geology and Soils).

Additionally, 93 riverine wetlands (of the total 114 wetlands) are present in the White Pass Study Area and comprise 1.9 acres (refer to Table 3.3-3). The riverine wetlands in the White Pass Study Area are typically located along ephemeral and intermittent reaches of streams in the expansion area. The primary hydrologic input to the riverine wetlands is surface water that floods out of the stream channel and onto adjacent floodplains during high flow events (e.g., spring melt). Secondary hydrology sources to these wetlands include surface flow from adjacent hillsides and groundwater from seeps in the inner gorge of the stream. Native hydrophytic shrub species dominate the vegetation communities in the riverine wetlands in the White Pass Study Area. The soils within the riverine wetlands range from mucky organic soils to mineral soils with loamy sand texture.

Finally, there are four depressional wetlands within the White Pass Study Area covering a total of 0.6 acre. Two of these depressional wetlands are located in Pigtail Basin approximately 5,400 feet in elevation. The primary hydrologic input into depressional wetlands is groundwater and overland flow. The soils within the depressional wetlands range from mucky organic soils to mineral soils with loamy sand texture, and the vegetation in depressional wetlands is typically dominated with herbaceous plant communities with limited shrub and tree dominated components along the edges.

Wetlands with existing direct impacts are defined as those wetlands that have been modified by activities that displace wetland areas by filling or excavating, modifying the wetland hydrology by ditching or creating impoundments, or modifying plant communities in the wetland through trimming or clearing. There is no data available to document historic impacts to wetlands resulting from grading or filling. Historic impacts to wetlands are estimated in this analysis by calculating the approximate area of wetlands that have modified vegetation communities. The modified vegetation resulted from clearing operations to construct the existing ski trails, thereby impacting wetland vegetation communities. Approximately 2.3 acres of wetlands exhibit historic impacts from clearing within the White Pass Study Area (refer to Table 3.3-3). It is assumed that wetlands within the existing SUP area have been directly impacted from the past construction of ski lifts, ski trails, buildings, and roads. The past impacts to these wetlands would likely have reduced the amount of wetland area and modified wetland hydrology. These wetlands are considered to be functioning below their full potential, due to the historic disturbance. The wetlands within the proposed expansion portion of the White Pass Study Area are all in an undisturbed condition, with no observable direct impacts to soils and topography, wetland hydrology, or native shrub and herbaceous plant communities. Therefore, it is assumed that these undisturbed wetlands are functioning at their full potential.

Development activities in the uplands along the wetland boundary can affect wetland functions. The location of the development activity with relation to the wetland and the type of development activity dictates the degree of impact and what wetland functions would be affected. Primary indirect impacts to wetlands typically occur from changes in hydrology and sediment sources. The wetlands in the proposed expansion portion of the White Pass Study Area have upslope conditions that are undisturbed, and therefore do not have existing indirect impacts. The upslope source areas of most of the wetlands in the existing SUP portion of the White Pass Study Area are either roads or ski trails, which increases the potential for increased sediment inputs and modified wetland hydrology. Existing roads and other artificial forest openings (e.g., ski trails) in the existing SUP portion of the White Pass Study Area also increase the potential for establishment of noxious weeds in wetlands within this portion of the White Pass Study Area (refer to Section 3.5 – Vegetation).

3.3.2.3 Riparian Zones

Riparian zones are the transitional lands between aquatic ecosystems (e.g., streams, lakes, and wetlands) and terrestrial ecosystem. Riparian zones are typically characterized as having a sharp gradient of environmental conditions, functional processes, and plant communities. Protection of riparian zones through sound regulatory and land management practices is important because these ecosystems serve many important ecosystem functions and are laterally connected to adjacent uplands as well as upstream and downstream aquatic ecosystems. On NFSL within the range of the Northern spotted owl, the Aquatic Conservation Strategy (ACS) from the *Northwest Forest Plan* specifies variable-width land allocations along various classes of streams, lakes, and wetlands that are called Riparian Reserves (USDA and USDI 1994). Riparian Reserves are land allocation designations intended to provide protection to aquatic resources and may not reflect the extent of the actual riparian zone for a particular site. The width designations for Riparian Reserves are designed to always include the extent of the riparian vegetation at a minimum, and usually encompass an area much larger than the actual riparian zone.

Similar protection areas, called riparian influence areas (RIAs), are designated in the GPNF Forest Plan, and the classification system and width designations are different than those provided for Riparian Reserves in the Aquatic Conservation Strategy. RIA widths are based on the classification of the associated stream or wetland and the extent of the RIA, and are typically less than the width of the Riparian Reserves (USDA 1990a; USDA and USDI 1994). Refer to Table 3.3 FEIS1 for a comparison of the default widths for Riparian Reserves and RIAs. Both Riparian Reserves and RIAs are analyzed in this section even though Riparian Reserves are larger and provide more protection to aquatic resources. The RIAs are sized more closely with the actual riparian zones observed in the field and the GPNF Forest Plan has very specific standards and guidelines that provide additional protection in certain circumstances (USDA 1990a; USDA and USDI 1994).

Table 3.3 FEIS1:
Comparison of Default Widths for Riparian Reserve and Riparian Influence Areas

Waterbody	Riparian Reserve Width (feet)	Riparian Influence Area Width (feet)
Streams		
Perennial, Fish-bearing	300	100[a]
Perennial, Non fish-bearing	150	100[a]
Intermittent/Seasonal	100	25
Wetlands less than 1 acre	150	300[b]
Wetlands greater than 1 acre	300	300[b]
Lakes/Ponds	300	300

[a] The GPNF Forest Plan does not differentiate widths based on fish presence. All perennial streams are assigned the same RIA width.
[b] The GPNF Forest Plan does not differentiate widths based on wetland acreage. All wetlands are assigned the same RIA width.

For the purposes of this FEIS, the RIA for wetlands was not evaluated because the required 300-foot buffer on the 114 mapped wetlands within the White Pass Study Area does not provide a riparian associated measure from which to gain information concerning impacts to the actual riparian zone. That is, including the 300-foot buffer analysis for wetland RIAs would duplicate the analysis performed for Riparian Reserves. Therefore, for the RIA of streams in Pigtail and Hogback basins, a width of 25 feet was chosen to more clearly resemble the actual riparian zone and provide a reasonable measure for evaluating impacts from the Action Alternatives. As a result, this analysis evaluates impacts to the 25-foot RIA along streams in order to measure the effect of the Forest Plan amendment on riparian zones. The analysis of Riparian Reserves includes impacts to both streams and wetlands.

This section discusses the current conditions and potential impacts to the existing 632.3 acres of Riparian Reserves and 147.4 acres of RIAs located within the limits of the Riparian Reserves (refer to Figures 3-22 and 3-27). The riparian functions analyzed in this section include stream shading, LWD recruitment, sediment filtration, and stream bank stability. Table 3.3-4 identifies the classes and protective widths of Riparian Reserves and RIAs found within the White Pass Study Area. Figures 3-22 and 3-27 show the distribution of Riparian Reserves and RIAs within the White Pass Study Area.

Riparian Reserves

As stated above, the ACS was developed to improve and maintain the ecological health of watersheds and aquatic ecosystems on public lands (USDA and USDI 1994). One of the four primary components of the ACS, Riparian Reserves, are applied to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. Riparian Reserves are lands along streams, wetlands, and lakes, and unstable and potentially unstable areas where special Standards and Guidelines direct land use. The widths of the Riparian Reserves for the streams, wetlands, and lakes within the White Pass Study Area were determined by consulting the Northwest Forest Plan (USDA and USDI 1994), the GPNF Forest Plan – Amendment 11 (USDA 1998a), the Clear Fork Watershed Assessment (USDA 1998a), and the Upper Tieton Watershed Assessment (USDA 1998b). The Riparian Reserve widths assigned to the streams, wetlands, and lakes in the White Pass Study Area are presented in Table 3.3-4.

Most of the Riparian Reserve widths are based on the values provided in the Northwest Forest Plan because the site potential tree height for the Pacific silver fir/Cascade azalea-big huckleberry plant association is the same as the buffer width in the Upper Tieton Watershed Analysis (USDA 1998b; USDA and USDI 1994). The Riparian Reserve widths are also used in the Upper Clear Fork Cowlitz River watershed side of the White Pass Study Area because the Clear Fork Watershed Assessment does not identify any site-specific or general changes to the widths contained in the Northwest Forest Plan (USDA 1998a; USDA and USDI 1994). The one exception to the Riparian Reserve standards presented in the Northwest Forest Plan is the 300-foot Riparian Reserve width specified for wetlands less than 1 acre in size in the GPNF Forest Plan – Amendment 11 (USDA 1998a). The 300-foot Riparian Reserve width was applied to all wetlands less than 1 acre in the White Pass Study Area regardless of what

National Forest the wetland was located on in order to provide a conservative analysis of Riparian Reserve impacts (refer to Figure 3-18).

Due to the conservative nature of the Riparian Reserve designations, most of the land area within the Riparian Reserves in the White Pass Study Area does not contain riparian vegetation because the extent of the riparian zone is very limited in steep, alpine stream and wetland systems. The actual riparian zone associated with the streams and wetlands in the White Pass Study Area is typically 5 to 20 feet wide, which is about the same width as the RIA for intermittent streams (refer to next section). Due to the differences in functional riparian zones and designated riparian zones, this analysis utilizes Riparian Reserve boundaries for analysis of upland functions, and the RIA boundaries for analysis of riparian functions. The upland forest communities located within Riparian Reserves are analyzed in order to characterize the following functions: LWD recruitment potential, stream and wetland shading potential, and overall land cover patterns. The RIAs are used to analyze particular riparian functions that occur only at that scale. These riparian functions include sediment filtration, stream bank stability, floodwater storage, LWD input to streams, stream channel shade, and stabilizing stream banks via root structure.

Table 3.3-4:
Riparian Reserve Width Rationale for Streams, Wetlands, and Lakes in the White Pass Study Area

Classification Rationale	Reserve Width	Riparian Reserve Width Rationale
Permanently flowing fish bearing streams	300 feet	The default 300-foot slope distance is greater than the distance equal to the two times the height of one site-potential tree (100 feet), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
Permanently flowing, non-fish bearing streams	150 feet	The default 150-foot slope distance is greater than the distance equal to the height of one site-potential tree (100 feet), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
Seasonally flowing or intermittent streams	100 feet	The distance equal to the height of one site-potential tree (100 feet) is equal to the default 100-foot 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.
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-foot slope distance which is greater than the one site potential tree height (100 feet).
Wetland less than 1 acre	300 feet	The GPNF Forest Plan - Amendment 11 states that the Riparian Reserve boundary for wetlands less than 1 acre is 300 feet, which is greater than the extent of the riparian vegetation, saturated soil, and one site potential tree height (100 feet).
Natural Lakes and Ponds	300 feet	The default 300-foot slope distance is greater than the distance equal to the height of one site-potential tree (100 feet), the outer edges of riparian vegetation, and the extent of saturated soil.

Source: USDA 1998a, 1998b; USDA and USDI 1994

The vegetative conditions of Riparian Reserves within the White Pass Study Area include all natural forest and natural non-forest vegetation types as well as historically altered non-forest vegetation types, such as modified shrub and herbaceous communities. The total area of Riparian Reserves within the White Pass Study Area is 632.3 acres (refer to Figure 3-22). A total of 395.3 acres of Riparian Reserves are present in the Upper Clear Fork Cowlitz River watershed and 237.0 acres of Riparian Reserves have been mapped in the Upper Tieton River watershed. Refer to Table 3.3-5 for a summary the existing Riparian Reserve characteristics within the White Pass Study Area.

The largest existing impact to Riparian Reserves in the White Pass Study Area, on the basis of intensity, is the complete removal of riparian function through the creation of impervious surfaces (roads, buildings, and parking lots) and also by the installation of stream culverts. Approximately 10.4 acres of impervious surfaces (developed cover) have been constructed within Riparian Reserves in the White Pass Study Area, which represents approximately 1.6 percent of the total Riparian Reserve area (refer to Table 3.3-5 and Figure 3-22). Approximately 75 percent of the existing developed cover in the White Pass Study Area is located in the Upper Tieton River watershed. These developed areas are located primarily within the upland forest portion of the Riparian Reserves. Most existing direct impacts to Riparian Reserves occur at the 28 road crossings of streams by culverts and fords within the White Pass Study Area (refer to Figure 3-14). Approximately 0.6 mile (3,010 feet) of streams in the White Pass Study Area do not have functioning Riparian Reserves because they have been placed in culverts for road crossings and diversion under parking lots, which completely eliminates most riparian functions (refer to Table 3.3-1). The length of streams that have been placed in culverts is evenly balanced between the two watersheds in the White Pass Study Area.

Table 3.3-5:
Summary of Existing Riparian Reserve Characteristics in the White Pass Study Area

Parameter	Upper Clear Fork Cowlitz	Upper Tieton	White Pass Study Area
Area of Riparian Reserves (acres)	395.3	237.0	**632.3**
Landcover Types within Riparian Reserves (acres):			
Forested	365.3	157.4	**522.7**
Talus	2.2	2.6	**4.8**
Modified Herbaceous	25.1	42.4	**67.6**
Developed	2.7	7.8	**10.4**
Lakes and Ponds	0	26.8	**26.8**
Total Area	**395.3**	**237**	**632.3**
Shade Potential and LWD Recruitment:			
Average Forest Canopy Cover	46.5%	49.5%	48.0%
High Canopy Cover Range	69.8%	74.3%	72.1%
Low Canopy Cover Range	23.2%	24.7%	24.0%

Note: Totals may vary due to rounding.

The largest historic direct impact to Riparian Reserves in the White Pass Study Area is from the removal of forest vegetation for the construction and maintenance of existing lifts and ski trails, which involved the removal of approximately 67.6 acres of forest (refer to Table 3.3-5). These existing ski trails are represented by the modified herbaceous landcover type and represent approximately 10.7 percent of the total Riparian Reserves in the White Pass Study Area. Forest clearing in these Riparian Reserves has reduced the level of riparian function for wildlife habitat, filtering sediment, floodwater storage, LWD input to streams, stream channel shade, and stabilizing stream banks via root structure. However, none of these functions have been completely eliminated in the White Pass Study Area because native herbaceous and shrub cover is maintained on ski trails to reduce erosion and improve bank stabilization. In addition, tree islands are preserved around streams in many areas to retain basic riparian functions even when the outer limits of the Riparian Reserve have been cleared (refer to Figure 3-22).

While it is well documented in scientific literature that LWD plays a key role in multiple stream ecosystem functions, LWD is not a dominant component of stream channel structure or function in most alpine systems (Naiman and Bilby 1998). This finding is supported by the low LWD densities observed in the streams within the White Pass Study Area. The low LWD densities are likely due to the location of most streams in meadows and in avalanche paths, where there are very few large trees present in the Riparian Reserve to provide LWD recruitment to the stream channels. This pattern is particularly evident in the ephemeral stream channels located in the proposed SUP expansion area. Even though Rosgen Type Aa+ and Type A streams are characterized as debris transport systems, most of the Type Aa+ and Type A streams in the White Pass Study Area have ephemeral flow regimes and generally do not have sufficient channel dimensions or discharge to transport LWD to down gradient stream reaches. However, many of these intermittent and ephemeral streams may transport sediment, gravels and cobbles, and Coarse Woody Debris downstream during small (one to five-year return interval) peak flow events in response to intense rain events or rain on snow events. Large peak flow events (50 to 100-year return interval) in these ephemeral streams in the White Pass Study Area may transport LWD as part of a large debris flow that could be initiated during large peak flow event. Although LWD is present in some of the ephemeral stream channels, it does not play a significant role in stream morphology and function. LWD does play a larger role in stream morphology in the intermittent and perennial streams in the White Pass Study Area, but only under extreme circumstances would these streams contribute LWD to larger, fish bearing streams lower in the watersheds.

Stream channel shading by riparian vegetation is an important moderator of water temperature in streams. Water temperatures that are too high can exceed water quality criteria and may cause stress to fish and other animals living in the stream. The streams in the White Pass Study Area have very high channel gradients; thus, stream temperatures are likely to decrease with increasing distance downstream from areas that lack shade because of evaporative cooling in turbulent cascades, riffles, and falls. Stream temperatures and riparian shade were not directly measured by field instrumentation in the White Pass Study Area. Instead, riparian shade was estimated analyzing existing tree canopy cover within Riparian

Reserves using GIS analysis. Canopy cover analysis indicates that the average canopy cover in Riparian Reserves within the Upper Clear Fork Cowlitz watershed is 46.5 percent (refer to Table 3.3-5). As illustrated in Figure 3-22, the canopy cover in the Upper Clear Fork Cowlitz watershed varies substantially, with a range from 23.2 percent to 69.8 percent based on one standard deviation from the average. The canopy cover is generally more open in Hogback Basin and cover is denser along the perennial streams below the cliff band in the existing ski area. The canopy cover in the Riparian Reserves within the Upper Tieton River watershed is also highly variable, but instead of naturally low canopy cover like in Hogback Basin, the low canopy cover is attributed to the exiting ski trail clearing (refer to Figure 3-22). The average canopy cover in the Upper Tieton watershed is 49.5 percent with a range from 24.7 percent to 74.3 percent (refer to Table 3.3-5).

The existing direct effects to Riparian Reserves from developed cover and ski trails mentioned above also have indirect effects on adjacent Riparian Reserves and stream channels. The removal of forest cover in Riparian Reserves may have increased the frequency and magnitude of debris flows and reduced the ability of the riparian vegetation to attenuate debris flow impacts once they occur. Historic forest clearing for chairlifts and ski trails in and adjacent to Riparian Reserves may have also increased the potential for windthrow (tree blowdown), especially when there is a hard forest edge without any forest thinning or feathering in the transition zone. The ski trails and roads within and adjacent to Riparian Reserves also increase potential for noxious weed transport and establishment into these areas. The increase in noxious weed potential is greatest at the 28 road crossings of streams where vehicular traffic has the greatest potential for spreading noxious weeds.

Riparian Influence Areas

The GPNF Forest Plan designates five different types of Riparian Areas based on the physical characteristics of the streams and wetlands to be classified. Riparian Area A includes all perennial streams, and they are assigned an influence area of 100 feet wide on either side of the stream to which specific management standards and guidelines are applied. All intermittent and ephemeral streams are classified as Riparian Area B, and they are assigned an influence area of 25 feet wide on either side of the stream. There are no streams in the White Pass Study Area that meet the criteria for Riparian Area C, which includes floodplains and side channels. Riparian Area D includes lakes, ponds, and wetlands on slopes less than 20 percent, and are assigned an influence area of 300 feet. As described earlier, the RIA for Riparian Area D is not used for analysis purposes in this EIS so that a more detailed analysis of the effects to the actual riparian zone could be conducted, and to evaluate the effects of the Forest Plan amendment on the actual riparian zone. Riparian Area E includes wetlands on slopes greater than 20 percent and may have a RIA that is 300 feet wide. There are no wetlands on slopes greater than 20 percent within the White Pass Study Area. The various Riparian Area types will be collectively referred to as RIAs for the remainder of this analysis for simplicity. Figure 3-27 displays the appropriate RIA for all of the streams in the White Pass Study Area.

The primary functions of the RIAs include stabilizing stream banks via root structure, filtering sediment, and floodwater storage. Even though the RIAs also contribute LWD input to streams and provide stream channel shade, these riparian functions are best analyzed at the larger Riparian Reserve scale, which includes at least one site potential tree height. The extent of the riparian vegetation along intermittent and perennial stream reaches in the White Pass Study Area is typically between 5 to 20 feet on each side of the stream channel, which includes the adjacent floodplain (if any), and in some cases, the adjacent wetland. The RIA is the appropriate scale for analyzing the potential impacts to riparian vegetation and stream functions because they encompass the ecosystem components that are the most significant drivers in these systems. A summary of the existing condition of the RIAs within the White Pass Study Area is presented in Table 3.3-6.

The distribution of various soil types in the RIA is an important indicator of the potential for soil erosion and subsequent sediment yield to adjacent waterbodies from proposed clearing and grading activities. As indicated in Table 3.3-6, most (approximately 63 percent) of the soil located in RIAs within the White Pass Study Area is considered to be medium erosion hazard. Approximately 38.7 acres (26.5 percent) of the RIAs in the White Pass Study Area contain low erosion hazard soil and the remaining 15.3 (approximately 10.5 percent) of the RIAs contain high erosion hazard soil. Based on the distribution of the erosion hazard classes in the White Pass Study Area, most of the existing and proposed development in RIAs within the White Pass Study Area would occur on low and medium erosion hazard soil. The sediment yield to waterbodies from existing development is generally low based on the small amount of high erosion hazard soil in RIAs, the high amount of forested Riparian Reserves, and field observations of limited soil erosion and sediment yield.

Table 3.3-6:
Summary of Existing Riparian Influence Area Characteristics in the White Pass Study Area

Parameter	Upper Clear Fork Cowlitz River Watershed	Upper Tieton River Watershed	Total White Pass Study Area (acres)
Riparian Influence Area (acres)	94.5	52.9	**147.4**
Stream Bank Stability (miles):			
Streams with potentially stable banks	10.0	3.8	**13.7**
Streams with potentially unstable banks	0.7	0.9	**1.5**
Total Stream Length (miles)	**10.6**	**4.6**	**15.3**
Soil Erosion Hazard within RIAs (acres):			
High Erosion Potential Soils	14.8	0.5	**15.3**
Medium Erosion Potential Soils	76.7	15.4	**92.1**
Low Erosion Potential Soils	2.2	36.5	**38.7**
Total Area (acres)	**93.7**	**52.4**	**146.1**

Note: Totals may vary due to rounding.

Construction activities near streams can cause direct impacts to RIAs and indirect impacts to stream channels and water quality through increased mass wasting and erosion, decreased sediment filtration, and decreased stream bank stability. An analysis of the length of streams with potentially unstable banks was performed in order to quantify these direct and indirect impacts to RIAs and streams. Stream lengths with potentially unstable banks include stream banks that do not have forest or shrub cover. Streams with potentially unstable banks can be the result of human management activities, or they can be naturally unstable. Human management activities that create potentially unstable stream banks include tree removal, grading activities, road crossings, and construction of impervious surfaces. Stream segments with naturally unstable banks include stream banks with naturally nonvegetated or sparsely vegetated herbaceous cover. All stream banks covered with natural forest and shrub communities are considered to be potentially stable and do not have specific management concerns in this analysis.

As summarized in Table 3.3-6, the length of streams with potentially stable banks in the White Pass Study Area is 13.7 miles. Streams with potentially stable banks comprise approximately 90 percent of the streams in the White Pass Study Area, with most of the potentially stable stream banks (10.0 miles) occurring in the Upper Clear Fork Cowlitz River watershed (refer to Table 3.3-6). These reaches typically occur within forested areas of the existing and proposed SUP areas (refer to Figure 3-27). Approximately 1.5 miles of streams, or 10 percent of streams in the White Pass Study Area have potentially unstable stream banks. These stream reaches are typically located within existing ski trails on ephemeral and intermittent streams. Several potentially unstable banks occur on perennial streams within existing ski trails near the base of the existing ski area (refer to Figure 3-27).

3.3.2.4 Water Quality

Surface Water Quality Standards

Current Legislative Framework

In July, 2003, revisions to State of Washington surface water quality standards (SWQS) were adopted by the WDOE (WAC 1997). The revised SWQS require review by the EPA to assure consistency with Clean Water Act Section 303(c) (and the implementing regulations in 40 CFR 131.5 and 131.21) and by NOAA Fisheries and the USFWS to assure consistency with the Endangered Species Act (WDOE 2003). On August 6 and December 1, 2004, the WDOE received two letters from the EPA requesting additional review and clarification of the SWQS provisions. Two additional letters from the EPA were received by the WDOE on January 12 and February 14, 2005, which approved portions of the SWQS revision submittal (WDOE website 2006). WDOE is required to respond to the EPA's disapproval of specific SWQS by December 18, 2006, by submitting revised changes to the SWQS. A final decision from the EPA is expected during the summer of 2007 (Hicks, pers. comm.). As required by the regulations and guidance at the time of publication, this FEIS follows the EPA-approved revisions to the SWQS, but uses the 1997 standards for sections still under review by the EPA. The most current SWQS would be utilized following the final decision from the EPA and relevant agencies. A summary of current SWQS in use can be found on the WDOE website (www.ecy.wa.gov).

1997 Surface Water Quality Standards

Under the existing 1997 SWQS, specific surface waters (rivers and lakes) of the State of Washington are classified according to the class-based criteria system outlined under WAC 173-201A-130 and 140. The criteria classes include: Class AA (extraordinary), Class A (excellent), Class B (good), Class C (fair), and Lake Class. For each criteria class, a set of characteristic uses and water quality criteria are listed in WAC 173-201A-030.

2003 Surface Water Quality Standards

Under the revised SWQS currently under review by the EPA (WAC 173-201A), the WDOE has established the following designated uses for specific fresh water rivers and lakes in the state: Aquatic Life uses, Recreational uses, Water Supply uses, and Miscellaneous uses. These designated uses are further broken down into specific categories. Aquatic Life uses include Char, Core Salmon/Trout, Non-Core Salmon/Trout, Salmon/Trout Rearing, Redband Trout, and Warm Water Species. Recreational uses include Extraordinary Primary Contact, Primary Contact, and Secondary Contact. Water Supply uses include Domestic, Industrial, Agricultural and Stock Water. Finally, Miscellaneous uses include Wildlife Habitat, Harvesting, Commerce/Navigation, Boating and Aesthetics. For each designated use, a set of general and water quality criteria are listed in WAC 173-201A-200 of the 2003 SWQS. Until such a time that EPA approves all the revised use designation tables, WDOE will continue to use the 1997 class-based standards for specific freshwater and marine waterbodies of the state, as detailed in the 1997 version of WAC 173-201A-120 and 130 (WDOE 2006).

Table 3.3 FEIS2 provides a summary of water quality standards currently in effect for surface waters in the White Pass Study Area (for more information, refer to WDOE 2006 and www.ecy.wa.gov/programs/wq/swqs/rev_rule.html).

Table 3.3 FEIS2:
Water Quality Criteria for Various Classes of Freshwater Surface Waters within the White Pass Study Area

Existing 1997 Surface Water Quality Standards (WAC 173-201A)		
Criteria Class	**Class AA (extraordinary)**	**Lake Class**
Fecal Coliform Organisms	Geometric mean: ≤50 colonies/100 mL AND ≤10%of all samples obtained for calculating the Geometric mean value exceeding 100 colonies/100 mL	Geometric mean: ≤50 colonies/100 mL AND ≤10%of all samples obtained for calculating the Geometric mean value exceeding 100 colonies/100 mL
Dissolved Oxygen	≥9.5 mg/L	No measurable decrease from natural conditions
Total Dissolved Gas	≤110% of saturation at any point of collection	≤110% of saturation at any point of collection
Temperature	Natural conditions ≤16.0°C: Temperature to be ≤16.0°C due to human activities; When natural conditions ≥16.0°C: Receiving water temperature rise ≤0.3°C; Incremental temp increases: Point source activities:≤ t=23/(T+5)[a]; Non-point source activities ≤ 2.8°C.	No measurable change from natural conditions
pH	6.5-8.5 (human caused variation < 0.2)	No measurable change from natural conditions
Turbidity	Background ≤50 NTU: ≤5 NTU over background; Background >50 NTU: ≤10% increase	≤5 NTU over background conditions
Revised, EPA-Approved 2003 Surface Water Quality Standards		
All Use Designations, Classes, and Waters of the State		
Aesthetic Values	Shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch or taste.	
Lakes		
Establishing Lake Nutrient Criteria	For lakes within the Cascades Ecoregion, if ambient total phosphorus (μg/L) range of lake is 0-4, the lake is ultra-oligotrophic, and the criteria should be set at 4 or less. If ambient total phosphorus (μg/L) range of lake is 4-10, the lakes is oligotrophic, and the criteria should be set at 10 or less.	

[a] "t" represents the maximum permissible temperature increase measured at a mixing zone boundary; and "T" represents the background temperature as measured at a point or points unaffected by the discharge and representative of the highest ambient water temperature in the vicinity of the discharge.

When surface water features do not meet established standards, they are identified as impaired under Section 303(d) of the Clean Water Act. The WDOE regularly reviews and determines the water quality status of polluted water bodies within Washington and publishes them in a 303(d) List. For each water body listed, WDOE develops a pollutant management plan where total maximum daily loads are established to rectify and maintain water quality within standards for those exceeded parameters.

White Pass Watersheds

Under the 1997 SWQS, both the Tieton River and the Upper Cowlitz River, which includes the Clear Fork Cowlitz River, are designated as Class AA (extraordinary) (WAC 1997). All lakes within the Upper Tieton River and Upper Clear Fork Cowlitz River watersheds of the White Pass Study Area not designated Class AA, are Lake Class (such as Leech Lake).

Table 3.3-7 details the current classification of watersheds within the White Pass Study Area, as well as potential use designations under the proposed 2003 SWQS revisions (currently under review by EPA). Criteria class (Class AA, Lake Class, etc.), or the proposed use designations (Aquatic Life, Recreational, Water Supply, and Miscellaneous uses), indicate how stringent the water quality requirements of the relevant waterbody will be.

Table 3.3-7:
Surface Water Quality Standards Applicable within the White Pass Study Area

Water-shed	1997	2003			
	Criteria Class Under 1997 SWQS (Current)[a]	**Aquatic Life Uses Under Proposed 2003 SWQS (Proposed)[b]**	**Recreational Uses Under Proposed 2003 SWQS (Proposed)[b]**	**Water Supply Uses Under Proposed 2003 SWQS (Proposed)[b]**	**Miscellaneous Uses Under Proposed 2003 SWQS (Proposed)[b]**
Upper Clear Fork Cowlitz River	Class AA (Extraordinary)	Core Salmon Spawning and Rearing	Extraordinary primary contact recreation	Domestic, Industrial, Agricultural, and Stock Water	Wildlife Habitat, Harvesting, Commerce/ Navigation, Boating, and Aesthetics
Upper Tieton River	Class AA (Extraordinary)	Char and Core[c]	Extraordinary primary contact recreation	Domestic, Industrial, Agricultural, and Stock Water	Wildlife Habitat, Harvesting, Commerce/ Navigation, Boating, and Aesthetics

[a] Specific classification for named surface waters are listed in WAC-173-201A-130 (WAC 1997). The WDOE continues to apply the 1997 criteria classifications to surface waters, as the EPA has not yet approved the proposed use designations outlined in the revised 2003 SWQS (WDOE 2006).

[b] Use designations (Aquatic Life, Recreational, Water Supply and Miscellaneous uses) are classifications outlined under WAC-176-201A-600 (WAC 2003). The EPA has not yet approved these proposed revisions to the SWQS, and are not in use by the WDOE at this time. Upon approval by the EPA, possibly in summer 2007, these use designations and applicable water quality criteria would come into effect (Hicks, pers. comm.).

[c] The majority of the Upper Tieton River Watershed was designated Char by the WDOE (WAC 173-201A) and approved by the EPA. Fish and Spencer Creeks in the western end of the watershed, south of Rimrock Lake, have been designated Core by the WDOE. However, the EPA has disapproved this decision, and designated the two creeks Char. Cold Creek, Bear Creek, and some creeks that flow into Rimrock Lake from the north have been designated Core by the WDOE, and have been approved such by the EPA. Please refer to the EPA Website (2006) for additional information.

Refer to discussion above, and www.ecy.wa.gov/programs/wq/swqs/rev_rule.html for additional information regarding the current and proposed SWQS.

Water Quality Data

Water Quality Parameters

A limited amount of water quality data has been documented within the Upper Clear Fork Cowlitz and Upper Tieton watersheds (USDA 1998a, 1998b). Best available data has been collected from an online database maintained by the WDOE Environmental Information Management (EIM) office. According to EIM data, there is one monitoring station located on Clear Creek in the Upper Tieton watershed and none within the Upper Clear Fork Cowlitz watershed (refer to Figure 3-11 – Upper 5th Field Watersheds for location of Clear Creek).

Water quality within the White Pass Study Area is considered to be good for Aquatic Life uses in both watersheds, and waters draining Hogback Basin meet State of Washington Class AA (exceptional) standards (USDA 1998a). Primary parameters typically evaluated for Aquatic Life uses include temperature, dissolved oxygen (DO), turbidity, and pH. A brief description of each parameter is given below in relation to the current 1997 SWQS (summarized in Table 3.3 FEIS2), and the proposed Aquatic Use standard from the revised 2003 SWQS. Due to the limited amount of water quality data collected within the Upper Tieton and the Upper Clear Fork Cowlitz watersheds, existing conditions for each parameter are identified, where data is available. Previous concerns over sewage problems led White Pass to construct a recirculating gravel filter for the resort wastewater treatment system in the 1990s (refer to Section 3.13 – Utilities and Infrastructure). According to the watershed assessments, no 303(d) listed water bodies occur within the Upper Tieton River or Upper Clear Fork Cowlitz River watersheds (USDA 1998a, 1998b).

Temperature

Stream temperature is an important water quality parameter for fish and other aquatic species that can potentially be affected by ski area management practices. Changes in water temperatures resulting from management activities such as removal of shade-providing vegetation can cause stream temperatures to exceed maximum temperature standards. Increased solar radiation has the potential to warm water as forest canopy vegetation is removed. While shading does not directly cool water temperatures, it reduces the amount of solar radiation reaching the water allowing for other processes, such as groundwater influx, to physically cool the water. Under the current 1997 SWQS, water temperature may not exceed 16.0°C in Class AA surface waters. Under the proposed 2003 SWQS, the maximum temperature standards are 53.6°F for Char and 60.8°F for Core Salmon and Trout, represented as a seven-day average maximum. Within Clear Creek, the seven-day average maximum temperature is 11.2°C, or 52.2°F (USFS 1997b), and is below the standard for Class AA waters, as well as proposed standards for Char, Core Salmon and Trout. Within the Upper Clear Fork Cowlitz River watershed, in Millridge Creek (feeds Knuppenburg

Lake), stream temperatures ranged from 8 to 9°C (44.8-48.2°F), which meets the standard for Class AA waters, and proposed rules for Core Salmon and Trout (USFS 1983).

Dissolved Oxygen

Increases in stream temperature reduce the ability of the water column to accommodate DO. The amount of DO that can be held by water can also be affected by other parameters such as salinity and pressure. Class AA water quality standards require DO to exceed 9.5 mg/L. The proposed Char, Core Salmon and Trout rearing Aquatic Life uses have the same one-day minimum criterion of 9.5 mg/L. DO concentrations in Clear Creek have been measured at 9.8 and 10.3 mg/L in 1994, meeting both the Class AA and proposed Aquatic Life standards (WDOE EIM 1994). No data on DO concentrations within the Upper Clear Fork Cowlitz watershed have been recorded (USDA 1998b).

Turbidity

Turbidity is a measure of refracted light passing through a water column, and typically is indicative of the amount of sediment and other particles (i.e., total suspended solids and total dissolved solids) entrained in the streamflow. Turbidity can be caused by finely divided organic matter, colored organic compounds, plankton and microorganisms. Both the current Class AA standards, as well as the proposed Aquatic Life uses for Char and Core Salmon and Trout rearing, have the same criteria of a 5 NTU increase over background when background is 50 NTUs or less, or a 10 percent increase over background when background is greater than 50 NTUs. A monitoring station (Station ID WA805S) located on Clear Creek indicates that total suspended solids averaged 1 mg/L over a two week study in 1994 (WDOE EIM website 2004). No turbidity or suspended solids data is known to exist for Millridge Creek or the Upper Clear Fork Cowlitz River.

pH

The pH of water affects the solubility of industrial, domestic, and agricultural contaminants carried in the water column. When the pH is too low, it can increase the toxicity of contaminants in solution, such as metals and ammonia, or it can precipitate these elements and other minerals and form sediments. Both the Class AA standards, as well as the proposed Char and Core Salmon and Trout rearing Aquatic Life uses define the desired range of pH from 6.5 to 8.5, and limit human-caused variation within this range to 0.2 units. Previous pH measurements in Leech Lake indicated a pH ranging from 6.5 to 7.5 (USDA 1990b; WDOE 1991), meeting both the Class AA and Aquatic Life standards. 1994 pH measurements in Clear Creek indicated a pH ranging from 6.33 to 6.99 (WDOE EIM 1994), the low end of the range being below the desired pH range for Class AA and Aquatic Life. No data on pH was available for Millridge Creek or the Upper Clear Fork Cowlitz River (USDA 1998a, 1998b).

Nutrients

Forest removal can potentially result in increases in nutrient loading (nitrogen and phosphorus) from natural decomposition of green slash and slash burning. The potential increase in nutrient loading could potentially impact streams within the White Pass Study Area. Research has shown that clearcutting may result in a fourfold increase in nitrate-nitrogen when the slash is broadcast burned, and a sixfold increase when the slash was left to decompose naturally (Harr and Fredriksen 1988). Maximum nutrient loading values followed the same pattern, with a high of 0.08 mg/L when the slash was broadcast burned and 0.27 mg/L when the slash was left to decompose naturally (Harr and Fredriksen 1988). A noticeable delay between forest removal and the observed peaks in nitrate-nitrogen levels occurs for both burning (approximately 12 to 15 months) and natural decomposition (approximately 28 months). A more recent study has documented that the total loss of nitrogen following forest removal is less than the annual inputs through precipitation (Martin and Harr 1989). Likewise, other studies have observed only a 5 percent increase in total nitrogen levels after slash burning (Antos et al. 2003). Additional research indicates that revegetation of clearcuts reduces the potential for nitrate-nitrogen to reach streams. Planted vegetation and the associated increase in nitrate-nitrogen uptake resulted in decreased soil concentrations of nitrate-nitrogen within two years of post-burn activities (Antos et al. 2003). This indicates that an initial pulse of nitrate-nitrogen that occurs soon after forest removal can be considered a short-term impact.

Lake Water Quality

Leech Lake is the largest waterbody within the White Pass Study Area, and water quality within this lake has been designated Lake Class by the WDOE (Anderson, pers. comm.). Leech Lake is located on the north side of US 12, with depths ranging from 2 to 15 feet, 6 feet being the most common depth measured (USDA 1990c). The WDOE conducted nutrient analyses on Leech Lake between June 8, 1990 and August 30, 1993. Total phosphorus measurements ranged from 0.00006 to 0.022 mg/L (refer to Table 3.3-8), total nitrogen measurements ranged from 0.06 to 3.9 mg/L, and chlorophyll-*a* ranged from 0.6 to 1.3 μg/L (WDOE 1996). A 2006 water quality study of Leech Lake reported total phosphorus levels of 0.33 mg/L, and nitrogen levels of 0.07 mg/L (Cascade Analytical 2006). WAC 173-201A-230 (WAC 2003) describes WDOE's lake nutrient criteria, approved by the EPA in 2006, and shows that ambient total phosphorus levels of 0.004-0.010 mg/L indicate oligotrophy.

A WDOE study conducted in 1991 concluded that Leech Lake is estimated as mesotrophic, even though the chlorophyll-*a* index estimated oligotrophy (0.6 - 1.1 μg/L) (WDOE 1991). Similarly, a 1995 report assessed Leech Lake as mesotrophic (WDOE 1995). According to the WDOE, mesotrophy was estimated because of abundant macrophytes in Leech Lake, algal densities that may have been inhibited due to competition from dense macrophyte growth, and fall productivity as indicated by the DO and pH increased with depth (WDOE 1991). Additionally, WDOE studies indicate that nitrogen is the limiting nutrient in Leech Lake during the spring, but during the fall, there is uncertainty as to which nutrient (nitrogen and/or phosphorus) is limiting (WDOE 1991). According to the 1991 study, emergent macrophytes covered approximately 10 percent of the lake surface, and about 98 percent of the shoreline, suggesting Leech Lake is moving toward a more eutrophic state (WDOE 1991).

Fecal coliform was measured in Leech Lake in March and June of 1989. Fecal coliform measurements ranged from 0 to 5 colonies per 100 ml (DuMond 1989). Current SWQS for Lake Class require the geometric mean of the sample to be no more than 50 colonies/100 mL, and no more than 10 percent of all samples obtained for calculating the geometric mean value may exceed 100 colonies/100 mL (WAC 1997). Leech Lake meets the Lake Class standard for fecal coliform. Additional water quality data for Leech Lake is presented below in Table 3.3-8.

Table 3.3-8:
Summary of Existing Water Quality Data for Leech Lake

Sample Date	April 18, 1989[a]	June 19, 1990[b]	September 18, 1990[b]	October 31, 2006[c]	WDOE Lake Class Standards[d,e]
Dissolved Oxygen (mg/l)	10	~10[f]	~12[f]	11.8	No measurable decrease from natural conditions
Ortho-P (mg/l)	0.3	0.004	0.009	0.07	-
Total Phosphorus (mg/l)	-	0.00006	0.022	0.33	-
pH	6.5	~7[f]	~7.5[f]	7.30	No measurable change from natural conditions
Temperature (C)	1.7	13	13.5	-	

[a] Source: USDA 1990c. Note: 1989 measurements are averages of four samples.
[b] Source: WSDOE 1991
[c] Source: Cascade Analytical 2006
[d] Also refer to Table 3.3-FEIS2 and WAC 2003.
[e] Source: WAC 173-201A-030 (WAC 1997).
[f] Approximate average measurement within upper 1 meter of water.

WEPP Modeling

A modeling study was conducted to quantify sediment production due to changes in land cover associated with the Action Alternatives (refer to Appendix L – WEPP Modeling Analysis). The US Department of Agriculture – Agricultural Research Service's Water Erosion Prediction Project (WEPP) model was used to compute sediment detachment for the various land cover types within each affected sub-watershed. As further detailed in Appendix L, a representative Hillslope WEPP/GIS analysis model was utilized to compute sediment detachment only, and did not account for routing and buffering (which reduce actual yields to the stream system). 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, and therefore it represents a conservative analysis (i.e., it overestimates the contribution of sediment to the Upper Clear Fork Cowlitz and Upper Tieton River sub-watersheds). 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" (USFS 2000b).

The most important potential adverse affect of forest management activities on streams is often an increase in inorganic sediment. Large increases in the amount of sediment delivered to a stream channel can greatly impair or even eliminate fish and aquatic invertebrate habitat, and alter the structure and width of the stream banks and adjacent riparian zone (MacDonald 1991). The physical effects of increased fine sediment load can be equally far-reaching. The amount of sediment can affect channel shape, sinuosity, and the relative balance between pools and riffles. Changes in sediment load would affect the bed material size, altering both the quality and quantity of fish and benthic invertebrate habitat (MacDonald 1991). Road construction and maintenance have been found to be the primary sources of sediment inputs. This sediment can be eroded from the road surface, road fills, or slope failures associated with road construction and drainage (MacDonald 1991). Mitigation measures and management activities can affect suspended sediment in streams by altering erosion rates and the rate of transport into stream channels.

Table 3.3 FEIS3 presents existing conditions of soil detachment under the WEPP model. Further information is available in Appendix L – WEPP Modeling Analysis.

Table 3.3 FEIS 3:
WEPP Sediment Detachment Existing Conditions

Sub Watershed	Soil Detachment (Tons/Year)
Upper Clear Fork Cowlitz	103.1
Upper Tieton	133.6

Ground Water Quality

Ground water quality standards are set forth in WAC 173-200 (WAC 1990), which implements the Water Pollution Control Act (RCW 90.48) and the Water Resources Act of 1971 (RCW 90.54). As described in Section 040 of the Ground Water Quality Standards, the purpose of the water quality criteria is to protect a variety of beneficial uses of ground water, including drinking water. Table 1 in Section 040 (Criteria) outlines specific contaminant criteria, based on human health, that is not to be exceeded in any ground waters of the state, except as detailed in Section 050.

As of publication of this FEIS, no ground water quality information was available for the White Pass Study Area. However, well log data kept by the WDOE EIM System indicates there are several wells in the vicinity of the White Pass Study Area. WDOE stated that they do not reveal any ground water quality information, they indicate the depth of the water table and soil types only (WDOE, pers. comm.). Three wells drilled by the WSDOT are located along US 12 at an embankment failure site at milepost 148.65 - 148.71 (refer to Figure 3-11 – Upper 5th Field Watersheds for US 12 mileposts). To the east of the White Pass Ski Area, near Dog Lake (outside the White Pass Study Area), is a 500-foot deep well used by the Department of Natural Resources to monitor water temperature. Groundwater temperatures ranged from 4.96°C at 10 meters, to 11.55°C at 148 meters in depth (Blackwell 1980). The static groundwater level was measured at 52 feet deep. North of US 12 near Knuppenburg Lake, on White Pass Forest Road (milepost 150.38) are two decommissioned wells with depths of 13 and 18 feet. No water quality information is available for these two wells.

3.3.2.5 Flow Regime

As described in Section 3.1 – Climate and Snow, average annual precipitation at White Pass is 79.6 inches. The average snowpack between January and March is 37.6 inches as measured as a SWE. 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). Average annual temperatures within the White Pass Study Area are 35.8°F during the period of record from 1989 through 2003. Temperatures range from an average high of 51.2°F in August to an average low of 24.2°F 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 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). 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). 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).

Water Use

The White Pass Company has diverted, for domestic use and fire control, a small portion of source waters from Millridge Creek (refer to Section 3.13 – Utilities and Infrastructure). 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 per day. During the highest visitor day use on record (2,949 skier visits), 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 – Fisheries.

Flow Model

The removal of forest cover and the creation of new impervious surfaces within a watershed can increase available surface and shallow subsurface water, resulting in altering the flow regime of a watershed (Dunne and Leopold 1978; Naiman. and Bilby 1998). The change in land cover can affect surface runoff generation and stream flow conditions by increasing residual soil moisture due to the excess water that would normally be used by trees through evapo-transpiration. Increased soil moisture can cause more development of surface water during rainstorms and additional shallow subsurface flow to streams, especially in riparian areas adjacent to streams (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, thereby creating stormwater runoff that results in the increased surface flow of streams (Wright et al. 1990). To analyze whether there would be any change to the flow regime of the Upper Clear Fork Cowlitz River and the Upper Tieton River watersheds within the White Pass Study Area due to implementation of the alternatives, a flow model was used (refer to Appendix E).

The geographic scope of the analysis for the flow model run for this FEIS was larger than the White Pass Study Area because accurate flow modeling required inclusion of the entire contributing area to the streams analyzed. Therefore, the scope of this analysis included 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 - Flow Model Analysis Area). This geographic area will be hereafter referred to as the Flow Model Analysis Area. The Upper Clear Fork Cowlitz watershed portion of the Flow Model Analysis Area is approximately 1,460 acres in size and the Upper Tieton watershed portion of the flow model analysis area covers approximately 535 acres. 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 watershed and at the mouth of an unnamed tributary to Millridge Creek above Knuppenberg Lake for the Upper Clear Fork Cowlitz watershed.

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. For the purposes of this analysis, the existing and proposed stream flow conditions were calculated and presented as average seven-day low flow (low flow) and the two-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).

Using the stream flow prediction methods described in the Flow Model Technical Report (refer to Appendix E), the existing seven-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 3.3-9). The estimated seven-day 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 3.3-9). The estimated two-year peak flows for the Upper Clear Fork Cowlitz and the Upper Tieton Rivers are 130.7 cfs and 54.4 cfs respectively.

Table 3.3-9:
Estimated Stream Flows for the Two Mainstem Rivers in the Flow Model Analysis Area

Watershed Name	Drainage Area (acres)	Seven-Day Low Flow (cfs)	Two-Year Peak Flow (cfs)
Upper Clear Fork Cowlitz River	1460	3.12	130.7
Upper Tieton River	535	1.23	54.4

3.3.3 Environmental Consequences

3.3.3.1 Streams

Alternative 1

Under Alternative 1, no expansion is proposed, therefore no impacts to streams would occur. Impacts (i.e., existing culverts and other stream crossings) to streams from the ongoing operation and maintenance of White Pass would continue to occur under Alternative 1. As a result, the condition of the streams within the White Pass Study Area would remain unchanged.

Alternative 2

Under Alternative 2, direct impacts to stream channels within the Upper Clear Fork Cowlitz watershed would occur from ski trail grading and new crossing structures that require in-channel work (e.g., culverts). The permanent road mileage within the Upper Clear Fork Cowlitz portion of the White Pass Study Area would remain unchanged at 2.6 miles under Alternative 2, and no new culvert, bridge, or ford crossings would be constructed on perennial streams (refer to Table 3.3-10). **There would be one new culvert constructed on a non-perennial stream under Alternative 2 associated with construction of**

the bottom terminal of the proposed *Hogback Express* chairlift (refer to Figure 3-15). As described in Chapter 2, this culvert would be placed as a stream protection measure. If possible, after construction, the culvert would be removed. If protection of the stream would be better accomplished by retaining the culvert, the implementation of Mitigation Measure MM6 would minimize direct impacts to the stream during culvert installation by incorporating 100-year storm and debris flow criteria (refer to Table 2.4-2). All ski trail crossings of streams within the Hogback Basin would cross streams by using snow bridges (refer to Other Management Provision OMP9 in Table 2.4-4).

Under Alternative 2, proposed utilities would cross streams in 11 locations in the Upper Clear Fork Cowlitz watershed (refer to Table 3.3-10 and Figure 3-15). **The implementation of Mitigation Measure MM1, listed in Table 2.4-2, would require these stream crossings by utilities to be aerial structures so that there would be no direct impact to stream channels from utility installation (refer to Table 3.3-10).** The exposed aerial stream crossing (at ground surface elevation) would include a rigid, insulated conduit and rigid bracing to hold the conduit in place and to support the structure during winter snowpack conditions. All utility crossings under Alternative 2 would occur within the Upper Clear Fork Cowlitz watershed (refer to Section 3.13 – Utilities and Infrastructure).

Table 3.3-10:
Potential Direct and Indirect Impacts to Streams in the Upper Clear Fork Cowlitz Watershed

Parameter	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Number of New Permanent Perennial Stream Crossings:				
Aerial Utility	0	0	0	0
Culverts	0	11	0	11
Fords	0	0	0	0
Bridges	0	0	0	0
Number of New Permanent Non-Perennial Stream Crossings:				
Aerial Utility	11	11	0	0
Culverts	1	0	4	0
Fords	0	0	0	0
Bridges	0	1	0	0
Total New Stream Crossings	**12**	**23**	**4**	**11**
Permanent Road Length by Surface:				
Paved (miles)	0.2	0.2	0.2	0.2
Unpaved (miles)	2.3	2.3	2.7	2.3
Total Road Length (miles)	2.6	2.6	2.9	2.6
Road Density (mi/mi^2)	1.5	1.5	1.7	1.5

[a]Non-perennial includes ephemeral and intermittent streams
*Note- Numbers presented in the table have been rounded in the GIS analysis. Totals may vary due to this rounding
Impacts to streams from Alternative 1 are included in Table 3.3-2.

All new ski trail crossings of streams proposed under Alternative 2 would occur within the Upper Clear Fork Cowlitz watershed portion of the White Pass Study Area. During the construction phase, as detailed by OMP9 and OMP10 (refer to Table 2.4-4), snow bridges would be utilized at the ski trail stream crossings so that culverts and bridges would not be needed and if/when the snow melts, a temporary corduroy crossing (felled tree debris) over ephemeral and intermittent streams would be utilized. A corduroy (felled tree debris) crossing would be utilized during the implementation phase and removed after the completion of the implementation phase (refer to Table 2.3.1-2). Approval for the technique (based on site-specific conditions at the time of construction) would be obtained from the USFS (USFS ID Team, pers. comm.). These crossings would occur on small, ephemeral and intermittent streams. The ephemeral and intermittent streams are typically in small channels, less than 1 foot in width. There would be no change to the channel morphology, LWD transport functions, or other stream characteristics as a result of snow bridge crossings. The use of corduroy crossings would be approved by the USFS as per OMP10 requirements, to minimize stream characteristic effects.

As described in Table 2.4-3, Management Requirements MR2 and MR3 would reduce impacts to streams due to channel modifications or construction of facilities. USFS approval is required for all channel modifications prior to construction, and construction activities within jurisdictional streams or wetlands require a Section 404 permit from the U.S. Army Corps of Engineers. All work must be in accordance with HPA specifications.

There would be no direct impact to streams within the Upper Tieton watershed under Alternative 2. The total length of roads within the watershed would continue to be 4.2 miles (refer to Table 3.3-11). The existing ten culverts and eight fords would remain in place and no new aerial utility crossings are proposed in the Upper Tieton River watershed (refer to Table 3.3-11). No new permanent ski trail crossings of streams within the Upper Tieton River would be constructed under Alternative 2. Construction of the proposed ski trails would not result in any direct grading impacts to stream channels (refer to Figure 3-15).

Table 3.3-11:
Potential Direct and Indirect Impacts to Streams in the Upper Tieton River Watershed

Parameter	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Number of New Permanent Perennial Stream Crossings:				
Aerial Utility	0	0	0	0
Culverts	0	0	0	0
Fords	0	0	0	0
Bridges	0	0	0	4
Number of New Permanent Non-perennial Stream Crossings:				
Aerial Utility	0	0	0	0
Culverts	0	0	0	0
Fords	0	0	0	0
Bridges	0	0	0	0
Total New Permanent Stream Crossings	0	0	0	4
Permanent Road length by Surface:				
Paved (miles)	0.3	0.3	0.3	0.3
Unpaved (miles)	3.9	3.9	3.9	3.9
Total Road Length (miles)	4.2	4.2	4.2	4.2
Road Density (mi/mi^2)	6.0	6.0	6.0	6.0

Note: Non-perennial includes ephemeral and intermittent streams. Totals may vary due to rounding.
Impacts to streams from Alternative 1 are included in Table3.3-2.

The length of streams with potentially unstable banks in the White Pass Study Area would increase from approximately 1.5 miles under existing conditions to approximately 1.6 miles (0.8 mile in each watershed) under Alternative 2, which represents approximately 10 percent of the total stream length in the White Pass Study Area (refer to Table 3.3-12). This increase of 0.1 mile of streams with potential unstable banks would result from grading for lift terminal construction and utility installation adjacent to streams (refer to Figure 3-28). The small amount of proposed tree removal and grading along these stream reaches would potentially indirectly affect the physical condition and function of these streams over the long-term by reducing bank stability, increasing adjacent hill slope erosion, altering hyporheic flow paths, reducing sediment filtration in the riparian vegetation zone, reducing stream shade, and eliminating potential LWD inputs.

Table 3.3-12:
Potential Impacts to Stream Bank Stability within the White Pass Study Area

Parameter	Alternative 2		Modified Alternative 4		Alternative 6		Alternative 9	
	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton
Streams with potentially stable banks (miles)	9.8	3.9	9.5	3.8	9.8	3.8	9.8	3.3
Streams with potentially unstable banks (miles)	0.8	0.8	1.1	0.9	0.8	0.9	0.8	1.3
Total Stream Length (miles)	**10.6**	**4.6**	**10.6**	**4.6**	**10.6**	**4.6**	**10.6**	**4.6**

Note: Totals may vary due to rounding.
Impacts to stream bank stability under Alternative 1 are included in Table 3.3-6.

The potential impacts to these stream functions would be avoided and or minimized through implementation of Mitigation Measure MM2 and Management Requirement MR1 to reduce soil erosion and sediment yield through implementation of a Stormwater Pollution Prevention Plan (SWPPP) and water quality monitoring during construction (refer to Table 2.4-2 and Table 2.4-3). Additionally, Mitigation Measures MM3 and MM7 would be implemented to reduce the loss of stream shade and LWD recruitment potential along stream channels. Based on the successful implementation of Mitigation Measures and Management Requirements, there would be no measurable long-term indirect impacts to streams under Alternative 2. However, short-term indirect impacts to these stream reaches may occur during the construction of ski trails and other facilities. Potential short-term sediment impacts from construction are further discussed in Section 3.3.5 – Water Quality and in Section 3.2 – Geology and Soils. In addition, no snow grooming would take place within riparian or key watershed areas unless there is a minimum of 3 feet of snow pack (refer to Other Management Provision OMP8 in Table 2.4-4), which is designed to reduce potential watershed impacts.

No new permanent roads would be built under Alternative 2, therefore the road density in the White Pass Study Area would remain at 2.7 mi/mi^2. **Approximately 2.5 acres of tree removal and grading would take place in moderate erosion potential areas and approximately 0.1 acre of low erosion potential areas within the RIA (refer to Table 3.3-16). There would be no tree removal or grading in high erosion potential areas under Alternative 2.** Potential sediment yields from mass wasting events that reach streams would be minimized through the implementation of Mitigation Measure MM11, Management Requirements MR1 and MR4, and Other Management Provisions OMP1, OMP2 (refer to Tables 2.4-2, 2.4-3, and 2.4-4), which would require erosion control measures to prevent sediment from reaching streams. Additional information regarding indirect impacts to streams are described in the Riparian Zone, Water Quality, and Flow Regime discussions in this section.

As discussed in Section 3.3.2 – Affected Environment, Rosgen Type A and Aa+ streams are inherently sensitive to disturbance and are natural sediment transport channels. Activities within Riparian Reserves have the potential to increase sedimentation to these channel types. Since the Proposed Action would not measurably increase peak flows in either watershed (refer to the following discussion under Flow Regime), downstream impacts from increased sediment transport would not be measurable.

Modified Alternative 4

Similar to Alternative 2, direct impacts to stream channels within the Upper Clear Fork Cowlitz watershed would occur from ski trail grading and new crossing structures that require in-channel work (e.g., culverts). The permanent road mileage within the Upper Clear Fork Cowlitz portion White Pass Study Area would remain unchanged at 2.6 miles under Modified Alternative 4, and no bridges or ford crossings would be constructed on perennial streams (refer to Table 3.3-10). **Eleven culverts would be installed on perennial streams as a result of construction of Trail 4-18 (refer to Table 3.3-10 and Figure 3-16).** The potential impacts to stream functions as a result of the construction of the proposed ski trails in the Upper Clear Fork Cowlitz watershed would be as described under Alternative 2. As described in Alternative 2, there would be no direct impacts to streams within the Upper Tieton watershed under Modified Alternative 4 (refer to Table 3.3-11).

Additionally, one new bridge would be constructed on an intermittent stream under Modified Alternative 4, due to construction of Trail 4-16 associated with the proposed *Hogback Express* chairlift (refer to Table 2.3.1-2 and Figures 2-4 and 3-16). The implementation of Mitigation Measure MM5 would minimize direct impacts to streams during bridge construction by limiting the crossing to a single span and placing the footings above the bankfull channel width to minimize the amount of in-channel work (refer to Table 2.4-2).

Under Modified Alternative 4, proposed utilities would cross streams in 11 locations (refer to Table 3.3-10 and Figure 3-16), as described in Alternative 2. However, in conjunction with the power and communication lines, a waterline would be installed to provide a water supply to the proposed mid-mountain lodge. Because of this additional utility installation and associated trenching disturbance, Modified Alternative 4 would likely effect streams more than Alternative 2. If it is determined that the proposed waterline utility would affect streams and wetlands substantially, an on-site well would be drilled to provide a water supply for the proposed mid-mountain lodge. The well would be located upslope of the mid-mountain lodge, within the 50-foot building envelope surrounding the lodge. As detailed in Table 1-3, the Yakima/Lewis Health District Code Compliance would be approached by White Pass Company to authorize public water supply use (refer to Section 3.13 - Utilities and Infrastructure for further details). The implementation of Mitigation Measure MM1, listed in Table 2.4-2, would require these stream crossings by utilities to be aerial structures so that there would be no direct impact to stream channels from utility installation. All utility crossings would occur within the Upper Clear Fork Cowlitz watershed.

As described in Table 2.4-3, Management Requirements MR2 and MR3 would reduce impacts to streams due to channel modifications or construction of facilities. USFS approval is required for all channel modifications prior to construction, and construction activities within jurisdictional streams or wetlands require a Section 404 permit from the U.S. Army Corps of Engineers. All work must be in accordance with HPA specifications.

The length of streams with potentially unstable banks in the White Pass Study Area would increase from approximately 1.5 miles under existing conditions to approximately 2.0 miles under Modified Alternative 4, which represents approximately 13 percent of the total stream length in the White Pass Study Area (refer to Table 3.3-12). This increase of 0.5 mile of streams with potential unstable banks would result from tree removal and grading for construction of lift terminals, trails, lift corridor, and utility installation adjacent to streams (refer to Figure 3-29). Additional impacts to stream bank stability would be associated with grading for Trail 4-16, Trail 4-18, and vegetation clearing for the proposed parking lot would occur adjacent to an intermittent stream. Indirect impacts to stream functions resulting from bank instability would be as described under Alternative 2.

No new permanent roads would be build under Modified Alternative 4, therefore the road density in the White Pass Study Area would remain at 2.7 mi/mi^2. **Approximately 1.0 acres of clearing and grading would take place in high erosion potential areas, 4.8 acres would take place in moderate erosion potential areas, and approximately 0.2 acre in low erosion potential areas within the RIA (refer to Table 3.3-16).** Potential sediment yields from mass wasting events that reach streams would be more than Alternative 2 due to the construction of Trail 4-16 and Trail 4-18. Potential impacts would be minimized through the implementation of Mitigation Measure MM11, Management Requirements MR1 and MR4, and Other Management Provisions OMP1, OMP2 (refer to Tables 2.4-2, 2.4-3, and 2.4-4), which would require erosion control measures to prevent sediment from reaching streams.

The proposed PCT reroute would not affect streams as it occurs on a high elevation ridgeline.

Alternative 6

Similar to Alternative 2, direct impacts to stream channels within the Upper Clear Fork Cowlitz watershed under Alternative 6 would occur from ski trail grading and new crossing structures that require in-channel work (e.g., culverts). **The permanent road mileage within the Upper Clear Fork Cowlitz watershed portion of the White Pass Study Area would increase by approximately 0.3 mile to 2.9 miles under Alternative 6 (refer to Table 3.3-10). There would be four new culverts constructed over intermittent and ephemeral streams that are associated with construction of the access road to the bottom terminal of the proposed *Basin* chairlift under Alternative 6 (refer to Figure 3-15).** No new culvert, bridge, or ford crossings would be constructed on perennial streams The implementation of Mitigation Measure MM6 would minimize direct impacts to streams during culvert installation by incorporating 100-year storm and debris flow criteria (refer to Table 2.4-2).

Under Alternative 6, all utility crossings would occur within the Upper Clear Fork Cowlitz watershed and construction of the proposed ski trails would not result in any direct grading impacts to stream channels (refer to Table 3.3-10 and Figure 3-15). Potential indirect impacts would be minimized through the implementation of Mitigation Measure MM11, Management Requirements MR1 and MR4, and Other Management Provisions OMP1 and OMP2 (refer to Tables 2.4-2, 2.4-3, and 2.4-4), which would require erosion control measures to prevent sediment from reaching streams. During construction, as detailed by Other Management Provision OMP10 (refer to Table 2.4-4), snow bridges would be utilized at the ski trail stream crossings so that culverts and bridges would not be needed. A corduroy crossing (felled tree debris) over intermittent and ephemeral streams would be utilized during the construction phase and removed after the completion of construction.

As described in Table 2.4-3, Management Requirements MR2 and MR3 would reduce impacts to streams due to channel modifications or construction of facilities. USFS approval is required for all channel modifications prior to construction, and construction activities within jurisdictional streams or wetlands require a Section 404 permit from the U.S. Army Corps of Engineers. All work must be in accordance with HPA specifications.

Under Alternative 6, there would be no direct impacts to streams within the Upper Tieton watershed as described under Alternative 2 (refer to Table 3.3-11).

The length of streams with potentially unstable banks in the Upper Clear Fork Cowlitz watershed would increase from approximately 1.5 miles under existing conditions to approximately 1.7 miles under Alternative 6, which represents approximately 11 percent of the total stream length in the White Pass Study Area (refer to Table 3.3-12). This increase of 0.2 mile of streams with potential unstable banks would result from clearing and grading for construction of the access road, trails and lift corridor where they cross streams (refer to Figure 3-28) and vegetation clearing for the proposed parking lot, which would occur adjacent to an intermittent stream. Indirect impacts to stream functions resulting from bank instability would be as described under Alternative 2.

The overall watershed risk for impacts to watershed function from road density (1.7 mi/mi^2) under Alternative 6 would be more than under the other Action Alternatives, due to the slight increase of 0.2 mile of road per square mile within the Upper Clear Fork Cowlitz watershed. The potential increase in sediment yield to streams from clearing and grading activities proposed under Alternative 6 would be the lowest of all Action Alternatives due to the reduced grading in moderate and low erosion hazard areas and in Riparian Reserves (refer to Table 3.3-16). **However, the inclusion of a permanent road in Alternative 6 would result in the highest potential for road-related impacts to streams (e.g., alteration of surface flow paths, bank instability, erosion, and sediment delivery) among the Action Alternatives.** Potential impacts would be minimized by implementing Mitigation Measure MM11, Management Requirements MR1 and MR4, and Other Management Provisions OMP1, OMP2 (refer to

Tables 2.4-2, 2.4-3, and 2.4-4). Additional information regarding indirect impacts to streams can be found in the Riparian Reserves, Water Quality, and Flow Regime discussions in this section.

Alternative 9

Similar to Alternative 2, direct impacts to stream channels within the Upper Clear Fork Cowlitz watershed would occur from ski trail grading and new crossing structures that require in-channel work (e.g., culverts). **Eleven culverts would be installed on perennial streams as a result of construction of Trail 9-6 in the *Paradise* pod (refer to Table 3.3-10 and Figure 3-17).** The road density within the Upper Clear Fork Cowlitz watershed would be as described under Alternative 2. The implementation of Mitigation Measures MM6 would minimize direct impacts to streams during culvert and bridge installation by incorporating 100-year storm and debris flow criteria and limiting the amount of in-channel work.

Under Alternative 9, direct impacts to streams would result from four new permanent bridge crossings on perennial streams within the Upper Tieton watershed as a result of ski trail construction (refer to Table 2.3.1-2, Table 3.3-11 and Figure 3-17). Installation of bridge crossings would comply with county, state and federal regulations for construction requirements. The road density within the Upper Tieton watershed would be as described under Alternative 2. Implementation of Mitigation Measure MM5 would minimize impacts by requiring bridge footings to be constructed upslope of the bankfull channel width and all crossings would be a single span.

As described in Table 2.4-3, Management Requirements MR2 and MR3 would reduce impacts to streams due to channel modifications or construction of facilities. USFS approval is required for all channel modifications prior to construction, and construction activities within jurisdictional streams or wetlands require a Section 404 permit from the U.S. Army Corps of Engineers. All work must be in accordance with HPA specifications.

Under Alternative 9, there would be approximately 2.1 miles of streams with potentially unstable banks as a result of bridge and culvert installation, which is the most of any Action Alternative (refer to Table 3.3-12 and Figure 3-30). Potential impacts to stream functions would be as described under Alternative 2. The implementation of Mitigation Measure MM11, Management Requirements MR1 and MR4, and Other Management Provisions OMP1, OMP2 (refer to Tables 2.4-2, 2.4-3, and 2.4-4) would protect bank stability and control erosion under the proposed bridges and culverts.

The potential increase in sediment yield to streams from clearing and grading activities proposed under Alternative 9 would be the most of all Action Alternatives (approximately 11.0 acres) in all erosion hazard areas within Riparian Reserves (refer to Table 3.3-16). Potential impacts would be minimized by implementing Mitigation Measure MM11, Management Requirements MR1 and MR4, and Other Management Provisions OMP1, OMP2 (refer to Tables 2.4-2, 2.4-3, and 2.4-4). Additional information regarding indirect impacts to streams can be found in the Riparian Reserves, Water Quality, and Flow Regime discussions in this section.

3.3.3.2 Wetlands

Alternative 1

Under Alternative 1, the proposed expansion of White Pass Ski Area would not occur, and no direct or indirect impacts to wetlands would occur from construction activities. Impacts to wetlands from the ongoing operation and maintenance of White Pass Ski Area would continue to occur under Alternative 1. Therefore, the condition of the wetlands within the White Pass Study Area would remain as described in Section 3.3.3.2 – Affected Environment.

Alternative 2

Wetlands are directly impacted by construction activities that require grading, which displaces wetland area and removes all functionality of the wetland through the placement of fill material and/or soil excavation in wetlands. Grading activities can also modify the hydrology of wetlands through the creation of more impervious surfaces in the wetland, such as buildings and parking lots, or by changing the existing drainage patterns, which can alter the hydrologic regime and cause a wetland to become impaired and/or defunct. Under Alternative 2, there would be the potential for approximately 0.03 acre of grading impacts in wetlands within the White Pass Study Area. However, with the implementation of Mitigation Measure MM1, this 0.03-acre impact would be avoided, so that there would be no long-term, direct impacts to wetlands due to grading under Alternative 2.

During the installation of the *Hogback Express* and *Basin* chairlifts and corresponding trails, 0.06 acre of clearing (refer to Table 3.3-13) would take place within wetlands in the White Pass Study Area, with all of the clearing acreage occurring within the Upper Clear Fork Cowlitz watershed, which encompasses the proposed expansion area. The prescription for the approximately 0.06 acre of proposed vegetation clearing, all of which occurs in riverine wetlands, typically consists 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 to 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). 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. Under Alternative 2, no clearing would take place in either slope or depressional wetlands (refer to Table 3.3-13).

Development activities in the uplands adjacent to wetlands can indirectly affect wetland functions. The location of the development activity with relation to the wetland and the type of development activity dictates the degree of impact and what wetland functions would be affected. Primary indirect impacts to wetlands typically occur from changes in hydrology and sediment sources. Under Alternative 2, grading would take place in the Riparian Reserves of several wetlands in the proposed expansion area. The potential for increased sediment delivery to wetlands would be increased during construction. Implementation of BMPs and Mitigation Measures such as MM3 and MM8, as well as Management Requirement MR1 would reduce the potential for these indirect impacts. The introduction of new disturbance in the Riparian Reserves, such as areas of grading activities, ski trail clearing, and utility trenching would result in increased potential for the introduction of noxious species into wetlands. Implementation of Mitigation Measures MM8 and MM9 and Management Requirement MR7 (refer to Table 2.4-2 and Table 2.4-3) would minimize the risk of the introduction of noxious species into wetlands as a result of the indirect impacts from clearing, grading, and utility trenching within the immediate vicinity of wetlands in the White Pass Study Area.

Operational and maintenance activities that indirectly impact wetlands would primarily be limited to wetlands on existing and proposed ski trails under Alternative 2. These activities include mowing vegetation, the maintenance of contour ditch lines, and snow management. Potential impacts to wetlands from operation and maintenance include increased sedimentation and the growth of noxious weeds and are usually long-term because they would cause wetlands to lose some of their functions. Wetlands within the White Pass Study Area that are in natural settings in the forest or open meadows would not be affected by the maintenance of ski area facilities.

Table 3.3-13
Potential Direct Impacts to Wetlands within the White Pass Study Area Under the Action Alternatives

Parameter	Alternative 2		Modified Alternative 4		Alternative 6		Alternative 9	
	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton
Potential Wetland Impacts from Vegetation Removal (acres):								
Slope Wetlands	0	0	0	0	0	0	0	0.02
Riverine Wetlands	0.06	0	0.06	0	0.08	0	0	0
Depressional Wetlands	0	0	0	0	0	0	0	0
Subtotal Clearing Impacts	0.06	0	0.06	0	0.08	0	0	0
Potential Wetland Impacts from Grading (acres)								
Slope Wetlands	0	0	0.04	0	0	0	0.04	0.01
Riverine Wetlands	0.03	0	0.02	0	0.02	0	0	0
Depressional Wetlands	0	0	0	0	0	0	0	0
Subtotal Potential Grading Impacts	0.03	0	0.06	0	0.02	0	0.04	0.01
Total Area of Wetland Impacts (acres)	**0.09**	**0**	**0.12**	**0**	**0.11**	**0**	**0.04**	**0.03**

Note: Totals may vary due to rounding
Impacts to wetlands from Alternative 1 are included in Table 3.3-3.

Modified Alternative 4

Under Modified Alternative 4, there would be the potential for approximately 0.06 acre of grading impacts in wetlands within the White Pass Study Area. However, with the implementation of Mitigation Measure MM1, this 0.06-acre impact would be avoided, so that there would be no long-term, direct impacts to wetlands due to grading under Modified Alternative 4.

During the installation of the *Hogback Express* and *Basin* chairlifts and corresponding trails, approximately 0.06 acre of clearing (refer to Table 3.3-13) would take place within wetlands in the White Pass Study Area, with all of the clearing occurring within the Upper Clear Fork Cowlitz watershed, which encompasses the proposed expansion area. Similar to Alternative 2, this 0.06 acre of proposed vegetation clearing would occur in riverine wetlands, and would follow the clearing prescriptions in Table 2.4-1. Potential impacts to riverine wetlands from clearing would be reduced through implementation of Mitigation Measures MM8 and MM9 outlined in Table 2.4-2. Under Modified Alternative 4, no clearing would take place in either slope or depressional wetlands (refer to Table 3.3-13).

Grading impacts to Riparian Reserves would be as described for Alternative 2.

As described in Alternative 2, operational and maintenance activities that indirectly impact wetlands would primarily be limited to wetlands on existing and proposed ski trails under Modified Alternative 4.

Alternative 6

Under Alternative 6, there would be potential for approximately 0.02 acre of grading impacts in wetlands within the White Pass Study Area. However, with the implementation of Mitigation Measure MM1, this 0.02-acre impact would be avoided so that there would be no long-term, direct impacts to wetlands due to grading under Alternative 6.

During the installation of the *Basin* chairlift and corresponding trails, approximately 0.08 acre of clearing (refer to Table 3.3-13) would take place within wetlands in the White Pass Study Area, with all of the clearing occurring within the Upper Clear Fork Cowlitz watershed, which encompasses the proposed expansion area. All 0.08 acre of proposed vegetation clearing would occur in riverine wetlands, and would follow the clearing prescriptions in Table 2.4-1. Potential impacts to riverine wetlands from clearing would be reduced through implementation of Mitigation Measures MM8 and MM9 outlined in Table 2.4-2. Under Alternative 6 no clearing would take place in either slope or depressional wetlands (refer to Table 3.3-13).

Grading impacts to Riparian Reserves would be as described for Alternative 2.

As described in Alternative 2, operational and maintenance activities that indirectly impact wetlands would primarily be limited to wetlands on existing and proposed ski trails under Alternative 6.

Alternative 9

Under Alternative 9, there would be the potential for approximately 0.05 acre of grading impacts in wetlands within the White Pass Study Area, with approximately 0.04 acre 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 Measure MM1, these impacts would be avoided so that there would be no long-term, direct impacts to wetlands due to grading under Alternative 9.

Under Alternative 9, the infill alternative, there would be no expansion of the SUP area. The *PCT* chairlift and corresponding trails would be built in the existing SUP area. A total of approximately 0.02 acre of clearing (refer to Table 3.3-13) would take place within wetlands in the Upper Tieton River watershed portion of the White Pass Study Area. All of the 0.02 acre of proposed vegetation clearing, would occur in slope wetlands, and would follow the clearing prescriptions in Table 2.4-1. Potential impacts to slope wetlands from clearing would be minimized through implementation of Mitigation Measures MM8 and MM9 outlined in Table 2.4-2. Under Alternative 9, no clearing would take place in either riverine or depressional wetlands (refer to Table 3.3-13).

Grading impacts to Riparian Reserves would be as described for Alternative 2.

As described under Alternative 2, operational and maintenance activities that indirectly impact wetlands would primarily be limited to wetlands on existing ski trails under Alternative 9.

3.3.3.3 Riparian Zones

As discussed previously, direct impacts to Riparian Reserves and RIAs can have indirect effects on streams, wetlands, flow regime, and water quality. Since the other sections discuss the potential indirect effects from activities in Riparian Reserves and RIAs in detail, the analyses in this subsection will focus on potential direct impacts to Riparian Reserves and RIAs.

Alternative 1

Under Alternative 1, the proposed expansion of White Pass Ski Area would not occur, and no direct or indirect impacts to Riparian Reserves and RIAs would occur from construction activities. Impacts to Riparian Reserves and RIAs from the ongoing operation and maintenance of White Pass Ski Area would continue under Alternative 1. Therefore, the condition of the Riparian Reserves and RIAs within the White Pass Study Area would remain as described in Section 3.3.3.2 – Affected Environment.

Alternative 2

Riparian Reserves

Under Alternative 2, the largest proposed impact to Riparian Reserves, on the basis of intensity, would be the complete removal of riparian function through the installation of one culvert under the bottom terminal of the Hogback Express chairlift. There would be no change to the permanent road network in the White Pass Study Area under Alternative 2. As such, there would be no additional direct impacts to Riparian Reserves in the White Pass Study Area from road crossings. The proposed culvert would directly impact Riparian Reserves by constraining the stream, eliminating riparian functions, and providing sites of increased sediment recruitment and erosion concerns. The size of the proposed culvert would be determined in the Construction Plan, however as specified in Mitigation Measure MM6 (refer to Table 2.4-2), the culvert would be sized to pass the 100-year event, including debris passage. In addition to the proposed culvert, 11 low-elevation, aerial utility crossings are proposed in the SUP expansion area to provide power to the two lifts and the mid-mountain lodge. The aerial utility crossings over the channel (at ground surface elevation – refer to Illustration 2.3 FEIS4) would directly impact Riparian Reserves by eliminating riparian functions within the utility corridor, such as the loss of riparian vegetation within the crossing corridor (refer to Table 3.3-14).

Table 3.3-14:
Summary of Potential Impacts to Riparian Reserves in the White Pass Study Area

Parameter	Alt. 1	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9
Riparian Reserve Area (acres)	632.3	No Change			
Proposed Clearing in Riparian Reserves (acre)	0.0	13.5	14.7	8.6	15.7
Proposed Grading in Riparian Reserves (acre)	0.0	4.2	11.1	4.0	8.7
Total Impacts to Riparian Reserves (acre)	**0.0**	**17.7**	**25.8**	**12.6**	**24.4**
Reduction in Average Canopy Cover	0.0%	2.8%	4.1%	2.0%	3.8%
Resulting Average Canopy Cover	48.0%	45.2%	43.9%	46.0%	44.2%

Under Alternative 2, there would be approximately 4.2 acres of grading in Riparian Reserves in the White Pass Study Area (refer to Table 3.3-14). Most of the proposed grading work would result in short-term, direct impacts to Riparian Reserves because the areas of proposed grading for utility installation and grading in the vicinity of the bottom terminal would be restored through replacement of topsoil and revegetation with native species. Following construction, these areas would be maintained as ski trails, so there would be a long-term direct impact to some riparian functions, but functions such as filtering sediment, floodwater storage, and stream bank stabilization would not be affected over the long-term because the trails would be maintained in a modified vegetative condition. Approximately 13.5 acres of Riparian Reserves in the White Pass Study Area would be cleared under Alternative 2 (refer to Table 3.3-14). These clearing impacts to Riparian Reserves would result in long-term, direct impacts to forest communities and the functions associated with upland forests within Riparian Reserves. The total impact to Riparian Reserves under Alternative 2 would be 17.7 acres, which represents approximately 2.8 percent of the Riparian Reserves in the White Pass Study Area.

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 (refer to Section 3.5 – Vegetation). These clearing and grading impacts would reduce the average canopy coverage in the White Pass Study Area by 2.8 percent so that the resulting average canopy cover would be 45.2 percent (refer to Table 3.3-14), thus indirectly impacting Riparian Reserves by reducing LWD recruitment within the White Pass Study Area. As stated in Section 3.3.2 – Affected Environment, LWD is not a dominant component of stream channel structure and function of Type Aa+ and Type A streams within the White Pass Study Area because of the lack of large trees within the Riparian Reserves. All of the clearing and grading under Alternative 2 would occur in the Upper Clear Fork Cowlitz watershed. However, LWD is abundant within the Lower Clear Fork Cowlitz subwatershed, with more than 80 pieces per mile (USDA 1998a). Therefore, no detrimental effects to LWD recruitment within this subwatershed are expected from implementation of Alternative 2. Implementation of Mitigation Measure MM7 (refer to Table 2.4-2) would further reduce impacts to LWD recruitment within the White Pass Study Area. The breakdown of canopy coverage reduction by watershed is shown in Table 3.3-15.

Under Alternative 2, the average canopy coverage of the White Pass Study Area would be reduced by approximately 2.8 to 45.2 percent (refer to Table 3.3-14), with a more open canopy cover occurring in Hogback Basin. The resulting canopy coverage is not expected to indirectly impact the stream temperatures within the White Pass Study Area because most of the affected streams occur in Hogback Basin and are ephemeral or intermittent. As a result, these streams are dry during the season with the highest solar exposure (i.e., summer). When they are flowing, these streams have high channel gradients with turbulent cascades, riffles, and falls, which cool the stream water regardless of the amount of canopy cover. Implementation of Mitigation Measures MM3 and MM10 would reduce the amount of indirect impacts to shading within Riparian Reserves.

The 17.7 total acres of direct impacts to Riparian Reserves under Alternative 2 would also indirectly impact the adjacent undisturbed Riparian Reserves through increasing the windthrow potential. The windthrow potential would be reduced through forest edge feathering and scalloping trail edge treatments under Alternative 2. Due to the specialized trail clearing treatments and the open nature of the forest communities in the White Pass Study Area, the amount of windthrow in Riparian Reserves is expected to remain similar to background levels. No new permanent roads would be constructed under Alternative 2, therefore increases in the transportation and establishment of noxious weeds into Riparian Reserves would be unlikely to occur. The greatest increase in noxious weed potential would continue to be at the existing 28 road crossings of streams and at the proposed new culvert. The construction of ski trails through and adjacent to Riparian Reserves may increase the potential for noxious weed establishment within the White Pass Study Area. Implementation of Mitigation Measure MM10 and Management

Requirement MR7 (refer to Table 2.4-2 and Table 2.4-3) would reduce potential indirect impacts to Riparian Reserves from noxious weeds.

Table 3.3-15:
Potential Impacts to Riparian Reserves in the Upper Clear Fork Cowlitz River Watershed and the Upper Tieton River Watershed Portions of the White Pass Study Area

Parameter	Alt. 1		Alt. 2		Mod. Alt. 4		Alt. 6		Alt. 9	
	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton
Riparian Reserve Area (acres)	395.3	237.0	No Change							
Proposed Clearing in Riparian Reserves (acre)	0.0	0.0	13.5	0.0	13.9	0.8	8.0	0.6	0.5	15.2
Proposed Grading in Riparian Reserves (acre)	0.0	0.0	4.2	0.0	8.3	2.8	2.7	1.3	3.6	5.1
Total Impacts to Riparian Reserves (acre)	**0.0**	**0.0**	**17.7**	**0.0**	**22.2**	**3.6**	**10.7**	**1.9**	**4.1**	**20.3**
Reduction in Ave. Canopy Cover	0.0%	0.0%	4.5%	0.0%	5.6%	1.5%	2.7%	0.8%	1.0%	8.6%
Resulting Ave. Canopy Cover	46.5%	49.5%	42.0%	49.5%	40.9%	47.9%	43.8%	48.7%	45.5%	40.9%

Riparian Influence Areas

A site-specific amendment to the GPNF Forest Plan would be required to allow for the construction of ski area facilities within RIAs along streams. The effects for Alternative 2, described below, take into account implementation of this amendment.

Under Alternative 2, there would be approximately 0.8 acre of grading in RIAs within the White Pass Study Area (refer to Table 3.3-16 and Figure 3-28). Grading within RIAs could result in either a short-term direct impact or a long-term direct impact depending on the construction activity. Long-term direct impacts to RIAs would result from construction activities that would eliminate all riparian function, such as the creation of impervious surfaces (buildings, lift towers and terminals, and roads) and the installation of bridges and culverts. Short-term direct impacts would result from construction activities such as the proposed grading for utility installation and grading in the vicinity of the bottom terminal, all of which would be restored through revegetation with native species. Following construction, these areas would be maintained as ski trails. Riparian functions, such as filtering sediment, floodwater storage, and stream bank stabilization, would not be affected over the long-term because the trails would be maintained in a modified vegetative condition over time.

Approximately 1.8 acres of RIAs within the White Pass Study Area would be cleared under Alternative 2 (refer to Table 3.3-16 and Figure 3-28). These clearing impacts to RIAs would result in long-term, direct impacts to forest communities and the riparian functions that they typically perform, such as nutrient and LWD inputs. The total amount of direct impacts to RIAs under Alternative 2 would be 2.6 acres, which represents approximately 1.8 percent of the RIAs within the White Pass Study Area. Implementation of BMPs and Mitigation Measures such as MM1, MM3, and MM10 (refer to Table 2.4-2) and Management Requirement MR1 (refer to Table 2.4-3) would help reduce the loss of riparian function of RIAs within the White Pass Study Area under Alternative 2.

Table 3.3-16:
Summary of Potential Impacts to Riparian Influence Areas in the White Pass Study Area

Parameter	Alt. 1	Alt. 2	Mod Alt. 4	Alt. 6	Alt. 9
Riparian Influence Area (acres)	147.4	No Change			
Proposed Clearing in RIAs (acres):					
On High Erosion Potential Soils	N/A	0.0	0.0	0.0	0.0
On Medium Erosion Potential Soils	N/A	1.8	1.7	1.0	0.4
On Low Erosion Potential Soils	N/A	0.0	0.1	0.1	6.6
Total Clearing in RIAs (acres)	**N/A**	**1.8**	**1.8**	**1.0**	**7.0**
Proposed Grading in RIAs (acres):					
On High Erosion Potential Soils	N/A	0.0	1.0	0.0	1.0
On Medium Erosion Potential Soils	N/A	0.7	3.1	0.3	2.2
On Low Erosion Potential Soils	N/A	0.1	0.1	0.1	0.8
Total Grading in RIAs (acres)	**N/A**	**0.8**	**4.1**	**0.4**	**4.0**
Total Impacts to RIAs (acres)	**N/A**	**2.6**	**5.9**	**1.4**	**11.0**

Note: Totals may vary due to rounding

Indirect impacts resulting from clearing and grading in RIAs would be increased sediment yield to streams and wetlands within the White Pass Study Area from construction activities. **Under Alternative 2, there would be no clearing or grading on High Erosion Potential Soils within RIAs, but 0.7 acre of grading and 1.8 acres of clearing would occur on Medium Erosion Potential Soils (refer to Table 3.3-16), which has the potential to indirectly impact streams through mass wasting and other erosion occurrences.** All of these indirect clearing and grading impacts within RIAs would take place in the Upper Clear Fork Cowlitz watershed and not in the Upper Tieton watershed (refer to Table 3.3-17). These indirect impacts to RIAs would likely create elevated sediment yields to streams above existing levels because of the erosion potential of the soils that lie within RIAs. The use of BMPs and implementation of Mitigation Measures MM2, MM3, MM8, and MM10 as well as Management Requirement MR1 would help reduce the sediment yield to streams from RIAs (refer to Tables 2.4-2 and 2.4-3).

Table 3.3-17:
Potential Impacts to Riparian Influence Areas in the Upper Clear Fork Cowlitz River Watershed and the Upper Tieton River Watershed Portions of the White Pass Study Area

Parameter	Alt. 1		Alt. 2		Mod. Alt. 4		Alt. 6		Alt. 9	
	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton
Riparian Influence Area (acres)	94.5	52.9	No Change							
Proposed Clearing in RIAs (acres):										
On High Erosion Soils	N/A	N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On Medium Erosion Soils	N/A	N/A	1.8	0.0	1.7	0.0	1.0	0.0	0.0	0.4
On Low Erosion Soils	N/A	N/A	0.0	0.0	0.02	0.1	0.1	0.0	0.0	6.7
Total Clearing in RIAs (acres)	**N/A**	**N/A**	**1.8**	**0.0**	**1.7**	**0.1**	**1.0**	**0.0**	**0.0**	**7.0**
Proposed Grading in RIAs (acres):										
On High Erosion Soils	N/A	N/A	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0
On Medium Erosion Soils	N/A	N/A	0.7	0.0	2.9	0.1	0.3	0.0	2.0	0.1
On Low Erosion Soils	N/A	N/A	0.1	0.0	0.09	0.02	0.1	0.0	0.0	0.8
Total Grading in RIAs (acres)	**N/A**	**N/A**	**0.8**	**0.0**	**4.0**	**0.1**	**0.4**	**0.0**	**3.0**	**0.9**
Total Impacts to RIAs (acres)	**N/A**	**N/A**	**2.6**	**0.0**	**5.7**	**0.2**	**1.4**	**0.0**	**3.0**	**8.0**

Note: Totals may vary due to rounding

Another indirect impact as a result of clearing within RIAs under Alternative 2 would be the creation of additional lengths of streams with unstable banks. Refer to the discussion of stream bank stability under Section 3.3.3.1 – Streams.

Modified Alternative 4

Riparian Reserves

Under Modified Alternative 4, the largest proposed impact to Riparian Reserves, on the basis of intensity, would be the complete removal of riparian function through the construction of the new parking lot, which would occupy 1.58 acres of Riparian Reserves and disturb another 0.48 acre during construction. In addition, the construction of a bridge over a perennial stream for Trail 4-16 would be among the largest impacts to Riparian Reserves. Like Alternative 2, there would be no change to the permanent road network in the White Pass Study Area under Modified Alternative 4, so there would be no additional direct impacts to Riparian Reserves within the White Pass Study Area from road crossings. The parking lot, bridge and 11 culverts (for Trail 4-18) would directly impact Riparian Reserves by eliminating riparian functions and providing sites of increased sediment recruitment and erosion concerns. In addition to the proposed bridge, 11 aerial utility crossings would directly impact Riparian Reserves by eliminating riparian functions within the utility corridor, as described in Alternative 2. Impacts to Riparian Reserves due to utility line installation under Modified Alternative 4 would be greater than under Alternative 2, because a waterline would be installed in conjunction with the power and communication lines to provide a water supply to the proposed mid-mountain lodge. However, all utilities would be installed within the specified 15-foot wide utility disturbance corridor (refer to Table 2.3.1-2). If it is determined that the proposed waterline would substantially affect streams and wetlands, an on-site well would be drilled to provide a water supply for the proposed mid-mountain lodge (refer to Section 3.13- Utilities and Infrastructure). The well would be located upslope of the mid-mountain lodge, within the 50-foot disturbance corridor surrounding the lodge and would not impact Riparian Reserves.

Under Modified Alternative 4, there would be approximately 11.1 acres of grading in Riparian Reserves in the White Pass Study Area (refer to Table 3.3-14). With the exception of the parking lot, described above, the short-term and long-term direct impacts to Riparian Reserves would be similar to Alternative 2, with the addition of the construction of trails 4-16, 4-17, and 4-18. Approximately 14.7 acres of Riparian Reserves in the White Pass Study Area would be cleared under Modified Alternative 4 (refer to Table 3.3-14) and these clearing impacts to Riparian Reserves would result in long-term, direct impacts to forest communities and the functions associated with upland forests within Riparian Reserves. The total impact to Riparian Reserves under Modified Alternative 4 would be 25.8 acres, which represents approximately 4.1 percent of the Riparian Reserves within the White Pass Study Area. Within Upper Clear Fork Cowlitz River watershed, there would be 4.5 more acres of impacts to Riparian Reserves under Modified Alternative 4 than under Alternative 2 (refer to Table 3.3-15). The alignment of the lifts and trails under Modified Alternative 4 results in less clearing along the ephemeral streams in the upper Hogback Basin. Including the additional clearing and grading for Trail 4-16 (which is not a component of Alternative 2), Modified Alternative 4 would result in greater disturbance to Riparian Reserves in Pigtail and Hogback Basins. However, under Modified Alternative 4, clearing and grading within the existing SUP area would result in less disturbance to forest stands with old-growth characteristics, as compared to

Alternative 9 (refer to Section 3.5 – Vegetation). Additionally, implementation of Mitigation Measures MM3 and MM10 would reduce the amount of indirect impacts within Riparian Reserves (refer to Table 2.4-2).

The 25.8 acres of clearing and grading within Riparian Reserves under Modified Alternative 4 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 (refer to Section 3.5 – Vegetation). These clearing and grading impacts would reduce the average canopy coverage in the White Pass Study Area by 4.1 percent so that the resulting average canopy cover would be 43.9 percent (refer to Table 3.3-14), thus indirectly impacting Riparian Reserves as described under Alternative 2. A total of 22.2 acres of clearing and grading under Modified Alternative 4 would occur in the Upper Clear Fork Cowlitz watershed and 3.6 acres of clearing and grading would occur in the Upper Tieton watershed (refer to Table 3.3-15). Implementation of Mitigation Measure MM7 (refer to Table 2.4-2) would further reduce impacts to LWD recruitment within the White Pass Study Area.

The resulting average canopy coverage, 40.9 percent in the Upper Clear Fork Cowlitz watershed and 47.9 percent in the Upper Tieton watershed (Table 3.3-15), is not expected to indirectly impact the stream temperatures within the White Pass Study Area because most of the affected streams occur in the Hogback Basin and are ephemeral or intermittent. As a result, these streams are dry during the season with the highest solar exposure (i.e., summer). Clearing along perennial reaches, associated with Trail 4-18 would occur along perennial reaches. When they are flowing, these streams have high channel gradients with turbulent cascades, riffles, and falls, which cool the stream water regardless of the amount of canopy cover. Implementation of Mitigation Measures MM3 and MM10 would minimize the amount of indirect impacts to shading within Riparian Reserves by reducing solar exposure to streams.

Approximately, 25.8 total acres of direct impacts to Riparian Reserves under Modified Alternative 4 would also indirectly impact the adjacent undisturbed Riparian Reserves through increased windthrow potential, as described under Alternative 2. No new permanent roads would be constructed under Modified Alternative 4, therefore increases in the transportation and establishment of noxious weeds into Riparian Reserves would not occur. The greatest increase in noxious weed potential would continue to be at the existing 28 road crossings of streams. The construction of ski trails through and adjacent to Riparian Reserves may increase the potential for noxious weed establishment within the White Pass Study Area. Implementation of Mitigation Measure MM10 and Management Requirement MR7 (refer to Table 2.4-2 and Table 2.4-3) would reduce potential indirect impacts to Riparian Reserves from noxious weeds.

The PCT reroute occurs on top of a ridge, so there would be no impact to Riparian Reserves.

Riparian Influence Areas

A site-specific amendment to the GPNF Forest Plan would be required to allow for the construction of ski area facilities within RIAs along streams. The effects of Modified Alternative 4, described below, take into account implementation of this amendment.

Under Modified Alternative 4, there would be approximately 4.1 acres of grading in RIAs within the White Pass Study Area (refer to Table 3.3-16 and Figure 3-29). As described in Alternative 2, grading within RIAs could result in either a short-term direct impact or a long-term direct impact depending on the construction activity. Following construction, these areas would be maintained as ski trails. Riparian functions such as filtering sediment, floodwater storage, and stream bank stabilization would not be affected over the long-term, because the trails would be maintained in a modified vegetative condition. Approximately 1.8 acres of RIAs within the White Pass Study Area would be cleared under Modified Alternative 4 (refer to Table 3.3-16 and Figure 3-29). These clearing impacts to RIAs would result in long-term, direct impacts to forest communities as described in Alternative 2. The total amount of direct impacts to RIAs under Modified Alternative 4 would be 5.9 acres, which represents approximately 4 percent of the RIAs within the White Pass Study Area. Implementation of BMPs and Mitigation Measures such as MM1, MM3, and MM10 (refer to Table 2.4-2) and Management Requirement MR1 (refer to Table 2.4-3) would help reduce the loss of riparian function in RIAs within the White Pass Study Area under Modified Alternative 4.

Indirect impacts resulting from clearing and grading in RIAs would include increased sediment yield to streams and wetlands within the White Pass Study Area from construction activities. Under Modified Alternative 4, there would be no clearing on High Erosion Potential Soils within RIAs, however approximately 1.0 acre of grading would occur in High Erosion Potential Soils in RIAs within the White Pass Study Area. Approximately 3.1 acres of grading and 1.7 acres of clearing would occur on Medium Erosion Potential Soils (refer to Table 3.3-16 and Table 3.3-17). These activities have the potential to indirectly impact streams through mass wasting and other erosion occurrences. These indirect impacts to RIAs would likely create slightly elevated sediment yields to streams above existing levels because of the erosion potential of the soils within RIAs. The use of BMPs and implementation of Mitigation Measures MM2, MM3, MM8, and MM10 as well as Management Requirement MR1 would help reduce the sediment yield to streams from RIAs.

Another indirect impact as a result of clearing within RIAs under Modified Alternative 4 would be the creation of additional lengths of streams with unstable banks (refer to Section 3.3.3.1 – Streams).

Alternative 6

Riparian Reserves

Under Alternative 6, the largest proposed impact to Riparian Reserves, on the basis of intensity, would be the construction of the 2.5-acre parking lot, which would eliminate riparian function in approximately 1.9 acres of Riparian Reserves. In addition, the complete removal of riparian function through the installation of four culverts for the proposed road to the bottom terminal of the *Basin* chairlift would rank among the larger Riparian Reserve impacts in Alternative 6. The culverts would directly impact Riparian Reserves by constricting the stream channel, eliminating riparian functions, and providing sites of increased sediment recruitment and erosion concerns. Under Alternative 6, there would be no aerial utility crossings because the proposed lodge and *Basin* chairlift would be in a location served by a road (refer to Figure 2-7), and the utilities serving the chairlift and lodge would be buried within the road corridor, which has culverted crossings.

Under Alternative 6, there would be approximately 4.0 acres of grading in Riparian Reserves within the White Pass Study Area (refer to Table 3.3-14). Short-term and long-term direct impacts to Riparian Reserves would be similar to Alternative 2. Approximately 8.6 acres of Riparian Reserves within the White Pass Study Area would be cleared under Alternative 6 (refer to Table 3.3-14) and these clearing impacts to Riparian Reserves would result in long-term, direct impacts to forest communities and the functions associated with upland forests within Riparian Reserves. The total impact to Riparian Reserves under Alternative 6 would be 12.6 acres, which represents approximately 2.0 percent of the Riparian Reserves within the White Pass Study Area, the lowest impact among the Action Alternatives.

The 12.6 acres of clearing and grading within Riparian Reserves under Alternative 6 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 because of the comparatively smaller tree size classes that occur in parkland (refer to Section 3.4 – Vegetation). These clearing and grading impacts would reduce the average canopy coverage in the White Pass Study Area by 2.0 percent so that the resulting average canopy cover would be 46.0 percent (refer to Table 3.3-14), thus indirectly impacting Riparian Reserves, as described under Alternative 2. Approximately 10.7 acres of the clearing and grading under Alternative 6 would occur in the Upper Clear Fork Cowlitz watershed and 1.9 acres of clearing and grading would occur in the Upper Tieton watershed (refer to Table 3.3-15). Implementation of Mitigation Measure MM7 (refer to Table 2.4-2) would further reduce impacts to LWD recruitment within the White Pass Study Area.

The resulting average canopy coverage, 43.8 percent in the Upper Clear Fork Cowlitz watershed and 48.7 percent in the Upper Tieton watershed (refer to Table 3.3-15), is not expected to indirectly impact the stream temperatures within the White Pass Study Area because most of the affected streams occur in the Hogback Basin and are ephemeral or intermittent. As a result, these streams are dry during the season with the highest solar exposure (i.e., summer). When they are flowing, these streams have high channel gradients with turbulent cascades, riffles, and falls, which cool the stream water regardless of the amount of canopy cover. Implementation of Mitigation Measures MM3 and MM10 would reduce the amount of indirect impacts to shading within Riparian Reserves.

The 12.6 total acres of direct impacts to Riparian Reserves under Alternative 6 would also indirectly impact the adjacent undisturbed Riparian Reserves through increased windthrow potential, as described under Alternative 2. Under Alternative 6, one new permanent road would be constructed; therefore increases in the transportation and establishment of noxious weeds into Riparian Reserves could occur. Implementation of Mitigation Measure MM10 and Management Requirement MR7 (refer to Table 2.4-2 and Table 2.4-3) would reduce potential indirect impacts to Riparian Reserves from noxious weeds.

Riparian Influence Areas

A site-specific amendment to the GPNF Forest Plan would be required to allow for the construction of ski area facilities within RIAs along streams. The effects of Alternative 6 take into account implementation of this amendment.

Under Alternative 6, there would be approximately 0.4 acre of grading in RIAs within the White Pass Study Area (refer to Table 3.3-16 and Figure 3-28). As described in Alternative 2, grading within RIAs could result in either short-term direct impacts or long-term direct impacts, depending on the construction activity. Following construction, these areas would be maintained as ski trails. Riparian functions, such as filtering sediment, floodwater storage, and stream bank stabilization, would not be affected over the long-term, because the trails would be maintained in a modified vegetative condition. Approximately 1.0 acre of RIAs within the White Pass Study Area would be cleared under Alternative 6 (refer to Table 3.3-16 and Figure 3-28). These clearing impacts to RIAs would result in long-term, direct impacts to forest communities, as described in Alternative 2. The total amount of direct impacts to RIAs under Alternative 6 would be 1.4 acres, which represents approximately 0.9 percent of the RIAs in the White Pass Study Area. Implementation of BMPs, Mitigation Measures MM1, MM3, and MM10 (refer to Table 2.4-2), and Management Requirement MR1 (refer to Table 2.4-3) would help reduce the loss of riparian function in RIAs within the White Pass Study Area under Alternative 6.

Indirect impacts resulting from clearing and grading in RIAs would include increased sediment yield to streams and wetlands within the White Pass Study Area from construction activities. Under Alternative 6, there would be no clearing or grading on High Erosion Potential Soils within RIAs, but 0.3 acre of grading and 1.0 acre of clearing would occur on Medium Erosion Potential Soils (refer to Table 3.3-16), which has the potential to indirectly impact streams through mass wasting and other erosion occurrences. All 1.4 acres of these indirect clearing and grading impacts within RIAs would take place in the Upper Clear Fork Cowlitz watershed and none would occur in the Upper Tieton watershed (refer to Table 3.3-17). These indirect impacts to RIAs would likely create slightly elevated sediment yields to streams above existing levels, because of the erosion potential of the soils within RIAs. The use of BMPs and implementation of Mitigation Measures MM2, MM3, MM8, and MM10, as well as Management Requirement MR1, would help reduce the sediment yield to streams from RIAs.

Another indirect impact as a result of clearing within RIAs under Alternative 6 would be the creation of additional lengths of streams with unstable banks (refer to Section 3.3.3.1 – Streams).

Alternative 9

Riparian Reserves

Under Alternative 9, the largest proposed impact to Riparian Reserves, on the basis of intensity, would be the construction of the 2.5-acre parking lot, as described for Alternative 6. **In addition, the complete removal of riparian function through the installation of 11 culverts and 4 bridges over streams for ski trails would be among the largest impacts to Riparian Reserves under Alternative 9.** As described under Alternative 2, there would be no change to the permanent road network in the White Pass Study Area under Alternative 9, so there would be no additional direct impacts to Riparian Reserves within the White Pass Study Area from road crossings. The proposed culverts and bridges would directly impact Riparian Reserves by constricting the stream channel, eliminating riparian functions, and providing sites of increased sediment recruitment and erosion concerns.

Under Alternative 9, there would be approximately 8.7 acres of grading and approximately 15.7 acres of clearing in Riparian Reserves within the White Pass Study Area (refer to Table 3.3-14). These grading and clearing impacts to Riparian Reserves would result in long-term, direct impacts to forest communities and the associated functions of Riparian Reserves. A majority of clearing and grading within the existing ski area would occur in forest stands with old-growth characteristics, the most of any alternative (refer to Section 3.5 – Vegetation and Appendix G). The total impact to Riparian Reserves under Alternative 9 would be 24.4 acres, which represents approximately 3.8 percent of the Riparian Reserves within the White Pass Study Area.

The 24.4 acres of clearing and grading within Riparian Reserves under Alternative 9 would immediately reduce any LWD input that these areas currently provide to the streams, particularly given that the proposed clearing would remove trees that are capable of providing LWD, unlike the parkland vegetation described under Alternative 2, Modified Alternative 4, and Alternative 6. These clearing and grading impacts would reduce the average canopy coverage in the White Pass Study Area by 3.8 percent so that the resulting average canopy cover would be 44.2 percent (refer to Table 3.3-14), thus indirectly impacting Riparian Reserves as described under Alternative 2. Approximately 4.1 acres of clearing and grading under Alternative 9 would occur in the Upper Clear Fork Cowlitz watershed and 20.3 acres of clearing and grading would occur in the Upper Tieton watershed (refer to Table 3.3-15). Implementation of Mitigation Measure MM7 (refer to Table 2.4-2) would reduce impacts to LWD recruitment within the White Pass Study Area.

The resulting average canopy coverage, 45.5 percent in the Upper Clear Fork Cowlitz watershed and 40.9 percent in the Upper Tieton watershed (Table 3.3-15), has the highest potential of all Action Alternatives to increase the stream temperatures within the White Pass Study Area, because the majority of canopy removal would take place along perennial streams. These streams drain groundwater seeps and/or snowmelt when flowing, and have high channel gradients with turbulent cascades, riffles, and falls, which cool the stream water regardless of the amount of canopy cover. Implementation of Mitigation Measures MM3 and MM10 would minimize the amount of indirect impacts to shading within Riparian Reserves.

The 24.4 total acres of direct impacts to Riparian Reserves under Alternative 9 would also indirectly impact the adjacent undisturbed Riparian Reserves through increased windthrow potential. No new permanent roads would be constructed under Alternative 9, therefore increases in the transportation and establishment of noxious weeds into Riparian Reserves would not occur. The greatest increase in noxious weed potential would continue to be at the existing 28 road crossings of streams as well as the 11 new culverts and 4 new bridges that would be constructed under Alternative 9. The construction of ski trails through and adjacent to Riparian Reserves may increase the potential for noxious weed establishment within the White Pass Study Area. Implementation of Mitigation Measure MM10 and Management Requirement MR7 (refer to Table 2.4-2 and Table 2.4-3) would reduce potential indirect impacts to Riparian Reserves from noxious weeds.

Riparian Influence Areas

A site-specific amendment to the GPNF Forest Plan would be required to allow for the construction of ski area facilities within RIAs along streams. The effects of Alternative 9, described below, take into account implementation of this amendment.

Under Alternative 9, there would be approximately 4.0 acres of grading in RIAs within the White Pass Study Area (refer to Table 3.3-16 and Figure 3-30). As described in Alternative 2, grading within RIAs could result in either short-term direct impacts or long-term direct impacts, depending on the construction activity. Following construction, these areas would be maintained as ski trails. Riparian functions, such as filtering sediment, floodwater storage, and stream bank stabilization, would not be affected over the long-term because the trails would be maintained in a modified vegetative condition over time. Approximately 7.0 acres of RIAs within the White Pass Study Area would be cleared under Alternative 9 (refer to Table 3.3-16 and Figure 3-30). These clearing impacts to RIAs would result in long-term, direct impacts to forest communities similar to those described for Alternative 2. The total amount of direct impacts to RIAs under Alternative 9 would be approximately 11.0 acres, which represents approximately 7.5 percent of the RIAs within the White Pass Study Area. Implementation of BMPs, Mitigation Measures MM1, MM3, and MM10 (refer to Table 2.4-2), and Management Requirement MR1 (refer to Table 2.4-3) would help reduce the loss of riparian function in RIAs within the White Pass Study Area under Alternative 9.

Indirect impacts resulting from clearing and grading in RIAs would include increased sediment yield to streams and wetlands within the White Pass Study Area from construction activities. Under Alternative 9, there would be approximately 1.0 acre of grading on High Erosion Potential Soils within RIAs as well as approximately 2.2 acres of grading and 0.4 acre of clearing on Medium Erosion Potential Soils (refer to Table 3.3-16), which has the potential to indirectly impact streams through mass wasting and other erosion events. Approximately 3.0 acres of these indirect clearing and grading impacts within RIAs would take place in the Upper Clear Fork Cowlitz watershed and 8.0 acres would occur in the Upper Tieton watershed (refer to Table 3.3-17). These indirect impacts to RIAs would likely create slightly elevated amounts of sediment yield to streams above existing levels because of the erosion potential of the soils within RIAs. The use of BMPs and implementation of Mitigation Measures MM2, MM3, MM8, and MM10, as well as Management Requirement MR1, would help reduce the amount of sediment yield to streams from RIAs.

Another indirect impact as a result of clearing within RIAs under Alternative 9 would be the creation of additional lengths of streams with unstable banks (refer to Section 3.3.3.1 – Streams).

3.3.3.4 Water Quality

Direct impacts to water quality are impacts that would occur from new point sources, either chemical or thermal. Activities that are most likely to indirectly impact water quality within the White Pass Study Area are those that may occur within Riparian Reserves, such as clearing of riparian vegetation, construction of roads and other ski area facilities, or grading within RIAs. These activities are discussed in more detail in the Riparian Zones discussion of this section. Potential indirect impacts to water quality include the following:

- Increased sediment yield to streams and wetlands from clearing and grading,
- Increased pollutant runoff from construction equipment into streams and wetlands,
- Increased water temperatures resulting from the removal of riparian vegetation and subsequent increases in solar radiation.

Alternative 1

Under Alternative 1, the White Pass Ski Area expansion would not occur, therefore no impacts to water quality would occur from construction activities. Impacts to water quality from the ongoing operation of White Pass that result in sediment detachment and potential yield to streams would continue to occur under Alternative 1 (refer to Appendix L – WEPP Technical Report). Therefore, the condition of water quality within the White Pass Study Area and the 5th field watershed would remain as described in Section 3.3.2 – Affected Environment.

Alternative 2

There would be no new point sources of pollution (chemical or thermal) that would affect water quality within the Upper Tieton and Upper Clear Fork Cowlitz watersheds, therefore no direct impacts to water quality would occur under Alternative 2. Indirect impacts to water quality could occur from the proposed project through increased sediment yield and changes in turbidity, pH, stream temperature, and DO.

Clearing and grading for lift, trail, road, and building construction within RIAs would increase the risk of erosion and sediment yield to streams and wetlands. The major source of sediment within the Upper Clear Fork Cowlitz watershed is clearing and grading associated with construction of the bottom terminals of the chairlifts. No impacts would occur within the Upper Tieton River watershed under Alternative 2. Tree island removal would result in comparatively less impact than full clearing due to a reduced disturbance area through selective tree removal. Approximately 2.6 acres of clearing and grading would occur within RIAs under Alternative 2 (refer to Table 3.3-16).

As described in Table 3.3 FEIS4, short-term (year of construction) sediment detachment generated within the White Pass Study Area from project activities would increase by a total of approximately 23 percent. Long-term (two to five years following construction) sediment detachment is expected to increase by approximately 4 percent under Alternative 2 (refer to Appendix L – WEPP Technical Report). There would be no change to the estimated long-term soil detachment within the Upper Tieton watershed as no construction activities would occur in the watershed under Alternative 2. 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.

Table 3.3 FEIS4:
WEPP Model Estimates of Soil Detachment for the White Pass Study Area

Soil Detachment	Alternative 2		Modified Alternative 4		Alternative 6		Alternative 9	
	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton	Upper Clear Fork Cowlitz	Upper Tieton
Short-term (tons/yr)	126.5	133.7	173.1	133.8	112.7	133.8	131.8	150.8
Short-term Increase (%)	23%	0.0%	68%	0.1%	9%	0.1%	28%	12.8%
Long-term (tons/yr)	107.2	133.7	113.3	133.9	107.8	133.7	106.6	134.8
Long-term Increase (%)	4%	0.0%	10%	0.2%	5%	0.1%	3%	0.8%

Note: WEPP model estimates of soil detachment for Alternative 1 are included in Table 3.3-FEIS 3.

Research has indicated that silt fences trap 90 percent (or more) of sediment from hillslope erosion (Robichaud and Brown 2002). Revegetation of exposed hillslopes has been shown to reduce erosion by greater than 70 percent using native vegetation (Grace 2002). Sediment basins are approximately 50-70 percent effective in trapping sediment during large storm events, or during periods of minimal vegetative cover at a construction site (TDEC 2002). 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, the implementation of Mitigation Measure MM2, Management Requirement MR1, and Other Management Provisions OMP1 and OMP2 would reduce potential sediment yield through the requirement of a SWPPP and other sediment control measures that minimize impacts to watershed resources (refer to Tables 2.4-2, 2.4-3, and 2.4-4).**

The fate of sediments delivered to Clear Creek and Millridge Creek are similar. Both streams flow into a lake downstream of the existing ski area, Leech Lake and Knuppenberg Lake, respectively. Both lakes act as natural sediment traps, and potential sediment yield generated by existing and proposed ski area operations not otherwise managed on-site would be retained in the lakes. Therefore, sediment impacts from the proposed project would become indistinguishable from sediment input to the watershed downstream of the lakes.

At the bottom terminal of the proposed *Basin* and *Hogback Express* chairlifts and the upper terminal of the proposed *Basin* chairlift, the potential for increased delivery of pollutants (e.g., fuel) to streams and wetlands would be increased during construction, since the terminals would be located within Riparian Reserves. Implementation of Mitigation Measures MM2, MM3, MM4, and MM9 (refer to Table 2.4-2) and Management Requirement MR1 (refer to Table 2.4-3) would minimize the potential for this short-term, indirect delivery of pollutants to streams and wetlands. Specifically, MR1 and MM3 would require implementation of a SWPPP and water quality testing before, during and after construction. The requirements of the SWPPP would ensure state water quality standards are met through the water quality monitoring program and any necessary corrective actions that would be taken on an as-needed basis.

During construction activities, the in-stream pH can be affected by concrete operations near streams because soluble cement constituents, such as lime, can raise the pH of stormwater runoff. Under Alternative 2, construction of the bottom terminals, the upper terminal of the proposed *Basin* chairlift, and the lower lift towers, including concrete footers, would take place within the Riparian Reserves. As a result, the potential for alterations of pH would be greatest under Alternative 2, as compared to the other Action Alternatives. Mitigation Measure MM2 and Management Requirement MR1 would avoid the occurrence of high pH runoff entering water bodies, thereby maintaining the existing pH regime in nearby water bodies.

At the mid-mountain lodge, operation of the re-circulating gravel filter (RGF) wastewater treatment system would provide secondary treatment for an average of 225 gallons per day (refer to Section 3.13 – Utilities and Infrastructure). No measurable change in nutrient loads or biological oxygen demand would be expected due to the low volume, high degree of treatment, and subsurface disposal of effluent.

Approximately 13.5 acres of clearing and 4.2 acres of grading (17.7 acres total) would occur in Riparian Reserves under Alternative 2, resulting in an increased potential for indirect thermal impacts to streams and wetlands (refer to Table 3.3-15). The tree island removal clearing prescription would create minimal impacts to the forest community due to the selective tree removal in subalpine parkland, compared to full clearing. The resulting canopy coverage is not expected to indirectly impact the stream temperatures within the White Pass Study Area because most of the affected streams occur in the Hogback Basin and are ephemeral or intermittent. As a result, these streams are dry during the season with the highest solar exposure (i.e., summer). When they are flowing, these streams have high channel gradients with turbulent cascades, riffles, and falls, which cool the stream water regardless of the amount of canopy cover. **The implementation of Mitigation Measure MM3 (refer to Table 2.4-2) and Other Management Provision OMP5 (refer to Table 2.4-4) would minimize this indirect impact by maintaining a minimum amount of understory shading.** Implementation of Mitigation Measures would result in an immeasurable effect on stream temperature. As a result, stream temperatures would remain well below SWQS. Because water temperature and DO are directly correlated, Alternative 2 would also maintain stream DO concentrations above minimum standards.

Modified Alternative 4

There would be no new point sources of pollution (chemical or thermal) that would affect water quality within the Upper Tieton and Upper Clear Fork Cowlitz watersheds. Therefore, no direct impacts to water quality would occur under Modified Alternative 4. Indirect impacts to water quality could occur from the proposed project through increased sediment yield and changes in turbidity, pH, stream temperature, and DO.

Under Modified Alternative 4, impacts to RIAs include 1.8 acres of clearing and 4.1 acres of grading within RIAs, for a total of 5.9 acres, which is greater than Alternative 2 (refer to Table 3.3-16). The largest grading impact in the Upper Clear Fork Cowlitz watershed would be associated with the construction of trails 4-16, 4-17 and 4-18, while in the Upper Tieton watershed construction of the 7-acre parking lot in the existing SUP area would increase the potential for sediment delivery to down-gradient streams and wetlands.

The representative WEPP model estimated that project-generated sediment detachment, which would potentially reach streams and/or wetlands, would increase by approximately 68.1 percent within the White Pass Study Area during the short-term (refer to Table 3.3 FEIS4). While during the long-term, the estimated project-generated sediment yield would increase by approximately 10.2 percent (refer to Table

3.3 FEIS4), which is the most for any Action Alternative (refer to Appendix L – WEPP Technical Report). Management Requirement MR1 would require the implementation of a SWPPP during construction and proper stabilization/treatment of construction activities. Additionally, as outlined under Alternative 2, fully implemented BMPs are predicted to be 60 to 65 percent effective (conservatively) at containing project-generated sediment. Therefore, with mitigation, sediment delivery due to the parking lot and other construction activities is expected to be negligible.

Impacts from pollutant runoff and changes in pH would be similar to Alternative 2.

As described under Alternative 2, potential impacts to stream temperatures under Modified Alternative 4 would occur from clearing within Riparian Reserves. Approximately 14.7 acres of clearing and 11.1 acres of grading (25.8 acres total) would occur in Riparian Reserves under Modified Alternative 4, which is greater than under Alternative 2. Similar to Alternative 2, the resulting canopy coverage is not expected to indirectly impact the stream temperatures within the White Pass Study Area because most of the affected streams occur in the Hogback Basin and are ephemeral or intermittent. As a result, these streams are dry during the season with the highest solar exposure (i.e., summer). However, canopy removal associated with Trail 4-18 would occur along perennial reaches. When they are flowing, these streams have high channel gradients with turbulent cascades, riffles, and falls, which cool the stream water regardless of the amount of canopy cover. Implementation of Mitigation Measure MM3 (refer to Table 2.4-2) and Other Management Provision OMP5 (refer to Table 2.4-4) would minimize this indirect impacts by maintaining a minimum amount of understory shading and all vegetation less than 3 feet in height within ski trails. Implementation of Mitigation Measures would result in an immeasurable effect on stream temperatures. As a result, stream temperatures would remain well below the SWQS. Because water temperature and DO are directly correlated, Modified Alternative 4 would also maintain stream DO concentrations above minimum standards.

At the mid-mountain lodge, operation of the RGF wastewater treatment system would provide secondary treatment for an average of 225 gallons per day (refer to Section 3.13 – Utilities and Infrastructure). No measurable change in nutrient loads or biological oxygen demand would be expected due to the low volume, high degree of treatment, and subsurface disposal of effluent.

Alternative 6

There would be no new point sources (chemical or thermal) of pollution that would affect water quality within the Upper Tieton and Upper Clear Fork Cowlitz watersheds. Therefore, no direct impacts to water quality would occur under Alternative 6. Indirect impacts to water quality could occur from the proposed project through increased sediment yield and changes in turbidity, pH, stream temperature, and DO.

Road building and road maintenance have been found to be primary sources of sediment inputs. This sediment can be eroded from the road surface, road fills, or slope failures associated with road construction and drainage (Newcombe and MacDonald 1991). Under Alternative 6, a 0.25-mile road is proposed to the bottom terminal of the *Basin* chairlift. This road would have four new culverts, all of which are potential sources of sediment to streams. The use of BMPs and implementation of Mitigation Measures MM2 and MM6 as well as Management Requirement MR1 would help reduce potential sediment impacts to these streams.

Clearing and grading within the RIA could increase sediment yield to nearby streams and wetlands. Approximately 1.0 acre of clearing and 0.4 acre of grading would occur within RIAs under Alternative 6, potentially impacting water quality (refer to Table 3.3-17). Sediment impacts related to clearing and grading would be less than Alternative 2 or Modified Alternative 4, due to the decreased amount of activity in Hogback Basin. Sediment impacts from the parking lot would be less than described under Modified Alternative 4, as a result of the reduced parking lot size.

The representative WEPP model estimated that project-generated sediment detachment, which would potentially reach streams and/or wetlands, would increase by approximately 9.1 percent within the White Pass Study Area during the short-term (Table 3.3 FEIS4). While during the long-term, the estimated project-generated sediment detachment would increase by approximately 5.1 percent (Table 3.3 FEIS 4) (refer to Appendix L – WEPP Technical Report). Implementation of Mitigation Measures MM2, MM3, MM4, and MM9 (refer to Table 2.4-2) and Management Requirement MR1 (refer to Table 2.4-3) would reduce the potential sediment yield by requiring a SWPPP and other erosion control measures to prevent sediment from entering the water. Additionally, as outlined under Alternative 2, fully implemented BMPs are predicted to be 60 to 65 percent effective (conservatively) at containing project-generated sediment. Therefore, with mitigation, sediment delivery due to project-related construction activities is expected to be negligible.

As described under Alternative 2, potential impacts to stream temperatures could occur from clearing within Riparian Reserves under Alternative 6. Approximately 8.6 acres of clearing and 4 acres of grading (12.6 acres total) would occur in Riparian Reserves under Alternative 6, resulting in an increased potential for indirect thermal impacts to streams and wetlands (refer to Table 3.3-15). The resulting canopy coverage is not expected to indirectly impact the stream temperatures within the White Pass Study Area because most of the affected streams occur in the Hogback Basin and are ephemeral or intermittent. As a result, these streams are dry during the season with the highest solar exposure (i.e., summer). When they are flowing, these streams have high channel gradients with turbulent cascades, riffles, and falls, which cool the stream water regardless of the amount of canopy cover. Implementation of Mitigation Measure MM3 (refer to Table 2.4-2) and Other Management Provision OMP5 (refer to Table 2.4-4) would maintain a minimum amount of understory shading and all vegetation less than 3 feet in height within ski trails. As a result, temperature effects under Alternative 6 would be less than the other Action Alternatives. Under Alternative 6, stream temperatures would remain well below SWQS. Because water temperature and DO are directly correlated, Alternative 6 would also maintain stream DO concentrations above minimum standards.

Alternative 9

There would be no new point sources (chemical or thermal) of pollution that would affect water quality within the Upper Tieton and Upper Clear Fork Cowlitz watersheds. Therefore, no direct impacts to water quality would occur under Alternative 9. Indirect impacts to water quality would occur through increased sediment yield and changes in turbidity, pH, stream temperature, and DO.

Clearing and grading within the RIA could increase sediment yield to nearby streams and wetlands. Approximately 7.0 acres of clearing and approximately 4.0 acres of grading would occur within the RIA under Alternative 9, potentially impacting water quality (refer to Table 3.3-17). Sediment impacts related to clearing and grading would be the greatest of all Action Alternatives due to denser canopy coverage within the existing SUP area. Sediment impacts from the parking lot would be as described under Alternative 6.

The representative WEPP model estimated that project-generated sediment detachment, which would potentially reach water resources, would increase by approximately 40.8 percent within the White Pass Study Area during the short-term (Table 3.3 FEIS 4). While during the long-term, the estimated project-generated sediment detachment would increase by approximately 3.8 percent (Table 3.3 FEIS 4). Implementation of Mitigation Measures MM2, MM3, MM4, and MM9 (refer to Table 2.4-2) and Management Requirement MR1 (refer to Table 2.4-3) would reduce the potential sediment yield by requiring a SWPPP and other erosion control measures to prevent sediment from entering the water. Additionally, as outlined under Alternative 2, fully implemented BMPs are predicted to be 60 to 65 percent effective (conservatively) at containing project-generated sediment. Therefore, with mitigation, sediment delivery due to project-related construction activities is expected to be negligible.

Potential impacts to stream temperatures could occur from clearing within Riparian Reserves. Approximately 15.7 acres of clearing and 8.7 acres of grading (24.4 acres total) would occur in Riparian Reserves under Alternative 9, resulting in an increased potential for indirect thermal impacts to streams and wetlands (refer to Table 3.3-15). Clearing impacts under Alternative 9 would be greater than all other Action Alternatives due to the full clearing prescription, and the increased total clearing area. In addition, the majority of the canopy removal under Alternative 9 would occur along perennial streams, which would be more susceptible to thermal impacts than ephemeral or intermittent streams because they are flowing during the summer. Full clearing would not leave any trees remaining within the Riparian Reserves in the eastern portion of the existing SUP area, as compared to tree island removal prescription applied to parkland under Alternatives 2, 6 and Modified Alternative 4. Implementation of Mitigation Measure MM3 (refer to Table 2.4-2) and Other Management Provision OMP5 (refer to Table 2.4-4) would maintain a minimum amount of understory shading and all vegetation less than 3 feet in height within ski trails. Due to the comparatively intense removal of forest canopy under Alternative 9, temperature effects would be greater than under the other Action Alternatives. However, under Alternative 9, stream temperatures would remain well below the SWQS. Because water temperature and DO are directly correlated, Alternative 9 would also maintain stream DO concentrations above minimum standards.

3.3.3.5 Flow Regime

Alternative 1

Water Use

Under Alternative 1, no expansion of the White Pass Ski Area is proposed, 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 – Affected Environment.

Flow Regime

Under Alternative 1, no expansion of the White Pass Ski Area is proposed, therefore no impacts to the flow regimes of the Upper Clear Fork Cowlitz River and Upper Tieton River watersheds would occur. The flow regimes of the streams within the White Pass Study Area would remain as described in Section 3.3.2 – Affected Environment.

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 watershed. Due to the proposed increase in the CCC under Alternative 2, the peak water demand during the ski season would increase from 12,561 gallons/day to 23,001 gallons/day (as described in 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 of 4.92 gallons/guest/day (refer to Section 3.3.2.5). The projected increase in water demand (based on measured peak demand values) would decrease the daily streamflow in Millridge Creek by approximately 0.016 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 two-year peak flow event when water withdrawals are unlikely by the ski area.

Flow Regime

Under Alternative 2, approximately 19.8 acres of clearing, grading, 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 (0.05 cfs) increase in seven-day low flow in the Upper Clear Fork Cowlitz River at the mouth of the Flow Model Analysis Area (refer to Table 3.3-18 and Figure 3-12).** 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 seven-day low 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).

The flow model results estimate that the two-year peak flow discharge rate would increase by approximately 0.3 percent (0.5 cfs) over existing conditions in the Upper Clear Fork Cowlitz River as a result of the 19.8 acres of clearing, grading, and new impervious surfaces proposed in Alternative 2 (refer to Table 3.3-18). The relatively small projected increase in two-year peak flow combined with the typical amount of instrumentation error associated with measuring discharge rates suggests that the estimated increase in two-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.

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 seven-day low flow discharge or to the two-year peak flow discharge of the Upper Tieton River from this project (refer to Table 3.3-18).

Table 3.3-18:
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		Mod. Alt. 4		Alt. 6		Alt. 9	
	Existing Flow	Increase in Flow		Increase in Flow		Increase in Flow		Increase in Flow	
	(cfs)	Percent	cfs	Percent	cfs	Percent	cfs	Percent	cfs
Seven-Day Low Flow									
Upper Clear Fork Cowlitz	3.12	1.4 %	0.05	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
Two-Year Peak Flow									
Upper Clear Fork Cowlitz	130.7	0.3 %	0.5	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 percentage increase in flows has approximately a 49 percent standard of error.

Due to the comparatively small size of the Flow Model Analysis Area within each modified 5th field watershed and the finding that changes in flow would not be measurable at the mouth on the Flow Model Analysis Area, the nominal changes in flow would not be detected at the modified 5th field scale.

Modified Alternative 4

<u>Water Use</u>

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 watershed. Due to the proposed increase in the CCC 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 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 two-year peak flow event when water withdrawals by the ski area are unlikely.

If the utility trenching for the waterline to the mid-mountain lodge under Modified Alternative 4 was determined to be infeasible for economic or environmental reasons, a shallow groundwater well would be constructed in the vicinity of the proposed mid-mountain lodge to provide domestic water (refer to Section 3.13 – Utilities and Infrastructure). 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 withdrawal are not expected to be measurable due to the low volume of the withdrawal and surface disposal of grey water through a RGF 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 slightly higher than the impacts described under Alternative 2. **Under Modified Alternative 4, additional clearing and grading would be required for construction of Trail 4-16, compared to Alternative 2. Approximately 44.4 acres of clearing, grading and construction of impervious surfaces would occur due to the construction of the two chairlifts, associated trails under Modified Alternative 4. 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 to approximately 3.17 cfs (refer to Table 3.3-18). Similarly, the two-year peak flow in the Upper Clear Fork Cowlitz River 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 two-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 Modified Alternative 4 (refer to 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 River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology.

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 two-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 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.

Alternative 6

Water Use

Under Alternative 6, the source of domestic water for the White Pass Ski Area would continue to be from the surface water diversion on Millridge Creek located in the Upper Clear Fork Cowlitz River watershed. Due to the proposed increase in the CCC under Alternative 6, the peak water demand during the ski season would increase from 12,561 gallons/day to 19,700 gallons/day (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 of 4.92 gallons/guest/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 two-year peak flow event when water withdrawals by the ski area are unlikely.

Flow Regime

Under Alternative 6, approximately 15.3 acres of clearing, grading and construction of impervious surfaces would occur due to the construction of the *Basin* chairlift and associated trails. 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 approximately 0.8 percent due to the elimination of the *Hogback Express* chairlift and trails from Alternative 6. 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 3.3-18). Similarly, the two-year peak flow in the Upper Clear Fork Cowlitz would increase by approximately 0.2 percent under Alternative 6, which is lower than under 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 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 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.

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 two-year peak flows in the Upper Tieton River would increase by approximately 0.2 percent over existing conditions under Alternative 6 resulting in an increase of approximately 0.1 cfs in discharge. 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.

Alternative 9

Water Use

Under Alternative 9, the source of domestic water for the White Pass Ski Area would continue to be from the surface water diversion on Millridge Creek located in the Upper Clear Fork Cowlitz River watershed. Due to the proposed increase in the CCC under Alternative 9, the peak water demand during the ski season would increase from 12,561 gallons/day to 17,751 gallons/day (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 of 4.92 gallons/guest/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 two-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 3.3-18). Similarly, the two-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 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 River would not be measurable at the mouth of the Flow Model Analysis Area with current monitoring technology.

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 Alternatives due to the forest clearing proposed for the *PCT* chairlift and associated trails. Under Alternative 9, approximately 38.9 acres of forest clearing, grading 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 3.3-18). Similarly, two-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 3.3-18). 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.

3.3.4 Cumulative Effects

A cumulative effects analysis was performed for each watershed at the site scale (White Pass Study Area) and 5th field watershed scale. Past, present and reasonably foreseeable projects with effects that overlap in space and time with the Action Alternatives are included in the analysis. Information on project descriptions can be found in Tables 3.0-FEIS1 and 3.0-FEIS2.

Projects and construction activities occurring within Riparian Reserves have the potential to alter plant communities and functional processes of the riparian zone. These processes include sediment filtration, stream bank stabilization, floodwater storage (duration and timing of flow), LWD recruitment, and stream channel shading (refer to Section 3.3.2.3). While Riparian Reserve widths typically encompass an area greater than the functional riparian zone, construction activities within the Riparian Reserve occur in closer proximity to watershed resources. Therefore, there is a higher potential for projects occurring within Riparian Reserves to impact watershed resources compared to projects occurring outside. As such, impacts to Riparian Reserves can be used as a surrogate measure for long-term cumulative impacts to Watershed Resources. Therefore, this analysis considers all past, present, and reasonably foreseeable future projects with effects occurring within Riparian Reserves.

Short-term cumulative impacts to Watershed Resources can occur when multiple projects overlap in space and time. For purposes of this analysis, short-term impacts are considered with regard to water quality. Impacts to water quality are most likely to result from increased sedimentation and contaminants such as equipment oil, grease, or fuel spills. Since the use of BMPs is typically required at the site scale to minimize erosion, short-term water quality impacts are not expected to be measurable at large scales (i.e. 5th field watershed). For purposes of this analysis, all projects with effects occurring within Riparian Reserves are assumed to have the potential for short-term cumulative impacts to water quality.

3.3.4.1 Upper Clear Fork Cowlitz Watershed

A summary of the projects occurring in the Upper Clear Fork Cowlitz watershed and the impacts to watershed resources can be found in Table 3.3-19. Additional information on project descriptions can be found in Table 3.0-FEIS1.

Table 3.3-19:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Watershed Resources

Project Number	Project Name	Cumulative Effects
UCFC-2	Forest Road 4600 Stabilization	Approximately 0.1 acre of short-term sediment deposition/turbidity effects to streams occurred through the placement of riprap around the culvert. The detrimental effects of this project had no temporal overlap with the White Pass expansion as the project site has stabilized. Spatially this project does not overlap with the White Pass Study Area, but occurred within the 5th field watershed. Combined with the other stabilization projects identified in this table, in the long-term, this project contributed to a cumulative reduction in sediment mobilization from unstable slopes at the 5th field watershed scale.
UCFC-3a	Palisades Scenic Viewpoint Project	Long-term direct impacts to watershed resources occurred through the creation of less than 0.5 acre of impervious surfaces within the existing disturbed area. There is no spatial overlap with the White Pass Study Area. Long-term project effects would temporally overlap with the effects of the White Pass expansion. In the long-term, this project contributed to a cumulative reduction in soil permeability at the 5th field watershed scale due to the displacement of soil by impervious surface. This project occurred outside of Riparian Reserves and the associated increase in surface runoff associated with the additional 0.5 acre of impervious surface is not measurable at the 5th field scale.
UCFC-3b	Palisades Scenic Viewpoint Project Vegetation Mgmt	Approximately 1 acre of trees will be felled and left onsite as woody material. Spatially this project does not overlap with the White Pass Study Area. Project effects would overlap in time with the effects of the White Pass expansion and cumulatively add to ground disturbance within the Upper Clear Fork Cowlitz watershed. Any localized decrease in soil permeability or increases in detrimental sediment mobilization from this project (i.e., the ground surface immediately under any felled tree) would not be measurable at the 5th field watershed scale.
UCFC-4	Mt Rainier/Goat Rocks Scenic Viewpoint	Installation of fence posts will result in small (several square feet each) areas of ground disturbance in the short-term during construction. This project would not overlap in space with the White Pass expansion. Project effects would overlap in time with the effects of the White Pass expansion. This project occurs outside of Riparian Reserves, and no measurable impacts to Watershed Resources are expected at the 5th field watershed scale.

**Table 3.3-19:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Watershed Resources**

Project Number	Project Name	Cumulative Effects
UCFC-5	White Pass Wildfire	The wildfire burned approximately 204 acres within the Upper Clear Fork Cowlitz watershed. Indirect impacts to water quality, loss of LWD recruitment potential, increased sedimentation, increased nutrient loading and changes in flow likely resulted from the burn. In the eight years following the fire, it is expected that some natural regeneration and stabilization of soils has occurred. This project did not overlap 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 soil productivity at the 5th field watershed scale. With continued revegetation, the potential for long-term effects of this fire will be eliminated.
UCFC-6	Knuppenberg Lake Bridge Removal	Beneficial, long-term direct impact to watershed resources occurred through the removal of 0.24 acre of impervious surface associated with the bridge footings. Long-term project effects would temporally overlap with the White Pass expansion. Spatially, there is no overlap with the White Pass Study Area. Coupled with projects UCFC-12, UCFC-14 and UCFC-15, the removal of the bridge would improve vegetative cover and the sediment regime at the 5th field watershed scale. These projects will partially offset the cumulative effects to watershed resources associated with the White Pass expansion or other projects listed in this table.
UCFC-7	Wilderness Trail Maintenance	Approximately 20.5 miles of trail are maintained every other year, which would directly affect watershed resources over the short-term through periodic sediment mobilization associated with treating sites along the corridor (i.e., removing downed logs and maintenance of drainage structures) with hand tools. A portion of this project would overlap spatially with the White Pass Study Area (i.e., PCNST in Hogback Basin). Temporally, the effects of annual maintenance work will overlap with the effects of the White Pass expansion. Maintenance would result in an increase in short-term erosion and sediment mobilization along the trail, on a maximum of 7.5 acres. Over the long-term, treatment areas along the trail edge will naturally revegetate. Any increase in erosion/sedimentation from this project would not be measurable at the 5th field watershed scale due to the dispersed nature of the effects, compared to other projects in this table that cumulatively effect water quality.

Table 3.3-19:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Watershed Resources

Project Number	Project Name	Cumulative Effects
UCFC-8	Ongoing Road Maintenance	Approximately 9 miles of road surface maintenance occurs every five years. Grading associated with road maintenance would indirectly affect watershed resources over the short-term by creating erodible surfaces that provide sediment to the aquatic environment, particularly Riparian Reserves along the edge of the road surface. This project would not overlap spatially with the White Pass Study Area. Ongoing maintenance activities in the 5th field watershed would overlap in time with the effects of the White Pass expansion, resulting in an increase in short-term erosion/sedimentation at the 5th field watershed scale on up to 46.3 acres. Regular maintenance and revegetation along the road prism will reduce the potential for long-term sediment deposition in streams. Any short-term increase in sediment from this project would not be measurable at the 5th field watershed scale and would be offset by the long-term benefit of the maintenance.
UCFC-10	Clear Fork Trail Puncheon Installation	The installation of puncheon along 0.1 mile (0.07 acre) of braided trail (an existing sediment source) directly affected watershed resources by eliminating user trails and reducing the potential for sediment mobilization. Spatially, this project did not overlap with the White Pass Study Area. Coupled with project UCFC-6, the puncheon would improve sediment conditions at the 5th field watershed scale. These projects will partially offset the cumulative effects to watershed resources associated with the White Pass expansion.
UCFC-11	Air Quality Monitoring Building	The creation of 0.02 acre of impervious surfaces for a building directly impacted soil permeability over the long-term. Project effects would temporally and spatially overlap with the effects of the White Pass expansion. In the long-term, this project and the other projects resulting in impervious surfaces (i.e., increase in runoff) listed in this table, contributed to a cumulative reduction in soil permeability at the 5th field watershed scale.
UCFC-12	Rockfall Mitigation (between mileposts 143 and 149)	The stabilization of 2.5 acres of unstable talus slopes directly impacted watershed resources over the short-term by affecting water quality due to erosion and sedimentation until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects, contributed to a loss of soil productivity at the 5th field watershed scale. In the long- term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed. This project occurred outside of Riparian Reserves, and no other measurable impacts to watershed resources occurred within the White Pass Study Area or at the 5th field watershed scale.

Table 3.3-19:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Watershed Resources

Project Number	Project Name	Cumulative Effects
UCFC-14	Unstable Slope Repair Projects (between mileposts 145.61 and 145.77)	The repair of 1 acre of unstable slopes will directly impact watershed resources over the short-term by affecting water quality due to erosion and sedimentation until the slopes are stabilized. Spatially, this project will not overlap with the White Pass Study Area. Temporally, the short-term project effects will contribute to a loss of soil productivity at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed. This project will occur outside of Riparian Reserves, and no other measurable impacts to watershed resources are expected to occur within the White Pass Study Area or at the 5th field watershed scale.
UCFC-15	Unstable Slope Repair Projects (between mileposts 141.8 and 144.4)	The repair of 4.5 acres of unstable slopes will directly affect watershed resources over the short-term by affecting water quality due to erosion and sedimentation until the slopes are stabilized. Spatially, this project will not overlap with the White Pass Study Area. Temporally, the short-term project effects will contribute to a loss of soil productivity at the 5th field watershed scale. In the long- term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed. This project will occur outside of Riparian Reserves, and no other measurable impacts to watershed resources occurred within the White Pass Study Area or at the 5th field watershed scale.
UCFC-16	Highway 12 Hazard Tree Removal	The periodic removal of occasional hazard trees within this 545-acre, 15-mile long corridor will directly impact soils and watershed functions. Hazard tree removal will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the hazard tree removal will overlap with the effects of the White Pass expansion. Short-term soil compaction and associated increase in surface runoff will occur in areas immediately under and adjacent to the felled trees, where the use of heavy equipment is required outside of the road surface. No long-term impacts to watershed resources are expected.
UCFC-17	White Pass Ski Area Yurt Construction	Long-term, direct impact to soils resulted from approximately 0.01 acre of new impervious surfaces from construction of the yurt. Spatially, the effects of this project overlap with the effects of the White Pass expansion. Temporally, the effects of the yurt will overlap with the effects of the White Pass expansion. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative increase in runoff at the 5th field watershed scale due to the decrease in soil permeability.

Table 3.3-19:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Watershed Resources

Project Number	Project Name	Cumulative Effects
UCFC-20	Benton Rural Electric Association (REA) Power Line Maintenance	The periodic power line right-of-way maintenance within this 28-acre, 1-mile long corridor will directly impact soil permeability and percolation of surface waster into the soil. The operation of equipment along the corridor could result in fuel or oil contamination, thereby affecting water quality. Power line maintenance will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the power line maintenance will overlap with the effects of the White Pass expansion. Short-term soil compaction and reduced permeability will occur in areas immediately under and adjacent to fallen trees and where the use of heavy equipment is required for maintenance. In the long-term, water quality impacts associated with fuel and oil would overlap with the effects of the White Pass expansion, and other projects in this table that have the potential to introduce fuel or oil into the watershed.
UCFC-21	White Pass Ski Area Day Lodge Remodel	Grading of 0.25 acre of previously disturbed ground resulted in short-term increase in sediment mobilization. In addition, the lodge increased the impervious surface associated with the lodge by 0.05 acre, increasing localized runoff. Temporally, the effects of the grading have been stabilized and do not overlap with the effects of the White Pass expansion. Spatially, the effect of the building construction overlaps with the effects of the White Pass expansion. In the long-term, the effects of the impervious surface, in conjunction with the other projects that include impervious surface, contributed to a cumulative reduction in soil permeability at the 5th field watershed scale.

As described in Table 3.3-19, numerous projects would contribute to short-term potential for increases in sediment delivery to streams. The cumulative effects on sediment delivery from these projects are not expected to be measurable as sediment mobilization and delivery would be localized to specific areas within the larger White Pass Study Area and to varying timeframes in the short-term. Table 3.3-18 shows that two-year peak flows leaving the White Pass Study Area would be increased by a maximum of 0.4 percent under the Action Alternatives. At the site scale, projects from Table 3.3-19 with effects to flow would not result in measurable changes in volume, timing or distribution of flows due to their dispersed distribution within the White Pass Study Area, compared to the modeled results in Table 3.3-18.

As described in Section 3.2 – Geology and Soils, the construction of impervious surfaces leads to decreased soil permeability and increased surface water runoff. This in turn has the potential to affect flow regimes downstream in the watershed. As described in Table 3.3-19, projects occurring outside of Riparian Reserves are not expected to have measurable cumulative effects at the 5th field scale. While projects occurring within Riparian Reserves would result in localized decreases in soil permeability, these projects are dispersed throughout the approximate 70,700 acre 5th field watershed and encompass less than two percent of the total Riparian Reserves within the Upper Clear Fork Cowlitz watershed (refer to Table 3.3-20). As a result, cumulative impacts to the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to implementation of any of the Action Alternatives are not expected to be measurable when added to the projects that overlap in space and time with the White Pass expansion at the 5th field scale.

Likewise, the increase in detrimental soil conditions described in Section 3.2 – Geology and Soils, has the potential to affect the sediment regime (sediment mobilization and delivery to streams) within the watershed. As described in Table 3.3-19, projects occurring outside of Riparian Reserves are not expected to have measurable effects on the sediment regime within the 5th field scale. Projects occurring within Riparian Reserves may result in short-term sediment delivery to streams. However, as projects stabilize over time, sediment delivery will decrease and long-term cumulative impacts are not expected. As described in the Clear Fork Cowlitz Watershed Condition Assessment, sediment introduced into streams within the watershed from management related events is slightly above background levels, but well within range of natural variability (USDA 1998a). Therefore, when combined with the implementation of the White Pass expansion, cumulative impacts to the sediment regime and delivery to streams are not expected to be measurable at the 5th field scale.

Table 3.3-20 summarizes the cumulative impacts of White Pass projects and projects not associated with the White Pass expansion within the Upper Clear Fork Cowlitz watershed at the site scale and 5th field scale.

Table 3.3-20
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed on Watershed Resources

Impact Type[a]	Alt. 1		Alt. 2		Mod. Alt. 4		Alt. 6		Alt. 9	
	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]
White Pass Study Area Scale										
White Pass Projects	0.00	0.00	17.70	4.48	22.22	5.62	10.70	2.71	4.10	1.04
Projects Not Associated with the White Pass Expansion	0.25	0.06	0.25	0.06	0.25	0.06	0.25	0.06	0.25	0.06
Cumulative Impacts	**0.25**	**0.06**	**17.95**	**4.54**	**22.47**	**5.68**	**10.95**	**2.77**	**4.35**	**1.10**
Fifth Field Scale										
White Pass Projects	0.00	0.00	17.70	0.07	22.22	0.08	10.70	0.04	4.10	0.02
Projects Not Associated with the White Pass Expansion	300.76	1.13	300.76	1.13	300.76	1.13	300.76	1.13	300.76	1.13
Cumulative Impacts	**300.76**	**1.13**	**318.46**	**1.19**	**322.98**	**1.21**	**311.46**	**1.17**	**304.86**	**1.14**

[a] Only impacts that occur within Riparian Reserves are counted in this analysis. They include clearing and grading, new impervious surfaces, and utility trenching. Projects that occur within Riparian Reserves are more likely to impact streams, wetlands, water quality and flow regime because of the proximity of the actions to the watershed resources in comparison to activities that have no relation to waters.
[b] Percent of Scale is the percentage of Riparian Reserves impacted in the White Pass Study Area and in the fifth field watershed. The total Riparian Reserves area within the White Pass Study Area is 395.3 acres, and 26,715 acres in the 5th field.

3.3.4.2 Upper Tieton River Watershed

A list of all projects occurring within the Upper Tieton River watershed and the impact to watershed resources is located in Table 3.3-21.

Table 3.3-21:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Watershed Resources

Project Number	Project Name	Cumulative Effects
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 potential for erosion/sediment deposition in the short-term. 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 watershed resources are expected because the disturbed soil areas will be immediately stabilized after construction. Combined with other projects identified in this table, this project would add to an increase in short-term erosion/sediment deposition potential 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	The installation of 0.004 acre of impervious surfaces to build the shed and install the tank directly impacted soil permeability over the long-term. Spatially the project effects occurred within the White Pass Study Area. The impervious surfaces and associated increase in runoff overlap temporally with the expansion. The increase in impervious surfaces will result in long-term increased runoff. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contributed to a cumulative increase in runoff at the 5th field watershed scale due to decreased soil permeability.
UT-4	White Pass Ski Area Relocation of Chair 3 and Platter Lift	Approximately 0.5 acre of grading occurred for new lift towers and terminals, directly impacting soils and converting 0.01 acre to impervious surface. Temporally, the grading impacts (i.e., increased erosion potential) did not overlap with the White Pass expansion, but the impervious surfaces and associated increase in runoff overlap with the effects of the White Pass expansion. Spatially this project occurred within the White Pass Study Area. The grading increased short-term erosion potential but has since stabilized. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contributed to a cumulative increase in runoff at the 5th field watershed scale due to decreased soil permeability.
UT-5	US Cellular Tower	The installation of 0.004 acre of impervious surfaces (tower footing) to build a cell tower directly impacted soil permeability over the long-term. Spatially the effects of this project occurred within the White Pass Study Area. Temporally, the long-term loss of soil permeability will overlap with the effects of the White Pass expansion. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contributed to a cumulative increase in runoff at the 5th field watershed scale due to decreased soil permeability.

**Table 3.3-21:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Tieton Watershed on Watershed Resources**

Project Number	Project Name	Cumulative Effects
UT-6	White Pass Ski Area Restaurant/Condo Conversion	A restaurant building that occupied 0.25 acre was demolished and a new building was constructed on the original building site, including additional sidewalks, resulting in an increase of 0.01 acre of impervious surface. Spatially and temporally, the effects of the building overlap with the effects of the White Pass expansion. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contributed to a cumulative increase in runoff at the 5th field watershed scale due to decreased soil permeability.
UT-7	White Pass Ski Area Cross Country Yurt	Approximately 0.25 acre of grading took place in a previously disturbed area (parking lot) resulting in approximately 0.02 acre of new impervious surfaces from the yurt and infrastructure. Spatially, the effects of this project overlap with the effects of the White Pass expansion. Temporally, the effects of the yurt will overlap with the effects of the White Pass expansion. In the short-term, the disturbed soil and associated erosion/sediment deposition potential has been stabilized and returned to use as a parking lot. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative increase in runoff at the 5th field watershed scale due to the decrease in soil permeability.
UT-8	White Pass Ski Area Manager's Cabin	Approximately 0.25 acre of ground was cleared and graded resulting in short-term potential for erosion/sediment deposition. The construction of the cabin resulted in 0.04 acre of impervious surfaces. The graded areas have been stabilized. Spatially, the effects of this project occurred within the White Pass Study Area. Temporally, the short-term erosion/sediment deposition potential has been stabilized and therefore does not overlap with the effects of the White Pass expansion. The long-term loss of soil permeability will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative increase in runoff at the 5th field watershed scale due to the decrease in soil permeability.
UT-9	White Pass Ski Area Manager's Office	Approximately 0.25 acre of previously disturbed ground was graded, creating short-term potential for erosion/sediment deposition. The creation of 0.03 acre of impervious surfaces directly impacted soil permeability over the long-term. Spatially, the effects of this project occurred within the White Pass Study Area. Temporally, the short-term erosion/sediment deposition potential has been stabilized and therefore does not overlap with the effects of the White Pass expansion. The long-term effect of the impervious surface on runoff will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative increase in runoff at the 5th field watershed scale due to the decrease in soil permeability.

Table 3.3-21: Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Watershed Resources

Project Number	Project Name	Cumulative Effects
UT-10	Dog Lake Campground/Four Trailhead Reconstruction	The reconstruction of the Dog Lake Campground and four trailheads directly impacted previously disturbed soils due to approximately 5 acres of grading, resulting in the potential for soil erosion/sediment deposition. This project does not overlap spatially with the White Pass Study Area. It is expected that the site will be stabilized immediately, but that the short-term erosion/sediment deposition effects will overlap with the effects of the White Pass expansion and other projects in this table that include the potential for erosion, as the site becomes revegetated and stable. No long-term effects are anticipated. The project includes traffic control and areas of revegetation which would aid in decreasing erosion and sediment deposition in Riparian Reserves that are currently present at the site.
UT-11	Clear Creek Overlook Reconstruction	The reconstruction of the Clear Creek Overlook will directly impact soils over the short-term due to approximately 1 acre of grading on previously disturbed soils. Creation of 0.1 acre of additional impervious surface will directly impact soils over the long-term. There is no spatial overlap with the White Pass Study Area. The short-term erosion/sediment deposition effects associated with grading are expected to be stabilized immediately. Long-term project effects associated with the new impervious surfaces (i.e., increased runoff) will temporally overlap with the effects of the White Pass expansion. In the long-term, this project will contribute to a cumulative increase in runoff at the 5th field watershed scale due to the increase in impervious surface.
UT-16	Trail 1106 Water Crossing	Re-construction or rerouting of the crossing (with hand tools) would likely result in a short-term increase in erosion/sediment deposition potential on up to 0.1 acre in Riparian Reserve. Any abandoned trail segment would be disguised and allowed to revegetate, thereby reducing erosion potential as the abandoned trail revegetates. This project does not overlap spatially with the White Pass Study Area. It is expected that the site will be stabilized immediately, but that the short-term erosion effects will overlap with the effects of the White Pass expansion and other projects in this table that include increased erosion/sediment deposition potential, as the site becomes revegetated and stable. No long-term effects are anticipated.
UT-18	Benton Rural Electric Association (REA) Power line Maintenance	The periodic power line right-of-way maintenance within this 223-acre, 8-mile long corridor will directly impact soil permeability and percolation of surface waster into the soil. The operation of equipment along the corridor could result in fuel or oil contamination, thereby affecting water quality. Power line maintenance will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the power line maintenance will overlap with the effects of the White Pass expansion. Short-term soil compaction and reduced permeability will occur in areas immediately under and adjacent to fallen trees and where the use of heavy equipment is required for maintenance. In the long-term, water quality impacts associated with fuel and oil would overlap with the effects of the White Pass expansion and other projects in this table that have the potential to introduce fuel or oil into the White Pass Study Area and the 5th field watershed.

**Table 3.3-21:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Watershed Resources**

Project Number	Project Name	Cumulative Effects
UT-19	Highway 12 Hazard Tree Removal	The periodic removal of occasional hazard trees within this 509-acre, 14-mile long corridor will directly impact soils and watershed functions. Hazard tree removal will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the hazard tree removal will overlap with the effects of the White Pass expansion. Short-term soil compaction and associated increase in surface runoff will occur in areas immediately under and adjacent to the felled trees, where the use of heavy equipment is required outside of the road surface. No long-term impacts to soils are expected.
UT-20	Clear Lake Recreation Projects	Construction of the access road and other site improvements over approximately 2 acres would directly impact watershed functions. Short-term erosion/sedimentation potential will occur during construction. Spatially, this project occurs outside the White Pass Study Area. Temporally, the long-term increase in surface runoff associated with remaining impervious surfaces will overlap with the effects of the White Pass expansion. In the long-term, this project will contribute to a cumulative increase in runoff at the 5th field watershed scale due to the increase in impervious surface.
UT-21	Fish Hawk/Spillway Campground Improvements	Construction of CXT toilet and access road directly impacted approximately 1 acre of soils. Short-term erosion and sediment effects occurred during construction, but the site has since stabilized, eliminating the short-term effect. Spatially, this project occurred outside the White Pass Study Area. Temporally, the long-term loss of soil permeability associated with remaining impervious surfaces associated with the toilet (less than 500 square feet) will overlap with the effects of the White Pass expansion. Combined with the other projects identified in this table, in the long-term, this project contributed to a cumulative increase in runoff volume at the 5th field watershed scale due to the displacement of soil by impervious surfaces.
UT-23	System Trail Maintenance	Approximately 48.5 miles of trail are maintained every other year, which would directly affect watershed resources over the short-term through periodic sediment mobilization associated with treating sites along the corridor (i.e., removing downed logs and maintenance of drainage structures) with hand tools. A portion of this project would overlap spatially with the White Pass Study Area (i.e., PCNST at White Pass). Temporally, the effects of annual maintenance work will overlap with the effects of the White Pass expansion. Maintenance would result in an increase in short-term erosion and sediment mobilization along the trail, on a maximum of 36 acres. Over the long-term, treatment areas along the trail edge will naturally revegetate. Any increase in erosion/sedimentation from this project would not be measurable at the 5th field watershed scale due to the dispersed nature of the effects, compared to other projects in this table that cumulatively affect water quality.

Table 3.3-21:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Watershed Resources

Project Number	Project Name	Cumulative Effects
UT-24	Snoqueen Mine	Over the past decade, active operations have been confined to a limited season during the summer. Mining operations would result in short- and long-term impacts to soils due to grading, which is not stabilized (i.e., reclaimed). Spatially, the mine does not overlap with the White Pass Study Area. Temporally, increased erosion/sedimentation effects have overlapped and will continue to overlap in time, In the short-and long-term, the erosion and sedimentation effects will overlap with the effects of the White Pass expansion and other projects in this table that include detrimental soil conditions. The effects of this mine are not expected to be measurable at the 5th field scale because the mine is located outside Riparian Reserves.
UT-26	Highway 12 Rock Stabilization (at Mile Post 155)	The stabilization of 1 acre of unstable talus slopes will directly affect watershed resources over the short-term by providing potential for erosion and sedimentation until the slopes are stabilized. Spatially, this project does not overlap with the White Pass Study Area. Temporally, the short-term project effects will contribute to increased sediment mobilization at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the erosion and sediment regime in the 5th field watershed.
UT-27	Highway 12 Rock Stabilization (at Mile Post 155)	The stabilization of 0.5 acre of unstable talus slopes in 2002 directly impacted watershed resources over the short-term by affecting water quality due to erosion and sedimentation until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to a loss of soil productivity at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed. This project occurred outside of Riparian Reserves, and no other measurable impacts to watershed resources occurred within the White Pass Study Area or at the 5th field watershed scale.
UT-28	Camp Prime Time Accessible Trail, Wagon Ride Route and Tree House	Construction of the trail, wagon ride route, and tree house will result in short-term potential for erosion and sediment mobilization on up to 3 acres. Depending on the surfacing used for the trail, it could create additional impervious surfaces, resulting in increased runoff. Spatially, this project does not overlap with the White Pass Study Area. Temporally, the short-term erosion/sediment effects associated with the project are expected to overlap with the White Pass expansion. The long-term increase in runoff will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative increase in runoff at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the impervious surfaces.

Table 3.3-21:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Watershed Resources

Project Number	Project Name	Cumulative Effects
UT-29	Clear Lake Boat Launch Heavy Maintenance	Maintenance of the boat launch will result in short-term water quality effects associated with sediment mobilization on less than 1 acre during placement of more secure foundations for the access dock. Spatially, this project does not overlap with the White Pass Study Area. Temporally, the short-term sediment effects are expected to be immediately stabilized, and therefore not to overlap with the White Pass expansion.
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	The replacement of an existing cell tower and building addition will result in a short-term increase in local sediment mobilization during construction on up to 0.3 acre. Spatially, this project overlaps with the White Pass Study Area. Temporally, the short-term sediment mobilization associated with the project will overlap with the White Pass expansion and other projects in this table that cause detrimental soil conditions. The long-term loss of soil permeability (i.e., increased surface runoff) will result from 0.1 acre of impervious surface associated with the cell tower and building addition. The runoff effects will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative increase in runoff at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by the impervious surfaces.
UT-32	Camp Site Maintenance	The periodic removal of occasional hazard trees within developed sites will directly impact soils and watershed functions. Hazard tree removal will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the hazard tree removal will overlap with the effects of the White Pass expansion. Short-term soil compaction and associated increase in surface runoff will occur in areas immediately under the felled trees. No long-term impacts to soils are expected from hazard tree removal. Other maintenance activities are not expected to result in effects to watershed resources.
UT-34	Unstable Slope Repair Projects (between Mile Posts 156.32 and 156.56)	The stabilization of approximately 4 acres of unstable talus slopes directly affected watershed resources over the short-term by creating erosion and sediment mobilization until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to increased runoff (due to hardened surfaces) at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed.
UT-35	Unstable Slope Repair Projects (between Mile Posts 161.93 and 165.02)	The stabilization of approximately 0.53 acre of unstable talus slopes directly affected watershed resources over the short-term by creating erosion and sediment mobilization until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to increased runoff (due to hardened surfaces) at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed.

As described in Table 3.3-21, numerous projects would contribute to short-term potential for increases in sediment delivery to streams. The cumulative effects on sediment delivery from these projects are not expected to be measurable as sediment mobilization and delivery would be localized to specific areas within the larger White Pass Study Area and to varying timeframes in the short-term. Table 3.3-18 shows that two-year peak flows leaving the White Pass Study Area would be increased by a maximum of 1.1 percent under the Action Alternatives. At the site scale, projects from Table 3.3-21 with effects to flow would not result in measurable changes in volume, timing or distribution of flows due to their dispersed distribution within the White Pass Study Area, compared to the modeled results in Table 3.3-18.

As described previously, the construction of impervious surfaces leads to decreased soil permeability and ultimately the potential to affect flow regimes downstream in the watershed. As described in Table 3.3-21, projects occurring outside of Riparian Reserves are not expected to have measurable cumulative effects at the 5th field scale. While projects occurring within Riparian Reserves would result in localized decreases in soil permeability, these projects are dispersed throughout the approximate 118,000 acre 5th field watershed, less than 2 percent of the Riparian Reserve area in the Upper Tieton River watershed would experience cumulative impacts from any Action Alternative (refer to Table 3.3-22). According to the Upper Tieton Watershed Analysis, hydrologic patterns at the watershed level have not been changed significantly as a result of forest management activities (USDA 1998b). Therefore, cumulative impacts to the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to implementation of any of the Action Alternatives are not expected to be measurable when added to the projects that overlap in space and time with the White Pass expansion at the 5th field scale.

The increase in detrimental soil conditions described in Section 3.2 – Geology and Soils, has the potential to affect the sediment regime (sediment mobilization and delivery to streams) within the watershed. As described in Table 3.3-19, projects occurring outside of Riparian Reserves are not expected to have measurable effects on the sediment regime within the 5th field scale. Projects occurring within Riparian Reserves may result in short-term sediment delivery to streams. However, as projects stabilize over time sediment delivery will decrease and long-term cumulative impacts are not expected. As described in the Upper Tieton Watershed Condition Assessment, sediment introduced into streams within the watershed from management related events is slightly above background levels, but within range of natural variability (USDA 1998b). Therefore, when combined with the implementation of the White Pass expansion, cumulative impacts to the sediment regime and delivery to streams are not expected to be measurable at the 5th field scale.

Table 3.3-22 summarizes the cumulative impacts of White Pass projects and projects not associated with the White Pass expansion within the Upper Tieton watershed at the site scale and 5th field scale.

Table 3.3-22
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Watershed Resources

Impact Type[a]	Alt. 1		Alt. 2		Mod. Alt. 4		Alt. 6		Alt. 9	
	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]
White Pass Study Area Scale										
White Pass Projects	0.00	0.00	0.00	0.00	3.60	1.52	1.90	0.80	20.30	8.57
Projects Not Associated with the White Pass Expansion	20.13	8.49	20.13	8.49	20.13	8.49	20.13	8.49	20.13	8.49
Cumulative Impacts	**20.13**	**8.49**	**20.13**	**8.49**	**23.73**	**10.01**	**22.03**	**9.30**	**40.43**	**17.06**
Fifth Field Scale										
White Pass Projects	0.00	0.00	0.00	0.00	3.60	0.02	1.90	0.01	20.30	0.11
Projects Not Associated with the White Pass Expansion	322.01	1.80	322.01	1.80	322.01	1.80	322.01	1.80	322.01	1.80
Cumulative Impacts	**322.01**	**1.80**	**322.01**	**1.80**	**325.61**	**1.82**	**323.91**	**1.82**	**342.31**	**1.92**

[a] Only impacts that occur within Riparian Reserves are counted in this analysis. They include clearing and grading, new impervious surfaces, and utility trenching. Projects that occur within Riparian Reserves are more likely to impact streams, wetlands, water quality and flow regime because of the proximity of the actions to the watershed resources in comparison to activities that have no relation to waters.
[b] Percent of Scale is the percentage of Riparian Reserves impacted in the White Pass Study Area and in the fifth field watershed.

3.4 FISHERIES

This section describes the occurrences of special status species within the White Pass Study Area.[26] Additional information regarding the overall fish distribution and habitat within the White Pass Study Area can be found in Appendix I – *Fisheries Technical Report and Biological Evaluation for the White Pass MDP Expansion Proposal*. This section is divided into two main parts; Affected Environment and Environmental Consequences. The Affected Environment contains descriptions of the existing conditions within the White Pass Study Area, defined as the existing SUP boundary and the proposed SUP expansion area. The Environmental Consequences analyzes the potential impacts to special status species as a result of the implementation of the Action Alternatives.

3.4.1 Introduction

The *Clear Fork Watershed Analysis* (USDA 1998a) and the *Upper Tieton Watershed Assessment* (USDA 1998b) present detailed fish distribution, habitat information and the occurrence of special status species (i.e., Threatened, Endangered, or Forest Service Sensitive) for Millridge Creek and Clear Creek, respectively. Other data sources include the *Fisheries Technical Report and Biological Evaluation for the White Pass MDP Expansion Proposal* and documents regarding fish species presence, species listed as threatened or endangered under the Endangered Species Act, and USFS Sensitive Species as referenced throughout the text.

3.4.2 Affected Environment

3.4.2.1 Special Status Species

The White Pass Study Area includes the headwaters of Millridge Creek and Clear Creek, located in the Upper Clear Fork Cowlitz and the Upper Tieton 5th field watersheds, respectively (refer to Figure 3-13). These headwater streams within the White Pass Study Area do not contain suitable habitat for spawning or rearing, of resident fish due to steep gradients. There is no known presence of any special status species occurring within the White Pass Study Area based on available survey data (USFS 1994, 1997a, 1997b, 2000, 2002a). Stream reaches downstream of the White Pass Study Area are known to contain resident and anadromous special status fish species. The closest known occurrence within the Upper Tieton watershed is approximately 6 miles downstream of the White Pass Study Area in Clear Lake. Similarly, within the Upper Clear Fork Cowlitz watershed, known populations of special status species occur approximately 8 miles downstream of the White Pass Study Area, below a natural waterfall barrier on the Clear Fork Cowlitz River. Special status fish species known to occur within downstream reaches of the Upper Clear Fork Cowlitz and Upper Tieton watersheds are listed in Table 3.4-1.

[26] For the purposes of this FEIS, Federal Threatened, Endangered, and USFS Sensitive Species are identified as “special status species”.

**Table 3.4-1:
Special Status Species Occurring in the
Upper Clear Fork Cowlitz and Upper Tieton River Watersheds**

Species	Status	Presence Within Downstream Reaches[a]	
		Upper Tieton River	Upper Clear Fork Cowlitz
Lower Columbia River Chinook (*Oncorhynchus tschawytscha*)	Federal Threatened	No	Yes
Lower Columbia River Steelhead (*Oncorhynchus mykiss*)	Federal Threatened	No	Yes
Bull Trout (*Salvelinus confluentus*)	Federal Threatened	Yes	No
Lower Columbia River/Southwest Washington Coho (*Oncorhynchus kistuch*)	Federal Threatened	No	Yes
Redband Trout (*Oncorhynchus mykiss sp*.)	USFS Sensitive Species	Yes	No
Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)	USFS Sensitive Species	Yes	Yes

[a] Includes both Clear Creek and Millridge Creek

The term “Lower Columbia River” (LCR) refers to the specific Evolutionary Significant Unit to which the salmonid belongs. An Evolutionary Significant Unit is a sub-portion of a species that is defined by substantial reproductive isolation from other conspecific units and represents an important component of the evolutionary legacy of the species.

Lower Columbia River Chinook Salmon (Oncorhynchus tschawytscha)

The Chinook salmon, sometimes referred to as the king salmon, is indigenous to the northern half of the Pacific coast of North America. It is the largest of the Pacific salmon with individuals reaching 50 kilograms or more. They are most abundant in larger river systems (Meehan et al. 1991). Two forms of LCR Chinook occur and are differentiated by their spring and fall run timing. Within the Columbia River system, spring Chinook typically begin their migration upstream in April and May and spawn in upper headwaters in September. Fall Chinook begin their migration in late August and September and spawn in October in mainstem reaches.

Natal streams for Chinook salmon may be relatively short coastal rivers or tributaries at the head of major drainages hundreds of kilometers from the sea. The time that adults return to their natal river systems depends primarily on the distance to the spawning grounds and the date the fish typically spawn (Meehan et al. 1991). For example, fish that spawn in headwater reaches would require more time to migrate upstream and would therefore return to their natal systems earlier than fish that spawn in lower, mainstem reaches. Freshwater entry and spawning timing are generally thought to be related to local temperature and water flow regimes. Temperature has a direct effect on the development rate of salmonids (Meyers et al. 1998).

Young Chinook emerge from redds in the spring; the young rear successfully in a wide variety of environments from small, infertile streams to large rivers or impoundments (Meehan et al. 1991). Like other salmonids in streams that get cold in the winter, the behavior of Chinook salmon juveniles changes from mainly feeding in summer to hiding and close association with cover in winter (Meehan et al. 1991). Distance of migration to the marine environment, stream stability, stream flow and temperature regimes, stream and estuary productivity, and general weather regimes have been implicated in the evolution and expression of specific emigration timing (Meyers et al. 1998).

The existence of LCR Chinook salmon has been documented up to river mile 1.3 in the Upper Clear Fork Cowlitz River (USFS 2002a). The Washington Department of Fish and Wildlife transports Chinook salmon from below the Mossyrock Dam and release fish into Lake Scanewa and Skate Creek (Seral, pers. comm.). Additional data describing fish counts and numbers released into each location was not available at the time of publication.

The *Upper Tieton River Watershed Analysis* states that anadromous fish do not occur within the watershed due to the passage barrier at the Tieton Dam, located at the mouth of the watershed (USDA 1998b). Based on the presence of these barriers and the absence of fish sightings during stream surveys, LCR Chinook salmon do not occur within the White Pass Study Area.

Lower Columbia River Steelhead Trout (Oncorhynchus mykiss)

Steelhead trout are the anadromous form of rainbow trout and are native to the drainages of Pacific North America. They are relatively long-lived, feed on forage fish in lakes or the ocean, and attain large size (Meehan et al. 1991).

Juvenile anadromous steelhead spend on average a two to three year period in fresh water before migrating to the sea. Migration to the sea usually occurs in the spring and the steelhead remain in the ocean for up to four years. The time of spawning is usually consistent from year to year in a given stream but can differ by a month or more among streams in the same region depending on local environments. Steelhead may use small headwater streams for spawning, and they may use the same areas used by salmon. They do not necessarily die after spawning as do the Pacific salmons, and are able to spawn more than once (Meehan et al. 1991; Busby et al. 1996).

The life history of juvenile steelhead is highly variable. In some populations, fish may spend their entire lives in a limited area of a small stream, but in others, they may migrate upstream or downstream soon after emergence from the gravel to enter lakes or other rearing areas. The time when steelhead smolts migrate to the sea appears to be controlled primarily by photoperiod, but it is influenced at times by other environmental factors such as flow, temperature, and lunar phase. Survival of embryos in redds depends on the amount of fine sediments present, the degree to which redds are disturbed by freshets, maintenance of adequate flows, and other factors (Meehan et al. 1991).

The existence of LCR steelhead has been documented up to river mile 1.3 in the Upper Clear Fork Cowlitz River (USFS 2002a). The *Upper Tieton River Watershed Analysis* states that anadromous fish do not occur within the watershed due to the migration barrier at the Tieton Dam (USDA 1998b). Based on the presence of these barriers and the absence of fish sightings during stream surveys, LCR steelhead trout do not occur within the White Pass Study Area.

Bull Trout (Salvelinus confluentus)

Bull trout are believed to be glacial relict whose distribution has expanded and contracted with natural climate changes. Bull trout often occur upstream from barriers in many drainages, an indication of early colonization (Meehan et al. 1991). They are strongly influenced by temperature and are seldom found in streams exceeding summer temperatures of 18 degrees Celsius (64.4 degrees Fahrenheit). Cool water temperatures during early life history results in higher egg survival rates, and faster growth rates in fry and possibly juveniles as well (WDFW 2004).

Bull trout live in a variety of habitats including small streams, large rivers, and lakes or reservoirs. In some drainages, the fish spend their lives in cold headwater streams. In others, they spend the first two to four years in small natal streams and then migrate into larger rivers, lakes, or reservoirs to spend another two to four years before maturing. Bull trout that stay in cold headwater streams their entire lives usually do not exceed 25 centimeters in length when mature (Meehan et al. 1991).

Basic rearing habitat requirements for juvenile bull trout include cold summer water temperatures (less than 15 degrees Celsius, or 59 degrees Fahrenheit) with sufficient surface and groundwater flows. Warmer temperatures are associated with lower bull trout densities, and can increase the risk of invasion by other species that could displace, compete with, or prey on juvenile bull trout. Juvenile bull trout are generally bottom foragers and rarely stray from cover. They prefer complex forms of cover that include deep pools, LWD, rocky stream beds, and undercut banks. High sediment levels and embeddedness can result in decreased rearing densities. Unembedded cobble/rubble substrate is preferred for cover and feeding, and also provides invertebrate production. Highly variable streamflow, reduction in LWD, bedload movement, and other forms of channel instability can limit the distribution and abundance of juvenile bull trout (Montana Fish Wildlife and Parks 2004a).

All life history stages of native char are associated with complex forms of cover, including LWD, under cut banks, boulders, and pools. Preferred spawning habitat consists of low gradient streams with loose, clean gravel and water temperatures of 5 to 9 degrees Celsius in late summer and early fall. Rearing and overwintering habitat requires cool clean water with insects, macro-zooplankton, and small fish for larger adults (WDFW 2004).

The *Clear Fork Watershed Analysis* does not document the existence of bull trout in the Millridge Creek or the Clear Fork Cowlitz River (USDA 1998a). Furthermore, the Tacoma Public Utility hydroelectric projects on the Cowlitz River may preclude bull trout from extending beyond river mile 90 in the mainstem Cowlitz River. However, there appears to be habitat for viable populations above the hydroelectric projects. The *Upper Tieton River Watershed Analysis* indicates that bull trout are known to occur in the Upper Tieton River watershed (USDA 1998b). They are suspected to occur in Clear Lake given recent sightings during fall snorkel surveys in the North Fork Tieton River (Toretta, pers. comm.). It is suspected that these fish originate from the population in Rimrock Lake.

3.4.2.2 Federal Threatened Species

Lower Columbia River Coho Salmon (Oncorhynchus kistuch)

Coho salmon are native to many drainages around the Pacific Rim from California to Alaska. They have been introduced into other areas. Coho are found in a broader diversity of habitats than are any of the other anadromous salmonids, from small tributaries of coastal streams to lakes to inland tributaries of major rivers. Groups of stocks in close proximity appear to be similar but groups of stocks from one area differ from groups in other areas (Meehan et al. 1991).

Adult coho salmon return from the ocean as early as July in northern areas and during the fall in southern areas. Spawning occurs in the fall to early winter in small headwater streams with year-round cool to almost freezing water temperatures. Spawning and rearing of juvenile coho generally takes place in small, low gradient (generally less than 3 percent) tributary streams (California Department of Fish and Game website 2004; Weitkamp et al. 1995). Young fish emerge from the redds in spring, and the juveniles rear in fresh water for one or more years before migrating to the sea. The length of freshwater rearing depends on the growth rate, which in turn depends on productivity and temperature of the natal streams. After they emerge in the spring, young fish spread into the available rearing space, some moving upstream but most moving downstream. In streams, young fish feed mainly on aquatic and terrestrial invertebrates. Water velocity and the presence of other fish are important constraints on the habitat that can be used by the young fish, which often must remain in shallow fringe areas of pools and runs until they become large enough to compete successfully for deeper, faster water. In the fall, as stream temperatures decline, young coho seek areas with more cover than the areas they used in summer. They may move into side channels, sloughs, and beaver ponds for the winter, and they are usually found close to various forms of woody debris, roots, and overhanging brush that provide cover in water of low velocity and more structural complexity (Meehan et al. 1991).

LCR coho salmon are not known to exist within the White Pass Study Area. The existence of LCR coho salmon has been documented up to river mile 1.3 in the Clear Fork Cowlitz River (USFS 2002a). The *Upper Tieton River Watershed Analysis* states that anadromous fish do not occur within the watershed due to the migration barrier at the Tieton Dam (USDA 1998b). The Washington Department of Fish and

Wildlife transports Chinook salmon from below the Mossyrock Dam and release fish into Lake Scanewa and Skate Creek (Seral, pers. comm.). Additional data describing fish counts and numbers released into each location was not available at the time of publication.

3.4.2.3 USFS Sensitive Species

Redband Trout (Oncorhynchus mykiss sp)

Redband trout are a native trout of western North America. There is considerable variation in the life history in this species of trout. Resident stream populations are found throughout the Columbia River Basin. A lake variation known as kamloops are found in some larger lakes in the Columbia and Frasier River (British Columbia) basins. A third variation is the steelhead that migrated from the ocean as far as the upper Snake River, Idaho (almost 1000 miles) (Behnke 1992).

The Columbia River redband trout (*O. mykiss gairdneri*), a subspecies of rainbow trout, is native to the Fraser and Columbia River drainages east of the Cascade Mountains to barrier falls on the Pend Oreille, Spokane, Snake and Kootenai rivers (Behnke 1992). Logging, mining, agriculture, grazing, dams, over harvest and hybridization and competition with other trout contributed to the decline of redband trout abundance, distribution and genetic diversity in the Columbia River Basin (Behnke 1992). Consequently, many populations are restricted to isolated headwater streams that may serve as refugia until effective conservation and rehabilitation strategies are implemented. Long-term persistence of these populations is threatened by loss of migratory life history forms and connectivity with other populations, which is critical to maintaining genetic diversity and dispersal among populations (Rieman and McIntyre 1995).

Characteristics vary considerably among populations of stream-resident redband trout, but generally they can be differentiated from the non-native coastal rainbow trout by larger more rounded spots, parr marks that tend to remain into adulthood and are more orange-red around the lateral line surrounded by greenish-yellow, rather than pink-red around the lateral line surrounded by dark green and silver like coastal rainbow trout. Redband trout also have very distinct white tips on the anal, dorsal and pectoral fins. This subspecies is genetically and morphologically differentiated from coastal rainbow trout. Morphological characteristics of distinction include the presence of vestigial basibranchial teeth, larger spots, more elliptical parr marks, fewer pyloric caeca, yellow and orange tints on the body, a trace of a cutthroat mark, and light colored tips on dorsal, anal, and pelvic fins (Behnke 1992). However, genetic techniques (e.g., protein electrophoresis) provide the only method to correctly identify this subspecies as unique from other salmonids (Montana Fish Wildlife and Parks 2004b).

Redbands are typically a stream-resident fish that make short spawning migrations either in the same stream or often into smaller tributaries. Redband trout prefer cool, clean, relatively low gradient streams but, in some circumstances, are able to withstand wider temperature variations than their cousins, the westslope cutthroat trout. Interior redband trout feed mainly on aquatic insects but eat what is available to them. Large adults also eat fish (Montana Fish Wildlife and Parks 2004b).

The species *O. mykiss* exhibits varying life histories. Resident forms of the species are usually called rainbow trout; however, the inland type of *O. mykiss* are often called Columbia River redband trout. Although the anadromous and resident forms have long been taxonomically classified within the same species, the exact relationship between the forms in any given area is not well understood. In coastal populations, it is unusual for the two forms to co-exist; they are usually separated by a migration barrier, be it natural or manmade (NOAA 2004b).

The *Clear Fork Watershed Analysis* does not report the presence of redband trout within the watershed (USDA 1998a). The *Upper Tieton Watershed Analysis* indicates that a stock of redband trout exists in Clear Lake (USDA 1998b). Additionally, redband trout are documented within the North Fork Tieton River from the mouth upstream for approximately 1 mile. Recent snorkel surveys conducted by the USFS documented the existence of redband/rainbow trout within the North Fork Tieton River (Torretta, pers. comm.). It is also suspected that they inhabit the lower half-mile of Clear Creek.

3.4.3 Environmental Consequences

Construction and/or operation of facilities associated with the White Pass proposal have the potential to impact fish presence, fish habitat, and special status fish species within and downstream of the White Pass Study Area. Impacts may be short-term or long-term in duration. In addition, these impacts may be further classified as direct or indirect.

Activities that result in a short-term disturbance to fish habitat include construction activities that temporarily impact water quality. For example, clearing within the RIA could impact water quality through increased turbidity and pollutant (i.e., fuel, oil, and grease) runoff in the short-term from operation of construction equipment. Short-term impacts would only persist during construction and conditions would return to pre-disturbance conditions following completion of construction. Long-term impacts would result from degradation of fish habitat due to physical and chemical changes to occupied fish habitat. Long-term impacts could include, but are not limited to, in-channel work within existing fish habitat, reductions in LWD recruitment potential in headwater stream reaches, and the permanent removal of riparian vegetation.

3.4.3.1 Direct Impacts

Direct impacts to fish are impacts that result in a direct loss of individuals. Direct impacts typically occur from in-water activities that result in the mortality of individuals. However, no direct impacts are expected to occur under any of the Action Alternatives, as no work is proposed within Leech Lake where fish habitat is present and no in-water development is proposed.

3.4.3.2 Indirect Impacts

Indirect impacts are impacts that alter a resource or habitat conditions. Indirect impacts have delayed or unforeseen effects that occur in the future or in a different location than the original action. For example, clearing of ski trails may result in the reduction of LWD recruitment potential and increased sedimentation. Riparian clearing may provide a pulse input of LWD to stream channels but would prevent future recruitment to the stream. Sediment, in large amounts, can impede the spawning process and lower the chances of eggs survival. Increase in sedimentation as a result of project implementation would result in less favorable fish habitat. In addition, removal of riparian vegetation near stream channels could potentially contribute to increases in water temperature through a reduction in vegetation that provides shade to the stream. For purposes of this analysis, indirect impacts are associated within clearing and grading that occurs within Riparian Reserves, as this zone is more likely to influence streams than impacts outside of Riparian Reserves.

3.4.3.3 Special Status Species

Alternative 1

Under Alternative 1, White Pass would continue to operate without any further development. No additional impacts would occur to special status fish species 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 special status species from the maintenance and operation activities are not expected to be measurable because these species are located 6 and 8 miles downstream of the White Pass Study Area in the Upper Tieton and Upper Clear Fork Cowlitz watersheds, and the nature of the action.

Alternative 2

Under Alternative 2, no direct impacts would occur to special status fish species. No special status species have been documented within the existing or proposed SUP areas.

Within the Upper Tieton watershed, known populations of special status species occur in Clear Lake, approximately 6 miles downstream of the White Pass Study Area. Likewise, within the Upper Clear Fork Cowlitz watershed, known populations of special status species are excluded from the upper portions by a natural barrier at river mile 1.3, approximately 8 miles below the White Pass Study Area. Since special status species occur far below the White Pass Study Area, indirect impacts to these populations resulting from any of the Action Alternatives are not expected to be measurable. The impacts most likely to carry downstream are increased flows, sediment, and changes to water quality. Furthermore, Leech Lake and Knuppenberg Lake act as natural sediment traps, minimizing the potential for sediment and water quality concerns generated at the ski area to reach these populations.

Stream Flow

Potential impacts to special status species from altered stream flows are not expected to occur under Alternative 2. As described in Section 3.3 – Watershed Resources, the flow model estimated a maximum increase of approximately 1.4 percent in the low flow and 0.3 percent in a two-year peak flow in the Upper Clear Fork Cowlitz watershed coming out of the White Pass Study Area under Alternative 2 (refer to Figure 3-12 and Table 3.3-18). No impacts would occur within the Upper Tieton River watershed, as no development is proposed under Alternative 2. Increased flows are predicted at points prior to Leech Lake and Knuppenberg Lake. These natural features would likely moderate and absorb the relatively small increase in peak flows projected by the model. Since the Flow Model Analysis Area encompasses a small portion of the Upper Tieton and Upper Clear Fork Cowlitz watersheds, changes in flow where special status species occur are not expected to be measurable.

Sediment

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, Knuppenburg Lake, Clear Creek, and Millridge Creek. There would be no impacts to the Upper Tieton watershed under Alternative 2 because no development would take place in this watershed. The potential for increased sediment loading would not be measurable above baseline levels (refer to Section 3.3 – Watershed Resources). Increased sediment loading would potentially occur from clearing and grading within riparian influence zone on moderate to high erosion potential areas. However, there would be no clearing or grading within high erosion potential areas under Alternative 2, therefore the risk of increased sediment is low (refer to Table 3.2-4 in Section 3.2 – Geology and Soil Resources). Approximately 4.5 acres of clearing and grading within moderate erosion potential areas would occur under Alternative 2. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measure MM2 and Other Management Provision OMP5 would require appropriate erosion control BMPs (i.e., silt fencing) and the revegetation of exposed soils to reduce potential erosion and sediment yield to streams under Alternative 2. Therefore, the potential for increased sediment loading would not be measurable.

Water Quality

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. A recirculating gravel filter would be constructed in conjunction with the development of the lodge to treat wastewater. 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 habitat are therefore not expected to be measurable where special status species are known to occur. Additional information on water quality can be found in Section 3.3 – Watershed Resources and Appendix I *Fisheries Technical Report and Biological Evaluation for the White Pass Proposal*.

Temperature

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 as no development is proposed. In the Upper Clear Fork Cowlitz watershed, approximately 17.7 acres of clearing and grading would occur within Riparian Reserves (refer to Table 3.3-15). Stream shading would be reduced by approximately 4.5 percent as a result. Therefore, the amount of solar radiation reaching the stream would increase (refer to Section 3.3.2.4 – Water Quality). Since all development 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.

Modified Alternative 4

There would be no impacts to special status species under Modified Alternative 4. Effects to stream flow, sediment, water quality, and temperature would be similar to Alternative 2. The low flow in the Upper Clear Fork Cowlitz would increase by approximately 1.6 percent and 0.4 percent in the two-year peak flow. The construction of the parking lot and ticket booth would increase the low flow in the Upper Tieton watershed by approximately 2.1 percent. Likewise, the two-year peak flow would increase by approximately 0.5 percent. As described under Alternative 2, the increase in flows would not likely be measurable downstream where special status species are known to occur.

Approximately 25.8 acres of clearing and grading within Riparian Reserves would occur in the White Pass Study Area (refer to Table 3.3-15), slightly more than under Alternative 2. Clearing and grading would occur on approximately 1.4 acres of high erosion potential soils and 10.8 acres of moderate erosion potential soils, which would result in a slightly higher potential for soil erosion and subsequent sediment yield to streams. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measure MM2 and Other Management Provision OMP5 would require appropriate erosion control BMPs (i.e., silt fencing) and the revegetation of exposed soils to reduce potential erosion and sediment yield to streams under Modified Alternative 4. The increased clearing within Riparian Reserves under Modified Alternative 4 would decrease the canopy coverage by approximately 5.6 percent within the Upper Clear Fork Cowlitz watershed, slightly more compared to

Alternative 2 (refer to Table 3.3-15). However, the increased solar exposure would be to ephemeral and intermittent channels, as described for Alternative 2. Stream shading within the Upper Tieton Watershed would be reduced by approximately 1.5 percent as a result of clearing; therefore the amount of solar radiation reaching the stream would increase slightly, potentially warming the water in perennial streams (refer to Table 3.3-15). The implementation of Mitigation Measures MM3 and MM10 would retain riparian understory vegetation to the greatest extent practicable to maintain stream shading.

Alternative 6

There would be no impacts to special status species under Alternative 6. Effects to stream flow, sediment, water quality, and temperature would be similar to Alternative 2. The low flow in the Upper Clear Fork Cowlitz would increase by approximately 0.8 percent and 0.2 percent in the two-year peak flow. The construction of the parking lot and ticket booth would increase the low flow in the Upper Tieton watershed by approximately 0.7 percent. Likewise, the two-year peak flow would increase by approximately 0.2 percent. As described under Alternative 2, the increase in flows would not likely be measurable downstream where special status species are known to occur.

Approximately 12.6 acres of clearing and grading within Riparian Reserves would occur in the White Pass Study Area, slightly more than under Alternative 2. Similar to Alternative 2, no clearing and grading would occur on high erosion potential soils, and clearing and grading would occur on approximately 2.5 acres of moderate erosion soils. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measure MM2 and Other Management Provision OMP5 would require appropriate erosion control BMPs (i.e., silt fencing) and the revegetation of exposed soils to reduce potential erosion and sediment yield to streams under Alternative 6. The decreased clearing within Riparian Reserves under Alternative 6 would decrease the canopy coverage within the Upper Clear Fork Cowlitz watershed portion of the White Pass Study Area by approximately 2.7 percent, resulting in a lower potential for increased water temperatures compared to Alternative 2, as evidenced in Table 3.3-15. The parking lot under Alternative 6 would reduce canopy coverage in the Upper Tieton watershed portion of the White Pass Study Area by 0.8 percent. In both cases the increase in solar radiation due to development would be to ephemeral and intermittent channels. As a result, the streams would be dry during the periods with highest solar radiation and no effect to stream temperature is expected. The implementation of Mitigation Measures MM3 and MM10 would retain riparian understory vegetation to the greatest extent practicable to maintain stream shading.

Alternative 9

There would be no impacts to special status species under Alternative 9. Effects to stream flow, sediment, water quality, and temperature would be similar to Alternative 2. The low flow in the Upper Clear Fork Cowlitz would increase by approximately 0.7 percent and 0.2 percent in the two-year peak flow. The construction of the parking lot, ticket booth, and trails would increase the low flow in the Upper Tieton watershed by approximately 4.6 percent. Likewise, the two-year peak flow would increase by approximately 1.1 percent. As described under Alternative 2, the increase in flows would not likely be measurable downstream where special status species are known to occur.

Approximately 24.4 acres of clearing and grading within Riparian Reserves would occur in the White Pass Study Area, slightly more than under Alternative 2. Clearing and grading would occur on approximately 1.2 acres of high erosion potential soils and 4.5 acres of moderate erosion potential soils, which would result in a slightly higher potential for soil erosion and subsequent sediment yield to streams. The implementation of Management Requirement MR1 would require the development of a SWPPP and Mitigation Measure MM2 and Other Management Provision OMP5 would require appropriate erosion control BMPs (i.e., silt fencing) and the revegetation of exposed soils to reduce potential erosion and sediment yield to streams under Alternative 9. The increased clearing within Riparian Reserves under Alternative 9 would decrease the canopy coverage within the Upper Clear Fork Cowlitz watershed portion of the White Pass Study Area by approximately 1.0 percent (refer to Table 3.3-15). Within the Upper Tieton watershed portion of the White Pass Study Area, canopy coverage would decrease by approximately 8.6 percent, potentially resulting in increased solar radiation reaching streams. Within the Upper Tieton portion of the White Pass Study Area, the canopy removal associated with the *PCT* pod would occur primarily along perennial reaches. Similarly, within the Upper Clear Fork Cowlitz portion of the White Pass Study Area, all canopy removal would be along perennial reaches. Therefore, Alternative 9 would have the highest potential to increase stream temperatures. The implementation of Mitigation Measures MM3 and MM10 would retain riparian understory vegetation to the greatest extent practicable to maintain stream shading and minimize impacts to temperatures.

3.4.4 Cumulative Effects

A cumulative effects analysis was performed for each watershed at the site scale (White Pass Study Area) and 5th field watershed scale. Past, present and reasonably foreseeable projects with effects that overlap in space and time with the Action Alternatives are included in the analysis. Information on project descriptions can be found in Tables 3.0-FEIS1 and 3.0-FEIS2.

As described in Section 3.3 – Watershed Resources, projects that occur within Riparian Reserves are in closer proximity to the stream channel or other fish bearing waterbodies. The closer proximity of project activities to waterbodies allows for sediment and/or pollutants to reach the stream and potentially impair water quality within fish-bearing stream segments of the watershed. Increased sedimentation also has the potential to reduce available spawning habitat. Cumulative impacts to fisheries resources may result from long-term impacts to fish habitat. Fish habitat can be impacted by increased sediment delivery, changes in the flow regime, decreased LWD recruitment, and decreased water quality to known fish bearing stream reaches.

3.4.4.1 Upper Clear Fork Cowlitz Watershed

A list of all projects occurring within the Upper Clear Fork Cowlitz watersheds is presented below in Table 3.4-2.

Table 3.4-2:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UCFC-2	Forest Road 4600 Stabilization	This project indirectly affected fish habitat on approximately 0.1 acre due to the placement of riprap around the culvert, resulting in sediment deposition/turbidity effects to streams over the short-term. The detrimental effects of this project had no temporal overlap with the White Pass expansion as the project site has stabilized. Spatially this project does not overlap with the White Pass Study Area, but occurred within the 5th field watershed scale.
UCFC-3a	Palisades Scenic Viewpoint Project	The creation of 0.5 acre of impervious surfaces to reconstruct the scenic overlook indirectly affected fish habitat through alterations to runoff timing and variability over the long-term. Spatially, the project effects occurred outside the White Pass Study Area. The impervious surfaces and associated increase in runoff overlap temporally with the White Pass expansion. This project occurred greater than 300 feet from any perennial stream, therefore no measurable impacts to fish were realized from the increased impervious area and resulting runoff volumes at the 5th field watershed scale.
UCFC-3b	Palisades Scenic Viewpoint Project Vegetation Mgmt	The felling of approximately 1 acre of trees would indirectly affect fish over the short-term through localized decreases in soil permeability and/or increases in detrimental sediment mobilization. These effects would not be measurable at the 5th field watershed scale.
UCFC-4	Mt Rainier/Goat Rocks Scenic Viewpoint	This project will indirectly affect fish habitat over the short-term due to small areas of soil disturbance from installation of fence posts. This project would not overlap spatially with the White Pass Study Area. This project would overlap in time with the White Pass expansion. This project occurs over 300 feet from any perennial stream, therefore no measurable impacts to fish are expected.
UCFC-5	White Pass Wildfire	The wildfire burned approximately 204 acres within the Upper Clear Fork Cowlitz watershed resulting in indirect impacts to fish habitat, water quality, loss of LWD recruitment potential, increased sedimentation, increased nutrient loading and changes in flow likely resulted from the burn. In the eight years following the fire, it is expected that some natural regeneration and stabilization of soils has occurred. This project did not overlap 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 soil productivity at the 5th field watershed scale. With continued revegetation, the potential for long-term effects of this fire will be eliminated.

**Table 3.4-2:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Fisheries**

Project Number	Project Name	Cumulative Effects
UCFC-6	Knuppenberg Lake Bridge Removal	Beneficial, long-term direct impact to fish habitat occurred through the removal of 0.24 acre of impervious surface associated with the bridge footings along the riparian fringe. Long-term project effects would temporally overlap with the White Pass expansion. Spatially, there is no overlap with the White Pass Study Area. Coupled with projects UCFC-10, UCFC-12, UCFC-14 and UCFC-15, the removal of the bridge would improve fish habitat, but would not be measurable at the 5th field scale due to the isolated location of the lake. These projects will partially offset any cumulative effects to fish associated with the White Pass expansion or other projects listed in this table.
UCFC-7	Wilderness Trail Maintenance	Approximately 20.5 miles of trail are maintained every other year, which would directly affect fish over the short-term through periodic water quality effects, including erosion/sedimentation and loss of shade with treating sites in Riparian Reserves along the corridor (i.e., removing downed logs and maintenance of drainage structures) with hand tools. A portion of this project would overlap spatially with the White Pass Study Area (i.e., PCNST in Hogback Basin). Temporally, the effects of annual maintenance work will overlap with the effects of the White Pass expansion. Maintenance would result in an increase in short-term erosion and sediment mobilization along the trail, on a maximum of 7.5 acres. Over the long-term, treatment areas along the trail edge will naturally revegetate, eliminating the short-term erosion/sedimentation and re-establishing shade. The loss of wood recruitment in Riparian Reserves would remain over the long-term. Coupled with other project in this table that reduce wood routing in Riparian Reserves, this project and the White Pass expansion (particularly Modified Alternative 4 and Alternative 9) would cumulatively reduce wood recruitment and establishment of fish habitat.
UCFC-8	Ongoing Road Maintenance	Approximately 9 miles of road surface maintenance occurs every five years. Grading associated with road maintenance would indirectly affect fish and fish habitat over the short-term by the deposition of sediment in the aquatic environment, particularly along Riparian Reserves along the edge of the road surface. This project would not overlap spatially with the White Pass Study Area. Ongoing maintenance activities in the 5th field watershed would overlap in time with the effects of the White Pass expansion, resulting in an increase in short-term sediment deposition in streams at the 5th field watershed scale on up to 46.3 acres. Regular maintenance and revegetation along the road prism will reduce the potential for long-term sediment deposition in streams. Any short-term increase in sediment from this project would not be measurable at the 5th field watershed scale and would be offset by the long-term benefit of the maintenance.
UCFC-10	Clear Fork Trail Puncheon Installation	The installation of puncheon along 0.1 mile (0.07 acre) of braided trail (an existing sediment source) indirectly affected fish habitat by eliminating user trails and reducing the potential for sediment mobilization. Spatially, this project did not overlap with the White Pass Study Area. Coupled with project UCFC-6, the puncheon would improve fish habitat conditions at the 5th field watershed scale. These projects will partially offset the cumulative effects to fish associated with the White Pass expansion.

Table 3.4-2:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UCFC-11	Air Quality Monitoring Building	The creation of 0.02 acre of impervious surfaces for a building directly impacted overland runoff over the long-term. Project effects would temporally and spatially overlap with the effects of the White Pass expansion. In the long-term, this project and the other projects resulting in impervious surfaces (i.e., increase in runoff) listed in this table, contributed to a cumulative increase in surface runoff at the 5th field watershed scale. This project occurs over 300 feet from any perennial stream, therefore no measurable impacts to fish are expected.
UCFC-12	Rockfall Mitigation (between mileposts 143 and 149)	The stabilization of 2.5 acres of unstable talus slopes indirectly affected fish over the short-term by affecting stream habitat due to sediment deposition until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to a loss of fish habitat at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed. This project occurred outside of Riparian Reserves and over 300 feet from any perennial stream, and no measurable impacts to fish occurred within the White Pass Study Area or at the 5th field watershed scale.
UCFC-14	Unstable Slope Repair Projects (between mileposts 145.61 and 145.77)	The repair of 1 acre of unstable slopes will indirectly affect fish over the short-term by affecting stream habitat due to sediment deposition until the slopes are stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects will contribute to a loss of fish habitat at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed. This project will occur outside of Riparian Reserves and over 300 feet from any perennial stream, and no measurable impacts to fish are expected to occur within the White Pass Study Area or at the 5th field watershed scale.
UCFC-15	Unstable Slope Repair Projects (between mileposts 141.8 and 144.4)	The repair of 4.5 acres of unstable slopes will indirectly affect fish over the short-term by affecting stream habitat due to sediment deposition until the slopes are stabilized. Spatially, this project will not overlap with the White Pass Study Area. Temporally, the short-term project effects will contribute to a loss of fish habitat at the 5th field watershed scale. In the long- term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed. This project will occur outside of Riparian Reserves and over 300 feet from any perennial stream, and no measurable impacts to fish will occur within the White Pass Study Area or at the 5th field watershed scale.

Table 3.4-2:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UCFC-16	Highway 12 Hazard Tree Removal	The periodic removal of occasional hazard trees within this 545-acre, 15-mile long corridor will indirectly affect fish over the short-term through periodic water quality effects, including erosion/sedimentation and loss of shade with occasional hazard tree removal in Riparian Reserves along the corridor. A portion of this project would overlap spatially with the White Pass Study Area (i.e., US 12 at White Pass). Temporally, the effects of hazard tree removal will overlap with the effects of the White Pass expansion. Over the long-term, treatment areas along the highway edge will naturally revegetate. The loss of wood recruitment in Riparian Reserves would remain over the long-term. Coupled with other projects in this table that reduce wood routing in Riparian Reserves, this project and the White Pass expansion (particularly Alternative 9) would cumulatively reduce wood recruitment and establishment of fish habitat. However these impacts are not expected to be measurable at the 5th field watershed scale.
UCFC-17	White Pass Ski Area Yurt Construction	Long-term, direct impact to soils resulted from approximately 0.01 acre of new impervious surfaces from construction of the yurt, indirectly affecting fish habitat through alterations to runoff timing and variability over the long-term. Spatially, the effects of this project overlap with the effects of the White Pass expansion. Temporally, the effects of the yurt will overlap with the effects of the White Pass expansion. This project occurred over 300 feet from any perennial stream, therefore no measurable impacts to fish were realized at the 5th field watershed scale.
UCFC-20	Benton Rural Electric Association (REA) Power Line Maintenance	The periodic power line right-of-way maintenance within Riparian Reserves along this 28-acre, 1-mile long corridor could result in fuel or oil contamination in streams, thereby affecting water quality and fish habitat. Power line maintenance will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the power line maintenance will overlap with the effects of the White Pass expansion. Short-term reduced permeability and associated effects on stream channel habitat (changes in timing and duration of flows) will occur in areas immediately under and adjacent to fallen trees and where the use of heavy equipment is required for maintenance. In the long-term, effects to fish habitat from water quality impacts associated with fuel and oil would overlap with the effects of the White Pass expansion and other projects in this table that have the potential to introduce fuel or oil into the watershed.
UCFC-21	White Pass Ski Area Day Lodge Remodel	Grading of 0.25 acre of previously disturbed ground resulted in a short-term increase in sediment mobilization. In addition, the lodge increased the impervious surface associated with the lodge by 0.05 acre, increasing localized runoff. Temporally, the effects of the grading have been stabilized and do not overlap with the effects of the White Pass expansion. Spatially, the effect of the building construction overlaps with the effects of the White Pass expansion. In the long-term, the effects of the impervious surface, in conjunction with the other projects that include impervious surface, contributed to a cumulative reduction in soil permeability at the 5th field watershed scale. This project occurred over 300 feet from any perennial stream, therefore no measurable impacts to fish were realized at the 5th field watershed scale.

Within the White Pass Study Area, the White Pass expansion would contribute to a short-term increase in sediment detachment, which would affect water quality. As described in Section 3.3 – Watershed Resources, sediment delivery to streams is not expected to be measurable with the use of BMPs during construction activities. Projects UCFC 11, 17, 20, and 21 would cumulatively add to an increase in sediment mobilization within the White Pass Study Area, however, as described in Table 3.4-2 the effects are not expected to be measurable with respect to fisheries or aquatic habitat. At the 5th field scale, the projects described in Table 3.4-2 are not expected to have a measurable effect on the sediment regime within the watershed. According to the watershed analysis, the Clear Fork Cowlitz River is relatively undisturbed and assumes the “sediment generation, transport, and storage regime” to reflect near natural conditions (USDA, 1998a).

At the site scale, implementation of the White Pass expansion would contribute to a long-term loss of LWD recruitment through construction activities that occur within Riparian Reserves. A maximum of 5.8 percent of the White Pass Study Area Riparian Reserves would experience cumulative impacts from the White Pass expansion and other projects. Projects UCFC 5, 7, and 16 would contribute to the cumulative loss of LWD recruitment within the 5th field scale. Less than two percent of the 5th field Riparian Reserve area would be impacted. However, as described in Table 3.4-2, these projects would result in isolated tree removal within Riparian Reserves, and would therefore not have a measurable effect to fish or aquatic habitat at the 5th field.

As described in the watershed analysis, sediment delivery within the watershed from management related events is slightly above background levels but well within range of natural variability (USDA 1998a). The watershed analysis further documents that the Riparian Reserves are functioning properly within the watershed (USDA 1998a). The amount of LWD is abundant within the lower watershed (USDA 1998a). Furthermore, stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds (USDA 1998a). Overall, fish habitat is expected to remain stable with respect to these parameters as described in the watershed analysis. Therefore, the combined cumulative effects to fish habitat is not expected to measurable, and the 5th field would continue to function adequately with respect to these parameters.

Table 3.4-3 summarizes the cumulative impacts of White Pass projects combined with projects not associated with the White Pass expansion within the Upper Clear Fork Cowlitz watershed at the site scale and 5th field scale.

Table 3.4-3
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed on Fisheries

Impact Type[a]	Alt. 1		Alt. 2		Mod. Alt. 4		Alt. 6		Alt. 9	
	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]
White Pass Study Area Scale										
White Pass Projects	0.00	0.00	17.70	4.48	22.22	5.62	10.70	2.71	4.10	1.04
Projects Not Associated with the White Pass Expansion	0.25	0.06	0.25	0.06	0.25	0.06	0.25	0.06	0.25	0.06
Cumulative Impacts	**0.25**	**0.06**	**17.95**	**4.54**	**22.47**	**5.68**	**10.95**	**2.77**	**4.35**	**1.10**
Fifth Field Scale										
White Pass Projects	0.00	0.00	17.70	0.07	22.22	0.08	10.70	0.04	4.10	0.02
Projects Not Associated with the White Pass Expansion	300.76	1.13	300.76	1.13	300.76	1.13	300.76	1.13	300.76	1.13
Cumulative Impacts	**300.76**	**1.13**	**318.46**	**1.19**	**322.98**	**1.21**	**311.46**	**1.17**	**304.86**	**1.14**

[a] Only impacts that occur within Riparian Reserves are counted in this analysis. They include clearing and grading, new impervious surfaces, and utility trenching. Projects that occur within Riparian Reserves are more likely to impact fisheries resources because of the proximity of the actions to the waters in comparison to activities that have no relation to waters.
[b] Percent of Scale is the percentage of Riparian Reserves impacted in the White Pass Study Area and in the fifth field watershed. The total Riparian Reserves area within the White Pass Study Area is 395.3 acres, and 26,715 acres in the 5th field.

3.4.4.2 Upper Tieton River Watershed

A list of all projects occurring within the Upper Tieton River watersheds is presented in Table 3.4-4.

Table 3.4-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UT-2	White Pass Ski Area Sewer Line Replacement	Approximately 0.73 acre of grading will occur from the excavation of the trench, resulting in potential for erosion/sediment deposition and degradation of fish habitat in the short-term. 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 fishery resources are expected because the disturbed soil areas will be immediately stabilized after construction. Combined with other projects identified in this table, this project would add to an increase in short-term sediment deposition and degradation of fish habitat within and outside the White Pass Study Area within the 5th field watershed.
UT-3	White Pass Ski Area Generator Shed and Propane Tank	The installation of 0.004 acre of impervious surfaces to build the shed and install the tank indirectly affected fish habitat through alterations to runoff timing and variability over the long-term. Spatially, the project effects occurred within the White Pass Study Area. The impervious surfaces and associated increase in runoff overlap temporally with the White Pass expansion. This project occurred greater than 300 feet from any perennial stream, therefore no measurable impacts to fish were realized from the increased impervious area and resulting runoff volumes at the 5th field watershed scale.
UT-4	White Pass Ski Area Relocation of Chair 3 and Platter Lift	The installation of 0.01 acre of impervious surfaces to build the lifts indirectly affected fish habitat though alterations to runoff timing and variability over the long-term. Any short-term effects related to ground disturbance have decreased because the site has stabilized. Spatially, the project effects occurred within the White Pass Study Area. The impervious surfaces and associated increase in runoff overlap temporally with the White Pass expansion. This project occurred greater than 300 feet from any perennial stream, therefore no measurable impacts to fish were realized from the increased impervious area and resulting runoff volumes at the 5th field watershed scale.
UT-5	US Cellular Tower	The installation of 0.004 acre of impervious surfaces (tower footing) to build a cell tower indirectly affected fish habitat through alterations to runoff timing and variability over the long-term. Spatially, the effects of this project occurred within the White Pass Study Area. Temporally, alterations to runoff characteristics will overlap with the effect of the White Pass expansion in the long-term. This project occurred over 300 feet from any perennial stream, therefore no measurable impacts to fish were realized at the 5th field watershed scale.

Table 3.4-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UT-6	White Pass Ski Area Restaurant/Condo Conversion	A restaurant building that occupied 0.25 acre was demolished and a new building was constructed on the original building site, including additional sidewalks, resulting in an increase of 0.01 acre of impervious surface, indirectly affecting fish habitat through alterations to runoff timing and variability over the long-term. Spatially and temporally, the effects of the building overlap with the effects of the White Pass expansion. This project occurred over 300 feet from any perennial stream, therefore no measurable impacts to fish were realized at the 5th field watershed scale.
UT-7	White Pass Ski Area Cross Country Yurt	Approximately 0.25 acre of grading took place in a previously disturbed area (parking lot) resulting in approximately 0.02 acre of new impervious surfaces from the yurt and infrastructure. The addition of impervious surfaces indirectly affected fish habitat through alterations to runoff timing and variability over the long-term. Spatially, the effects of this project overlap with the effects of the White Pass expansion. Temporally, the effects of the yurt will overlap with the effects of the White Pass expansion. In the short-term, the disturbed soil and associated erosion/sediment deposition potential has been stabilized and returned to use as a parking lot. This project occurred over 300 feet from any perennial stream, therefore no measurable impacts to fish were realized at the 5th field watershed scale.
UT-8	White Pass Ski Area Manager's Cabin	Approximately 0.25 acre of ground was cleared and graded resulting in short-term potential for erosion/sediment deposition. The construction of the cabin resulted in 0.04 acre of impervious surfaces and indirectly affecting fish habitat through alterations to runoff timing and variability over the long-term. The graded areas have been stabilized. Spatially, the effects of this project occurred within the White Pass Study Area. Temporally, the short-term erosion/sediment deposition potential has been stabilized and therefore does not overlap with the effects of the White Pass expansion. The long-term loss of soil permeability and associated runoff effects will overlap with the effects of the White Pass expansion in the White Pass Study Area. This project occurred over 300 feet from any perennial stream, therefore no measurable impacts to fish were realized at the 5th field watershed scale.
UT-9	White Pass Ski Area Manager's Office	Approximately 0.25 acre of previously disturbed ground was graded, creating short-term potential for erosion/sediment deposition. The conversion of 0.03 acre to impervious surface indirectly affected fish habitat through alterations to runoff timing and variability over the long-term. Spatially, the effects of this project occurred within the White Pass Study Area. Temporally, the short-term erosion/sediment deposition potential has been stabilized and therefore does not overlap with the effects of the White Pass expansion. The long-term effect of the impervious surface on runoff will overlap with the effects of the White Pass expansion in the White Pass Study Area. This project occurred over 300 feet from any perennial stream, therefore no measurable impacts to fish were realized at the 5th field watershed scale. Implementation of this project would not overlap in time with the proposed White Pass expansion, but did occur within the White Pass Study Area.

Table 3.4-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UT-10	Dog Lake Campground/Four Trailhead Reconstruction	The reconstruction of the Dog Lake Campground and four trailheads indirectly affected fish habitat due to approximately 5 acres of grading, resulting in the potential for soil erosion/sediment deposition in Riparian Reserves. This project does not overlap spatially with the White Pass Study Area. It is expected that the site will be stabilized immediately, but that the short-term erosion/sediment deposition effects will overlap with the effects of the White Pass expansion and other projects in this table that include the potential for effects to fish habitat due to sediment deposition as the site becomes revegetated and stable. No long-term effects are anticipated. The project includes traffic control and areas of revegetation which would aid in decreasing erosion and sediment deposition in Riparian Reserves that are currently present at the site.
UT-11	Clear Creek Overlook Reconstruction	The reconstruction of the Clear Creek Overlook will indirectly affect fish habitat over the short-term due to approximately 1 acre of grading on previously disturbed soils. Creation of 0.1 acre of additional impervious surface will directly impact runoff volumes over the long-term. There is no spatial overlap with the White Pass Study Area. The short-term erosion/sediment deposition effects associated with grading are expected to be stabilized immediately. Long-term project effects associated with the new impervious surfaces (i.e., increased runoff) will temporally overlap with the effects of the White Pass expansion. This project occurs over 300 feet from any perennial stream, therefore no measurable impacts to fish are expected at the 5th field watershed scale.
UT-14	Dog Lake Eurasion Water Milfoil Control Project	The removal of water milfoil from approximately 3 acres of the lake will impact fish. The presence of people in the water would indirectly impact fish by changing the foraging behavior. Removal operations would likely result in short-term increases in turbidity. As milfoil control would be ongoing, it is expected to overlap in time with the White Pass expansion. However, since Dog Lake is located outside the White Pass Study Area and the White Pass expansion is not expected to impact fish, there would be no overlap in the White Pass Study Area.
UT-16	Trail 1106 Water Crossing	Re-construction or rerouting of the crossing (with hand tools) would likely result in a short-term increase in sediment deposition potential on up to 0.1 acre in Riparian Reserves. Any abandoned trail segment would be disguised and allowed to revegetate, thereby reducing erosion potential as the abandoned trail revegetates. This project does not overlap spatially with the White Pass Study Area. It is expected that the site will be stabilized immediately, but that the short-term erosion effects to fish habitat will overlap at the 5th field watershed scale with the effects of the White Pass expansion and other projects in this table that include increased sediment deposition potential, as the site becomes revegetated and stable. No long-term effects are anticipated.

Table 3.4-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UT-18	Benton Rural Electric Association (REA) Power line Maintenance	The periodic power line right-of-way maintenance within Riparian Reserves along this 223-acre, 8-mile long corridor could result in fuel or oil contamination in streams, thereby affecting water quality and fish habitat. Power line maintenance will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. Temporally, the effects of the power line maintenance will overlap with the effects of the White Pass expansion. Short-term reduced permeability and associated effects of stream channel habitat (changes in timing and duration of flows) will occur in areas immediately under and adjacent to fallen trees and where the use of heavy equipment is required for maintenance. In the long-term, effects to fish habitat from water quality impacts associated with fuel and oil would overlap with the effects of the White Pass expansion and other projects in this table that have the potential to introduce fuel or oil into the White Pass Study Area and the 5th field watershed.
UT-19	Highway 12 Hazard Tree Removal	The periodic removal of occasional hazard trees within this 509-acre, 14-mile long corridor will indirectly affect fish over the short-term through periodic water quality effects, including erosion/sedimentation and loss of shade with occasional hazard tree removal in Riparian Reserves along the corridor. A portion of this project would overlap spatially with the White Pass Study Area (i.e., US 12 at White Pass). Temporally, the effects of hazard tree removal will overlap with the effects of the White Pass expansion. Over the long-term, treatment areas along the highway edge will naturally revegetate. The loss of wood recruitment in Riparian Reserves would remain over the long-term. Coupled with other project in this table that reduce wood routing in Riparian Reserves, this project and the White Pass expansion (particularly Alternative 9) would cumulatively reduce wood recruitment and establishment of fish habitat. However these impacts are not expected to be measurable at the 5th field watershed scale.
UT-20	Clear Lake Recreation Projects	Construction of the access road and other site improvements over approximately 2 acres would directly affect fish. Short-term water quality impacts from erosion/sedimentation will occur during construction. Spatially, this project occurs outside the White Pass Study Area. Temporally, the long-term increase in surface runoff associated with remaining impervious surfaces will overlap with the effects of the White Pass expansion. In the long-term, this project's contribution to increased runoff is not expected to affect fish in Clear Lake.
UT-21	Fish Hawk/Spillway Campground Improvements	Construction of CXT toilet and access road directly impacted approximately 1 acre of soils. Short-term erosion and sediment effects occurred during construction, but the site has since stabilized, eliminating the short-term effect. Spatially, this project occurred outside the White Pass Study Area. Temporally, the long-term loss of soil permeability associated with remaining impervious surfaces associated with the toilet (less than 500 square feet) will overlap with the effects of the White Pass expansion. Combined with the other projects identified in this table, in the long-term, this project contributed to a cumulative alterations to stream flow and associated fish habitat at the 5th field watershed scale due to the displacement of soil by impervious surfaces.

Table 3.4-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UT-23	System Trail Maintenance	Approximately 48.5 miles of trail are maintained every other year, which would directly affect fish over the short-term through periodic water quality effects, including periodic water quality effects from erosion/sedimentation and loss of shade with treating sites in Riparian Reserves along the corridor (i.e., removing downed logs and maintenance of drainage structures) with hand tools. A portion of this project would overlap spatially with the White Pass Study Area (i.e., PCNST at White Pass). Temporally, the effects of annual maintenance work will overlap with the effects of the White Pass expansion. Maintenance would result in an increase in short-term erosion and sediment mobilization along the trail, on a maximum of 36 acres. Over the long-term, treatment areas along the trail edge will naturally revegetate, eliminating the short-term erosion/sedimentation and re-establishing shade. The loss of wood recruitment in Riparian Reserves would remain over the long-term. Coupled with other project in this table that reduce wood routing in Riparian Reserves, this project and the White Pass expansion (particularly Alternative 9) would cumulatively reduce wood recruitment and establishment of fish habitat.
UT-24	Snoqueen Mine	Over the past decade, active operations have been confined to a limited season during the summer. Mining operations would result in short- and long-term impacts to soils due to grading, which is not stabilized (i.e., reclaimed). Spatially, the mine does not overlap with the White Pass Study Area. Temporally, increased erosion/sedimentation effects have overlapped and will continue to overlap in time. In the short-and long-term, the erosion and sedimentation effects will overlap with the effects of the White Pass expansion and other projects in this table that include detrimental soil conditions. This project occurs over 300 feet from a perennial stream, therefore no measurable impacts to fish are realized at the 5th field watershed scale.
UT-26	Highway 12 Rock Stabilization (at Mile Post 155)	The stabilization of 1 acre of unstable talus slopes will indirectly affect fish resources over the short-term by providing potential for erosion and sedimentation until the slopes are stabilized. Spatially, this project does not overlap with the White Pass Study Area. Temporally, the short-term project effects will contribute to a loss of soil productivity at the 5th field watershed scale. In the long- term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the erosion and sediment regime in the 5th field watershed. This project occurs outside of 300 feet of a perennial stream, therefore no measurable impacts to fish are expected at the 5th field watershed scale.

Table 3.4-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UT-27	Highway 12 Rock Stabilization (at Mile Post 155)	The stabilization of 0.5 acre of unstable talus slopes in 2002 indirectly affected fish over the short-term by affecting stream habitat due to sediment deposition until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to a loss of fish habitat at the 5th field watershed scale. In the long- term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime in the 5th field watershed. This project occurred outside of Riparian Reserves and over 300 feet from any perennial stream, and no measurable impacts to fish occurred within the White Pass Study Area or at the 5th field watershed scale.
UT-28	Camp Prime Time Accessible Trail, Wagon Ride Route and Tree House	Construction of the trail will result in short-term potential for fish habitat effects due to erosion and sediment mobilization on up to 3 acres. Depending on the surfacing used for the trail, it could create additional impervious surfaces, resulting in increased runoff. Spatially, this project does not overlap with the White Pass Study Area. Temporally, the short-term erosion/sediment effects associated with the project are expected to overlap with the White Pass expansion. The long-term increase in runoff will overlap with the effects of the White Pass expansion in the White Pass Study Area. This project occurs over 300 feet from any perennial stream, therefore no measurable impacts to fish are expected at the 5th field watershed scale.
UT-29	Clear Lake Boat Launch Heavy Maintenance	Maintenance of the boat launch will result in short-term effects to fish habitat associated with sediment mobilization on less than 1 acre during placement of more secure foundations for the access dock. Ground vibration associated with operating equipment will disturb fish in the vicinity of the project area during the short-term. Spatially, this project does not overlap with the White Pass Study Area. Temporally, the short-term fish habitat/disturbance effects are expected to be immediately stabilized, and therefore not to overlap with the White Pass expansion.
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	The replacement of an existing cell tower and building addition will result in a short-term increase in local sediment mobilization during construction on up to 0.3 acre. Spatially, this project overlaps with the White Pass Study Area. Temporally, the short-term sediment mobilization associated with the project will overlap with the White Pass expansion and other projects in this table that cause detrimental soil conditions. The long-term loss of soil permeability (i.e., increased surface runoff) will result from 0.1 acre of impervious surface associated with the cell tower and building addition. The runoff effects will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative increase in runoff at the 5th field watershed scale due to the displacement of soil (i.e., loss of productivity) by impervious surfaces. This project occurs outside of 300 feet of a perennial stream, therefore no measurable impacts to fish are expected at the 5th field watershed scale.

Table 3.4-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Fisheries

Project Number	Project Name	Cumulative Effects
UT-32	Camp Site Maintenance	The periodic removal of occasional hazard trees within developed sites will indirectly affect fish over the short-term through periodic water quality effects, including erosion/sedimentation and loss of shade due to tree removal in Riparian Reserves. A portion of this project would overlap spatially with the White Pass Study Area. Temporally, the effects of hazard tree removal will overlap with the effects of the White Pass expansion. The loss of wood recruitment in Riparian Reserves would remain over the long-term. Coupled with other projects in this table that reduce wood routing in Riparian Reserves, this project and the White Pass expansion (particularly Alternative 9) would cumulatively reduce wood recruitment and establishment of fish habitat. However, these impacts are not expected to be measurable at the 5th field watershed scale. Other maintenance activities are not expected to result in effects to fisheries.
UT-34	Unstable Slope Repair Projects (between Mile Posts 156.32 and 156.56)	The stabilization of approximately 4 acres of unstable talus slopes indirectly affected fish over the short-term by creating erosion and sedimentation until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to increased runoff (due to hardened surfaces) at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime, thereby reducing sediment effects on fish habitat in the 5th field watershed. This project occurs over 300 feet from any perennial stream, therefore no measurable impacts to fish are expected at the 5th field watershed scale.
UT-35	Unstable Slope Repair Projects (between Mile Posts 161.93 and 165.02)	The stabilization of approximately 0.53 acres of unstable talus slopes indirectly affected fish over the short-term by creating erosion and sedimentation until the slopes were stabilized. Spatially, this project did not overlap with the White Pass Study Area. Temporally, the short-term project effects contributed to increased runoff (due to hardened surfaces) at the 5th field watershed scale. In the long-term, slope stabilization associated with this project and other slope stabilization/rockfall mitigation projects in this table will improve the sediment regime, thereby reducing sediment effects on fish habitat in the 5th field watershed. This project occurs over 300 feet from any perennial stream, therefore no measurable impacts to fish are expected at the 5th field watershed scale.

Within the White Pass Study Area, the White Pass expansion would contribute to a short-term increase in sediment detachment, which could affect water quality. As described in Section 3.3 – Watershed Resources, sediment delivery to streams is not expected to be measurable with the use of BMPs during construction activities. Projects described in Table 3.4-4 would cumulatively add to an increase in sediment mobilization within the White Pass Study Area and 5th field scale, however, as described in Table 3.4-4 the effects on the sediment regime are not expected to be measurable in terms of fish habitat.

At the site scale, implementation of the White Pass expansion would contribute to a long-term loss of LWD recruitment through construction activities that occur within Riparian Reserves. Project UT12 would contribute cumulatively to the loss of LWD recruitment at the site scale. A maximum of 17.6 percent of the White Pass Study Area Riparian Reserves would be impacted. Projects UT 23 and 32 would cumulatively add to the loss of LWD recruitment within the 5th field scale. Less than two percent of the 5th field Riparian Reserve area would be impacted. However, as described in Table 3.4-2, these projects would result in isolated tree removal within Riparian Reserves, and would therefore not have a measurable effect to fish or other aquatic habitat at the 5th field.

As described in the watershed analysis, there is little data for the Upper Tieton River describing existing sediment delivery from roads and previous management activities. The watershed analysis further documents that the watershed is functioning adequately with respect to sediment, Riparian Reserves, and stream channels (USDA 1998b). The amount of LWD in streams within the watershed is typically at natural levels (USDA 1998b). Overall, the combined cumulative impact to fish habitat is not expected to be measurable, and the 5th field would continue to function adequately with respect to these parameters.

Table 3.4-5 summarizes the cumulative impacts of White Pass projects combined with projects not associated with the White Pass expansion within the Upper Tieton watershed at the site scale and 5th field scale.

Table 3.4-5:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Fisheries

Impact Type[a]	Alt. 1		Alt. 2		Mod. Alt. 4		Alt. 6		Alt. 9	
	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]	Area (ac.)	Percent of Scale (%)[b]
White Pass Study Area Scale										
White Pass Projects	0.00	0.00	0.00	0.00	3.60	1.52	1.90	0.80	20.30	8.57
Projects Not Associated with the White Pass Expansion	20.13	8.49	20.13	8.49	20.13	8.49	20.13	8.49	20.13	8.49
Cumulative Impacts	**20.13**	**8.49**	**20.13**	**8.49**	**23.73**	**10.01**	**22.03**	**9.30**	**40.43**	**17.06**
Fifth Field Scale										
White Pass Projects	0.00	0.00	0.00	0.00	3.60	0.02	1.90	0.01	20.30	0.11
Projects Not Associated with the White Pass Expansion	322.01	1.80	322.01	1.80	322.01	1.80	322.01	1.80	322.01	1.80
Cumulative Impacts	**322.01**	**1.80**	**322.01**	**1.80**	**325.61**	**1.82**	**323.91**	**1.82**	**342.31**	**1.92**

[a] Only impacts that occur within Riparian Reserves are counted in this analysis. They include clearing and grading, new impervious surfaces, and utility trenching. Projects that occur within Riparian Reserves are more likely to impact streams, wetlands, water quality and flow regime because of the proximity of the actions to the watershed resources in comparison to activities that have no relation to waters.
[b] Percent of Scale is the percentage of Riparian Reserves impacted in the White Pass Study Area and in the fifth field watershed.

3.5 VEGETATION

This section describes the vegetation communities, the occurrences of special-status plant species, and noxious weeds within the White Pass Study Area. This section is divided into two main parts; Affected Environment and Environmental Consequences. The Affected Environment contains descriptions of the existing conditions within the White Pass Study Area, defined as the existing SUP boundary and the proposed SUP expansion area. The Environmental Consequences analyzes the potential impacts to the vegetation communities, special status species, and noxious weeds as a result of the implementation of the No Action and Action Alternatives.

3.5.1 Introduction

The White Pass Study Area lies within the Cascade Mountains and is located on US 12 approximately 55 miles west of Yakima, Washington. The White Pass Study Area is within the boundaries of the GPNF and OWNF. Both the Upper Tieton and Upper Clear Fork Cowlitz River watersheds occur in the White Pass Study Area.

Biologists and other specialists conducted field surveys within the White Pass Study Area, reviewed literature, interpreted color aerial photographs, and contacted state and federal resource agencies to accumulate information on vegetation resources. Resources consulted include the Clear Fork Cowlitz River Watershed Analysis (USDA 1998a) and Upper Tieton River Watershed Analysis (USDA 1998b), the Botanical Report for the 2003 Proposed White Pass Ski Area Expansion Project (USFS 2003a), Okanogan and Wenatchee National Forests Weed Management and Prevention Strategy and Best Management Practices (USFS 2002b), the Record of Decision for the Pacific Northwest Region Invasive Plants Program – Preventing and Managing Invasive Plants (USDA 2005) the Wetland and Stream Survey for the White Pass Proposal (SE Group 2004), and other documents as referenced in the text.

The USFS has conducted numerous field surveys for sensitive plant species within the White Pass Study Area between 1987 and 2004 (refer to Table 3.5 FEIS1).

Table 3.5 FEIS1:
USFS Field Surveys for Sensitive Plant Species within the White Pass Study Area 1987-2004

Date	Report Title	Authors
1987	Report of Plant Survey at White Pass Expansion Area	Barker
1991	Biological Evaluation, Proposed Endangered, Threatened and Sensitive Plant Species for the White Pass Waste Water Disposal	Engle
1992	Biological Evaluation, Proposed Endangered, Threatened and Sensitive Plant Species for the Proposed White Pass Ski Area Expansion, Glade North of Chairlift 4 and Route of Chairlift 8	Parsons and Engle
1993	Biological Evaluation, Proposed Endangered, Threatened and Sensitive Plant Species for the Proposed White Pass Ski Area Projects – 1992	Parsons and Engle

Table 3.5 FEIS1:
USFS Field Surveys for Sensitive Plant Species within the White Pass Study Area 1987-2004

Date	Report Title	Authors
1994	Biological Evaluation, Proposed Endangered, Threatened and Sensitive Plant Species for the Replacement of Chairlift #1 – White Pass Ski Area	Parsons and Engle
1995a	Biological Evaluation, Proposed Endangered, Threatened and Sensitive Plant Species for the Proposed White Pass Ski Area Expansion, Cat Track, Mainstreet Extension, Old Holiday	Massie
1995b	Biological Evaluation, Proposed Endangered, Threatened and Sensitive Plant Species for the Proposed White Pass Ski Area Expansion, Cross-Country Ski Trail System	Massie
1999	Survey and Manage Bryophyte, Lichen, Fungi, and Vascular Plant Evaluation for the Proposed White Pass Ski Area	Leingang
2000	Botanical Evaluation for Chair #3 Lift Line, Ski Run, Tower Locations, and the Propane site, and the Generator Shed site	Wheeler
2002	White Pass Proposed Yurt Site, Botanical Analysis Results	Ianni
2003a	Botanical Report for the Proposed Halfpipe Construction Project at White Pass Ski Area	Ianni
2003b	Botanical Report for the Proposed 2003 White Pass Ski Area Expansion Project	Ianni
2005	Botanical Report for the Proposed Dog Lake Campground and White Pass Pacific Crest Trail (PCT) Trailheads Maintenance and Expansion Project.	Ianni

Vegetation management within the existing ski area is typically accomplished through routine maintenance operations and Master Development Plan project elements. Proposed management direction activities for vegetation are included in the Mitigation Measures, Management Requirements, and Other Management Provisions as described in Chapter 2 (refer to Tables 2.4-2 through 2.4-4). The Mitigation Measures, Management Requirements and Other Management Provisions provide guidance for the long-term management of vegetation in the White Pass Study Area and identify measures for managing vegetation in existing ski trails and around supporting ski facilities and infrastructure. Direction from these measures would also be used for vegetation management during project implementation.

3.5.2 Affected Environment

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. Descriptions of the vegetation communities within the White Pass Study Area are presented in this section. In an effort to present a detailed description of these vegetation communities, a brief discussion of forest structural components, such as canopy layers and canopy cover, has been included. Additional information regarding vegetation within the White Pass Study Area can be found in Appendix G – Vegetation.

The vegetation community and 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

EIS 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. Please refer to Section 3.6 – Wildlife for additional information on wildlife habitat within the White Pass Study Area.

No significant issues regarding vegetation communities within the White Pass Study Area have been identified. The issues relating to vegetation during public scoping and the DEIS process were identified in the context of wildlife habitat and are discussed in Section 3.6 – Wildlife. The discussion of the vegetation communities is included in this FEIS to establish characteristics of the existing wildlife habitat present within the White Pass Study Area as well as provide general baseline environmental conditions to assist the reader in understanding the expansion area setting and the context of the Proposed Action. The discussion of wildlife usage of the habitat types present within the White Pass Study Area can be found in Section 3.6 – Wildlife.

3.5.2.1 Existing Vegetation Communities

Vegetation communities were divided into specific cover types by species composition and age classification. The age class did not play a major factor in determining vegetation communities due to the even distribution of age classes throughout the White Pass Study Area according to GIS data. Only a small portion (7.8 acres, 0.005 percent) of the White Pass Study Area is in an early seral condition. These are the small tree islands located within existing ski trails below the cliff band. The rest of the forested communities are in a late seral condition (1,235.8 acres, 78.6 percent of the White Pass Study Area). The eastern portion of the SUP area contains forest stands that exhibit old-growth forest characteristics; i.e., large trees, multi-storied, closed canopy, standing snags, etc. However, according to GIS data, no official old-growth stands have been designated within the White Pass Study Area.[27] The existing forested and non-forested vegetation communities within the White Pass Study Area are described below (refer to Table 3.5-1). The percent cover column in the table represents the portion of the White Pass Study Area covered by that vegetation type. The distribution of various vegetation communities is displayed in Figure 3-31.

Within the White Pass Study Area, the mixed conifer forest dominates at lower elevations within the area of existing ski operations. Mountain hemlock parkland forests dominate the higher elevations and a majority of the proposed expansion area.

[27] Late seral forests do not necessarily qualify as 'old growth'. In order for a forest to be officially classified 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, several forest stands within the existing ski area contain some old growth characteristics.

Table 3.5-1:
Existing Vegetation Communities within the White Pass Study Area

Type	Total Acres	Percent of Total White Pass Study Area
Mixed Conifer	528.5	34%
Mountain Hemlock	58.8	4%
Mountain Hemlock Parkland	654.4	42%
Modified Herbaceous	213.1	14%
Rock/Talus	52.5	3%
Total[a]	**1507.2**	**96%**

[a] The total vegetation cover does not equal the White Pass Study Area (1,572 acres) due to approximately 36 acres of developed and 26.8 acres of open water, both of which are not considered to be vegetated.

Within the Okanogan-Wenatchee National Forests, spruce budworm infestations have impacted approximately 51,000 acres within the Naches Ranger District through defoliation and seed cone depletion (USDA 2003a). Spruce budworm is an extensive problem within the forest and primarily affects Douglas-fir (*Pseudotsuga menziesi*), grand fir (*Abies grandis*), subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii)* Pacific silver fir (*Abies amabillis*), mountain hemlock (*Tsuga mertensiana*), and western hemlock (*Tsuga heterophylla*). While spruce budworm is considered to be a problem in the OWNF, it is not analyzed in this EIS because it has not been identified as a problem within the White Pass Study Area.

Mixed Conifer Forest

The mixed conifer forest generally occurs below an elevation of 5,000 feet. This community is characterized by the co-dominance of mountain hemlock (*Tsuga mertensiana*) and Pacific silver fir (*Abies amabilis*). Within the White Pass Study Area, mixed conifer forest covers approximately 528.5 acres (34 percent) and is evenly split between the Upper Clear Fork Cowlitz and Upper Tieton River watersheds. Mountain hemlock and Pacific silver fir are known to overlap and generally co-dominate the forest community in this elevation range (USDA 1998b). Generally, mountain hemlock dominates at slightly higher elevations, whereas Pacific silver fir dominates at lower elevations. Additionally, western hemlock (*Tsuga heterophylla*), Alaska yellow cedar (*Chamaecyparis nootkatensis*), and Engelmann spruce (*Picea engelmanii*) are scattered throughout this community. Understory vegetation consist of saplings of the above named species in addition to other shrub and herbaceous vegetation. The shrub community typically consists of big huckleberry (*Vaccinium membranaceum*), western prince's pine (*Chimaphila umbellata* var. *occidentalis*), low huckleberry (*Vaccinium myrtillus*), beargrass (*Xerophyllum tenax*), dwarf bramble (*Rubus lasiococcus*), and sidebells pyrola (*Pyrola secunda*), among others. The herbaceous vegetation consists of western rattlesnake plantain (*Goodyera oblongifolia*) and various mosses.

Mountain Hemlock

The mountain hemlock dominated forest community generally occurs within the western portion of the White Pass Study Area at elevations ranging from 3,000 to 4,500 feet (USDA 1998a). It is similar to the mixed conifer forest described previously, except that mountain hemlock dominates the canopy throughout. The understory vegetation in this community is similar to the mixed conifer forest due to the closed canopy in both forests. This community covers approximately 58.8 acres (4 percent) and occurs entirely within the Upper Clear Fork Cowlitz watershed.

Mountain Hemlock Parkland

The mountain hemlock parkland community is located in a subalpine setting, typically between elevations of 5,000 and 6,000 feet in the southern portion of the White Pass Study Area. It is characterized by open, slow-growing mountain hemlock with scattered subalpine fir (*Abies lasiocarpa*) and Alaska yellow cedar, whitebark pine, and Pacific silver fir. Based on visual observations during field surveys, trees generally grow in scattered clumps on randomly distributed hummocks and minor ridges in the terrain. Tree growth within this community is also limited by the climatic conditions, such as heavy snow and ice accumulations, high winds, and a relatively short growing season. Understory and open area vegetation includes sedge species (*Carex spp*.), red mountain heath (*Phyllodoce empetriformis*), Cascade huckleberry (*Vaccinium deliciosum*), big huckleberry, grouse huckleberry (*Vaccinium scoparium*) and smooth woodrush (*Luzula hitchockii*). Within the White Pass Study Area, mountain hemlock parkland covers approximately 654.4 acres (42 percent) and is located almost entirely within the Upper Clear Fork Cowlitz watershed.

Tree Age

An estimate of the age of the trees within the expansion area was taken from a sample of 50 trees, at different elevations. An increment borer was used to obtain a core sample with minimal damage to the tree. All cores were prepared and an age was determined by counting the number of annual rings from the tree center to the bark. The average age of the expansion area is approximately 127 years with a standard deviation of 68 years.

Modified Herbaceous

Existing ski trails within the White Pass Ski Area were cleared between 1956 and 1959 and are maintained in an open condition with a modified grass and forb community. As such, modified herbaceous is the only modified vegetation community within the White Pass Study Area. It covers approximately 213.1 acres (14 percent) of the White Pass Study Area. Of this, slightly more occurs within the Upper Tieton River watershed, approximately 116.8 acres. Typically shrubs are observed in scattered clumps in this community, but are not common enough to be considered a unique strata (i.e., greater than 11 percent cover).

Rock/Talus

Rock outcrops, talus slopes, and other high-elevation rock areas within the White Pass Study Area are sparsely vegetated. These areas are considered as part of the vegetated landscape due to the unique growing conditions and wildlife habitat provided by these areas. Overall, rock/talus areas encompass approximately 52.5 acres (3 percent) of the White Pass Study Area, with most of it occurring within the Upper Clear Fork Cowlitz watershed.

3.5.2.2 Existing Forest Structure

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 FEIS2.

Table 3.5 FEIS2:
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 FEIS3.

Table 3.5 FEIS3:
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 White Pass Study Area (refer to Figure 3-35 Existing Forest Canopy Structure). Table 3.5-2 summarizes the forest canopy structure currently present in the White Pass Study Area. In general, there are no large tree classifications present within the White Pass Study Area.[28] Additional information regarding the forest structure can be found in the *White Pass Vegetation Technical Report and Biological Evaluation* in Appendix G.

Table 3.5-2:
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%**

3.5.2.3 PETS, Survey and Manage Species, and Surveys Conducted

Special-status plant species include those plants listed as Proposed, Endangered, or Threatened under the federal Endangered Species Act, USFS Survey and Manage species (2001), and plants listed on the USFS Region 6 sensitive species list (USFS 2004b). An initial survey and inventory of the vegetation species present in the Hogback Ridge portion of the White Pass Study Area was completed in June and July 1987 (Barker 1987). As described previously, twelve subsequent special-status plant surveys were conducted by the USFS at White Pass between 1987 and 2004 within the White Pass Study Area in areas most likely to be disturbed by the proposed project (USFS 2003c). Individual survey reports have been included in the References section (refer to Chapter 4) of this document and a summary of these surveys is included in Appendix G. Survey methods followed the approved USFS protocol for sensitive plants and 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.

[28] 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.

PETS (Proposed, Endangered, Threatened or Sensitive) plant species suspected to occur due to the presence of potentially suitable habitat within the White Pass Study Area are listed in Table 3.5-3. None of these species have been located during the numerous botanical surveys completed at White Pass (Barker 1987; USFS 2003c). Since no populations of special-status species have been encountered during extensive surveys between 1987 and 2004, the risk of disturbing PETS species in the White Pass Study Area is considered to be low.

Table 3.5-3:
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 3.5-3:
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
Schistostega pennata	Survey and Manage	Yes	Yes
Clavariadelphus sachalinensis	Survey and Manage	Yes	Yes
Bryophytes			
Schistostega pennata	Survey and Manage/ USFS Sensitive	Yes	Yes
Scouleria marginata	USFS Sensitive	Yes	Yes
Tetraphis geniculata	Survey and Manage/ USFS Sensitive	Yes	No

Changes to Survey and Manage Species

In March 2004, the Record of Decision (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 (USDA and USDI 2004b) was issued. The ROD determined that conservation of rare and little known species on National Forest System lands would rely on other elements of the Northwest Forest Plan (NWFP) and Forest Service Sensitive Species Policies. The ROD also determined that 152 of the 296 Survey and Manage species were eligible for inclusion in Special Status Species Programs (including the Sensitive Species Program). With respect to surveys already completed at the time of issuance of the 2004 ROD, it specified that no additional survey work was required for projects that fully complied with the former Survey and Manage Standards and Guidelines.

At the issuance of the April 2004 ROD (USDA and USDI 2004b), the White Pass Proposal project had fully complied with all of the previously required Survey and Manage Mitigation Measure Standards and Guidelines. Documentation of surveys for all Special Status Species, including all the species formerly listed as Survey and Manage (but no longer listed) is in the project files. The USFS conducted recent surveys at White Pass for lichens and bryophytes that were moved from the Survey and Manage to the Regional Forester's Sensitive Species list (USFS 2004b). These recent surveys did not detect the presence of any PETS species at White Pass. Following the discretionary guidance of the April 2004 ROD, additional surveys for fungi were not completed because they were considered impractical (USFS 2004b). Refer to the Addendum to the 2003 Botanical Report, located in Appendix G for further information.

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 plants/Special Status species would be provided pursuant to the 2001 Record of Decision for management of these species. In this regard, the White Pass Study 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).

Rhizomnium nudum was considered a Survey and Manage plant species during preparation of the previous EIS, but it was removed from the Survey and Manage list in the second annual review for Survey and Manage species (USFS and USBLM 2003). Numerous occurrences of *R. nudum* have been documented in the Cascade Mountain Range in Washington, including the Olympic National Park, Mount Rainier National Park, the Mount Baker-Snoqualmie National Forest, and the Gifford Pinchot National Forest (USFS and USBLM 1999). Although there are known locations in the White Pass Study Area, *R. nudum* is no longer considered a special-status species, and Standards and Guidelines and Mitigation Measures associated with this species in Washington are no longer required.

3.5.2.4 Noxious Weeds

Noxious weed species addressed under this evaluation include those weeds declared noxious by the State of Washington Noxious Weed Board (WAC 2001) and the Yakima County Weed Control Board (Yakima County 2001). Noxious weed species commonly encountered in the Gifford Pinchot and Okanogan-Wenatchee National Forests and likely to occur within the White Pass Study Area are shown in Table 3.5-4. Although populations of these noxious weed species may occur, they have not been observed within the White Pass Study Area and their potential introduction is most likely low because of climatic conditions, i.e., high elevations, cold temperatures, and limited growing season due to a persistent snowpack. However, chances are higher for the establishment and spread of noxious weeds in disturbed areas, if a seed/propagative material source were to be present. Disturbed sites, including parking areas, trailheads, etc., provide potential population centers for these species.

Table 3.5-4:
Noxious Weeds that have the
Potential to Occur within the White Pass Study Area

Scientific Name	Common Name
Centaurea maculosa	Spotted knapweed
Centaurea diffusa	Diffuse knapweed
Chrysanthemum leucanthemum	Oxeye daisy
Cirsium arvense	Canada thistle
Cirsium vulgare	Bull thistle
Cytisus scoparius	Scotch broom
Hypericum perforatum	St. John’s wort
Hypochaeris radicata	Spotted cat’s-ear
Linaria genistifolia dalmatica	Dalmatian toadflax
Lythrum salicaria	Purple loosestrife
Senecio jacobaea	Tansy ragwort

No Washington State listed noxious weeds were located during the surveys of the proposed White Pass SUP area expansion, and none were observed in the current SUP area (WAC 2001; Yakima County 2001). Non-native species including white clover (*Trifolium repens*) and red sandspurry (*Spergularia rubra*) have been observed in the current White Pass SUP area. Three Washington State listed noxious weed species were noted during a botanical survey in 2005 at the White Pass PCNST north trailhead and horse camp. Oxeye daisy (*Leucanthemum vulgare*), cat’s ear (*Hypochaeris radicata*), and tansy ragword (*Senecio jacobea*) were encountered. These species are located outside of the White Pass Study Area, which is described as the current SUP boundary and the proposed SUP boundary expansion. However, these species occur in the Nordic trail system, which is approved for use under the SUP. The next closest documented occurrence of a Washington State listed noxious weed is a diffuse knapweed (*Centaurea diffusa*) site about 5 miles east of White Pass on US 12. Information for weed occurrences on the Cowlitz Valley Ranger District of the Gifford Pinchot National Forest was not investigated, but oxeye daisy (*Chrysanthemum leucanthemum*) and scotchbroom (*Cytisus scoparius*) have been observed along the US 12 corridor between White Pass and Packwood. It is also likely that cat's-ear (*Hypochaeris radicata*) is in this area. These three noxious weed species present the highest likelihood of establishing in the proposed project area. However, as previously stated, the establishment of noxious weeds in the project area is currently limited by several interacting factors.

The White Pass proposal took into account the questions from the 1989 Mediated Agreement to analyze impacts to noxious weeds (USFS 1989). The discussion of the questions in relation to the White Pass Ski Area proposal can be found in the Noxious Weed section of Environmental Consequences.

3.5.3 Environmental Consequences

Construction and/or operation of facilities associated with the White Pass proposal have the potential to impact vegetation communities and forest structure within the White Pass Study Area. Impacts may be short-term or long-term in duration. In addition, these impacts may be further classified as direct or indirect.

Activities that result in a short-term disturbance to vegetation communities include the installation of buried utility lines in existing clearings and grading in previously modified shrub and herbaceous vegetation communities. Impacts to vegetation from normal ski area operations and maintenance could occur. Operational impacts, such as skiing and grooming, have the potential to impact vegetation through incidental contact damage. Typically, damage from skiers is minor and usually occurs to shrub and herbaceous vegetation protruding from the snowpack. Damage from grooming equipment can be more severe, for example, scarring of tree boles adjacent to ski trails. Grooming equipment does not typically impact shrub or herbaceous vegetation within the ski trail because the snowpack evenly distributes the weight of the equipment over the terrain.

Short-term impacts may persist for several years (two to three years) as shrub and herbaceous vegetation reestablishes to pre-disturbance conditions. Long-term impacts result from the conversion of an existing vegetation community to another community type, such as forest removal to be maintained as ski trails or lift terminals. Long-term impact activities include partial tree island removal, full clearing, and full clearing with grading resulting in a loss of natural vegetation that would not revert to a pre-development condition in a two to three year period (i.e., the removal of forested communities, construction of impervious surfaces, etc).

Direct impacts typically have immediate effects in the area of activity and include all of the activities listed above. Direct impacts to vegetation are classified as those impacts that would modify the condition of a vegetated site (i.e., from forest to herbaceous). These impacts would include permanent loss of vegetation, conversion of vegetation communities to another vegetation type, or a short-term loss of vegetation during a temporary construction impact. These impacts relate to the impact analysis for other resource areas. For example, loss or conversion of vegetation communities would directly affect wildlife habitat in the White Pass Study Area. Section 3.6 – Wildlife refers to impacts displayed in this section to assist in the analysis of impacts to wildlife. Similarly, the loss or conversion of vegetation communities along riparian corridors directly affects the analysis of impacts in Section 3.2 – Watershed Resources, where riparian functions are discussed and in Section 3.15 – Visual Resources, where the effect of forest removal is discussed in the context of visual effects.

Indirect impacts have delayed or unforeseen effects that occur in the future or in a different location than the original action. For example, changes to the composition of an herbaceous community as a result of surrounding canopy removal would be considered an indirect impact on that community. Indirect impacts to vegetation would also include future maintenance operations (i.e., mowing/brushing ski trails), areas of soil disturbance that provide opportunity for noxious weed establishment, compaction of soils that limit establishment or health of plants growing in the soil, and utility trenching in existing herbaceous communities. These impacts relate to the impact analysis for other resource areas. For example, soils that remain in a disturbed condition (i.e., un-vegetated) would affect sediment generation and are therefore discussed in Section 3.2 – Geology and Soils.

3.5.3.1 Vegetation Communities

Alternative 1

Under Alternative 1, there would be no new impacts to the existing vegetation communities within the White Pass Study Area as no new development would occur.[29] White Pass would not construct any new trails or chairlifts and would continue to operate under their existing permit.

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

Alternative 2

Under Alternative 2, there would be approximately 19.7 acres of direct impacts to vegetation communities resulting from tree removal for the construction of the proposed *Basin* and *Hogback Express* chairlifts, associated trails, mid-mountain lodge, and utilities (refer to Table 3.5-5 and Figure 3-32). Overall, this represents approximately 1.3 percent of the entire White Pass Study Area. The majority of

[29] The effects of the Action Alternatives on Forest Structure are provided in Appendix G – White Pass Vegetation Technical Report and Biological Evaluation because forest stand structure was not identified as an issue. Forest structure is germaine to the wildlife discussion. Therefore Section 3.6 – Wildlife refers to the information presented in Appendix G.

the tree removal would be for the construction of the chairlifts and ski trails (through tree island removal techniques) and would not involve any grading impacts. The natural characteristic of the terrain is open glades with scattered tree islands. The general aim of the tree island removal prescription is to connect existing forest openings, through selective tree removal, to create ski trails. The majority of the proposed ski trails utilize the existing forest openings, which minimizes the need for forest clearing to create a skiable trail. Tree island removal clearing techniques result in a lower degree of impact compared to full clearing because trees and small understory vegetation are retained within the ski trail.

Table 3.5-5:
Potential Impacts to Vegetation Communities 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)	**19.7**	**44.7**	**15.3**	**38.9**

Note: Totals may vary due to rounding.
Existing vegetation communities under Alternative 1 are included in Table 3.5-1.

The proposed clearing impacts would only occur within the mountain hemlock parkland community and the Upper Clear Fork Cowlitz watershed. Implementation of Management Requirement MR6 and Other Management Provision OMP5 would ensure that impacts to the mountain hemlock parkland community would be minimized by selective tree removal and by establishing the maximum clearing limits to avoid any unnecessary clearing. Utilities would be trenched within ski trail boundaries as described in Table 2.4.1 (Construction Techniques). Additionally, OMP5 would require the revegetation of herbaceous and shrub vegetation cover in cleared ski trails, which would be managed for the life of the ski area (refer to Table 2.4-5). Long-term impacts would persist in these modified vegetation communities as long as the area is maintained as a developed ski area. There would be no impacts to mixed conifer or mountain hemlock communities under Alternative 2.

Indirect impacts under Alternative 2 to vegetation communities could occur from future maintenance of ski trails, buildings, and other ski area facilities. These impacts would include, but are not limited to, periodic mowing/brushing to maintain ski trails in a modified condition suitable for skiing or hazard tree removal. Mowing/brushing would prevent future forest regeneration by not allowing saplings to establish during the life of the ski area. Other Management Provision OMP5 would ensure that impacts to adjacent natural vegetation communities would be minimized by limiting maintenance techniques to manual methods within the Mountain Hemlock Parkland community, and within established trails in other communities. A second potential indirect impact would be the establishment of noxious weeds within cleared areas. Additional information regarding noxious weeds can be found under the *Noxious Weeds* discussion in this section.

Modified Alternative 4

Impacts to vegetation communities under Modified Alternative 4 would be the most of any Action Alternative due to additional clearing to realign trails away from Riparian Reserves, an egress trail (Trail 4-16) from the proposed *Hogback Express* bottom terminal, and additional trails within the existing SUP area. Tree island removal clearing techniques would occur for trail construction within the Hogback Basin and result in a lower degree of impact compared to full clearing because trees and small understory vegetation are retained within the ski trail. Additionally, a new ticket booth would be constructed adjacent to the Yakima Ski Club building and a new parking lot would be constructed near the bottom terminal of the existing *Lower Cascade* chairlift (refer to Figure 3-33).

Impacts to vegetation communities under Modified Alternative 4 would total approximately 44.7 acres, or approximately 2.8 percent of the White Pass Study Area (refer to Table 3.5-5). The majority of the impacts would occur within the mixed conifer community, approximately 21.6 acres, associated with construction of the ski trails within the existing SUP area, parking lot and ticket booth. As described in Appendix G, approximately 11 acres of clearing and grading in the mixed conifer community would impact forest stands with old-growth characteristics as a result of tree removal for construction activities within the existing SUP area. This equates to approximately 2.4% of the White Pass Study Area within the Upper Tieton River Watershed and 0.009% of the entire Upper Tieton Watershed. Approximately 21.5 acres of clearing and grading would occur to the mountain hemlock parkland community as a result of tree removal associated with construction of the proposed lifts, trails, and lodge, as well as the PCNST re-route. Management Requirement MR6 and Other Management Provision OMP5 would reduce impacts to adjacent natural vegetation communities by marking maximum trail clearing limits, felling trees away from adjacent communities, and limiting maintenance techniques to manual methods within the mountain hemlock parkland community.

Indirect impacts under Modified Alternative 4 to vegetation communities would be as described under Alternative 2.

Under Modified Alternative 4, approximately 2,000 feet of the existing PCNST would be rerouted to minimize impact to and views from the trail. As described in Mitigation Measure MM23, the trail would be cleared and maintained to a 24-inch tread of mineral soil and a 6-foot clearing of trees and woody shrubs. Additionally, the trail would be located to avoid the removal trees over 8 inches DBH wherever possible. Approximately 0.12 acre of vegetation would be permanently removed, and 0.36 acre of additional woody vegetation clearing would occur within and outside of the White Pass Study Area.

Alternative 6

Under Alternative 6, impacts to vegetation communities would be less than Alternative 2, because the proposed *Hogback Express* and associated trails would not be constructed. Tree island removal clearing methods would be utilized for trail construction within the Pigtail Basin and result in a lower degree of impact compared to full clearing because trees and small understory vegetation are retained within the ski trail.

Clearing and grading impacts to vegetation communities under Alternative 6 would total approximately 15.3 acres, or approximately 1.0 percent of the White Pass Study Area (refer to Table 3.5-5). The majority of the impacts would occur within the mountain hemlock parkland community, approximately 11.3 acres, as a result of tree removal associated with construction of the proposed lifts, trail, and mid-mountain lodge. Approximately 3.8 acres of clearing and grading would occur to the mixed conifer community associated with construction of the parking lot and mid-mountain lodge, and would impact 3.8 acres of forest stands with old-growth characteristics (refer to Appendix G). This equates to approximately 0.8% of the White Pass Study Area within the Upper Tieton River Watershed and 0.003% of the entire Upper Tieton Watershed. Implementation of Management Requirement MR6 and Other Management Provision OMP5 would reduce impacts to adjacent natural vegetation communities by marking maximum clearing limits, felling trees away from adjacent forest communities, and limiting maintenance techniques to manual methods within the mountain hemlock parkland community.

Indirect impacts under Alternative 6 to vegetation communities would be as described under Alternative 2.

Alternative 9

Under Alternative 9, no expansion of the SUP boundary would occur. All proposed construction would occur within the existing ski area SUP boundary. Lift and trail construction would require full clearing methods within the mixed conifer community compared to tree island removal in all other alternatives. Full clearing is required in this area due to the dense forest condition and lack of existing openings as seen within Hogback and Pigtail Basins. Full clearing results in a higher degree of impact because trees would not be retained in the trail and a majority of the understory vegetation would be removed (refer to Figure 3-34).

Clearing and grading impacts to vegetation communities under Alternative 9 would total approximately 38.9 acres, or approximately 2.4 percent of the White Pass Study Area (refer to Table 3.5-5). All impacts from clearing and grading would occur within the mixed conifer community, predominantly within the Upper Tieton River watershed. Approximately 24.2 acres of clearing would occur in forest stands with old-growth characteristics (the Medium tree – Multi-story – Closed Canopy forest structure). This equates to approximately 5.4% of the White Pass Study Area within the Upper

Tieton River Watershed and 0.02 percent of the entire Upper Tieton Watershed, the most of any alternative. There would be no impacts to the mountain hemlock parkland community. Implementation of Management Requirement MR6 and Other Management Provision OMP5 would reduce impacts to adjacent natural vegetation communities by establishing maximum clearing limits and felling trees away from adjacent and sensitive vegetation.

Indirect impacts to vegetation communities under Alternative 9 would be as described under Alternative 2.

Under Alternative 9, approximately 225 feet of the PCNST would be re-routed on the eastern portion of the existing SUP to avoid a proposed ski trail. As described in Mitigation Measure MM23, the trail would be cleared and maintained to a 24-inch tread to mineral soil and a 6-foot clearing of trees and woody shrubs. Additionally, the trail would be located to avoid trees over 8 inches DBH wherever possible. Approximately 0.01 acre of complete vegetation removal and 0.03 acre of woody vegetation removal would occur. The trail corridor would be maintained in this condition.

3.5.3.2 PETS, Survey and Manage, and USFS Sensitive Species

Alternative 1

Under Alternative 1, White Pass would continue to operate under its existing permit. No new development would occur and therefore there would be no new impacts to PETS, Survey and Manage, or USFS Sensitive plant species within the White Pass Study Area. There are no known populations that would be affected by routine operation and maintenance of the ski area.

Alternatives 2, 6, 9 and Modified Alternative 4

No federally listed species under the Endangered Species Act, Survey and Manage, or USFS Sensitive species have been found within the White Pass Study Area during vegetative surveys. Therefore, there would be no impacts to known or previously documented Endangered, Threatened, Sensitive, or Survey and Manage species within proposed disturbed areas, i.e., new trail and lift clearings. The implementation of Management Requirement MR6 would further minimize potential impacts to special status species if new populations are encountered during construction by stopping work until adequate surveys and protection measures are implemented.

3.5.3.3 Noxious Weeds

Alternative 1

Under Alternative 1, White Pass would continue to operate under its existing permit. No new development would occur and therefore the potential for the spread of noxious weeds would be limited to existing disturbed areas and corridors. The use of best management practices, as described in the OWNF

Weed Management and Prevention Strategy and Best Management Practices, by all personnel are designed to reduce the risk of the establishment of noxious weeds within the White Pass Study Area.

The extensive snowpack season, cold climate and short growing season in the proposed project area provide for an environment that is not conducive to the establishment of most noxious weeds. Based on past and current observations, the current conditions and natural processes occurring in the upper Hogback Basin make it relatively inhospitable to noxious weeds.

Alternatives 2, 6, 9 and Modified Alternative 4

Under all Action Alternatives, there is a potential for the spread of noxious weeds within proposed disturbed areas (i.e., new trail and lift clearings). Primary corridors for noxious weed dispersal within the White Pass Study Area include US 12, other roads, trails, and riparian areas. Possible vectors for the introduction of noxious weed seeds or propagative material into the White Pass Study Area include any necessary heavy equipment, work crews, and vehicles.

Surveys of the White Pass Study Area, to date, have not detected the presence of noxious weeds outside of the developed areas along the US 12 right-of-way corridor. However, noxious weeds have been observed in areas adjacent to the White Pass Study Area, in areas permitted for use under the SUP, such as at the White Pass PCNST north trailhead and horse camp.

The upper Hogback Basin is roadless, and consequently, has no areas consistently disturbed by human activities outside use of the PCNST by hikers and stock users. A large portion of the proposed SUP area expansion is comprised of late seral, high elevation, open parkland where natural ecological community processes dominate. Meadow openings in the parkland have very little bare soil cover and an abundance of native shrubs and perennial herbs. The extensive snowpack season, cold climate and short growing season in the proposed project area provide for an environment that is not conducive to the establishment of most noxious weeds. Based on past and current observations, the current conditions and natural processes occurring in the upper Hogback Basin make it relatively inhospitable to noxious weeds.

The initial and ongoing disturbance required to implement and maintain the proposed ski area expansion has the ability to introduce noxious weeds within the proposed project area. Noxious weeds have the highest probability of establishing around the areas where intense soil disturbance such as grading or digging will occur. These areas include the lift sheds, mid-mountain lodge, parking lots, lift tower locations, small sections of constructed ski trail, and areas along the re-routed PCNST. There is a lower probability of noxious weed establishment in the disturbed corridors of the ski trails and liftlines where tree island removal and full clearing with no grading techniques occur (i.e., less soil disturbance: smaller scale and intensity). Possible construction-related vectors for introduction of weed seed or propagative material into the project area includes any required heavy machinery, work crews, and project access vehicles. In addition, vectors for the introduction of weed seeds related to operations may include hikers, stock, or hand tools. The use of Prevention Strategy Best Management Practices (USFS 2002b) by White Pass personnel and/or contractors are designed to reduce the risk of weed introduction into the project area.

The impact analysis for noxious weeds took into account the site-specific analysis questions posed in the Mediated Agreement (USFS 1989). Associated vegetation would be minimally impacted from the proposed project under any of the Action Alternatives and would continue to limit the establishment and spread of noxious weeds (refer to Vegetation Communities under Section 3.5.3 – Environmental Consequences). Due to the existing unfavorable environmental conditions within the White Pass Study Area (high elevation and limited growing season), the establishment of noxious weeds following construction disturbance is not likely. Previous tree removal for lift and trail construction within the White Pass Study Area has not increased the spread of noxious weeds, as evidenced by the lack of presence within ski trails. Therefore the implementation of the Action Alternatives is not expected to increase the potential for the introduction, spread, and establishment of noxious weeds. Management Requirement MR7 would require the revegetation of any disturbed soil with native vegetation to minimize the establishment and spread of noxious weeds according to the Okanogan-Wenatchee National Forest Weed Management and Prevention Strategy and Best Management Practices (USFS 2002b). Management Requirement MR7 and Appendix O.

3.5.4 Cumulative Effects

For purposes of this analysis, cumulative effects to vegetation are considered at the site scale (White Pass Study Area) and the Cumulative Effects Analysis Area (CEAA). The CEAA is comprised of two, 5th field watersheds, the Upper Tieton watershed and the Upper Clear Fork Cowlitz watershed. Past, present and reasonably foreseeable projects occurring within each watershed area are included in the analysis. A list of all projects occurring within the Upper Clear Fork Cowlitz (refer to Table 3.5-6) and the Upper Tieton watershed (refer to Table 3.5-7) and the impact to vegetation are presented below.

Table 3.5-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Vegetation

Project Number	Project Name	Cumulative Effects
UCFC-3a	Palisades Scenic Viewpoint Project	The creation of 0.5 acre of impervious surfaces to reconstruct the overlook indirectly affected vegetation through replacement of vegetation and soil with an impervious surface over the long-term. Spatially, the project effects occurred outside the White Pass Study Area. The effect of the removed vegetation overlaps temporally with the White Pass expansion. Construction of this project did not overlap in time with implementation of the White Pass expansion. Combined with the construction of the previous projects at White Pass identified in this table and the White Pass expansion, this project added to the loss of vegetation within the 5th field watershed.

**Table 3.5-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Clear Fork Cowlitz Watershed on Vegetation**

Project Number	Project Name	Cumulative Effects
UCFC-3b	Palisades Scenic Viewpoint Project Vegetation Mgmt	Long-term impacts would result from the treatment of a 1-acre stand of trees to improve views. Temporally, the vegetation management would overlap with tree removal for the White Pass expansion and ongoing trail, road, highway hazard trees, power line, and camp maintenance activities within the watershed. There is no spatial overlap with the White Pass Study Area, but implementation of Modified Alternative 4 or Alternative 9, combined with the additional vegetation removal from this and other projects identified in this table would cumulatively decrease the amount of forest vegetation at the 5th field watershed scale.
UCFC-4	Mt Rainier/Goat Rocks Scenic Viewpoint	Approximately 0.75 acre of stand treatment will occur for this project. The effects of this project would overlap with the effects of the White Pass expansion in time. There is no spatial overlap with the White Pass Study Area, but implementation of the Action Alternatives, combined with the additional vegetation removal from this and other projects identified in this table would cumulatively decrease the amount of forest vegetation 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. 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 vegetation at the 5th field watershed scale. With continued revegetation, the potential for long-term effects of this fire will be eliminated.
UCFC-6	Knuppenberg Lake Bridge Removal	Beneficial, long-term direct impact to vegetation occurred through the removal of a 0.24-acre impervious surface associated with the bridge footings along the riparian fringe. Long-term project effects would temporally overlap with the White Pass expansion. Spatially, there is no overlap with the White Pass Study Area. Coupled with projects UCFC-12, UCFC-14 and UCFC-15, the removal of the bridge would improve provide for re-establishment of vegetation in previously disturbed areas. These projects will partially offset any cumulative effects to vegetation associated with the White Pass expansion or other projects listed in this table.
UCFC-7	Wilderness Trail Maintenance	Vegetation removal from tree clearing and corridor brushing would directly impact vegetation. In addition, ground disturbance and structure maintenance would indirectly impact vegetation. Maintenance activities would limit future growth of vegetation by maintaining a modified condition along the trail. Approximately 20.5 miles of trail are maintained every other year. The short- and long-term effects of this project overlap spatially with the effects of the White Pass expansion within the White Pass Study Area and at the 5th field watershed. Ongoing maintenance of trails, roads, and campsites with the 5th field watershed would overlap in time with the White Pass expansion and result in cumulative loss of vegetation along trail corridors in the White Pass Study Area and at the 5th field watershed scale.

Table 3.5-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz Watershed on Vegetation

Project Number	Project Name	Cumulative Effects
UCFC-8	Ongoing Road Maintenance	Road maintenance activities impact vegetation by maintaining a modified vegetative condition along the edge of the road. Approximately 9 miles of road maintenance (i.e. re-surfacing, re-grading) occurs every five years. While this project does not overlap spatially with the White Pass Study Area, the effects of ongoing maintenance of trails, roads, and campsites with the 5th field watershed would overlap in time with the White Pass expansion and result in the cumulative loss forest vegetation at the 5th field scale.
UCFC-10	Clear Fork Trail Puncheon Installation	The installation of puncheon along 0.1 mile (0.07 acre) of braided trail (an existing, unvegetated area) directly affected vegetation by eliminating user trails (encouraging vegetation re-growth) while eliminating the potential for natural revegetation in the area of puncheon during the lifetime of the puncheon. Spatially, this project did not overlap with the White Pass Study Area. Coupled with project UCFC-6, the puncheon would help to stabilize an area of impact to vegetation resulting from user trails.
UCFC-11	Air Quality Monitoring Building	Approximately 0.02 acres of clearing occurred on Pigtail Peak for the construction of the building. 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 contributed to a cumulative loss of forest vegetation 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)	Approximately 2.5 acres of modified vegetation was impacted during slope stabilization project on US 12. The area is maintained in a modified condition. Implementation of this project did not overlap in time with the proposed White Pass expansion. This project occurred outside the White Pass Study Area, and did not contribute to a loss of forested vegetation at the 5th field watershed scale as the project occurs within the previously modified US 12 right-of-way.
UCFC-14	Unstable Slope Repair Projects (between mileposts 145.61 and 145.77)	The repair of 1 acre of unstable slopes will affect modified vegetation during this slope stabilization project on US 12. The area will continue to be maintained in a modified condition. Implementation of this project will not overlap in time with the White Pass expansion. This project will occur outside the White Pass Study Area, and will not contribute to a loss of forested vegetation at the 5th field watershed scale as the project will occur within the previously modified US 12 right-of-way.
UCFC-15	Unstable Slope Repair Projects (between mileposts 141.8 and 144.4)	The repair of 4.5 acres of unstable slopes will directly affect modified vegetation during slope stabilization project on US 12. The area will be maintained in a modified condition. Implementation of this project will not overlap in time with the White Pass expansion. This project will occur outside the White Pass Study Area, and will not contribute to a loss of forested vegetation at the 5th field watershed scale as the project occurs within the US 12 right-of-way.
UCFC-16	Highway 12 Hazard Tree Removal	The removal of hazard trees within the US 12 right-of-way is not expected to result in additional long-term impacts to vegetation. Ongoing tree removal would overlap in time with construction of the White Pass expansion, but would occur outside the White Pass Study Area.

**Table 3.5-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Clear Fork Cowlitz Watershed on Vegetation**

Project Number	Project Name	Cumulative Effects
UCFC-17	White Pass Ski Area Yurt Construction	The conversion of 0.01 acre of forest to impervious surfaces indirectly affected vegetation through replacement of vegetation and soil with an impervious surface over the long-term. Spatially, the project effects occurred within the White Pass Study Area. The effect of vegetation removal overlaps temporally with the White Pass expansion. Construction of this project did not overlap in time with implementation of the White Pass expansion. Combined with the construction of the previous projects at White Pass identified in this table and the White Pass expansion, this project added to the loss of vegetation within the Study Area.
UCFC-18	Special Forest Product Permits	No long-term impacts to vegetation would result from the removal of beargrass and tree boughs as the vegetation community would not change. There would be no spatial or temporal overlap with the White Pass expansion.
UCFC-20	Benton Rural Electric Association (REA) Power Line Maintenance	Maintenance activities along the power line corridor will affect vegetation within a 28-acre area. However, no long-term impacts to vegetation are expected as the corridor is maintained in a non-natural vegetative condition. As maintenance is ongoing, there would be temporal overlap with the White Pass expansion. Power line maintenance will spatially overlap with the White Pass Study Area and the 5th field watershed.

**Table 3.5-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Tieton Watershed on Vegetation**

Project Number	Project Name	Cumulative Effects
UT-2	White Pass Ski Area Sewer Line Replacement	Approximately 0.73 acre of grading will occur due to the excavation of the trench and resulting in the loss of ground cover vegetation in the short-term. 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 vegetation are expected because the disturbed soil areas will be immediately stabilized after construction. Combined with the White Pass expansion and other projects identified in this table, this project would add to a cumulative, short-term loss of vegetation within and outside the White Pass Study Area within the 5th field watershed.
UT-3	White Pass Ski Area Generator Shed and Propane Tank	The installation of 0.004 acre of impervious surfaces to build the shed and install the tank indirectly affected vegetation through replacement of vegetation and soil with an impervious surface over the long-term. Spatially, the project effects occurred within the White Pass Study Area. The effect of the removed vegetation overlaps temporally with the White Pass expansion. Construction of this project did not overlap in time with implementation of the White Pass expansion. Combined with the construction of the previous projects at White Pass identified in this table and the White Pass expansion, this project added to the loss of vegetation within the White Pass Study Area.

Table 3.5-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Vegetation

Project Number	Project Name	Cumulative Effects
UT-4	White Pass Ski Area Relocation of Chair 3 and Platter Lift	Approximately 0.5 acres of clearing (shrubs and herbaceous vegetation) and grading occurred to realign the existing lifts, eliminating vegetation in the short-term. Within this total, 0.01 acre was converted to impervious surface, contributing to the loss of vegetation. The remainder of the 0.5 acre was reseeded and has stabilized. Spatially, this project overlaps with the White Pass expansion. Temporally, the short-term effects do not overlap with the White Pass expansion, but the effects of the loss of vegetation in the long-term (0.01 acre) will overlap with the effects of the White Pass expansion. Combined with the construction of the previous projects at White Pass identified in this table and the White Pass expansion, this project added to the loss of vegetation within the White Pass Study Area.
UT-5	US Cellular Tower	Impacts to vegetation resulted from approximately 0.004 acre of clearing and installation of impervious surface. Spatially, the effects of the cellular tower site overlap with the White Pass expansion. Temporally, the long-term loss of vegetation will overlap with the effects of the White Pass expansion. Combined with the effect of the previous projects at White Pass identified in this table and the White Pass expansion, this project added to the loss of vegetation within the White Pass Study Area.
UT-6	White Pass Ski Area Restaurant/Condo Conversion	The conversion of 0.01 acre to impervious surfaces indirectly affected vegetation through replacement of vegetation and soil with an impervious surface over the long-term. Spatially, the project effects occurred within the White Pass Study Area. The effect of vegetation removal overlaps temporally with the White Pass expansion. Construction of this project did not overlap in time with implementation of the White Pass expansion. Combined with the construction of the previous projects at White Pass identified in this table and the White Pass expansion, this project added to the loss of vegetation within the White Pass Study Area.
UT-8	White Pass Ski Area Manager's Cabin	Approximately 0.25 acre of ground was cleared and graded resulting in short-term loss of vegetation. The construction of the cabin resulted in 0.04 acre of impervious surfaces. The graded areas have been stabilized and revegetated. Spatially, the effects of this project occurred within the White Pass Study Area. Temporally, the short-term loss of vegetation has been stabilized and therefore does not overlap with the effects of the White Pass expansion. The long-term loss of vegetation associated with the impervious surfaces overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative loss of vegetation in the White Pass Study Area and at the 5th field watershed scale.
UT-10	Dog Lake Campground/ Four Trailhead Reconstruction	The reconstruction of the Dog Lake Campground and associated trailheads impacted approximately 1.0 acre of vegetation due to clearing and grading. Some selected areas were also revegetated with this project. Spatially, this project does not overlap with the White Pass Study Area, therefore project effects will not overlap with expansion effects spatially. However, the effects of this project are expected to overlap in time with the effects of the White Pass expansion. Therefore it would add to a loss of vegetation at the 5th field watershed scale.

**Table 3.5-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Vegetation**

Project Number	Project Name	Cumulative Effects
UT-11	Clear Creek Overlook Reconstruction	The reconstruction of the Clear Creek Overlook will directly impact vegetation over the short-term due to approximately 1 acre of grading. Creation of 0.1 acre of additional impervious surface will directly affect vegetation over the long-term. There is no spatial overlap with the White Pass Study Area. The short-term loss of vegetation associated with grading is expected to be stabilized immediately. Long-term loss of vegetation associated with the new impervious surfaces will temporally overlap with the effects of the White Pass expansion. In the long-term, this project, coupled with the White Pass expansion and other impervious surfaces listed in this table, will contribute to a cumulative loss of vegetation at the 5th field watershed scale.
UT-16	Trail 1106 Water Crossing	If the trail is rerouted and a ford is constructed (instead of bridge replacement), up to a 0.1-acre loss of riparian vegetation would occur in the short-term, until the abandoned crossing revegetates. This project does not overlap spatially with the White Pass Study Area. The short-term loss of vegetation will overlap with the effects of the White Pass expansion and other projects in this table that include short-term vegetation loss at the 5th field watershed scale. No long-term effects are anticipated.
UT-18	Benton Rural Electric Association (REA) Power line Maintenance	Maintenance activities along the power line corridor will affect vegetation within a 223-acre area. Power line maintenance will spatially overlap with the White Pass Study Area and the 5th field watershed. However, no long-term impacts to vegetation are expected as the corridor is maintained in a non-natural vegetative condition. As maintenance is ongoing, there would be temporal overlap with the White Pass expansion.
UT-19	Highway 12 Hazard Tree Removal	Hazard tree removal will spatially overlap with the White Pass Study Area and the 5th field watershed. The removal of hazard trees within the US 12 right-of-way is not expected to result in additional long-term impacts to vegetation. Ongoing tree removal would overlap in time with construction of the White Pass expansion.
UT-20	Clear Lake Recreation Projects	Campsite improvements and road modifications within the existing campground would impact vegetation from clearing and grading on approximately 2 acres, in the short-term. As the project effects occur outside the White Pass Study Area, there is no spatial overlap with the effects of the White Pass expansion. However, the short-term effect will overlap in time with the White Pass expansion.
UT-23	System Trail Maintenance	Vegetation removal from tree clearing and corridor brushing would directly impact vegetation. In addition, ground disturbance and structure maintenance would indirectly impact vegetation. Maintenance activities would limit future growth of vegetation by maintaining a modified condition along the trail. Approximately 48.5 miles of trail are maintained every other year. The short- and long-term effects of this project overlap spatially with the effects of the White Pass expansion within the White Pass Study Area and at the 5th field watershed. Ongoing maintenance of trails, roads, and campsites with the 5th field watershed would overlap in time with the White Pass expansion and result in cumulative loss of vegetation along trail corridors in the White Pass Study Area and at the 5th field watershed scale.

Table 3.5-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton Watershed on Vegetation

Project Number	Project Name	Cumulative Effects
UT-25	Zig Zag Nordic and Snowshoe Trails	The Nordic trail has been maintained in a modified condition, although no soil disturbance has taken place. Over the long-term, the 4.4 acres of vegetation removal effects along the trail overlaps spatially and temporally with the White Pass expansion. The snowshoe trails have resulted in no short- or long-term effects to vegetation. The *Zig Zag* Nordic trail has cumulatively contributed to a loss of forest vegetation in the White Pass Study Area.
UT-26	Highway 12 Rock Stabilization (at Mile Post 155)	Approximately 1 acre of scattered pockets of vegetation would be impacted during slope stabilization projects on US 12. The effects are expected to be long-term as the area would continue to be maintained in a modified condition. Implementation of this project would overlap in time with the White Pass expansion. This project occurred outside the White Pass Study Area, and would not contribute to a loss of forested vegetation at the 5th field watershed scale as the project occurs within the previously modified US 12 right-of-way.
UT-27	Highway 12 Rock Stabilization (at Mile Post 155)	Approximately 0.5 acre of scattered pockets of vegetation was impacted during slope stabilization project on the previously modified US 12 corridor. Implementation of this project did not overlap in time with the proposed White Pass expansion. This project occurred outside the White Pass Study Area, and did not contribute to a loss of forested vegetation at the 5th field watershed scale as the project occurs within the US 12 right-of-way.
UT-28	Camp Prime Time Accessible Trail, Wagon Ride Route and Tree House	Construction of the trail, wagon ride route, and tree house would result in additional impacts to less than 0.1 acre of ground vegetation. No impacts to vegetation are expected from using an existing road for rides or the construction of a tree house. Effects are expected to overlap in time with the effects of the White Pass expansion and cumulatively add to a loss of vegetation at the 5th field watershed scale.
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	The replacement of an existing cell tower and building addition will result in a short-term decrease in vegetation cover on up to 0.3 acre. Spatially, this project overlaps with the White Pass Study Area. Temporally, the short-term loss of vegetation associated with the project will overlap with the White Pass expansion and other projects in this table that cause short-term loss of vegetation. The long-term loss of vegetation will result from 0.1 acre of impervious surface associated with the cell tower and building addition. The long-term loss of vegetation will overlap with the effects of the White Pass expansion in the White Pass Study Area. In the long-term, this project and the other projects resulting in impervious surfaces, listed in this table, contribute to a cumulative loss of vegetation at the 5th field watershed scale.
UT-32	Camp Site Maintenance	Hazard tree removal will spatially overlap with the White Pass Study Area and the 5th field watershed outside of the White Pass Study Area. The removal of hazard trees within developed sites is not expected to result in additional long-term impacts to vegetation. Occasional tree removal would overlap in time with construction of the White Pass expansion. Other maintenance activities are not expected to result in effects to vegetation.

**Table 3.5-7:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Tieton Watershed on Vegetation**

Project Number	Project Name	Cumulative Effects
UT-34	Unstable Slope Repair Projects (between Mile Posts 156.32 and 156.56)	Approximately 4 acres of scattered pockets of vegetation were impacted during slope stabilization projects on US 12. The impacts are expected to be long-term as the area would be maintained in a modified condition. Vegetation effects of this project overlap in time with the effects of the White Pass expansion. This project occurred outside the White Pass Study Area, and would not contribute to a loss of forested vegetation at the 5th field watershed scale as the project occurs within the previously modified US 12 right-of-way.
UT-35	Unstable Slope Repair Projects (between Mile Posts 161.93 and 165.02)	Approximately 0.53 acre of scattered pockets of vegetation were impacted during slope stabilization projects on US 12. The impacts are expected to be long-term as the area would be maintained in a modified condition. Vegetation effects of this project overlap in time with the effects of the White Pass expansion. This project occurred outside the White Pass Study Area, and would not contribute to a loss of forested vegetation at the 5th field watershed scale as the project occurs within the previously modified US 12 right-of-way.

Within the site scale, the implementation of the White Pass expansion and projects described in Tables 3.5-6 and 3.5-7 would contribute to a long-term loss of forested vegetation. Approximately 3 percent of the site scale (refer to Table 3.5-8) would experience the cumulative loss of forested vegetation with the implementation of the Action Alternative with the greatest impact (Modified Alternative 4). Neither the White Pass expansion nor the other cumulative effects projects would eliminate plant communities at the site scale. As a result, the cumulative effect on plant communities at the site scale would not be measurable. At the larger CEAA, approximately 0.3 percent of the CEAA would experience the cumulative loss of forested vegetation. The projects in Table 3.5-6 and 3.5-7 would not result in the elimination of any plant communities within the CEAA, and the cumulative project effects are distributed throughout the CEAA. As a result, the cumulative effect of the White Pass expansion and these other projects would not have a measurable effect on plant communities at the fifth field scale. As the CEAA is comprised of two 5th field watersheds, the cumulative impact at the 5th field scale would be substantially less than 0.3 percent (refer to Table 3.5-8). Continued revegetation of projects at the 5th field scale described in Tables 3.5-6 and 3.5-7 would reduce the cumulative loss of forested vegetation over time.

Table 3.5-8:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Cumulative Effects Analysis Area[a] on Vegetation

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	3.32	0.21	3.32	0.21	3.32	0.21	3.32	0.21	3.32	0.21
Cumulative Impacts	**3.32**	**0.21**	**23.02**	**1.47**	**47.84**	**3.05**	**18.42**	**1.17**	**38.62**	**2.46**
CEAA Scale [a]										
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	611.62	0.32	611.62	0.32	611.62	0.32	611.62	0.32	611.62	0.32
Cumulative Impacts	**611.62**	**0.32**	**631.32**	**0.33**	**656.14**	**0.35**	**626.72**	**0.33**	**646.92**	**0.34**

[a] The Cumulative Effects Analysis Area (CEAA) is the combined areas of the Upper Tieton and modified Upper Clear Fork Cowlitz watersheds.

3.6 WILDLIFE

3.6.1 Introduction

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 1-1. 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 WNF 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 *WNF 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 WNF 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).[30]

- 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.

- USFS/WNF/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.

Vegetation communities, described in detail in Section 3.5 – Vegetation, are the basis for the descriptions of wildlife habitat in this section.

The Environmental Consequences portion of this wildlife section contains analysis of the potential impacts to wildlife species that may occur within the White Pass Study Area. A detailed analysis is presented in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* (Appendix H) and the results of that analysis are reported in this section. In brief, **short-term adverse effects to wildlife resulting from construction activities, such as avoidance of the White Pass Study Area, were identified for most species. No long-term adverse affects to wildlife from ski area operations and maintenance are expected to occur.**

[30] 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).

Formal consultation under the ESA with USFWS for listed species was completed on November 9, 2006 with the issuance of a Biological Opinion for the *Biological Assessment for the White Pass Expansion Proposal* (refer to Appendix N).

3.6.2 Affected Environment

The 1,570-acre White Pass Study Area is comprised of a mosaic of wildlife habitats.[31] 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.

3.6.2.1 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, 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*

[31] 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.

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.

3.6.2.2 Key Wildlife Habitats and Associated Species

The respective Gifford Pinchot and 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 through 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.

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).

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 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.

3.6.2.3 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 3.6-1. 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 below. Detailed information regarding these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6-1:
Federally Listed Threatened or Endangered Species
Potentially Occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using White Pass Study 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 denning (Ruediger et al. 2000). Forest types considered to be primary habitat are lodgepole pine and subalpine fir.	Primary habitat does not exist in the White Pass Study Area. Early successional forest is lacking in area. The area is identified as unoccupied by the USFS and USFWS (2006). Species 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 was completed on November 9, 2006. A final Biological Assessment is published in Appendix N of this FEIS.

3.6.2.4 U.S. Forest Service Survey and Manage Species

Six species of wildlife on the USFS Survey and Manage Species list for the WNF 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 3.6-FEIS1 and described below. Detailed information regarding these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6 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.

Table 3.6 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
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.
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 thysanodes*)	Bunchgrass, interior Douglas-fir forest and ponderosa pine forest (Nagorsen and Brigham 1993).	No suitable habitat occurs within the White Pass Study Area.[a]

Table 3.6 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
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 includedin the following analysis.

3.6.2.5 U.S. Forest Service Sensitive Species

Three species of wildlife on the Regional Forester's Sensitive Species List for the WNF 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 3.6-2 and described below. Detailed information regarding these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6-2:
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.

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

Two 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 presented in Table 3.6-3. Detailed information regarding these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6-3:
USFWS Species of Concern
Potentially Occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using White Pass Study 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.

3.6.2.7 Management Indicator Species

Thirteen wildlife species are listed as WNF and/or GPNF management indicator species that may occur within the White Pass Study Area. The GPNF and WNF 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 in Table 3.6-4. Detailed information regarding these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6-4:
WNF 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 3.6-4:
WNF 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 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.

Table 3.6-4:
WNF and GPNF Management Indicator Species
Potentially Occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using White Pass Study Area
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.
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.

3.6.2.8 Species of Local Concern

Species of local concern are those species that have been deemed important to the local ecology by the USFS wildlife biologist. Species in this category that are discussed in this document are included in Table 3.6-5. Neotropical migratory birds are listed in Table 3.6-6. Detailed information regarding these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6-5:
USFS Species of Local Concern
Potentially Occurring within the White Pass Study Area

Species	Habitat Association	Potential for Using White Pass Study Area
Blue grouse (*Dendragapus obscurus*)	Breed in alpine or subalpine ecotones and forests bordering montane areas. In the fall, most Blue grouse migrate from open to more dense areas of conifers, typically at higher elevations.	Known to occur within the White Pass Study Area.
White-tailed ptarmigan (*Lagopus leucurus*)	Alpine meadows and open rocky areas above timberline. Engages in short migrations, moving down to the edge of the forest in the fall and back onto the alpine tundra in spring.	Known to occur within the White Pass Study Area.

Table 3.6-6:
Neotropical Migratory Birds Potentially Occurring in the White Pass Study 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 flycatcher[c]	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				

Table 3.6-6:
Neotropical Migratory Birds Potentially Occurring in the White Pass Study 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 (westside only)									
Band-tailed pigeon	X		X						
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.

3.6.3 Environmental Consequences

The physical actions associated with the White Pass MDP 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 EIS, impacts to wildlife will be discussed in terms of direct versus indirect and short-term versus long-term as defined below. Finally, impacts associated with the Proposed Expansion will be evaluated at a larger scale (5^{th} field 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 Impacts

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 could 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. For some species, such as deer and elk, the conversion of forest to non-forest could create more forage.

Indirect Impacts

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 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.
- Routine annual maintenance.

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

Short-term Impacts

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 Impacts

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, such as vegetation mowing or brushing for lift and trail maintenance, and occasional felling of hazard trees.

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 and Appendix G, as shown in Figures 3-31 through 3-35 in the FEIS. Impacts to vegetation, as well as wildlife would vary, depending on the impact mechanism and alternative. Impacts are discussed individually for each species analyzed. Impacts to vegetation communities are listed in Table 3.5-5 and displayed in Figures 3-32 through 3-38.

A detailed analysis of impacts to wildlife is presented in Appendix H and the results of that analysis are reported in this section. **Short-term adverse effects to wildlife resulting from construction activities, such as avoidance of the White Pass Study Area, were identified for most species. No long-term adverse affects to wildlife from ski area operations and maintenance are expected to occur.**

3.6.3.1 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 would result largely from changes in vegetation composition. Removal of vegetation or conversion from forest vegetation communities to modified herbaceous vegetation communities 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/or reduce the value of riparian areas as travel corridors for species such as pine marten, elk, and Neotropical migratory birds.

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 3.6-7 identifies the area of riparian vegetation that would be eliminated or converted under each of the Action Alternatives. 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.

Table 3.6-7:
Potential Direct Impacts to Riparian Reserves within the White Pass Study Area

	Existing	Changes Per Alternative (Impacts)			
	Alt. 1	**Alt. 2**	**Mod. Alt. 4**	**Alt. 6**	**Alt. 9**
Area of Riparian Reserves (acres)	632.3	632.3	632.3	632.3	632.3
Proposed Clearing in Riparian Reserves (acres)	0.0	13.5	15.0	8.6	15.7
Proposed Grading in Riparian Reserves (acres)	0.0	4.2	11.1	4.0	8.7
Landcover Types within Riparian Reserves					
Forested (acres)	522.7	19.1	24.8	12.6	24.3
Talus (acres)	4.8	0	0	0	0
Modified Herbaceous (acres)	67.5	0	1.3	0	0
Developed (acres)	10.5	0	0	0	0
Conversion to modified herbaceous (acres)	0.0	19.0	23.1	10.5	20.3
Conversion to developed (acres)	0.0	0.1	1.7	2.0	1.3

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, yet higher overall than Alternative 2 due to the inclusion of a parking lot and trails within the existing SUP Area. Of all Action Alternatives, 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). Mitigation Measures MM3 and MM10 would reduce impacts to Riparian Reserves under all Action Alternatives (refer to Table 2.4-4).

Late-seral Forest

The White Pass Study Area contains approximately 1,235.8 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 3.6 FEIS 2 below displays impacts to late-seral forest resulting from each alternative.

Table 3.6 FEIS2:
Potential Direct Impacts to Late-seral Forest within the White Pass Study Area

	Alt. 1	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9
Area of late-seral forest (acres)	1,236	1,236	1,236	1,236	1,236
Proposed Clearing and Grading (acres)	0.0	19.7	43.2	15.1	35.4

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, ski trails, parking lot, and ticket booth (refer to Figure 3-33). The fewest impacts to late-seral forest would occur under Alternative 6 with 15.1 acres removed or modified. Alternative 2 impact approximately 19.7 acres of late-seral forest in the proposed expansion area (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, and clearing for lifts and trails would result in similar linear openings that already exist in the mountain parkland habitat.

Construction of chairlifts 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. As described in Table 2.4-4, Other Management Provision OMP7 would reduce impacts to wildlife due to increased human activity and presence by requiring animal-proof containers to be used for waste disposal to prevent habituation of wildlife to human food sources.

Full clearing would result in increased fragmentation 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 will be approximately 12 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). Fragmentation would indirectly impact forest dwelling wildlife species such as pine marten and pileated woodpecker by reducing overstory cover and snags and CWD, considered key habitat components for late-seral dependent species. Some forest dependent species are hesitant and/or unwilling to move across 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, including vegetation brushing, mowing, and facility repairs, 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 1,235.8 acres of late-seral forest, most of which is capable of creating CWD (coarse woody debris) 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 would take several decades 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 the *PCT* chairlift would be constructed in medium tree, closed canopy, multi-story forest.

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, increased 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 2.4-4). 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.

3.6.3.2 Threatened and Endangered Species

Table 3.6-8 presents the impacts to threatened and endangered species potentially occurring within the White Pass Study Area under all alternatives. A detailed analysis of potential impacts to these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6-8:
Available Habitat for Federally Listed Threatened or Endangered Species Potentially Occurring within the Project Area

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

Clearing and grading would result in permanent removal of suitable dispersal and/or nesting, roosting, foraging (NRF) habitat for the northern spotted owl, as vegetation within the cleared areas would be maintained as a managed shrub/herbaceous condition for the life of the ski area under all Action Alternatives (refer to Table 3.6-8). As described in Table 2.4-3, Management Requirement MR10 would restrict helicopter use during northern spotted owl nesting season if surveys are not current at the time of construction.

3.6.3.3 U.S. Forest Service Survey and Manage Species

Table 3.6-FEIS3 presents the impacts to USFS Survey and Manage species potentially occurring within the White Pass Study Area. A detailed analysis of potential impacts to these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6 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/ Existing (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effects; All Alternatives
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
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 Foraging 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.

Table 3.6 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/ Existing (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effects; All Alternatives
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

3.6.3.4 U.S. Forest Service Sensitive Species

Table 3.6-9 presents the impacts to USFS Sensitive Species potentially occurring within the White Pass Study Area. A detailed analysis of potential impacts to these species can be found in the Wildlife Technical Report and Biological Evaluation for the White Pass MDP located in Appendix H of this document.

Table 3.6-9:
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/ Existing (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effects; All Alternatives
California wolverine (*Gulo gulo luteus*)	1,507.3	1,487.6	1,476.0	1492	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

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

Table 3.6-10 presents the impacts to U.S. Fish and Wildlife Service Species of Concern potentially occurring within the White Pass Study Area. A detailed analysis of potential impacts to these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6-10:
Available Habitat for USFWS Species of Concern
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 Effects; All Alternatives[a]
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.

[a] Based on analysis in the Biological Evaluation and Wildlife Report in Appendix H

3.6.3.6 USFS Management Indicator Species

Table 3.6-11 presents the impacts to USFS Management Indicator Species potentially occurring within the White Pass Study Area. A detailed analysis of potential impacts to these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6-11:
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/ Existing (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effects; All Alternatives[a]
Black-backed woodpecker (*Picoides arcticus*)	522.5	522.5	500.8	518.7	487.2	May impact individuals, but will 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 will 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 will 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 will not affect species viability in the project area

Table 3.6-11:
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/ Existing (acres)	Alt. 2 (acres)	Mod. Alt. 4 (acres)	Alt. 6 (acres)	Alt. 9 (acres)	Determination of Effects; All Alternatives[a]
Pileated woodpecker (*Dryocopus pileatus*)	522.5	522.5	500.8	518.7	487.2	May impact individuals, but will 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 will not affect species viability in the project area
Rocky Mountain elk (*Cervus elephus nelsoni*); Roosevelt Elk (*C. e. roosevelti*)	932.3 Foraging	912.6	909.4	924.1	932.2	May impact individuals, but will not affect species viability in the project area
	315.2 Cover	315.2	293.6	311.5	280.0	

[a] Based on analysis in the Biological Evaluation and Wildlife Report in Appendix H

3.6.3.7 Species of Local Concern

Table 3.6-12 presents the impacts to Species of Local Interest potentially occurring within the White Pass Study Area. A detailed analysis of potential impacts to these species can be found in the *Wildlife Technical Report and Biological Evaluation for the White Pass MDP* located in Appendix H of this document.

Table 3.6-12:
Available Habitat for Species of Local Concern 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 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 will 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 will not affect species viability in the project area

Table 3.6-12:
Available Habitat for Species of Local Concern Potentially Occurring within the White Pass Study Area by Alternative

Species	Alt. 1/ Existing	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9	Determination of Effects; All Alternatives
	(acres)	(acres)	(acres)	(acres)	(acres)	
White-tailed ptarmigan (*Lagopus leucurus*)	654.4	634.7	632.9	643.1	654.4	May impact individuals, but will 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.

Management Requirements MR8 and MR9 would reduce potential impacts to special status species in the White Pass Study Area (refer to Table 2.4-3). MR8 would require immediate notification of the Forest Service Biologist and alteration of management activities if special status species are present or new species are encountered during construction. MR9 would require surveys for species status species to be conducted in all areas where suitable habitat is determined by a Forest Service Biologist.

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 below in Table 3.6-13 and 3.6-14 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 3.6.2, 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 WNF and GPNF. While the vegetation community may be undisturbed, existing human 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 effects, and increasing human activity, which in turn increases potential disturbance to animals moving through the area. The re-routed PCNST would not increase recreational use along the trail, although users would pass through the area along the ridge rather than in the current alignment. Because the re-route would be built in parkland, the PCNST re-route would not measurably affect habitat connectivity. During construction of the re-routed PCNST, the presence of workers using hand tools would act as a disturbance to wildlife, potentially causing wildlife to avoid the area during construction.

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 seasonal 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 corridors. 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, such as vegetation mowing and brushing, 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.

3.6.4 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 Management	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.

3.7 AQUATIC CONSERVATION STRATEGY

3.7.1 Introduction

The Aquatic Conservation Strategy (ACS) was developed to improve and maintain the ecological health of watersheds and aquatic ecosystems contained within them on federal public lands. The four primary components of the ACS are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems:

1. **Riparian Reserves:** As stated in the 1994 ROD, "Riparian Reserves are lands along streams, wetlands, and lakes, and unstable and potentially unstable areas where special Standards and Guidelines direct land use." Riparian Reserves were mapped in the Project Area and described in Section 3.3 – Watershed Resources.

2. **Key Watersheds:** As stated in the 1994 ROD, "Key Watersheds are a system of large refugia comprising watersheds that are crucial to at-risk fish species and stocks and provide high quality water. A Tier 1 Key Watershed contributes directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species, and they have a high restoration potential. A Tier 2 Key Watershed may not contain at-risk fish stocks, but are important sources of high quality water." The Clear Fork Cowlitz watershed has been identified as a Tier 2 Key Watershed.

3. **Watershed Analysis:** As stated in the 1994 ROD, "The Northwest Forest Plan Standards and Guidelines contain procedures for conducting watershed analysis that evaluates geomorphic and ecologic processes operating in specific watersheds." The *Clear Fork Watershed Analysis* (USDA 1998a) and the *Upper Tieton Watershed Analysis* (USDA 1998b) were used as information resources during the preparation of the White Pass Expansion Proposal EIS.

4. **Watershed Restoration:** As stated in the 1994 ROD, "A comprehensive, long-term program of watershed restoration to restore watershed health and aquatic ecosystems, including the habitats supporting fish and other aquatic and riparian-dependent organisms."

The four components of the ACS employ several tactics to approach the goal of maintaining the natural disturbance regime. Land use activities should be limited or excluded in those parts of the watershed prone to instability. The distribution of land use activities, such as timber harvest or roads, must minimize increases in peak streamflows. Headwater riparian areas need to be protected, so that when debris slides and flows occur they contain LWD and boulders necessary for creating habitat farther downstream. Riparian areas along larger channels need protection to limit bank erosion, ensure an adequate and continuous supply of LWD to channels, and provide shade and microclimate protection. As specified in the 1994 ROD:

> "To protect the remaining high quality habitats, no new roads will be constructed in inventoried roadless areas in Key Watersheds. Watershed analysis must be conducted in all non-Key Watersheds that contain roadless areas before any management activities can occur within those roadless areas. Existing system and non-system road mileage should be reduced outside roadless areas in Key Watersheds, and if funding is insufficient to implement reductions, there should be no net increase in the amount of roads in Key Watersheds" (1994 ROD at B-19).

Any species-specific strategy aimed at defining explicit standards for habitat-elements would be insufficient for protecting even the targeted species. Therefore, the ACS must strive to maintain and improve ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. Because it is based on natural disturbance processes, it may take decades, possibly more than a century, to accomplish all of its objectives. Some improvements in aquatic ecosystems, however, can be expected in 10 to 20 years.

3.7.2 Aquatic Conservation Strategy Objectives

As stated in the Northwest Forest Plan Standards and Guidelines (B-11), Forest Service and BLM-administered lands within the range of the northern spotted owl will be managed to:

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

4. 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, addition, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

6. 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.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

The 1994 ROD describes that standards and guidelines are designed to focus the review of proposed and certain existing projects to determine the compatibility with the ACSOs. The standards and guidelines focus on “meeting” and “not preventing attainment” of the ACSOs. In order to evaluate the compatibility of the alternatives with the ACSOs, Tables 3.7-FEIS1 and 3.7-FEIS2 present an evaluation of each ASCO within the context of five related resource areas: Geology and Soils, Water and Watershed Resources, Vegetation, Wildlife, and Fisheries. In order to determine whether each alternative will “meet” or “not prevent attainment” of the ASCOs, the evaluation includes a summary of the existing conditions for each resource area, based on watershed analysis and site-specific evaluations, and then refers the reader to the appropriate section of the EIS for more detailed discussion. The analysis then summarizes the effects of the alternatives at two scales: Site (location varies by resource) and 5th field (Upper Clear Fork Cowlitz, a Tier 2 key watershed, and Upper Tieton) to support a determination of the effect of the proposed development and cumulative effects. Finally, the evaluation presents a comparison of the severity of impacts by alternative in descending degree of impact in order to display the similarities or differences between the alternatives.

In addition to the analysis of compatibility with the ACSOs, the analysis of the existing watershed conditions in the two watersheds is presented in Table 3.7-1 (Upper Clear Fork Cowlitz watershed) and Table 3.7-2 (Upper Tieton watershed), where the existing conditions is compared to the potential effects of the alternatives. A summary of the existing watershed condition is included, along with the effects of the alternatives on those conditions, and a listing of design constraints that have been built into the alternatives in an effort not to retard the attainment of the Riparian Reserve Standards and Guidelines.

Also provided is an evaluation of the alternatives relative to appropriate and relevant Standards and Guidelines for Riparian Reserves (1994 ROD, pages C31-C38 – refer to Table 3.7-3).[32]

[32] 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 EIS.

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Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>ACSO 1</td><td>Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted</td></tr>
<tr><th>Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="2">Existing Conditions</td></tr>
<tr><td>• Previous developments (timber harvest, ski area, road construction) have altered physical landscape features through the loss of soil productivity.
• Current risks to Riparian Reserves include some timber harvests, the construction of any new roads, dispersed/developed recreation, potential mass wasting, windthrow, and catastrophic fire (USDA 1998a).</td><td>• Current risks to Riparian Reserves include some timber harvest, the construction of any new roads, dispersed/developed recreation, potential mass wasting, windthrow, and catastrophic fire (USDA 1998a).
• The road density of the Upper Clear Fork Cowlitz watershed that White Pass lies within is approximately 1.7 miles/mile^2 and the road density in Riparian Reserves is 1.5 miles/mile^2 (USDA 1998a).
• The Riparian Reserves in the majority of the watershed are functioning properly because very little management activity has occurred in the riparian areas (USDA 1998a).
• 80 percent of the Clear Fork watershed is within Mount Rainier National Park or Wildernesses (USDA 1998a). Note that for the purposes of this EIS, this watershed has been modified to exclude the Mount Rainier National Park, and has been renamed the Upper Clear Fork Cowlitz watershed.</td></tr>
<tr><td colspan="2">Site Scale</td></tr>
<tr><td colspan="2">Analysis area: 1,120 acres</td></tr>
<tr><td>Implementation of the Action Alternatives would increase the loss of soil productivity within the site scale. The effect at the landscape scale would not result in measurable changes to the distribution, diversity, and complexity of the watershed features.
• Alternative 2, Modified Alternative 4 and Alternative 9 include no new roads, thereby maintaining the existing road density of 1.5 miles/mile^2 in the White Pass Study Area. Alternative 6 includes the development of approximately 0.25 mile of new road in a Tier 2 Key Watershed/IRA, which would increase the road density to approximately 1.7 miles/mile^2 in the White Pass Study Area (refer to Table 3.3-10). Alternative 6 would require the decommissioning and obliteration of approximately 0.6 mile of road in the watershed to avoid a net increase in road mileage in the watershed. Construction of the road would require a site-specific modification of the</td><td>Clearing and grading associated with the Action Alternatives would not measurably affect landscape-scale features at the site scale.
• The clearing and grading in Riparian Reserves range from approximately 4.1 acres in Alternative 9 to approximately 22.2 acres in Modified Alternative 4 (refer to Table 3.3-15).
• Alternative 2, Modified Alternative 4 and Alternative 9 include no new roads, thereby maintaining the existing road density of 1.5 miles/mile^2 in the White Pass Study Area. Alternative 6 includes the development of approximately 0.25 mile of new road in a Tier 2 Key Watershed/IRA, which would increase the road density to approximately 1.7 miles/mile^2 in the White Pass Study Area (refer to Table 3.3-10). Alternative 6 would require the decommissioning and obliteration of approximately 0.6 mile of road in the watershed to avoid a net increase in road</td></tr>
</table>

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>ACSO 1</td><td colspan="2">Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted</td></tr>
<tr><th>Vegetation</th><th>Wildlife</th><th>Fisheries</th></tr>
<tr><td colspan="3">Existing Conditions</td></tr>
<tr><td>• At the landscape scale, vegetation communities are largely intact. The low road density, properly functioning Riparian Reserves, and low levels of disturbance discussed in Watershed Resources are indicative of near-natural conditions.
• 80 percent of the Clear Fork watershed is within Mount Rainier National Park or Wildernesses (USDA 1998a). Note that for the purposes of this EIS, this watershed has been modified to exclude the Mount Rainier National Park, and has been renamed the Upper Clear Fork Cowlitz watershed.</td><td>• While the distribution, diversity, and complexity of watershed and landscape scale features are important components of wildlife habitat, the physical properties on which impacts to wildlife would be measured are primarily associated with the properties described for vegetation.</td><td>• Previous developments (timber harvest, ski area, road construction) have altered physical landscape features through road construction and the removal of vegetation. These alterations are generally localized to small areas within the larger watershed (refer to Section 3.4 – Fisheries). As described in Watershed Resources, Riparian Reserves are largely intact and functioning properly.</td></tr>
<tr><td colspan="3">Site Scale</td></tr>
<tr><td colspan="3">Analysis area: 1,120 acres</td></tr>
<tr><td>The removal of vegetation communities associated with the Action Alternatives would not have a measurable effects on the landscape-scale features (refer to Section 3.5).
• The Action Alternatives would result in approximately 1.0 to 5.6 percent reduction in canopy cover within Riparian Reserves, with canopy cover remaining approximately 40.9 to 45.5 percent (refer to Table 3.3-15).
• The hydrologic maturity within the White Pass Study Area may be reduced by removal of vegetation under the Action Alternatives, however, the</td><td>Wildlife impacts at the site scale would be as described under Vegetation.</td><td>Fish impacts at the site scale would be as described under Watershed Resources, Vegetation and Geology and Soils.</td></tr>
</table>

Table 3.7 FEIS1: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 1	***Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted***
Geology and Soils	**Watershed Resources**
Standards and Guidelines, which would require a coordinated review by the Regional Interagency Executive Committee and Regional Ecosystem Office. If this road were to be selected in the ROD for this FEIS, the Decision could not be rendered until the Regional Interagency Executive Committee concurs that such a modification to the Standards and Guidelines is consistent with the objective of the Standards and Guidelines. Such coordination has not taken place as of the publication of this FEIS. In addition, a decision for road construction within an IRA is reserved to the Chief of the Forest Service, unless he should choose to grant an exception otherwise (FSM 1920, i.d. 1920-2004-1, section 1925.03). • Under the Action Alternatives, there would be no change to the road density at the watershed scale. • Under all Action Alternatives, the total detrimental soil conditions would not exceed 20 percent within the site scale (refer to Table 3.2-3). • Total soil impacts as a result of clearing and grading at the site scale ranges from approximately 27.57 acres under Alternative 9 to 49.14 acres under Modified Alternative 4 (refer to Table 3.2-6).	mileage in the watershed. Under the Action Alternatives, there would be no change to the road density at the watershed scale.
Finding: Meets ACSO 1	**Finding: Meets ACSO 1**
5th Field Scale	
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)	
The effects of the Action Alternatives coupled with the cumulative actions range from approximately 340.01 acres (Alternative 9) to 361.58 acres (Modified Alternative 4), which equates to approximately 0.48 percent to 0.51 percent of the 5th field scale, respectively (refer to Section 3.2.4). Section 3.2 describes that the effects to Geology and Soils would not measurably affect the complexity and distribution of landscape-scale geology and soil features at the 5th field scale.	The effects of the Action Alternatives coupled with the cumulative actions range from approximately 304.86 acres (Alternative 9) to 322.98 acres (Modified Alternative 4), which equates to approximately 1.14 percent to 1.21 percent of the 5th field scale Riparian Reserves, respectively (refer to Section 3.3.4). As discussed in Section 3.3, the effects to Watershed Resources would not measurably affect the complexity and distribution of watershed and landscape-scale features at the 5th field scale.
Finding: Meets ACSO 1	**Finding: Meets ACSO 1**
Degree of impacts by alternative: 4=9>2>6>1	**Degree of impacts by alternative: 4=9>2>6>1**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 1	***Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted***	
Vegetation	**Wildlife**	**Fisheries**
majority of canopy removal would take place outside of Riparian Reserves and in subalpine parkland, resulting in an average canopy cover of 40.9 to 45.5 percent (refer to Table 3.3-15). • Removal of vegetation within the Hogback Basin in Alternatives 2, 6 and Modified Alternative 4 would not alter the sub-alpine parkland community at the site scale.		
Finding: Does Not Prevent Attainment of ACSO 1	**Finding: Does Not Prevent Attainment of ACSO 1**	**Finding: Meets ACSO 1**
5th Field Scale		
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). Therefore, no measurable impacts to the distribution and complexity of landscape-scale vegetation features at the 5th field scale are expected.	Wildlife impacts at the 5th field scale would be as described under Vegetation.	Fish impacts at the 5th field scale would be as described under Watershed Resources.
Finding: Meets ACSO 1	**Finding: Meets ACSO 1**	**Finding: Meets ACSO 1**
Degree of impacts by alternative: 4=9>2>6>1	**Degree of impacts by alternative: 4=9>2>6>1**	**Degree of impacts by alternative: 4=9>2>6>1**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 2	***Maintain and restore spatial and temporal connectivity within and between watersheds. These linkages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.***

Geology and Soils	**Watershed Resources**
Existing Conditions	
Existing geology and soils conditions are as described under Vegetation.	• Current risks to spatial connectivity include some timber harvest, the construction of any new roads, dispersed/developed recreation, and catastrophic fire (USDA 1998a). • The Riparian Reserves in the majority of the watershed are functioning properly because very little management activity has occurred in the riparian areas (USDA 1998a). • The Lower Clear Fork Cowlitz subwatershed has 79 road crossings and 1.25 road crossings per stream mile (USDA 1998a).
Site Scale	
Analysis area: 1,120 acres	
Effects on geology and soils are as described under Vegetation.	Clearing in Riparian Reserves for construction and ski trail clearing would reduce forest connectivity, fragmenting riparian habitat. Such clearing could create localized barriers to fish and wildlife movement along riparian corridors (Refer to Wildlife). The Action Alternatives would not measurably affect spatial and temporal connectivity within the site scale. • The clearing and grading in Riparian Reserves range from approximately 4.1 acres in Alternative 9 to approximately 22.2 acres in Modified Alternative 4 (refer to Table 3.3-15). • The Action Alternatives would result in approximately 1.0 to 5.6 percent reduction in canopy cover within Riparian Reserves, with canopy cover remaining approximately 40.9 to 45.5 percent (refer to Table 3.3-15). • Streams may directly be impacted through the construction of culverts and bridges. However, these stream crossings would be located primarily on first order, ephemeral and intermittent streams within the Upper Clear Fork Cowlitz watershed portion of the White Pass Study Area. • All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas.

**Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Clear Fork Cowlitz Watershed**

ACSO 2	***Maintain and restore spatial and temporal connectivity within and between watersheds. These linkages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.***	
Vegetation	**Wildlife**	**Fisheries**
Existing Conditions		
• Development within the watershed has removed native vegetation and fragmented contiguous forested areas. • The Riparian Reserves in the majority of the watershed are functioning properly because very little management activity has occurred in the riparian areas (USDA 1998a).	Existing wildlife conditions are as described under Vegetation.	Existing fish and aquatic habitat conditions are as described for Watershed Resources.
Site Scale		
Analysis area: 1,120 acres		
Under the Action Alternatives, vegetation removed for the development of additional ski area facilities would not measurably affect the connectivity between watersheds at the site scale. As described in Section 3.5 – Vegetation, clearing and grading within the mountain hemlock parkland community would not measurably change the community structure at the site scale. • Removal of vegetation associated with construction activities would increase the amount of non-forested conditions within Riparian Reserves. Vegetation removal in Riparian Reserves ranges from 4.1 acres under Alternative 9 to 22.2 acres in Modified Alternative 4 (refer to Table 3.3-15). • The Action Alternatives would result in approximately 1.0 to 5.6 percent reduction in canopy cover within Riparian Reserves, with canopy cover	As described in Section 3.6 – Wildlife, the Action Alternatives would have the greatest effect on connectivity for low mobility species. The removal of vegetation would reduce available connective habitat at the site scale. These effects are described under Vegetation.	As described in Section 3.4 – Fisheries, streams within the site scale contain no suitable fish habitat due to steep gradients. The installation of culverts on stream segments under all Action Alternatives would have no effect on connective aquatic habitat.

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 2	***Maintain and restore spatial and temporal connectivity within and between watersheds. These linkages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.***
Geology and Soils	**Watershed Resources**
	• All Action Alternatives would avoid direct impacts to streams and wetlands where possible through the implementation of the Mitigation Measures and Management Requirements listed in Tables 2.4-2 and 2.4-3, the use of BMPs, and field fitting individual construction projects.
Finding: Does Not Prevent Attainment of ACSO 2	**Finding: Does Not Prevent Attainment of ACSO 2**
5th Field Scale	
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)	
Effects to geology and soils at the 5th field scale are as described for Vegetation.	The watershed resources effects of the Action Alternatives coupled with the cumulative actions ranges from approximately 304.86 acres (Alternative 9) to 322.98 acres (Modified Alternative 4), which equates to approximately 1.14 percent to 1.21 percent of the 5th field scale Riparian Reserves, respectively (refer to Section 3.3.4). As discussed in Section 3.3, the effects to Watershed Resources would not measurably affect connective riparian habitat at the 5th field scale.
Finding: Meets ACSO 2	**Finding: Meets ACSO 2**
Degree of impacts by alternative: 4>9>2>6>1	**Degree of impacts by alternative: 4>9>2>6>1**

**Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Clear Fork Cowlitz Watershed**

ACSO 2	***Maintain and restore spatial and temporal connectivity within and between watersheds. These linkages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.***	
Vegetation	**Wildlife**	**Fisheries**
remaining approximately 40.9 to 45.5 percent (refer to Table 3.3-15). • Vegetation would be maintained at a height of 3 feet above ground to prevent ground disturbance and to maintain shading and wildlife habitat.		
Finding: Does not Prevent Attainment of ACSO 2	**Finding: Does Not Prevent Attainment of ACSO 2**	**Finding: Meets ACSO 2**
5th Field Scale		
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). Therefore, vegetation effects would not result in any measurable impacts to connective riparian habitat at the 5th field scale.	Wildlife impacts at the 5th field scale would be as described under Vegetation.	The effects of the Action Alternatives coupled with the cumulative actions range from approximately 304.86 acres (Alternative 9) to 322.98 acres (Modified Alternative 4), which equates to approximately 1.14 percent to 1.21 percent of the 5th field scale Riparian Reserves, respectively (refer to Section 3.4.4). Cumulative actions would result in isolated tree removal within the 5th field Riparian Reserves. Therefore, as discussed in Section 3.4 – Fisheries, fisheries effects would not result in any measurable effects to connective aquatic habitat at the 5th field scale.
Finding: Meets ACSO 2	**Finding: Meets ACSO 2**	**Finding: Meets ACSO 2**
Degree of impacts by alternative: 4>9>2>6>1	**Degree of impacts by alternative: 4>9>2>6>1**	**Degree of impacts by alternative: 4>9>2>6>1**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>ACSO 3</td><td>Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.</td></tr>
<tr><th>Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="2">Existing Conditions</td></tr>
<tr><td>At the site scale, approximately 98 percent of the riparian area along streams occurs on medium to high erosion potential soils (refer to Table 3.3-6).
Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).</td><td>Salvage logging activities have been reported to reduce the number of standing large trees and number of in-stream logs, thereby reducing the LWD recruitment potential (USDA 1998a).
LWD is very abundant within the Lower Clear Fork Cowlitz subwatershed, which has more than 80 pieces per mile (USDA 1998a).
The Lower Clear Fork Cowlitz subwatershed has 63.2 miles of streams (USDA 1998a).
The Lower Clear Fork Cowlitz subwatershed displays evidence of historic channel widening that is attributed to past timber management and road construction projects (USDA 1998a).
Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).</td></tr>
<tr><td colspan="2">Site Scale</td></tr>
<tr><td colspan="2">Analysis area: 1,120 acres</td></tr>
<tr><td>The Action Alternatives would impact the physical integrity of the aquatic system through clearing and grading within Riparian Reserves. These geology and soils impacts are not expected to affect aquatic systems measurably at the site scale.
Clearing and grading on medium and high erosion potential soils within riparian areas ranges from 1.3 acres in Alternative 6 to 5.6 acres in Modified Alternative 4 (refer to 3.3-17).
Millridge Creek is a perennial stream, the WEPP analysis (refer to Section 3.3 – Watershed Resources and Appendix L) details approximate soil detachment as a result of each Action Alternative within the Upper Clear Fork Cowlitz Watershed. As described, short-term (year of construction) sediment detachment generated within the White Pass Study Area for project activities would increase within a range from approximately 9 percent under Alternative 6 to 68 percent under Modified Alternative 4 for the Upper Clear Fork Cowlitz Watershed. Within the</td><td>The Action Alternatives would impact the physical integrity of the aquatic system through clearing and grading within Riparian Reserves. These impacts are not expected to be measurable at the site scale.
The Action Alternatives would cause a slight reduction in the amount of LWD within Riparian Reserves due to the removal of trees for ski facility construction. Alternatives 2, Modified Alternative 4, and 6 would include development of lifts and trails in Hogback and/or Pigtail Basins, which are dominated by subalpine parkland vegetation. This vegetation type is comprised of comparatively smaller size classes than other plant communities at the site scale, and is therefore less capable of providing LWD. Alternative 9 would remove approximately 4 acres of forest capable of providing LWD (refer to Table 3.3-15).
Streams may directly be impacted through the construction of culverts and bridges. However, these stream crossings would be located primarily on first order, ephemeral and intermittent streams.</td></tr>
</table>

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 3	***Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.***	
Vegetation	**Wildlife**	**Fisheries**
Existing Conditions		
• Salvage logging activities have been reported to reduce the number of standing large trees and number of in-stream logs, thereby reducing the LWD recruitment potential (USDA 1998a). • LWD is very abundant within the Lower Clear Fork Cowlitz subwatershed, which has more than 80 pieces per mile (USDA 1998a). • Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).	While shorelines, banks, and bottom configurations are important components of wildlife habitat, the physical properties on which the effects to wildlife would be measured are primarily detailed under Watershed Resources.	• Prior development, timber harvest, and road construction have reduced the physical integrity of the aquatic system through the placement of culverts and hardened stream banks throughout the watershed. • While shorelines, banks, and bottom configurations are important components of fish habitat, the physical properties on which the effects to fish would be measured are primarily detailed under Watershed Resources.
Site Scale		
Analysis area: 1,120 acres		
The effects on the physical integrity of the aquatic system for vegetation are as described for Watershed Resources.	While shorelines, banks, and bottom configurations are important components of wildlife habitat, the physical properties on which the effects to wildlife would be measured are primarily detailed under Watershed Resources.	The construction of culverts under all Action Alternatives would impact the physical integrity of the aquatic system at the site scale. However, these culverts would be placed in first order streams that do not contain suitable fish habitat. Impacts to the physical integrity of the aquatic system would be as described for Watershed Resources.

**Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Clear Fork Cowlitz Watershed**

ACSO 3	***Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.***
Geology and Soils	**Watershed Resources**
Upper Clear Fork Cowlitz Watershed, long-term (two to five years following construction), sediment detachment is expected to increase from approximately 3 percent under Alternative 9 to 10 percent under Modified Alternative 4 (Additional information on the results of the WEPP model can be found in Appendix L – WEPP Technical Report). • Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils).	• Implementation of the Action Alternatives would not alter stream functionality at the site scale (refer to Section 3.3 – Watershed Resources). • Millridge Creek is a perennial stream. According to the WEPP model (refer to Appendix L), short-term (year of construction) sediment detachment generated at the site scale for project activities would increase within a range of 9 percent under Alternative 6 to 68 percent under Modified Alternative 4. Long-term (two to five years following construction), sediment detachment is expected to increase from approximately 3 percent under Alternative 9 to 10 percent under Modified Alternative 4. • Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils). • All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas.
Finding: Meets ACSO 3	**Finding: Does Not Prevent Attainment of ACSO 3**
5th Field Scale	
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)	
Effects to geology and soils in the 5th field scale are as described for Vegetation.	The effects of the Action Alternatives coupled with the cumulative actions range from approximately 304.86 acres (Alternative 9) to 322.98 acres (Modified Alternative 4), which equates to approximately 1.14 percent to 1.21 percent of the 5th field scale Riparian Reserves, respectively (refer to Section 3.3.4). As discussed in Section 3.3, the effects to Watershed Resources would not measurably affect the physical integrity of aquatic systems at the 5th field scale. As described in Section 3.3 – Watershed Resources, these actions are localized to small areas scattered throughout the entire 5th field watershed.
Finding: Meets ACSO 3	**Finding: Meets ACSO 3**
Degree of impacts by alternative: 4=9>6>2>1	**Degree of impacts by alternative: 4=9>6>2>1**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 3	***Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.***	
Vegetation	**Wildlife**	**Fisheries**
Finding: Does Not Prevent Attainment of ACSO 3	**Finding: Does Not Prevent Attainment of ACSO 3**	**Finding: Does Not Prevent Attainment of ACSO 3**
5th Field Scale		
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). As discussed in Section 3.3, the effects to watershed resources would not measurably affect the physical integrity of aquatic systems at the 5th field scale, as these actions are localized to small areas scattered throughout the entire 5th field watershed.	Wildlife impacts at the 5th field scale would be related to the effects described in Vegetation.	As described in Watershed Resources, no measurable impacts to the physical integrity of aquatic systems at the 5th field scale are expected.
Finding: Meets ACSO 3	**Finding: Meets ACSO 3**	**Finding: Meets ACSO 3**
Degree of impacts by alternative: 4=9>6>2>1	**Degree of impacts by alternative: 4=9>6>2>1**	**Degree of impacts by alternative: 4=9>6>2>1**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>ACSO 4</td><td>Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.</td></tr>
<tr><th>Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="2">Existing Conditions</td></tr>
<tr><td>
Sediment introduced into streams within the watershed from management related events are slightly above background levels but well within range of natural variability (USDA 1998a).
Millridge Creek is a sensitive stream to additional disturbances as a result of several slides originating from US 12 that have delivered large quantities of sediment. Additional sediment inputs will likely further affect Millridge Creek (USDA 1998a).
Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).
</td><td>
As described in Geology and Soils, background sediment inputs to Millridge Creek affect turbidity. Additional sediment inputs will likely further affect Millridge Creek (USDA 1998a).
Sediment introduced into streams within the watershed from management related events are slightly above background levels but well within range of natural variability (USDA 1998a).
55 percent of Millridge Creek has a Pfankuch stability rating of Fair and 45 percent has a rating of Poor (USDA 1998a).
Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).
Currently all streams are maintaining Washington State temperature standards for Class AA waters (USDA 1998a).
None of the streams within the Clear Fork Cowlitz Watershed are on the Washington Department of Ecology 303(d) list (USDA 1998a).
</td></tr>
<tr><td colspan="2">Site Scale</td></tr>
<tr><td colspan="2">Analysis area: 1,120 acres</td></tr>
<tr><td>The Action Alternatives would result in increased sediment detachment at the site scale. Increased sediment detachment would have the potential to impact water quality within streams at the site scale (refer to Section 3.3 – Watershed Resources). The use of BMPs and Mitigation Measures described in Tables 2.4-2 to 2.4-4 would reduce the potential sediment yield to streams at the site scale.
Millridge Creek is a perennial stream, the WEPP analysis (refer to Section 3.3 – Watershed Resources and Appendix L) details approximate soil detachment as a result of each Action Alternative within the Upper Clear Fork Cowlitz Watershed. As described, short-term (year of
</td><td>The Action Alternatives would result in potential impacts to water quality from increased sediment yield, pollutant runoff and increased water temperatures (refer to Section 3.3 – Watershed Resources). The use of BMPs and Mitigation Measures described in Tables 2.4-2 to 2.4-4 would reduce the likelihood of pollutant runoff from construction equipment to streams at the site scale. Overall, impacts to water quality are not expected to be measurable at the site scale.
As described in Geology and Soils, the Action Alternatives would result in an increase in sediment detachment. This could lead to an increase in sediment yield and turbidity at the site scale.
</td></tr>
</table>

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>***ACSO 4***</td><td colspan="2">***Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.***</td></tr>
<tr><th>Vegetation</th><th>Wildlife</th><th>Fisheries</th></tr>
<tr><td colspan="3">**Existing Conditions**</td></tr>
<tr><td>• Herbaceous vegetation can provide sediment filtering functions that reduce sediment yield to streams. These impacts are described in Geology and Soils and Watershed Resources. The loss of canopy cover may affect local stream temperatures where forested vegetation that provides shade to streams has been removed.
• Existing canopy cover in Riparian Reserves is approximately 46.5 percent (refer to Table 3.3-15).
• Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).</td><td>While water quality is an important component of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.</td><td>While water quality is an important component of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.</td></tr>
<tr><td colspan="3">**Site Scale**</td></tr>
<tr><td colspan="3">Analysis area: 1,120 acres</td></tr>
<tr><td>The removal of overstory riparian canopy along streams associated with the Action Alternatives could result in an increase in indirect thermal impacts to streams (refer to Section 3.3 – Watershed Resources). Overall, the reduction in riparian canopy is not expected to have a measurable impact on stream temperature at the site scale.
• Reduction in canopy cover within Riparian Reserves ranges from 1.0 percent in Alternative 9 to 5.6 percent in</td><td>While water quality is an important component of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.</td><td>While water quality is an important component of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.</td></tr>
</table>

Table 3.7 FEIS1: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 4	***Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.***
Geology and Soils	**Watershed Resources**
construction) sediment detachment generated within the site scale for project activities would increase within a range from approximately 9 percent under Alternative 6 to 68 percent under Modified Alternative 4. Long-term (two to five years following construction), sediment detachment is expected to increase from approximately 3 percent under Alternative 9 to 10 percent under Modified Alternative 4 (Additional information on the results of the WEPP model can be found in Appendix L – WEPP Technical Report). • Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils). • Understory vegetation would be maintained at a minimum height of 3 feet in areas that include clearing prescriptions with no grading (refer to Table 2.4-1) to minimize sediment delivery. • No access corridors, staging areas, spoils piles, or other construction related materials would be placed in Riparian Reserves. Whenever feasible, potential impacts to Riparian Reserves would be minimized by bringing construction equipment and materials to the project site over snow (refer to Table 2.4-2).	• Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils). • Implementation of the Action Alternatives is not expected to contribute to the listing of any stream on the Department of Ecology's 303(d) list since there would be no new point sources of pollution and water quality impacts are projected to be nominal (refer to Section 3.3 – Watershed Resources). • Impacts to stream temperature would occur from the removal of riparian canopy as described in Vegetation. • Understory vegetation would be maintained at a minimum height of 3 feet in areas that include clearing prescriptions with no grading (refer to Table 2.4-1) to minimize sediment delivery and to help keep stream temperatures cool. • All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas. • Through implementation of a Stormwater Pollution Prevention Plan and the use of BMPs, no long-term changes in the pH, turbidity, and dissolved oxygen of streams at the site scale are expected (refer to Table 2.4-2).
Finding: Does Not Prevent Attainment of ACSO 4	**Finding: Does Not Prevent Attainment of ACSO 4**
5th Field Scale	
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)	
The effects of the Action Alternatives, coupled with the cumulative actions would not result in a measurable increase of sediment detachment at the fifth field scale. These actions occur within small, localized areas that are scattered throughout the entire watershed. Furthermore, a majority of the actions occur outside of Riparian Reserves and therefore are less likely to result in sediment yield to streams within the fifth field scale.	The effects of the Action Alternatives coupled with the cumulative actions range from approximately 304.86 acres (Alternative 9) to 322.98 acres (Modified Alternative 4), which equates to approximately 1.14 percent to 1.21 percent of the 5th field scale Riparian Reserves, respectively (refer to Section 3.3.4). As described in Section 3.3 – Watershed Resources, these actions are localized to small areas scattered

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 4	***Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.***	
Vegetation	**Wildlife**	**Fisheries**
Modified Alternative 4, with canopy cover remaining at approximately 45.5 to 40.9 percent, respectively (refer to Table 3.3-15). • Understory vegetation would be maintained at a minimum height of 3 feet in areas that include clearing prescriptions with no grading (refer to Table 2.4-1) to help keep stream temperatures cool.		
Finding: Does Not Prevent Attainment of ACSO 4	**Finding: Does Not Prevent Attainment of ACSO 4**	**Finding: Does Not Prevent Attainment of ACSO 4**
5th Field Scale		
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). As described in Section 3.3 – Watershed Resources,	While water quality is an important component of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.	While water quality is an important component of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>ACSO 4</td><td colspan="2">Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.</td></tr>
<tr><th colspan="2">Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="2">Therefore impacts to geology and soils are not expected to result in any measurable effects to water quality at the 5th field.</td><td>throughout the entire 5th field. Sediment detachment would be as described under Geology and Soils. As discussed in Section 3.3 – Watershed Resources, the effects to Watershed Resources would not measurably affect water quality at the 5th field scale.</td></tr>
<tr><td colspan="2">Finding: Meets ACSO 4</td><td>Finding: Meets ACSO 4</td></tr>
<tr><td colspan="2">Degree of impacts by alternative: 4>6>2>9>1</td><td>Degree of impacts by alternative: 4>9>2>6>1</td></tr>
<tr><td>ACSO 5</td><td colspan="2">Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.</td></tr>
<tr><td colspan="3">Existing Conditions</td></tr>
<tr><td colspan="2">Millridge Creek is a sensitive stream to additional disturbances as a result of several slides originating from US 12 that have delivered large quantities of sediment. Additional sediment inputs will potentially further affect Millridge Creek (USDA 1998a).
Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).
The Lower Clear Fork Cowlitz subwatershed has been identified as having high impacts to stream channels from bedload movement; most of this bedload is sediment associated with the Wilderness areas and to a much lesser degree, past management activities such as road construction and timber harvest. Because of the heavy sediment movement, enough sediment deposition has occurred to cause problems with stream channel migration (USDA 1998a).
Sediment introduced into streams within the watershed from management related events are slightly above background levels but well within range of natural variability (USDA 1998a).</td><td>Millridge Creek is a sensitive stream to additional disturbances as a result of several slides originating from US 12 that have delivered large quantities of sediment. Additional sediment inputs will potentially further affect Millridge Creek. 55 percent of Millridge Creek has a Pfankuch stability rating of Fair and 45 percent has a rating of Poor (USDA 1998a).
Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).
The Lower Clear Fork Cowlitz subwatershed has been identified as having high impacts to stream channels from bedload movement; most of this bedload is sediment associated with the Wilderness areas and to a much lesser degree, past management activities such as road construction and timber harvest. Because of the heavy sediment movement, enough sediment deposition has occurred to cause problems with stream channel migration (USDA 1998a).
Sediment introduced into streams within the watershed from management related events are slightly above background levels but well within range of natural variability (USDA 1998a).</td></tr>
</table>

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 4	***Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.***	
Vegetation	**Wildlife**	**Fisheries**
these actions are localized to small areas scattered throughout the entire 5th field. The impacts to vegetation would not measurably affect water quality at the 5th field scale		
Finding: Meets ACSO 4	**Finding: Meets ACSO 4**	**Finding: Meets ACSO 4**
Degree of impacts by alternative: 4>2>6>9>1	**Degree of impacts by alternative: 4>2>6>9>1**	**Degree of impacts by alternative: 4>9>2>6>1**
ACSO 5	***Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.***	
Existing Conditions		
• Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a). • Existing canopy cover in Riparian Reserves is approximately 46.5 percent (refer to Table 3.3-15).	While changes in sediment regimes can influence the quality of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.	Changes in the sediment regime can influence the quality of fish habitat through covering suitable spawning gravel and increasing turbidity.

Table 3.7 FEIS1: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>ACSO 5</td><td>Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.</td></tr>
<tr><th>Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="2">Site Scale</td></tr>
<tr><td colspan="2">Analysis area: 1,120 acres</td></tr>
<tr><td>The Action Alternatives would result in increased sediment detachment at the site scale, which has the potential to impact the sediment regime within streams at the site scale (refer to Section 3.3 – Watershed Resources). The use of BMPs and Mitigation Measures described in Tables 2.4-2 to 2.4-4 would reduce the likely sediment yield to streams and are not expected to be measurable at the site scale.
Millridge Creek is a perennial stream, the WEPP analysis (refer to Section 3.3 – Watershed Resources and Appendix L) details approximate soil detachment as a result of each Action Alternative within the Upper Clear Fork Cowlitz Watershed. As described, short-term (year of construction) sediment detachment generated within the White Pass Study Area for project activities would increase within a range from approximately 9 percent under Alternative 6 to 68 percent under Modified Alternative 4 for the Upper Clear Fork Cowlitz Watershed. Within the Upper Clear Fork Cowlitz Watershed, long-term (two to five years following construction), sediment detachment is expected to increase from approximately 3 percent under Alternative 9 to 10 percent under Modified Alternative 4 (Additional information on the results of the WEPP model can be found in Appendix L – WEPP Technical Report).
Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils).
Sediment impacts to streams and wetlands would be minimized through the implementation of the Mitigation Measures in Table 2.4-2 and the use of BMPs during construction activities.</td><td>As described in Geology and Soils, the WEPP model indicates that short and long-term sediment detachment would increase under the Action Alternatives. Increased sediment detachment has the potential to impact the sediment regime through increased yield to streams. However, the use of BMPs and Mitigation Measures would reduce actual sediment yield and the potential impacts to sediment regime are not expected to be measurable at the site scale.
Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils).
Sediment impacts to streams and wetlands would be minimized through the implementation of the Mitigation Measures in Table 2.4-2 and the use of BMPs during construction activities.</td></tr>
<tr><td>Finding: Does Not Prevent Attainment of ACSO 5</td><td>Finding: Does Not Prevent Attainment of ACSO 5</td></tr>
</table>

**Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Clear Fork Cowlitz Watershed**

ACSO 5	***Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.***	
Vegetation	**Wildlife**	**Fisheries**
Site Scale		
Analysis area: 1,120 acres		
The Action Alternatives would reduce the sediment filtering function of vegetation through clearing and grading in Riparian Reserves. • Reduction in canopy cover within Riparian Reserves ranges from 1.0 percent under Alternative 9 to 5.6 percent under Modified Alternative 4, with canopy cover remaining at approximately 45.5 to 40.9 percent, respectively (refer to Table 3.3-15). • Understory vegetation would be maintained at a minimum height of 3 feet to maintain sediment filtering and minimize sediment yield in areas that include clearing prescriptions with no grading (refer to Table 2.4-1).	While changes in sediment regimes can influence the quality of wildlife habitat at the site scale, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.	As described in Geology and Soils and Watershed Resources, changes to the sediment regime are not expected to be measurable at the site scale. Therefore, no measurable effects to the quality of fish habitat are expected at the site scale.
Finding: Does Not Prevent Attainment of ACSO 5	**Finding: Does Not Prevent Attainment of ACSO 5**	**Finding: Does Not Prevent Attainment of ACSO 5**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 5	***Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.***
Geology and Soils	**Watershed Resources**
5th Field Scale	
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)	
The effects of the Action Alternatives, coupled with the cumulative actions would not result in a measurable increase of sediment detachment at the fifth field scale. These actions occur within small, localized areas that are scattered throughout the entire watershed. Furthermore, a majority of the actions occur outside of Riparian Reserves and therefore are less likely to result in sediment yield to streams within the fifth field scale. Therefore the impact to geology and soils would not result in any measurable effects to sediment regime at the 5th field scale.	The effects of the Action Alternatives coupled with the cumulative actions range from approximately 304.86 acres (Alternative 9) to 322.98 acres (Modified Alternative 4), which equates to approximately 1.14 percent to 1.21 percent of the 5th field scale Riparian Reserves, respectively (refer to Section 3.3.4). As described in Section 3.3 – Watershed Resources, these actions are localized to small areas scattered throughout the entire 5th field. The effects to watershed resources would not measurably affect sediment regime at the 5th field scale.
Finding: Meets ACSO 5	**Finding: Meets ACSO 5**
Degree of impacts by alternative: 4>6>2>9>1	**Degree of impacts by alternative: 4>6>2>9>1**
ACSO 6	***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***
Existing Conditions	
Decreased soil permeability and increases in impervious areas (e.g., facilities, parking lots, road network, timber harvest) have contributed to increased runoff within the watershed.	• Increased runoff has the potential to change the timing, magnitude and duration of peak, high and low flows. • Peak flow alterations within the main tributary streams from Mount Rainier National Park and Wildernesses are not expected to change over time except in areas where past human disturbance has affected the area (USDA 1998a). • The frequency of flooding and peak flows is expected to remain relatively constant throughout the Clear Fork watershed because 80 percent of the watershed is within Mount Rainier National Park or Wildernesses (USDA 1998a). • As described in Appendix I – Fisheries Technical Report and Biological Evaluation, peak/base flows are rated functioning adequately as Aggregate Recovery Percentage exceed 95 percent. • Pavement and developed facilities result in increased surface flow (Wright et al., 1990).

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>ACSO 5</td><td colspan="2">Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.</td></tr>
<tr><th>Vegetation</th><th>Wildlife</th><th>Fisheries</th></tr>
<tr><td colspan="3">5th Field Scale</td></tr>
<tr><td colspan="3">Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)</td></tr>
<tr><td>The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). As described in Section 3.3 – Watershed Resources, these actions are localized to small areas scattered throughout the entire 5th field. The impacts to vegetation would not measurably affect sediment regime at the 5th field scale.</td><td>While changes in sediment regimes can influence the quality of wildlife habitat at the 5th field scale, the physical properties on which effects to wildlife would be measured are primarily Geology and Soils, Watershed Resources, and Vegetation.</td><td>As described in Geology and Soils and Watershed Resources, changes to the sediment regime are not expected to be measurable at the 5th field scale. Therefore, no measurable effects to the quality of fish habitat are expected at the 5th field scale.</td></tr>
<tr><td>Finding: Meets ACSO 5</td><td>Finding: Meets ACSO 5</td><td>Finding: Meets ACSO 5</td></tr>
<tr><td>Degree of impacts by alternative: 4>2>6>9>1</td><td>Degree of impacts by alternative: 4>2>6>9>1</td><td>Degree of impacts by alternative: 4>9>2>6>1</td></tr>
<tr><td>ACSO 6</td><td colspan="2">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</td></tr>
<tr><td colspan="3">Existing Conditions</td></tr>
<tr><td>Vegetation within the watershed is hydrologically mature as the Aggregate Recovery Percentage exceeds 95 percent (refer to Appendix I – Fisheries Technical Report and Biological Evaluation). The effects of vegetation removal on in-stream flows would be as described in Watershed Resources.</td><td>While changes in instream flows can influence the quality of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Watershed Resources.</td><td>While changes in instream flows can influence the quality of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Watershed Resources.</td></tr>
</table>

Table 3.7 FEIS1: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>ACSO 6</td><td>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</td></tr>
<tr><th>Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="2">Site Scale</td></tr>
<tr><td colspan="2">Analysis area: 1,120 acres</td></tr>
<tr><td>Under the Action Alternatives, additional impervious surfaces and developed areas (buildings, temporary road) would increase runoff within the site scale. The effect of increased runoff on in-stream flows would be as described under Watershed Resources.</td><td>Under the Action Alternatives, in-stream flows would be affected at the site scale through the removal of vegetation (which may further reduce hydrologic maturity) and increases in impervious surfaces.
As described in Section 3.3 – Watershed Resources, the increased two-year peak flow ranges from 0.2 percent under Alternatives 6 and 9 to 0.4 percent under Modified Alternative 4. Similarly, the increased seven-day low flow ranges from 0.7 percent under Alternative 9 to 1.6 percent under Modified Alternative 4 (refer to Table 3.3-15).
The changes in the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to implementation of the Action Alternatives would not be measurable at the mouth of the Flow Model Analysis Area analyzed for this EIS (refer to Section 3.3.3.5 – Flow Regime).
Implementation of the Action Alternatives would not alter stream functionality at the site scale (refer to Section 3.3 – Watershed Resources).
Through the implementation of Lift and Trail Construction Techniques listed in Table 2.4-1 and the use of BMPs, there would be a small reduction of the changes in the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to the minimization of clearing trees and vegetation at the site scale.</td></tr>
<tr><td>Finding: Does Not Prevent Attainment of ACSO 6</td><td>Finding: Does Not Prevent Attainment of ACSO 6</td></tr>
<tr><td colspan="2">5th Field Scale</td></tr>
<tr><td colspan="2">Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)</td></tr>
<tr><td>The effects of the Action Alternatives, coupled with the cumulative actions would not result in a measurable increase in runoff at the fifth field scale. The effects of the Action Alternatives coupled with the cumulative actions range from approximately 340.0 acres (Alternative 9) to 361.6 acres (Modified Alternative 4), which equates to approximately 0.48 percent to 0.51 percent of the 5th field scale, respectively (refer to Section 3.2.4). These actions occur within small,</td><td>As described in Geology and Soils, the effects of the Action Alternatives, coupled with the cumulative actions, range from approximately 340.0 acres (Alternative 9) to 361.6 acres (Modified Alternative 4), which equates to approximately 0.48 percent to 0.51 percent of the 5th field, respectively (refer to Section 3.2.4). The removal of vegetation and increased impervious surfaces associated with these actions would not result in any measurable changes to runoff at</td></tr>
</table>

**Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed**

ACSO 6	***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***	
Vegetation	**Wildlife**	**Fisheries**
Site Scale		
Analysis area: 1,120 acres		
Effects of the Action Alternatives on vegetation at the site scale would be as described for Watershed Resources.	Effects of the Action Alternatives on wildlife at the site scale would be as described for Watershed Resources.	Effects of the Action Alternatives on fish at the site scale would be as described for Watershed Resources.
Finding: Does Not Prevent Attainment of ACSO 6	**Finding: Does Not Prevent Attainment of ACSO 6**	**Finding: Does Not Prevent Attainment of ACSO 6**
5th Field Scale		
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)		
Effects of the Action Alternatives on vegetation at the 5th field scale would be as described for Watershed Resources.	Effects of the Action Alternatives on wildlife at the 5th field scale would be as described for Watershed Resources.	Effects of the Action Alternatives on fish at the 5th field scale would be as described for Geology and Soils and Watershed Resources.

Table 3.7 FEIS1: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 6	***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***
Geology and Soils	**Watershed Resources**
localized areas that are scattered throughout the entire watershed. Therefore impacts to geology and soils would not result in any measurable effects to in-stream flows at the 5th field scale.	the 5th field scale. As described in Section 3.2 – Geology and Soils, these actions are localized to small areas scattered throughout the entire 5th field. Additionally, the flow model analysis described in Section 3.3 – Watershed Resources details that there would not be a measurable effect on the flow regime at the site scale, and therefore, no measurable effect is expected at the 5th field. Cumulative impacts to watershed resources would not result in any measurable changes to the flow regime at the 5th field scale.
Finding: Meets ACSO 6	**Finding: Meets ACSO 6**
Degree of impacts by alternative: 4>2>6>9>1	**Degree of impacts by alternative: 4>2>6>9>1**
ACSO 7	***Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands***
Existing Conditions	
Decreased soil permeability and increases in impervious areas (e.g., facilities, parking lots, road network, timber harvest) have contributed to increased runoff, potentially resulting in changes to water levels and floodplain inundation within the watershed.	As described in Geology and Soils, increased runoff has the potential to affect water levels and floodplain inundation within the watershed. • Peak flow alterations within the main tributary streams from Mount Rainier National Park and Wildernesses are not expected to change over time except in areas where past human disturbance has affected the area (USDA 1998a). • The frequency of flooding and peak flows is expected to remain relatively constant throughout the Clear Fork Cowlitz watershed because 80 percent of the fifth-field watershed is within Mount Rainier National Park or Wildernesses (USDA 1998a).

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 6	***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***	
Vegetation	**Wildlife**	**Fisheries**
Finding: Meets ACSO 6	**Finding: Meets ACSO 6**	**Finding: Meets ACSO 6**
Degree of impacts by alternative: 4>2>6>9>1	**Degree of impacts by alternative: 4>2>6>9>1**	**Degree of impacts by alternative: 4>2>6>9>1**
ACSO 7	***Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands***	
Existing Conditions		
Vegetation within the watershed is hydrologically mature as the Aggregate Recovery Percentage exceeds 95 percent (refer to Appendix I – Fisheries Technical Report and Biological Evaluation). The effects of vegetation removal on water levels in streams and wetlands would be as described in Watershed Resources.	While changes in water levels and floodplain inundation can influence the quality of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Watershed Resources.	While changes in water levels and floodplain inundation can influence the quality of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Watershed Resources.

**Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Clear Fork Cowlitz Watershed**

<table>
<tr><td>ACSO 7</td><td colspan="2">Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands</td></tr>
<tr><th colspan="2">Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="3">Site Scale</td></tr>
<tr><td colspan="3">Analysis area: 1,120 acres</td></tr>
<tr><td colspan="2">Under the Action Alternatives, additional impervious surfaces and developed areas would increase runoff, but are not expected to result in measurable changes to water levels or floodplain inundation within the site scale. The effects would be as described for Watershed Resources.</td><td>Under the Action Alternatives, water levels in streams, wetlands, and floodplains would be affected at the site scale through the removal of vegetation (which may further reduce hydrologic maturity) and increases in impervious surfaces. At the site scale, water levels of streams and wetlands are strongly influenced by groundwater sources (refer to Section 3.3 – Watershed Resources). Streams within the site scale are small, ephemeral snow melt channels that do not exhibit floodplain development.
The changes in the changes in water levels due to flow regime alterations from the implementation of the Action Alternatives would not be measurable at the site scale (refer to Section 3.3.3.5 – Flow Regime).
Implementation of the Action Alternatives would not alter floodplain inundation within the site scale (refer to Section 3.3 – Watershed Resources).</td></tr>
<tr><td colspan="2">Finding: Meets ACSO 7</td><td>Finding: Meets ACSO 7</td></tr>
<tr><td colspan="3">5th Field Scale</td></tr>
<tr><td colspan="3">Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)</td></tr>
<tr><td colspan="2">The geology and soils effects of the Action Alternatives coupled with the cumulative actions range from approximately 340.0 acres (Alternative 9) to 361.6 acres (Modified Alternative 4), which equates to approximately 0.48 percent to 0.51 percent of the 5th field scale, respectively (refer to Section 3.2.4). These actions occur within small, localized areas that are scattered throughout the entire watershed. Therefore, impacts to geology and soils are not expected to measurably affect water levels or floodplain inundation at the 5th field scale.</td><td>As described in Geology and Soils, the effects of the Action Alternatives, coupled with the cumulative actions, range from approximately 340.0 acres (Alternative 9) to 361.6 acres (Modified Alternative 4), which equates to approximately 0.48 percent to 0.51 percent of the 5th field, respectively (refer to Section 3.2.4). As described in Section 3.2 – Geology and Soils, these actions are localized to small areas scattered throughout the entire 5th field. Therefore, impacts to watershed resources would not result in any measurable impacts to water levels in streams and wetlands or floodplain inundation at the 5th field scale.</td></tr>
<tr><td colspan="2">Finding: Meets ACSO 7</td><td>Finding: Meets ACSO 7</td></tr>
<tr><td colspan="2">Degree of impacts by alternative: 4>2>6>9>1</td><td>Degree of impacts by alternative: 4>2>6>9>1</td></tr>
</table>

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 7	***Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands***	
Vegetation	**Wildlife**	**Fisheries**
Site Scale		
Analysis area: 1,120 acres		
Effects of the Action Alternatives on vegetation would be as described for Watershed Resources.	Effects of the Action Alternatives on wildlife would be as described for Watershed Resources.	Effects of the Action Alternatives on fish would be as described for Watershed Resources.
Finding: Meets ACSO 7	**Finding: Meets ACSO 7**	**Finding: Meets ACSO 7**
5th Field Scale		
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)		
Effects of the Action Alternatives on vegetation at the 5th field scale would be as described for Watershed Resources.	Effects of the Action Alternatives on wildlife at the 5th field scale would be as described for Watershed Resources.	Effects of the Action Alternatives on fish at the 5th field scale would be as described for Geology and Soils and Watershed Resources.
Finding: Meets ACSO 7	**Finding: Meets ACSO 7**	**Finding: Meets ACSO 7**
Degree of impacts by alternative: 4>2>6>9>1	**Degree of impacts by alternative: 4>2>6>9>1**	**Degree of impacts by alternative: 4>2>6>9>1**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

<table>
<tr><td>ACSO 8</td><td colspan="2">Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.</td></tr>
<tr><th colspan="2">Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="3">Existing Conditions</td></tr>
<tr><td colspan="2">Existing geology and soils conditions are as described in Vegetation.</td><td>• The Riparian Reserves in the majority of the watershed are functioning properly because very little management activity has occurred in the riparian areas (USDA 1998a).
• Salvage logging activities have been reported to reduce the number of standing large trees and number of in-stream logs, thereby reducing the LWD recruitment potential (USDA 1998a).
• LWD is very abundant within the Lower Clear Fork Cowlitz subwatershed, which has more than 80 pieces per mile (USDA 1998a).
• Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).
• Within the 5th field watershed, there are approximately 39.8 miles of road inside the existing riparian corridors (USDA 1998a).</td></tr>
<tr><td colspan="3">Site Scale</td></tr>
<tr><td colspan="3">Analysis area: 1,120 acres</td></tr>
<tr><td colspan="2">Effects on geology and soils are as described for Vegetation.</td><td>Clearing in Riparian Reserves associated with the Action Alternatives would affect plant community composition, structure and function.
• The clearing and grading in Riparian Reserves range from approximately 4.1 acres in Alternative 9 to approximately 22.2 acres in Modified Alternative 4 (refer to Table 3.3-15).
• The Action Alternatives would cause a slight reduction in the amount of LWD within Riparian Reserves due to the removal of trees for ski facility construction. Alternatives 2, 6 and Modified</td></tr>
</table>

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.***	
Vegetation	**Wildlife**	**Fisheries**
Existing Conditions		
• Development within the watershed has not significantly changed plant community composition, structure or function. • The Riparian Reserves in the majority of the watershed are functioning properly because very little management activity has occurred in the riparian areas (USDA 1998a). • Salvage logging activities have been reported to reduce the number of standing large trees and number of in-stream logs, thereby reducing the LWD recruitment potential (USDA 1998a). • Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).	Existing wildlife conditions are similar to those described for Vegetation.	Existing fisheries and aquatic habitat conditions are similar to those described for Watershed Resources.
Site Scale		
Analysis area: 1,120 acres		
Under the Action Alternatives, vegetation removed for the development of additional ski area facilities would affect plant community structure and function in Riparian Reserves at the site scale by: • The Action Alternatives would cause a slight reduction in the amount of LWD within Riparian Reserves due to the removal of trees for ski facility	The effects to the composition, structure and function of plant communities utilized by riparian-dependent species are described in Vegetation.	As described in Watershed Resources, riparian community composition, structure and function would be impacted by clearing and grading associated with the Action Alternatives. Construction of the four bridges over perennial streams in Alternative 9 would result in impacts to streambank function.

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.***
Geology and Soils	**Watershed Resources**
	Alternative 4 would include development of lifts and trails in Hogback and/or Pigtail Basins, which are dominated by subalpine parkland vegetation. This vegetation type is comprised of comparatively smaller size classes than other plant communities in the White Pass Study Area, and is therefore less capable of providing LWD. Alternative 9 would remove approximately 4 acres of forest capable of providing LWD (refer to Table 3.3-15). • The potential direct impacts to wetlands would range from approximately 0.04 acre in Alternative 9, 0.09 acre in Alternative 2, 0.11 acre in Alternative 6, and approximately 0.12 acre in Modified Alternative 4 (refer to Table 3.3-13). These impacts would be avoided through implementation of Mitigation Measures in Table 2.4-2 and the use of BMPs. • All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas. • Construction prescriptions and Mitigation Measures in Table 2.4-2 include lop and scatter, with no removal of woody material from cleared areas. Wood would also be placed in stream channels to enhance channel complexity and reduce channel erosion.
Finding: Does Not Prevent Attainment of ACSO 8	**Finding: Does Not Prevent Attainment of ACSO 8**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and***	
Vegetation	**Wildlife**	**Fisheries**
construction. Alternatives 2, 6 and Modified Alternative 4 would include development of lifts and trails in Hogback and/or Pigtail Basins, which are dominated by subalpine parkland vegetation. This vegetation type is comprised of comparatively smaller size classes than other plant communities at the site scale, and is therefore less capable of providing LWD. Alternative 9 would remove approximately 4 acres of forest capable of providing LWD (refer to Table 3.3-15). • Understory vegetation would be maintained at a minimum height of 3 feet in Riparian Reserves (refer to Table 2.4-1) to prevent ground disturbance, minimize sediment delivery, maintain shading and wildlife habitat, and to help keep stream temperatures cool. • The hydrologic maturity at the site scale may be reduced by removal of vegetation, however, the majority of canopy removal would take place outside of Riparian Reserves and in subalpine parkland, resulting in an average canopy cover of 40.9 to 45.5 percent (refer to Table 3.3-15). • Construction prescriptions and Mitigation Measures in Table 2.4-2 include lop and scatter, with no removal of woody material from cleared areas. Wood would also be placed in stream channels to enhance channel complexity and reduce channel erosion.		
Finding: Does Not Prevent Attainment of ACSO 8	**Finding: Does Not Prevent Attainment of ACSO 8**	**Finding: Does Not Prevent Attainment of ACSO 8**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.***
Geology and Soils	**Watershed Resources**
5th Field Scale	
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)	
Effects to geology and soils in the 5th field scale are as described for Vegetation.	The watershed resources effects of the Action Alternatives coupled with the cumulative actions range from approximately 304.86 acres (Alternative 9) to 322.98 acres (Modified Alternative 4), which equates to approximately 1.14 percent to 1.21 percent of the 5th field scale Riparian Reserves, respectively (refer to Section 3.3.4). As discussed in Section 3.3, the effects to Watershed Resources would not measurably affect riparian plant community composition, structure and function at the 5th field scale.
Finding: Meets ACSO 8	**Finding: Meets ACSO 8**
Degree of impacts by alternative: 4>2>6>9>1	**Degree of impacts by alternative: 4>2>6>9>1**
ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***
Existing Conditions	
• Previous developments (timber harvest, ski area, road construction) have altered riparian habitat features through the loss of soil productivity. • Current risks to riparian habitat include some timber harvest, the construction of any new roads, dispersed/developed recreation, potential mass wasting, windthrow, and catastrophic fire (USDA 1998a).	• Current risks to riparian habitat include some timber harvest, the construction of any new roads, dispersed/developed recreation, low LWD recruitment potential, potential mass wasting, windthrow, and catastrophic fire (USDA 1998a). • The road density of the watershed at the site scale is approximately 1.7 miles/mile^2. The road density in Riparian Reserves is 1.5 miles/mile^2 (USDA 1998a). • The Riparian Reserves in the majority of the watershed are functioning properly because very little management activity has occurred in the riparian areas (USDA 1998a). • 80 percent of the fifth-field watershed is within Mount Rainier National Park or Wildernesses (USDA 1998a). • Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements (USDA 1998a).

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and***	
Vegetation	**Wildlife**	**Fisheries**
5th Field Scale		
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions range from 0.33 percent of the CEAA under Alternatives 2 and 6 to 0.35 percent of the CEAA under Modified Alternative 4 (refer to Section 3.5.4). Vegetation impacts would not result in any measurable impacts to riparian plant community composition, structure and function at the 5th field scale.	The effects to the composition, structure and function of plant communities utilized by riparian-dependent species are described in Vegetation.	As described in Watershed Resources, no measurable impacts to the composition, structure and function of riparian plant communities at the 5th field scale are expected.
Finding: Meets ACSO 8	**Finding: Meets ACSO 8**	**Finding: Meets ACSO 8**
Degree of impacts by alternative: 4>2>6>9>1	**Degree of impacts by alternative: 4>2>6>9>1**	**Degree of impacts by alternative: 4>2>6>9>1**
ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***	
Existing Conditions		
• At the landscape scale, vegetation communities are largely intact. The low road density, properly functioning Riparian Reserves, and low levels of disturbance discussed in Watershed Resources are indicative of near-natural conditions. • 80 percent of the fifth-field watershed is within Mount Rainier National Park or Wildernesses (USDA 1998a). • The Riparian Reserves in the majority of the watershed are functioning properly because very little management activity has occurred in the riparian areas (USDA 1998a).	The physical properties on which impacts influencing the distribution of invertebrate and vertebrate riparian dependent species would be measured are primarily described under Watershed Resources and Vegetation.	• Previous developments (timber harvest, ski area) have altered habitat characteristics through road construction and tree removal. Overall complexity of fish habitat features remains relatively stable. • The physical properties on which impacts influencing fish habitat would be measured are primarily watershed resources. Refer to Watershed Resources.

**Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Clear Fork Cowlitz Watershed**

<table>
<tr><td>ACSO 9</td><td>Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.</td></tr>
<tr><td>Geology and Soils</td><td>Watershed Resources</td></tr>
<tr><td colspan="2">Site Scale</td></tr>
<tr><td colspan="2">Analysis area: 1,120 acres</td></tr>
<tr><td>Implementation of the Action Alternatives would increase the loss of soil productivity within the site scale. The effect at the site scale would not result in measurable changes to riparian habitat.
Alternative 2, Modified Alternative 4 and Alternative 9 include no new roads, thereby maintaining the existing road density of 1.5 miles/mile^2 in the site scale. Alternative 6 includes the development of approximately 0.25 mile of new road in a Tier 2 Key Watershed/IRA, which would increase the road density to approximately 1.7 miles/mile^2 in the site scale (refer to Table 3.3-10). Alternative 6 would require the decommissioning and obliteration of approximately 0.6 mile of road in the watershed to avoid a net increase in road mileage in the watershed. Under the Action Alternatives, there would be no change to the road density at the watershed scale.
Under all Action Alternatives, the total detrimental soil conditions would not exceed 20 percent within the site scale (refer to Table 3.2-3).
Total soil impacts as a result of clearing and grading at the site scale ranges from approximately 27.57 acres under Alternative 9 to 49.14 acres under Modified Alternative 4 (refer to Table 3.2-6).</td><td>Clearing and grading within Riparian Reserves associated with the Action Alternatives would not measurably affect habitat for riparian-dependent species at the site scale.
The clearing and grading in Riparian Reserves range from approximately 4.1 acres in Alternative 9 to approximately 22.2 acres in Modified Alternative 4 (refer to Table 3.3-15).
Alternative 2, Modified Alternative 4 and Alternative 9 include no new roads, thereby maintaining the existing road density of 1.5 miles/mile^2 in the site scale. Alternative 6 includes the development of approximately 0.25 mile of new road in a Tier 2 Key Watershed/IRA, which would increase the road density to approximately 1.7 miles/mile^2 at the site scale (refer to Table 3.3-10). Alternative 6 would require the decommissioning and obliteration of approximately 0.6 mile of road in the watershed to avoid a net increase in road mileage in the watershed. Under the Action Alternatives, there would be no change to the road density at the watershed scale.
All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas.
All Action Alternatives would avoid direct impacts to streams and wetlands where possible through the implementation of Mitigation Measures and Management Requirements listed in Tables 2.4-2 and 2.4-3, the use of BMPs, and field fitting individual construction projects.</td></tr>
<tr><td>Finding: Meets ACSO 9</td><td>Finding: Does Not Prevent Attainment of ACSO 9</td></tr>
</table>

Table 3.7 FEIS1: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***	
Vegetation	**Wildlife**	**Fisheries**
Site Scale		
Analysis area: 1,120 acres		
The removal of vegetation communities associated with the Action Alternatives would not have a measurable affects on habitat for riparian-dependent species (refer to Section 3.5). • The Action Alternatives would result in approximately 1.0 to 5.6 percent reduction in canopy cover within Riparian Reserves, with canopy cover remaining approximately 40.9 to 45.5 percent (refer to Table 3.3-15). • The hydrologic maturity within the site scale may be reduced by removal of vegetation under the Action Alternatives, however, the majority of canopy removal would take place outside of Riparian Reserves and in subalpine parkland, resulting in an average canopy cover of 40.9 to 45.5 percent (refer to Table 3.3-15). • Understory vegetation would be maintained at a minimum height of 3 feet in areas that include clearing prescriptions with no grading (refer to Table 2.4-1) to minimize sediment delivery and to help keep stream temperatures cool. • Removal of vegetation within the Hogback Basin in Alternatives 2, 6 and Modified Alternative 4 would not alter the sub-alpine parkland community at the site scale.	Wildlife impacts at the site scale would be as described under Vegetation and Watershed Resources.	Fish impacts at the site scale would be as described under Watershed Resources, Vegetation and Geology and Soils.
Finding: Does Not Prevent Attainment of ACSO 9	**Finding: Does Not Prevent Attainment of ACSO 9**	**Finding: Does Not Prevent Attainment of ACSO 9**

Table 3.7 FEIS1:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***
Geology and Soils	**Watershed Resources**
5th Field Scale	
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)	
The effects of the Action Alternatives coupled with the cumulative actions range from approximately 340.01 acres under Alternative 9 to 361.58 acres under Modified Alternative 4, which equates to approximately 0.48 percent to 0.51 percent of the 5th field scale, respectively (refer to Section 3.2.4). Section 3.2 describes that the effects to geology and soils would not measurably affect habitat for riparian-dependent species at the 5th field scale.	The effects of the Action Alternatives coupled with the cumulative actions range from approximately 304.86 acres under Alternative 9 to 322.98 acres under Modified Alternative 4, which equates to approximately 1.14 percent to 1.21 percent of the 5th field scale Riparian Reserves, respectively (refer to Section 3.3.4). As discussed in Section 3.3, the effects to watershed resources would not measurably affect habitat for riparian-dependent species at the 5th field scale.
Finding: Meets ACSO 9	**Finding: Meets ACSO 9**
Degree of impacts by alternative: 4>2>6>9>1	**Degree of impacts by alternative: 4>2>6>9>1**

Table 3.7 FEIS1: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Clear Fork Cowlitz Watershed

ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***	
Vegetation	**Wildlife**	**Fisheries**
5th Field Scale		
Analysis area: Upper Clear Fork Cowlitz River Watershed (70,722 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). Therefore, impacts to vegetation are not expected to result in any measurable impacts to habitat for riparian-dependent species at the 5th field scale.	Wildlife impacts at the 5th field scale would be related to the effects described in Vegetation.	Fish impacts at the 5th field scale would be as described in Watershed Resources.
Finding: Meets ACSO 9	**Finding: Meets ACSO 9**	**Finding: Meets ACSO 9**
Degree of impacts by alternative: 4>2>6>9>1	**Degree of impacts by alternative: 4>2>6>9>1**	**Degree of impacts by alternative: 4>2>6>9>1**

Table 3.7 FEIS2: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 1	***Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted***
Geology and Soils	**Watershed Resources**
Existing Conditions	
• Previous developments (timber harvest, ski area) have altered physical landscape features through road construction and slope recontouring. • Current risks to Riparian Reserves include timber harvest, the construction of new roads, dispersed/developed recreation, low LWD recruitment potential, potential mass wasting, windthrow, and catastrophic fire (USDA 1998b).	• The disturbance regime in this watershed is functioning adequately because much of the watershed is within Wilderness. Timber harvest has been minimal so it has not altered the disturbance regime (USDA 1998b). • Due to the relatively low levels of harvest and roading, hydrologic patterns at the watershed level have not been changed significantly as a result of forest management activities (USDA 1998b). • It is estimated that less than 15 percent Equivalent Clearcut Area has been disturbed in the watershed, and unstable riparian areas are intact, so the watershed is rated to be functioning adequately (USDA 1998b). • Risks to Riparian Reserves include timber harvest, the construction of new roads, dispersed/developed recreation, low LWD recruitment potential, potential mass wasting, windthrow, and catastrophic fire (USDA 1998b). • Only 2 of the 37 sub-drainages analyzed have a road density greater than 3.0 miles/mile^2 (USDA 1998b).
Site Scale	
Analysis area: 450 acres	
Implementation of the Action Alternatives would increase the loss of soil productivity within the site scale. The effect at the landscape scale would not result in measurable changes to the distribution, diversity, and complexity of geology and soils features. • Under the Action Alternatives, the total acreage of detrimental soil conditions within the site scale would range from 2.9 percent under Alternative 2 to 3.6 percent under Alternative 9 (refer to Table 3.2-3), which is below the 20 percent threshold for an activity area (USDA 1990b). • Total soil impacts as a result of clearing and grading at the site scale ranges from approximately 18.40 acres (4.08 percent of the site scale) under Alternative 2 to 47.23 acres (10.5 percent of the site scale) in Alternative 9 (refer to Table 3.2-8).	Clearing and grading in Riparian Reserves, road density and hydrologic maturity associated with the Action Alternatives would not measurably affect landscape-scale watershed features at the site scale. • The clearing and grading in Riparian Reserves range from approximately 0.0 acre in Alternative 2 to 20.3 acres (8.6 percent of total) in Alternative 9 (refer to Table 3.3-15). • Tere would be no new roads proposed in the Upper Tieton watershed portion of the White Pass Study Area, so there would be no change to the road density (refer to Table 3.3-11). • Alternative 9 would result in the greatest effects to the distribution, diversity and function of Riparian Reserves among the Action Alternatives due to the removal of mature forest along perennial streams. Riparian function would be reduced at ski trail and bridge crossings, but would be maintained along these streams at the site scale.

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 1	***Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted***	
Vegetation	**Wildlife**	**Fisheries**
Existing Conditions		
• Land use activities within the Upper Tieton have contributed to the existing land cover, as represented by the mosaic of vegetation communities and developed areas that comprise the existing vegetation conditions. • It is estimated that less than 15 percent Equivalent Clearcut Area has been disturbed in the watershed, and unstable riparian areas are intact, so the watershed is rated to be functioning adequately (USDA 1998b).	While the distribution, diversity, and complexity of watershed and landscape scale features are important components of wildlife habitat, the physical properties on which impacts to wildlife would be measured are primarily associated with the properties described for Vegetation.	Previous developments (timber harvest, ski area) have altered physical landscape features through road construction and slope recontouring. These alterations are generally localized rather than landscape-scale changes (refer to Section 3.4 – Fisheries).
Site Scale		
Analysis area: 450 acres		
The effects to vegetation communities associated with the Action Alternatives would not have a measurable effect on landscape-scale features at the site scale because all plant communities would continue to persist (refer to Section 3.5). • The removal of vegetation communities at the site scale would occur predominately in a mixed conifer community with Medium tree – Multi-story – Closed Canopy forest structure. Removal of mixed conifer communities with old growth characteristics ranges from 0.0 acre under Alternative 2 to 24.2 acres under Alternative 9, approximately 5.4 percent	Wildlife impacts at the site scale would be as described under Vegetation.	Fisheries impacts would be as described under Geology and Soils, Vegetation and Watershed Resources.

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 1	***Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted***
Geology and Soils	**Watershed Resources**
Finding: Does not prevent attainment of ACSO 1	**Finding: Does not prevent attainment of ACSO 1**
5th Field Scale	
Analysis area: Upper Tieton River Watershed (118,204 acres)	
The geology and soils effects of the Action Alternatives, coupled with the cumulative actions, ranges from approximately 332.57 acres (under Alternative 2) to 361.4 acres (under Alternative 9), which equates to approximately 0.28 percent to 0.31 percent of the 5th field scale, respectively (refer to Section 3.2.4). Section 3.2 – Geology and Soils describes that the effects to geology and soils would not measurably affect the distribution and complexity of landscape-scale geology and soil features at the 5th field scale.	The Action Alternatives, coupled with the cumulative actions, would affect approximately 322.01 acres (under Alternative 2) to 342.31 acres (under Alternative 9) of Riparian Reserves, which equates to approximately 1.80 percent to 1.92 percent of the 5th field scale Riparian Reserves, respectively (refer to Section 3.3.4). As discussed in Section 3.3 – Watershed Resources, the effects to Riparian Reserves would not measurably affect the landscape-scale distribution and complexity of watershed and landscape-scale features at the 5th field scale.
Finding: Meets ACSO 1	**Finding: Meets ACSO 1**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 1	***Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted***	
Vegetation	**Wildlife**	**Fisheries**
of the site scale, the most of any alternative (refer to Appendix G). However, plant communities would not be eliminated at the site scale. • Reduced canopy cover within Riparian Reserves under the Action Alternatives ranges from 0.0 percent under Alternative 2 to 8.6 percent under Alternative 9, with canopy cover remaining at approximately 40.9 to 49.5 percent, respectively (refer to Table 3.3-15).		
Finding: Does not prevent attainment of ACSO 1	**Finding: Does not prevent attainment of ACSO 1**	**Finding: Does not prevent attainment of ACSO 1**
5th Field Scale		
Analysis area: Upper Tieton River Watershed (118,204 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the Cumulative Effects Analysis Area (CEAA; refer to Section 3.5 - Vegetation) in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). A majority of these effects occur outside of Riparian Reserves, and would therefore have no effect on riparian plant communities. Cumulative actions occurring within Riparian Reserves are localized to small areas that are scattered throughout the 5th field. Therefore, no measurable impacts to the distribution and complexity of landscape-scale vegetation features at the 5th field scale are expected.	Wildlife impacts at the 5th field scale would be as described under Vegetation.	Fisheries impacts would be as described under Geology and Soils, Vegetation and Watershed Resources. The fisheries effects of the Action Alternatives coupled with cumulative actions ranges from approximately 322.01 acres (under Alternative 2) to 342.31 acres (under Alternative 9), which equates to approximately 1.80 percent to 1.92 percent of the 5th field, respectively (refer to Section 3.4.4). As discussed in Section 3.4 - Fisheries, the effects to fish or aquatic habitat would not measurably affect the distribution and complexity of landscape-scale features associated with fisheries at the 5th field scale.
Finding: Meets ACSO 1	**Finding: Meets ACSO 1**	**Finding: Meets ACSO 1**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**	**Degree of impacts by alternative: 9>4>6>2=1**

**Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Tieton River Watershed**

<table>
<tr><td>ACSO 2</td><td colspan="2">Maintain and restore spatial and temporal connectivity within and between watersheds. These linkages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.</td></tr>
<tr><td colspan="2">Geology and Soils</td><td>Watershed Resources</td></tr>
<tr><td colspan="3">Existing Conditions</td></tr>
<tr><td colspan="2">• Existing geology and soils conditions are as described under Vegetation.</td><td>• The Riparian Reserves in the majority of the watershed are properly functioning because very little management activity has occurred in the riparian areas (USDA 1998b).
• Due to the relatively low levels of harvest and roading, spatial connectivity at the watershed scale has not been changed significantly as a result of forest management activities (USDA 1998b).
• Risks to spatial connectivity include timber harvest, the construction of new roads, dispersed/developed recreation, and catastrophic fire (USDA 1998b).</td></tr>
<tr><td colspan="3">Site Scale</td></tr>
<tr><td colspan="3">Analysis area: 450 acres</td></tr>
<tr><td colspan="2">Effects on geology and soils are as described under Vegetation.</td><td>Clearing in Riparian Reserves for ski trails and construction would reduce forest continuity, fragmenting riparian habitat. Such clearing may create localized barriers to fish and wildlife movement along riparian corridors (refer to Wildlife). The Action Alternatives would not measurably affect spatial and temporal connectivity within the site scale.
• The clearing and grading in Riparian Reserves ranges from approximately 0 acres in Alternative 2 to 20.3 acres in Alternative 9 (refer to Table 3.3-15).
• Reduced canopy cover within Riparian Reserves under the Action Alternatives ranges from 0.0 percent under Alternative 2 to 8.6 percent under Alternative 9, with canopy cover remaining at approximately 40.9 to 49.5 percent, respectively (refer to Table 3.3-15).
• Streams may be directly impacted through the construction of four bridges (under Alternative 9).
• All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to</td></tr>
</table>

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 2	***Maintain and restore spatial and temporal connectivity within and between watersheds. These linkages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.***	
Vegetation	**Wildlife**	**Fisheries**
Existing Conditions		
• Development within the watershed has removed native vegetation and fragmented contiguous forested areas. • The Riparian Reserves in the majority of the watershed are properly functioning because very little management activity has occurred in the riparian areas (USDA 1998b). • Due to the relatively low levels of harvest and roading, spatial connectivity at the watershed scale has not been changed significantly as a result of forest management activities (USDA 1998b).	Existing wildlife conditions are as described under Vegetation.	Existing fisheries and aquatic habitat conditions are as described under Watershed Resources.
Site Scale		
Analysis area: 450 acres		
Under the Action Alternatives, vegetation removed for the development of additional ski area facilities would affect the connectivity between watersheds at the site scale. • Removal of vegetation associated with construction activities would increase the amount of non-forested area within Riparian Reserves. Vegetation removal in Riparian Reserves ranges from approximately 0 acre in Alternative 2 to 20.3 acres (8.6 percent of total) in Alternative 9 (refer to Table 3.3-15). • Alternative 9 would result in the greatest amount of fragmentation of mature forest of all Action Alternatives. • Reduced canopy cover within Riparian Reserves under the	As described in Section 3.6 – Wildlife, the Action Alternatives would have the greatest affect on connectivity for low mobility species. The removal of vegetation would reduce available connective habitat at the site scale. These effects are described under Vegetation.	Alternative 9 would result in the construction of four bridges over perennial streams. As bridge footings are located upslope of the ordinary high water mark, no measurable impacts to connective aquatic habitat are expected to occur. Impacts to riparian habitat are as described under Watershed Resources.

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 2	***Maintain and restore spatial and temporal connectivity within and between watersheds. These linkages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.***
Geology and Soils	**Watershed Resources**
	• parallel Riparian Reserves while minimizing disturbance in riparian areas. • All Action Alternatives would avoid direct impacts to streams and wetlands where possible through the implementation of the Mitigation Measures and Management Requirements listed in Tables 2.4-2 and 2.4-3, the use of BMPs, and field fitting the individual construction projects.
Finding: Does Not Prevent Attainment of ACSO 2	**Finding: Does Not Prevent Attainment ACSO 2**
5th Field Scale	
Analysis area: Upper Tieton River Watershed (118,204 acres)	
Geology and soils impacts at the 5th field are as described under Vegetation.	The effects of the Action Alternatives, coupled with the cumulative actions, on Riparian Reserves range from approximately 322.01 acres (Alternative 2) to 342.31 acres (Alternative 9), which equates to approximately 1.80 percent to 1.92 percent of the 5th field Riparian Reserves, respectively (refer to Section 3.3.4). Watershed resource impacts would not result in any measurable changes to the connective riparian habitat at the 5th field. These actions are localized to small areas scattered throughout the entire 5th field.
Finding: Meets ACSO 2	**Finding: Meets ACSO 2**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 2	***Maintain and restore spatial and temporal connectivity within and between watersheds. These linkages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.***	
Vegetation	**Wildlife**	**Fisheries**
Action Alternatives ranges from 0.0 percent under Alternative 2 to 8.6 percent under Alternative 9, with canopy cover remaining at approximately 40.9 to 49.5 percent, respectively (refer to Table 3.3-15). • Within Riparian Influence Areas, vegetation would be maintained at a minimum height of 3 feet above ground to prevent ground disturbance and to maintain shading and habitat connectivity.		
Finding: Does Not Prevent Attainment ACSO 2	**Finding: Does Not Prevent Attainment ACSO 2**	**Finding: Does Not Prevent Attainment ACSO 2**
5th Field Scale		
Analysis area: Upper Tieton River Watershed (118,204 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). A majority of these effects occur outside of Riparian Reserves, and would therefore have no effect on connective riparian habitat. Cumulative actions occurring within Riparian Reserves are localized to small areas that are scattered throughout the 5th field. Therefore, impacts to vegetation would result in no measurable impacts to connective riparian habitat at the 5th field scale.	Impacts to connective riparian habitat are not expected to be measurable at the 5th field scale (refer to Vegetation). Therefore, wildlife impacts would not result in any measurable impacts to riparian-dependent species at the 5th field scale.	The effects of the Action Alternatives, coupled with the cumulative actions, range from approximately 322.01 acres (Alternative 2) to 342.31 acres (Alternative 9), which equates to approximately 1.80 percent to 1.92 percent of the 5th field scale, respectively (refer to Section 3.4.4). Cumulative actions would result in isolated tree removal within the 5th field Riparian Reserves. Therefore, fisheries impacts would not result in any measurable effects to connective aquatic habitat at the 5th field scale (refer to Section 3.4 – Fisheries).
Finding: Meets ACSO 2	**Finding: Meets ACSO 2**	**Finding: Meets ACSO 2**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

<table>
<tr><td>ACSO 3</td><td colspan="2">Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.</td></tr>
<tr><th colspan="2">Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="3">Existing Conditions</td></tr>
<tr><td colspan="2">At the site scale, approximately 30 percent of the riparian area along streams occurs on medium to high erosion potential soils (refer to Table 3.3-6).</td><td>Most streams are considered to be functioning adequately for the channel type with deep pools within geomorphic constraints (USDA 1998b).
The streambank conditions of the North Fork Tieton River is rated functioning adequately (USDA 1998b).
Approximately 80 percent of the stream length within the site scale have stable banks (refer to Table 3.3-6).
Prior development, timber harvest, and road construction have reduced the physical integrity of the aquatic system through the placement of culverts and hardened stream banks throughout the watershed.</td></tr>
<tr><td colspan="3">Site Scale</td></tr>
<tr><td colspan="3">Analysis area: 450 acres</td></tr>
<tr><td colspan="2">Clearing and grading on medium and high erosion potential soils within riparian areas ranges from 0.0 acre in Alternative 2 to 0.5 acre in Alternative 9 (refer to Table 3.3-17).
Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils).</td><td>The Action Alternatives would impact the physical integrity of the aquatic system through clearing and grading within Riparian Reserves. These impacts are not expected to be measurable at the site scale.
The Action Alternatives would cause a slight reduction in the amount of LWD within Riparian Reserves due to the removal of trees for ski facility construction. Alternatives 6 and 9 include development of a 2.5-acre parking lot, which would eliminate riparian function in approximately 1.9 acres of Riparian Reserves (refer to Section 3.3.3.3). Under Modified Alternative 4, a 7-acre parking lot would eliminate riparian function from approximately 2.1 acres of Riparian Reserves (refer to Section 3.3.3.3).
All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas.
Streams may be directly impacted through the construction of four bridges (for Alternative 9).
Implementation of the Action Alternatives would not alter stream functionality within the White Pass Study Area or within the watershed (refer to Section 3.3 – Watershed Resources).</td></tr>
</table>

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 3	***Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.***	
Vegetation	**Wildlife**	**Fisheries**
Existing Conditions		
The Riparian Reserves in the majority of the watershed are properly functioning because very little management activity has occurred in the riparian areas (USDA 1998b).	While shorelines, banks, and bottom configurations are important components of wildlife habitat, the physical properties on which the effects to wildlife would be measured are primarily described under Watershed Resources.	• Prior development, timber harvest, and road construction have reduced the physical integrity of the aquatic system through the placement of culverts and hardened stream banks throughout the watershed. • While shorelines, banks, and bottom configurations are important components of fish habitat, the physical properties on which the effects to fish would be measured are
Site Scale		
Analysis area: 450 acres		
The effects on the physical integrity of the aquatic system for vegetation are as described under Watershed Resources.	While shorelines, banks, and bottom configurations are important components of wildlife habitat, the physical properties on which the effects to wildlife would be measured are primarily described under Watershed Resources.	The construction of four bridges under Alternative 9 would impact the stream banks of perennial streams at the site scale. Impacts to the physical integrity of the aquatic system would be as described under Watershed Resources.

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 3	*Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*
Geology and Soils	**Watershed Resources**
	• Construction of ski trails and bridges under Alternative 9 would reduce the length of streams with stable banks to approximately 72 percent of the total stream length (refer to Table 3.3-12). • Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils).
Finding: Meets ACSO 3	**Finding: Does Not Prevent Attainment of ACSO 3**
5th Field Scale	
Analysis area: Upper Tieton River Watershed (118,204 acres)	
Geology and soils impacts at the 5th field are as described under Vegetation.	The effects of the Action Alternatives, coupled with the cumulative actions, on Riparian Reserves range from approximately 322.01 acres (Alternative 2) to 342.31 acres (Alternative 9), which equates to approximately 1.80 percent to 1.92 percent of the 5th field Riparian Reserves, respectively (refer to Section 3.3.4). Cumulative effects to watershed resources would not result in any measurable changes to the physical integrity of aquatic systems at the 5th field scale. As described in Section 3.3 – Watershed Resources, these actions are localized to small areas scattered throughout the entire 5th field.
Finding: Meets ACSO 3	**Finding: Meets ACSO 3**
Degree of impacts by alternative: 9>4>6=2=1	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 3	*Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*	
Vegetation	**Wildlife**	**Fisheries**
Finding: Does Not Prevent Attainment of ACSO 3	**Finding: Does Not Prevent Attainment of ACSO 3**	**Finding: Does Not Prevent Attainment of ACSO 3**
5th Field Scale		
Analysis area: Upper Tieton River Watershed (118,204 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). A majority of these effects occur outside of Riparian Reserves, and would therefore have no effect on the physical integrity of aquatic systems. Cumulative actions occurring within Riparian Reserves are localized to small areas that are scattered throughout the 5th field. Therefore, impacts to vegetation are not expected to result in any measurable impacts to the physical integrity of aquatic systems at the 5th field scale.	The effects to the physical integrity of aquatic systems utilized by riparian-dependent species are described in Vegetation.	As described in Watershed Resources, no measurable impacts to the physical integrity of aquatic systems at the 5th field scale are expected.
Finding: Meets ACSO 3	**Finding: Meets ACSO 3**	**Finding: Meets ACSO 3**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 4	***Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.***

Geology and Soils	Watershed Resources
Existing Conditions	
Sediment sources due to management appear to be limited within the watershed. Since most of the watershed is undisturbed, it is rated functioning adequately relative to sediment (USDA 1998b).	• None of the streams within the watershed have been designated as "water quality limited" by the Washington State Department of Ecology on the 1996 or 1998 303(d) lists (USDA 1998b). • Temperatures in the tributaries of this watershed are believed to be meeting the state water quality standard of 61 degrees Fahrenheit for most of the summer months (USDA 1998b). • Sediment sources due to management appear to be limited within the watershed, and since most of it is undisturbed, this watershed is rated functioning adequately relative to sediment (USDA 1998b).
Site Scale	
Analysis area: 450 acres	
The Action Alternatives would result in increased sediment detachment at the site scale. Increased sediment detachment has the potential to impact water quality within streams at the site scale (refer to Section 3.3 – Watershed Resources). The use of BMPs and Mitigation Measures described in Tables 2.4-2 to 2.4-4, and summarized below, would reduce the potential sediment yield to streams at the site scale. • Long-term sediment detachment increases would range from 0.0 percent under Alternative 2 to 0.8 percent under Alternative 9. Short-term sediment detachment would range from 0.0 percent under Alternative 2 to 12.8 percent under Alternative 9 (refer to Table 3.3-FEIS4). • Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils). • No access corridors, staging areas, spoils piles, or other construction related materials would be placed in Riparian Reserves. Whenever feasible, potential impacts to Riparian Reserves would be minimized by bringing construction materials and equipment to the project site via and at the time of snowpack (refer to Table 2.4-2).	The Action Alternatives would result in potential impacts to water quality from increased sediment yield, pollutant runoff and increased water temperatures (refer to Section 3.3 – Watershed Resources). Impacts resulting from increased sediment would be as described in Geology and Soils. The use of BMPs and Mitigation Measures described in Tables 2.4-2 to 2.4-4 would reduce the likelihood of pollutant runoff from construction equipment to streams at the site scale. Impacts to stream temperature would occur from the removal of riparian canopy as described in Vegetation. Overall, impacts to water quality are not expected to be measurable at the site scale. • Implementation of the Action Alternatives is not expected to contribute to the listing of any stream on the Department of Ecology's 303(d) list since there would be no new point sources of pollution and water quality impacts are projected to be nominal (refer to Section 3.3 – Watershed Resources). • Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils). • All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 4	***Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.***	
Vegetation	**Wildlife**	**Fisheries**
Existing Conditions		
Herbaceous vegetation can provide sediment filtering functions that reduce sediment yield to streams. These impacts are described in Geology and Soils and Watershed Resources. The loss of canopy cover may affect local stream temperatures where forested vegetation that provides shade to streams has been removed.	While water quality is an important component of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.	While water quality is an important component of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.
Site Scale		
Analysis area: 450 acres		
The removal of overstory riparian canopy along streams associated with the Action Alternatives could result in an increase in indirect thermal impacts to streams. Overall, the reduction in riparian canopy is not expected to have a measurable impact on stream temperature at the site scale. • Canopy cover within Riparian Reserves would be reduced by a range of 0 percent under Alternative 2 to 8.6 percent under Alternative 9, with canopy cover remaining at approximately 49.5 to 40.9 percent, respectively (refer to Table 3.3-15). • Understory vegetation would be maintained at a minimum height of 3 feet in areas that include clearing prescriptions with no grading (refer to Table 2.4-1) to minimize sediment delivery and to help keep stream temperatures cool.	While water quality is an important component of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.	While water quality is an important component of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.

Table 3.7 FEIS2: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 4	***Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.***

Geology and Soils	**Watershed Resources**
	proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas. • Through the implementation of a Stormwater Pollution Prevention Plan and the use of BMPs, no long-term changes in the pH, turbidity, and dissolved oxygen of streams at the site scale are expected.
Finding: Does Not Prevent Attainment of ACSO 4	**Finding: Does Not Prevent Attainment of ACSO 4**
5th Field Scale	
Analysis area: Upper Tieton River Watershed (118,204 acres)\	
The effects of the Action Alternatives, coupled with the cumulative actions would not result in a measurable increase in sediment detachment at the fifth field scale. These actions would occur within small, localized areas that are scattered throughout the entire watershed. Furthermore, a majority of the actions occur outside of Riparian Reserves and therefore are less likely to result in sediment yield to streams within the fifth field scale. Therefore, no effects to geology and soils at the fifth field are expected to measurably impact water quality.	The effects of the Action Alternatives, coupled with the cumulative actions, on Riparian Reserves range from approximately 322.01 acres (Alternative 2) to 342.31 acres (Alternative 9), which equates to approximately 1.80 percent to 1.92 percent of the 5th field Riparian Reserves, respectively (refer to Section 3.3.4). Cumulative effects to watershed resources would not result in any measurable changes to water quality at the 5th field scale. These actions are localized to small areas scattered throughout the entire 5th field. Sediment impacts to water quality would be as described under Geology and Soils.
Finding: Meets ACSO 4	**Finding: Meets ACSO 4**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 4	***Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the ecosystem, benefiting survival, growth, reproduction, and migration of individuals composing its aquatic and riparian communities.***	
Vegetation	**Wildlife**	**Fisheries**
Finding: Does Not Prevent Attainment of ACSO 4	**Finding: Does Not Prevent Attainment of ACSO 4**	**Finding: Does Not Prevent Attainment of ACSO 4**
5th Field Scale		
Analysis area: Upper Tieton River Watershed (118,204 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions range from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). A majority of these effects occur outside of Riparian Reserves, and would therefore have less of an effect on water quality as they do not occur within close proximity to waterbodies. Cumulative actions occurring within Riparian Reserves are localized to small areas that are scattered throughout the 5th field. Therefore, impacts to vegetation would result in no expected measurable impacts to water quality at the 5th field scale.	While water quality is an important component of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.	While water quality is an important component of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.
Finding: Meets ACSO 4	**Finding: Meets ACSO 4**	**Finding: Meets ACSO 4**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

<table>
<tr><td>ACSO 5</td><td colspan="2">Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.</td></tr>
<tr><th colspan="2">Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="3">Existing Conditions</td></tr>
<tr><td colspan="2">Sediment sources due to management appear to be limited within the watershed. Since most of the watershed is undisturbed, it is rated functioning adequately relative to sediment (USDA 1998b).</td><td>Sediment sources due to management appear to be limited within the watershed. Since most of the watershed is undisturbed, it is rated functioning adequately relative to sediment (USDA 1998b).
Streams within the headwater portions of the watershed are typically Rosgen Type A and B channels (SE Group 2004 and USDA 1998b). Characteristics of these stream types are primarily sediment transport channels and do not contain high quality fish habitat (USDA 1998b).</td></tr>
<tr><td colspan="3">Site Scale</td></tr>
<tr><td colspan="3">Analysis area: 450 acres</td></tr>
<tr><td colspan="2">The Action Alternatives would result in increased sediment detachment at the site scale, resulting in potential impacts to the sediment regime at the site scale (refer to Section 3.3 – Watershed Resources). The use of BMPs and Mitigation Measures described in Tables 2.4-2 to 2.4-4 would reduce the likely sediment yield to streams. Therefore, impacts to sediment regime and are not expected to be measurable at the site scale.
Long-term sediment detachment increase would range from 0.0 percent under Alternative 2 to 0.8 percent under Alternative 9. Short-term sediment detachment would range from 0.0 percent under Alternative 2 to 12.8 percent under Alternative 9 (refer to Table 3.3-FEIS4).
Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils).
No access corridors, staging areas, spoils piles, or other construction related materials would be placed in Riparian Reserves. Whenever feasible, potential impacts to Riparian Reserves would be minimized by bringing construction materials and equipment to the project site via and at the time of snowpack (refer to Table 2.4-2).
Stabilization and revegetation of disturbed soils in accordance with the SWPPP would minimize sediment detachment and yield (refer to Tables 2.4-3 and 2.4-4).</td><td>As described in Geology and Soils, the WEPP model indicates that long-term sediment detachment would increase under the Action Alternatives. Increased sediment detachment has the potential to impact the sediment regime through increased yield to streams. However, the use of BMPs and Mitigation Measures would reduce actual sediment yield. Therefore, impacts to sediment regime are not expected to be measurable at the site scale.
Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils).
Sediment impacts to streams and wetlands would be minimized through the implementation of the Mitigation Measures and Management Requirements in Tables 2.4-2 and 2.4-3 as well as the use of BMPs during construction activities.
The Action Alternatives would not impact stream channel types at the site scale. They would continue to function primarily as sediment transport channels.</td></tr>
<tr><td colspan="2">Finding: Does Not Prevent Attainment of ACSO 5</td><td>Finding: Does Not Prevent Attainment of ACSO 5</td></tr>
</table>

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 5	***Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.***	
Vegetation	**Wildlife**	**Fisheries**
Existing Conditions		
Herbaceous vegetation can provide sediment filtering functions that reduce sediment yield to streams. These impacts are described in Geology and Soils and Watershed Resources.	While changes in sediment regimes can influence the quality of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.	Changes in the sediment regime can influence the quality of fish habitat through covering suitable spawning gravel and increasing turbidity. Sediment due to management appears to be limited within the watershed. Since most of the watershed is undisturbed, it is rated functioning adequately relative to sediment (USDA 1998b).
Site Scale		
Analysis area: 450 acres		
The Action Alternatives would reduce the sediment filtering function of vegetation through clearing and grading in Riparian Reserves. Vegetation removal in Riparian Reserves ranges from approximately 0.0 acres in Alternative 2 to 20.3 acres in Alternative 9 (refer to Table 3.3-15). • Within Riparian Influence Areas, understory vegetation would be maintained at a minimum height of 3 feet to maintain sediment filtering and minimize sediment yield in areas that include clearing prescriptions with no grading (refer to Table 2.4-1).	While changes in sediment regimes can influence the quality of wildlife habitat at the site scale, the physical properties on which effects to wildlife would be measured are primarily described under Geology and Soils, Watershed Resources, and Vegetation.	As described in Geology and Soils and Watershed Resources, changes to the sediment regime are not expected to be measurable at the site scale. Therefore, no measurable effects to the quality of fish habitat are expected at the site scale.
Finding: Meets ACSO 5	**Finding: Does Not Prevent Attainment of ACSO 5**	**Finding: Does Not Prevent Attainment of ACSO 5**

**Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Tieton River Watershed**

<table>
<tr><td>ACSO 5</td><td colspan="2">Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.</td></tr>
<tr><th colspan="2">Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="3">5th Field Scale</td></tr>
<tr><td colspan="3">Analysis area: Upper Tieton River Watershed (118,204 acres)</td></tr>
<tr><td colspan="2">The effects of the Action Alternatives, coupled with the cumulative actions would not result in a measurable increase in sediment detachment at the fifth field scale. These actions occur within small, localized areas that are scattered throughout the entire watershed. Furthermore, a majority of the actions occur outside of Riparian Reserves and therefore are less likely to result in sediment yield to streams within the fifth field scale. Therefore no effects to geology and soils at the fifth field are expected to measurably impact sediment regime.</td><td>The Riparian Reserve effects of the Action Alternatives, coupled with the cumulative actions, would range from approximately 322.01 acres (Alternative 2) to 342.31 acres (Alternative 9), which equates to approximately 1.80 percent to 1.92 percent of the 5th field Riparian Reserves, respectively (refer to Section 3.3.4). Projects occurring within Riparian Reserves would not result in any measurable changes to sediment regime at the 5th field scale. As described in Section 3.3 – Watershed Resources, these actions are localized to small areas scattered throughout the entire 5th field. Sediment detachment impacts would be as described under Geology and Soils. Therefore, no effects to watershed resources are expected to measurably impact sediment regime at the fifth field scale.</td></tr>
<tr><td colspan="2">Finding: Meets ACSO 5</td><td>Finding: Meets ACSO 5</td></tr>
<tr><td colspan="2">Degree of impacts by alternative: 9>4>6>2=1</td><td>Degree of impacts by alternative: 9>4>6>2=1</td></tr>
<tr><td>ACSO 6</td><td colspan="2">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</td></tr>
<tr><td colspan="3">Existing Conditions</td></tr>
<tr><td colspan="2">Decreased soil permeability and increases in impervious areas (e.g., facilities, parking lots, road network, timber harvest) have contributed to increased runoff within the watershed.</td><td>Increased runoff has the potential to change the timing, magnitude and duration of peak, high and low flows.
Less than 15 percent Equivalent Clearcut Area has been disturbed in the watershed, and unstable riparian areas are intact, so the watershed is rated to be functioning adequately (USDA 1998b).
Due to the relatively low levels of harvest and roading, hydrologic patterns at the watershed level have not been changed significantly as a result of forest management activities (USDA 1998b).
Pavement and developed facilities result in increased surface flow (Wright et al., 1990).</td></tr>
</table>

Table 3.7 FEIS2: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 5	***Maintain and restore the sediment regime in which the aquatic system evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.***	
Vegetation	**Wildlife**	**Fisheries**
5th Field Scale		
Analysis area: Upper Tieton River Watershed (118,204 acres)		
The effects to vegetation from the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). A majority of these effects occur outside of Riparian Reserves, and would therefore have less of an effect on the sediment regime as they do not occur within a close proximity to waterbodies. Cumulative actions occurring within Riparian Reserves are localized to small areas that are scattered throughout the 5th field. Therefore, no impacts to vegetation are expected to measurably affect sediment regime at the 5th field scale.	While changes in sediment regimes can influence the quality of wildlife habitat at the 5th field scale, the physical properties on which effects to wildlife would be measured are primarily Geology and Soils, Watershed Resources, and Vegetation.	As described in Geology and Soils and Watershed Resources, changes to the sediment regime are not expected to be measurable at the 5th field scale. Therefore, no measurable effects to the quality of fish habitat are expected at the 5th field scale.
Finding: Meets ACSO 5	**Finding: Meets ACSO 5**	**Finding: Meets ACSO 5**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**	**Degree of impacts by alternative: 9>4>6>2=1**
ACSO 6	***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***	
Existing Conditions		
A minor amount of past canopy alteration has occurred at the site scale, but not at a level which could measurably affect streamflows (USDA 1998b).	While changes in instream flows can influence the quality of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Watershed Resources.	While changes in instream flows can influence the quality of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Watershed Resources.

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

<table>
<tr><td>ACSO 6</td><td>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</td></tr>
<tr><th>Geology and Soils</th><th>Watershed Resources</th></tr>
<tr><td colspan="2">Site Scale</td></tr>
<tr><td colspan="2">Analysis area: 450 acres</td></tr>
<tr><td>Under the Action Alternatives, additional impervious surfaces and developed areas would increase runoff within the site scale. The effects would be as described for Watershed Resources. The proposed parking lot under Alternatives 6, 9 and Modified Alternative 4 would include stormwater management to offset increased runoff volume, and to capture sediment, oil and grease associated with the surface runoff. The effect of increased runoff on in-stream flows would be as described under Watershed Resources.</td><td>Under the Action Alternatives, in-stream flows would be affected at the site scale through the removal of vegetation (which may further reduce hydrologic maturity) and increases in impervious surfaces. As described in Section 3.3 – Watershed Resources, the increase in two-year peak flow ranges from 0.0 percent under Alternative 2 to 1.1 percent under Alternative 9. Similarly, the increase in seven-day low flow ranges from 0.0 percent under Alternative 2 to 4.6 percent under Alternative 9.
The changes in the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to implementation of the Action Alternatives would not be measurable at the mouth of the Flow Model Analysis Area analyzed for this EIS (refer to Section 3.3.3.5 – Flow Regime).
Implementation of the Action Alternatives would not alter stream functionality or the hydrologic regime within the site scale (refer to Section 3.3 – Watershed Resources).
Through the implementation of Lift and Trail Construction Techniques listed in Table 2.4-1 and the use of BMPs, there would be a small reduction of the changes in the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to the minimization of clearing trees and vegetation at the site scale. Alternative 9 includes the highest impact to forest conditions with the removal of trees within mature forest (refer to Section 3.3 – Watershed Resources and Section 3.5 – Vegetation)</td></tr>
<tr><td>Finding: Does Not Prevent Attainment of ACSO 6</td><td>Finding: Does Not Prevent Attainment of ACSO 6</td></tr>
<tr><td colspan="2">5th Field Scale</td></tr>
<tr><td colspan="2">Analysis area: Upper Tieton River Watershed (118,204 acres)</td></tr>
<tr><td>The geology and soils effects of the Action Alternatives, coupled with the cumulative actions would not result in a measurable increase in runoff at the fifth field scale. The effects of the Action Alternatives coupled with the cumulative actions range</td><td>As described in Geology and Soils, the effects of the Action Alternatives, coupled with the cumulative actions, range from approximately 332.57 acres (Alternative 2) to 361.4 acres (Alternative 9), which equates to approximately 0.28 percent to 0.31 percent</td></tr>
</table>

**Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Tieton River Watershed**

ACSO 6	***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***	
Vegetation	**Wildlife**	**Fisheries**
Site Scale		
Analysis area: 450 acres		
Effects of the Action Alternatives on vegetation at the site scale would be as described for Watershed Resources.	Effects of the Action Alternatives on wildlife at the site scale would be as described for Watershed Resources.	Effects of the Action Alternatives on fish at the site scale would be as described for Watershed Resources.
Finding: Does Not Prevent Attainment of ACSO 6	**Finding: Does Not Prevent Attainment of ACSO 6**	**Finding: Does Not Prevent Attainment of ACSO 6**
5th Field Scale		
Analysis area: Upper Tieton River Watershed (118,204 acres)		
Effects of the Action Alternatives on vegetation at the 5th field scale would be as described for Watershed Resources.	Effects of the Action Alternatives on wildlife at the 5th field scale would be as described for Watershed Resources.	Effects of the Action Alternatives on fish at the 5th field scale would be as described for Geology and Soils and Watershed Resources.

Table 3.7 FEIS2: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 6	***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***
Geology and Soils	**Watershed Resources**
from approximately 332.57 acres (Alternative 2) to 361.4 acres (Alternative 9), which equates to approximately 0.28 percent to 0.31 percent of the 5th field scale, respectively (refer to Section 3.2.4). These actions occur within small, localized areas that are scattered throughout the entire watershed. Therefore no impacts to geology and soils would result in measurable effects to in-stream flows at the 5th field scale.	of the 5th field, respectively (refer to Section 3.2.4). The removal of vegetation and increased impervious surfaces associated with these actions would not result in any measurable changes to runoff at the 5th field scale. As described in Section 3.2 – Geology and Soils, these actions are localized to small areas scattered throughout the entire 5th field. Impacts to watershed resources would not result in measurable affects to in-stream flows at the 5th field scale.
Finding: Meets ACSO 6	**Finding: Meets ACSO 6**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**
ACSO 7	***Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands***
Existing Conditions	
Decreased soil permeability and increases in impervious areas (e.g., facilities, parking lots, road network, timber harvest) have contributed to increased runoff, potentially resulting in changes to water levels and floodplain inundation within the watershed.	• It is estimated that less than 15 percent Equivalent Clearcut Area has been disturbed in the watershed, and unstable riparian areas are intact, so the watershed is rated to be functioning adequately (USDA 1998b). • Due to the relatively low levels of harvest and roading, hydrologic patterns at the watershed level have not been changed significantly as a result of forest management activities (USDA 1998b). • The majority of the watershed is rated as functioning adequately in regard to floodplain connectivity (USDA 1998b).
Site Scale	
Analysis area: 450 acres	
Under the Action Alternatives, additional impervious surfaces and developed areas would increase runoff, but are not expected to result in measurable changes to water levels or floodplain inundation at the site scale. The effects would be as described for Watershed Resources.	Under the Action Alternatives, water levels in streams, wetlands, and floodplains would be affected at the site scale through the removal of vegetation (which may further reduce hydrologic maturity) and increases in impervious surfaces. • At the site scale, water levels of streams and wetlands are strongly influenced by groundwater sources (refer to Section 3.3 – Watershed Resources). The groundwater influence acts to moderate water levels. As described in Section 3.3 – Watershed Resources, streams within the site

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 6	***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***	
Vegetation	**Wildlife**	**Fisheries**
Finding: Meets ACSO 6	**Finding: Meets ACSO 6**	**Finding: Meets ACSO 6**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**	**Degree of impacts by alternative: 9>4>6>2=1**
ACSO 7	***Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands***	
Existing Conditions		
A minor amount of canopy alteration has occurred at the site scale, but not at a level which could measurably affect floodplain inundation (USDA 1998b).	While changes in water levels and floodplain inundation can influence the quality of wildlife habitat, the physical properties on which effects to wildlife would be measured are primarily described under Watershed Resources.	While changes in water levels and floodplain inundation can influence the quality of fish habitat, the physical properties on which effects to fish would be measured are primarily described under Watershed Resources.
Site Scale		
Analysis area: 450 acres		
Effects of the Action Alternatives on vegetation at the site scale would be as described for Watershed Resources.	Effects of the Action Alternatives on wildlife at the site scale would be as described for Watershed Resources.	Effects of the Action Alternatives on fish at the site scale would be as described for Watershed Resources.

Table 3.7 FEIS2: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 7 — ***Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands***	
Geology and Soils	**Watershed Resources**
	scale are narrow, deeply incised channels and therefore have very limited floodplain development. • The changes in water levels due to flow regime alterations from the implementation of the Action Alternatives would not be measurable at the site scale (refer to Section 3.3.3.5 – Flow Regime). • Implementation of the Action Alternatives would not alter floodplain inundation at the site scale (refer to Section 3.3 – Watershed Resources). • Alternative 9 includes the highest impact to forest conditions at the site scale. Through the implementation of Lift and Trail Construction Techniques listed in Table 2.4-1 and the use of BMPs, there would be a reduction of the changes to floodplain inundation due to the minimization of clearing trees and vegetation at the site scale (refer to Section 3.3 – Watershed and 3.5 – Vegetation).
Finding: Meets ACSO 7	**Finding: Meets ACSO 7**
5th Field Scale	
Analysis area: Upper Tieton River Watershed (118,204 acres)	
The geology and soils effects of the Action Alternatives, coupled with the cumulative actions, would not result in measurable changes to water levels or floodplain inundation at the fifth field scale. The geology and soils effects of the Action Alternatives coupled with the cumulative actions range from approximately 332.57 acres (Alternative 2) to 361.4 acres (Alternative 9), which equates to approximately 0.28 percent to 0.31 percent of the 5th field scale, respectively (refer to Section 3.2.4). These actions occur within small, localized areas that are scattered throughout the entire watershed. Therefore no effects to geology and soils are expected to result in measurable effects to water levels or floodplains at the 5th field scale.	As described in Geology and Soils, the effects of the Action Alternatives, coupled with the cumulative actions, range from approximately 332.57 acres (Alternative 2) to 361.4 acres (Alternative 9), which equates to approximately 0.28 percent to 0.31 percent of the 5th field, respectively (refer to Section 3.2.4). The removal of vegetation and increased impervious surfaces associated with these actions would not result in any measurable changes to water levels or floodplain inundation at the 5th field scale. As described in Section 3.2 – Geology and Soils, these actions are localized to small areas scattered throughout the entire 5th field.
Finding: Meets ACSO 7	**Finding: Meets ACSO 7**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7 FEIS2: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 7	***Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands***	
Vegetation	**Wildlife**	**Fisheries**
Finding: Meets ACSO 7	**Finding: Meets ACSO 7**	**Finding: Meets ACSO 7**
5th Field Scale		
Analysis area: Upper Tieton River Watershed (118,204 acres)		
Effects of the Action Alternatives on vegetation at the 5th field scale would be as described for Watershed Resources.	Effects of the Action Alternatives on wildlife at the 5th field scale would be as described for Watershed Resources.	Effects of the Action Alternatives on fish at the 5th field scale would be as described for Geology and Soils and Watershed Resources.
Finding: Meets ACSO 7	**Finding: Meet s ACSO 7**	**Finding: Meets ACSO 7**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.***

Geology and Soils	Watershed Resources
Existing Conditions	
Existing geology and soils conditions are as described under Vegetation.	• The Riparian Reserves in the majority of the watershed are properly functioning because very little management activity has occurred in the riparian areas (USDA 1998b). • Due to the relatively low levels of harvest and roading, plant community composition at the watershed scale has not been changed significantly as a result of forest management activities (USDA 1998b). • Risks to plant community composition, structure and function include timber harvest, the construction of new roads, dispersed/developed recreation, and catastrophic fire (USDA 1998b). • The North Fork Tieton River has had little riparian timber harvest or other management and is rated functioning adequately relative to LWD (USDA 1998b).
Site Scale	
Analysis area: 450 acres	
Effects on geology and soils are as described under Vegetation.	Clearing in Riparian Reserves associated with the Action Alternatives would affect plant community composition, structure and function. • The clearing and grading in Riparian Reserves range from approximately 0.0 acres in Alternative 2 to 20.3 acres in Alternative 9 (refer to Table 3.3-15). These impacts would affect riparian community composition, structure and function. • Reduction in canopy cover within Riparian Reserves under the Action Alternatives ranges from 0.0 percent under Alternative 2 to 8.6 percent under Alternative 9, with canopy cover remaining at approximately 49.5 to 40.9 percent, respectively (refer to Table 3.3-15).

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.***	
Vegetation	**Wildlife**	**Fisheries**
Existing Conditions		
• Development within the watershed has not significantly changed plant community composition, structure or function. • The Riparian Reserves in the majority of the watershed are properly functioning because very little management activity has occurred in the riparian areas (USDA 1998b). • Due to the relatively low levels of harvest and roading, spatial connectivity at the watershed scale have not been changed significantly as a result of forest management activities (USDA 1998b). • The North Fork Tieton River has had little riparian timber harvest or other management and is rated functioning adequately relative to LWD (USDA 1998b).	Existing wildlife conditions are as described under Vegetation.	Existing fisheries and aquatic habitat conditions are as described under Watershed Resources.
Site Scale		
Analysis area: 450 acres		
Under the Action Alternatives, vegetation removed for the development of additional ski area facilities would affect plant community structure and function in Riparian Reserves at the site scale. • Removal of vegetation associated with construction activities would increase the amount of non-forested conditions within Riparian Reserves. Vegetation removal in Riparian Reserves ranges from approximately 0 acres in	The effects to the composition, structure and function of plant communities utilized by riparian-dependent species are as described under Vegetation.	As described in Watershed Resources, riparian community composition, structure and function would be impacted by clearing and grading associated with the Action Alternatives. Construction of the four bridges over perennial streams in Alternative 9 would result in impacts to streambank function. BMPs and Mitigation Measures listed in Tables 2.4-2 through 2.4-4 would minimize the impacts to streambank function and riparian communities as described under Watershed Resources.

Table 3.7 FEIS2: Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.***

Geology and Soils	Watershed Resources
	• All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas. • The Action Alternatives would cause a slight reduction in the amount of LWD within Riparian Reserves due to the removal of trees for ski facility construction. Alternatives 6 and 9 would include development of a 2.5-acre parking lot in the Upper Tieton River watershed, which would eliminate riparian function in approximately 1.9 acres of Riparian Reserves (refer to Section 3.3.3.3). Under Modified Alternative 4, the 7-acre parking lot would eliminate riparian function from approximately 2.1 acres of Riparian Reserves (refer to Section 3.3.3.3). • Construction prescriptions and Mitigation Measures in Table 2.4-2 include lop and scatter requirements, with no removal of woody material from cleared areas. Wood would also be placed in stream channels to enhance channel complexity and reduce channel erosion. • The potential direct impacts to wetlands would range from approximately 0.0 acres in Alternative 2, Modified Alternative 4, and Alternative 6, and 0.03 acre in Alternative 9 (refer to Table 3.3-13). These impacts would be avoided through implementation of Mitigation Measures in Table 2.4-2 and the use of BMPs as well as field fitting the individual construction projects. • The hydrologic maturity within the White Pass Study Area may be reduced by removal of vegetation under the Action Alternatives. However, the majority of canopy removal would take place outside of Riparian Reserves. The hydrologic maturity of the watershed would not be measurably affected at the 5th field scale.
Finding: Does Not Prevent Attainment of ACSO 8	**Finding: Does Not Prevent Attainment of ACSO 8**

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.***	
Vegetation	**Wildlife**	**Fisheries**
Alternative 2 to 20.3 acres in Alternative 9 (refer to Table 3.3-15). • Alternative 9 would result in the greatest amount of fragmentation of dense forests of all Action Alternatives. • Reduction in canopy cover within Riparian Reserves under the Action Alternatives ranges from 0.0 percent under Alternative 2 to 8.6 percent under Alternative 9, with canopy cover remaining at approximately 49.5 to 40.9 percent, respectively (refer to Table 3.3-15). • The Action Alternatives would cause a slight reduction in the amount of LWD within Riparian Reserves due to the removal of trees for ski facility construction. Alternatives 6 and 9 would include development of a 2.5-acre parking lot, which would eliminate riparian function in approximately 1.9 acres of Riparian Reserves (refer to Table 3.3-15). Under Modified Alternative 4, the 7-acre parking lot would eliminate riparian function from approximately 2.1 acres of Riparian Reserves (refer to Table 3.3-15). • Vegetation would be maintained at a minimum height of 3 feet above ground to prevent ground disturbance, minimize sediment delivery, and to maintain shading and wildlife habitat.		
Finding: Does Not Prevent Attainment of ACSO 8	**Finding: Does Not Prevent Attainment of ACSO 8**	**Finding: Does Not Prevent Attainment of ACSO 8**

**Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Tieton River Watershed**

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.***

Geology and Soils	**Watershed Resources**
5th Field Scale	
Analysis area: Upper Tieton River Watershed (118,204 acres)	
Geology and soils impacts at the 5th field are as described under Vegetation.	The effects of the Action Alternatives, coupled with the cumulative actions, on Riparian Reserves range from approximately 322.01 acres (Alternative 2) to 342.31 acres (Alternative 9), which equates to approximately 1.80 percent to 1.92 percent of the 5th field Riparian Reserves, respectively (refer to Section 3.3.4). As described in Section 3.3 – Watershed Resources, these actions are localized to small areas scattered throughout the entire 5th field. Effects to watershed resources would not result in any measurable changes to the composition, structure and function of riparian plant communities at the 5th field scale.
Finding: Meets ACSO 8	**Finding: Meets ACSO 8**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**

ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***

Existing Conditions	
• Previous developments (timber harvest, ski area) have altered habitat characteristics through road construction and tree removal. • Risks to Riparian Reserves include timber harvest, the construction of new roads, dispersed/developed recreation, low LWD recruitment potential, potential mass wasting, windthrow, and catastrophic fire (USDA 1998b).	• The disturbance regime in this watershed is functioning adequately because much of the watershed is within Wilderness. Timber harvest has been minimal so it has not altered the disturbance regime (USDA 1998b). • Due to the relatively low levels of harvest and roading, hydrologic patterns at the watershed level have not been changed significantly as a result of forest management activities (USDA 1998b). • It is estimated that less than 15 percent Equivalent Clearcut Area has been disturbed in the watershed, and unstable riparian areas are intact, so the watershed is rated to be functioning adequately (USDA 1998b).

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 8	***Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of large wood sufficient to sustain physical complexity and stability.***	
Vegetation	**Wildlife**	**Fisheries**
5th Field Scale		
Analysis area: Upper Tieton River Watershed (118,204 acres)		
The vegetation effects of the Action Alternatives and cumulative actions ranges from 0.33 percent of the CEAA in Alternatives 2 and 6 to 0.35 percent of the CEAA in Modified Alternative 4 (refer to Section 3.5.4). A majority of these effects occur outside of Riparian Reserves, and would therefore have no effect on riparian plant communities. Cumulative actions occurring within Riparian Reserves are localized to small areas that are scattered throughout the 5th field. Therefore, no impacts to vegetation would result in measurable impacts to the composition, structure and function of riparian plant communities at the 5th field scale.	The wildlife effects to the composition, structure and function of plant communities utilized by riparian-dependent species are as described under Vegetation.	As described in Watershed Resources, no measurable impacts to the composition, structure and function of riparian plant communities at the 5th field scale are expected.
Finding: Meets ACSO 8	**Finding: Meets ACSO 8**	**Finding: Meets ACSO 8**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**	**Degree of impacts by alternative: 9>4>6>2=1**
ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***	
Existing Conditions		
• Land use activities within the Upper Tieton Watershed have contributed to the existing land cover, as represented by the mosaic of vegetation communities and developed areas that comprise the existing vegetation conditions. • It is estimated that less than 15 percent Equivalent Clearcut Area has been disturbed in the watershed, and unstable riparian areas are intact, so the	• The physical properties on which impacts influencing the distribution of invertebrate and vertebrate riparian dependent species would be measured are primarily watershed resources and vegetation. Refer to Watershed Resources and Vegetation.	• Previous developments (timber harvest, ski area) have altered habitat characteristics through road construction and tree removal. • The physical properties on which impacts influencing fish habitat would be measured are primarily watershed resources. Refer to Watershed Resources.

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***
Geology and Soils	**Watershed Resources**
	• Risks to Riparian Reserves include timber harvest, the construction of new roads, dispersed/developed recreation, low LWD recruitment potential, potential mass wasting, windthrow, and catastrophic fire (USDA 1998b). • Most streams are considered to be functioning adequately for the channel type with deep pools within geomorphic constraints (USDA 1998b). • The streambank conditions of the North Fork Tieton River is rated functioning adequately (USDA 1998b). • Only 2 of the 37 sub-drainages analyzed have a road density greater than 3.0 miles/mile^2 (USDA 1998b).
Site Scale	
Analysis area: 450 acres	
Implementation of the Action Alternatives would increase the loss of soil productivity within the site scale. The geology and soils impacts would not result in measurable changes to riparian habitat at the site scale. • Under all Action Alternatives, the total acreage of detrimental soil conditions would not exceed 20 percent within the site scale (refer to Table 3.2-3). • Total soil impacts as a result of clearing and grading at the site scale ranges from approximately 18.40 acres under Alternative 2 to 47.23 acres in Alternative 9 (refer to Table 3.2-8). • Under all Action Alternatives, there would be no new roads proposed in the watershed at the site scale, so there would be no change to the road density (refer to Table 3.3-11).	Clearing and grading in Riparian Reserves, road density and stream crossings associated with the Action Alternatives would affect the site scale. Impacts to watershed resources are not expected to have a measurable impact on riparian habitat at the site scale. • The clearing and grading in Riparian Reserves range from approximately 0 acres in Alternative 2 to 20.3 acres in Alternative 9 (refer to Table 3.3-15). • Under all Action Alternatives, there would be no new roads proposed in the watershed at the site scale, so there would be no change to the road density (refer to Table 3.3-11). • Under Alternative 9, impacts to aquatic habitat would result from four new permanent bridge crossings on perennial streams within the Upper Tieton watershed as a result of ski trail construction (refer to Table 2.3.1-2, Table 3.3-11 and Figure 3-17). • Under all Action Alternatives, there would be no direct impacts to stream channels or aquatic habitat. For all Action Alternatives there could be a slight change to the timing, duration, or magnitude of low flow and peak flow conditions due to land cover alterations from implementation of the Action Alternatives.

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***	
Vegetation	**Wildlife**	**Fisheries**
watershed is rated to be functioning adequately (USDA 1998b).		
Site Scale		
Analysis area: 450 acres		
• The removal of vegetation communities associated with the Action Alternatives would not be measurable at the site scale (refer to Section 3.5). The reduction in canopy cover within Riparian Reserves associated with the Action Alternatives would not measurably impact the aquatic habitat at the site scale. The following details these effects at the site scale: • The removal of vegetation communities at the site scale would occur predominately in a mixed conifer community with Medium tree – Multi-story – Closed Canopy forest structure. Removal of mixed conifer communities with old growth characteristics range from 0 acres under Alternative 2 to 24.2 acres under Alternative 9 (refer to Appendix G). Under Alternative 9, removal of the mixed conifer community with Medium tree – Multi-story – Closed Canopy forest structure equates to approximately 5.4%	Wildlife impacts at the site scale would be related to the effects described in Watershed Resources and Vegetation. Populations of riparian dependent wildlife would be temporarily displaced during construction activities (refer to Section 3.6 – Wildlife).	Fisheries impacts would be related to the effects described in Geology and Soils, Vegetation and Watershed Resources. • Construction of a parking lot in Alternatives 6, 9, and Modified Alternative 4 would impact Riparian Reserves, potentially increasing flow to riparian habitat due to decreased soil permeability. • Construction of four bridge crossings on perennial streams in Alternative 9 would impact aquatic habitat. • Under all Action Alternatives, there would be no direct impacts to stream channels or riparian habitat. For all Action Alternatives there could be a slight change to the timing, duration, or magnitude of low flow and peak flow conditions due to land cover alterations from implementation of the Action Alternatives. • BMPs and Mitigation Measures listed in Tables 2.4-2 through 2.4-4 would minimize the impacts to riparian habitat.

Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs) at Two Scales within the Upper Tieton River Watershed

ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***
Geology and Soils	**Watershed Resources**
Finding: Does not prevent attainment of ACSO 9	**Finding: Does not prevent attainment of ACSO 9**
5th Field Scale	
Analysis area: Upper Tieton River Watershed (118,204 acres)	
The effects of the Action Alternatives, coupled with the cumulative actions, range from approximately 332.57 acres under Alternative 2 to 361.4 acres under Alternative 9, which equates to approximately 0.28 percent to 0.31 percent of the 5th field scale, respectively (refer to Section 3.2.4). Section 3.2 describes that the effects to Geology and Soils would not measurably affect riparian habitat at the 5th Field scale.	The effects of the Action Alternatives, coupled with the cumulative actions, range from approximately 322.01 acres under Alternative 2 to 342.31 acres under Alternative 9, which equates to approximately 1.80 percent to 1.92 percent of the 5th field scale, respectively (refer to Section 3.3.4). Cumulative actions would not result in any measurable changes in the timing, duration, or magnitude of low flow and peak flow events at the fifth field scale for the Upper Tieton River watershed (refer to Section 3.3.3.5 – Flow Regime). Therefore, no measurable effects to riparian habitat are expected (refer to Section 3.3 – Watershed Resources).
Finding: Meets ACSO 9	**Finding: Meets ACSO 9**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**

**Table 3.7 FEIS2:
Compatibility Analysis of the Aquatic Conservation Strategy Objectives (ACSOs)
at Two Scales within the Upper Tieton River Watershed**

ACSO 9	***Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.***	
Vegetation	**Wildlife**	**Fisheries**
of the White Pass Study Area within the Upper Tieton River Watershed, the most of any alternative (refer to Appendix G). However, plant communities would not be eliminated at the site scale. • Reduction in canopy cover within Riparian Reserves under the Action Alternatives ranges from 0.0 percent under Alternative 2 to 8.6 percent under Alternative 9, with canopy cover remaining at approximately 49.5 to 40.9 percent, respectively (refer to Table 3.3-15).		
Finding: Does not prevent attainment of ACSO 9	**Finding: Does not prevent attainment of ACSO 9**	**Finding: Does not prevent attainment of ACSO 9**
5th Field Scale		
Analysis area: Upper Tieton River Watershed (118,204 acres)		
The mixed conifer vegetation communities with Medium tree – Multi-story – Closed Canopy forest structure removed under Alternative 9 equates to approximately 0.02% of the entire Upper Tieton River Watershed, the most of any alternative (refer to Appendix G). As discussed in Section 3.3 and 3.5, the vegetation impacts would not measurably affect riparian habitat at the 5th field scale.	Wildlife impacts at the 5th field scale would be related to the effects described in Vegetation. As described in Section 3.6, impacts to riparian-dependent species would occur from short-term noise disruptions, increased human activity, and the loss of habitat resulting from the effects of the Action Alternatives and cumulative actions. These effects are localized to small areas scattered throughout the entire 5th field. Therefore, wildlife impacts would not result in any measurable effects to riparian-dependent species at the 5^{th} field.	The effects of the Action Alternatives, coupled with the cumulative actions, range from approximately 322.01 acres under Alternative 2 to 342.31 acres under Alternative 9, which equates to approximately 1.80 percent to 1.92 percent of the 5th field scale, respectively (refer to Section 3.4.4). Cumulative actions would not result in any measurable changes in the timing, duration, or magnitude of low flow and peak flow events at the fifth field scale for the Upper Tieton River watershed (refer to Section 3.3.3.5 – Flow Regime). Therefore, fisheries impacts are not expected to measurably effect riparian habitat at the 5^{th} field scale (refer to Section 3.3 – Watershed Resources).
Finding: Meets ACSO 9	**Finding: Meets ACSO 9**	**Finding: Meets ACSO 9**
Degree of impacts by alternative: 9>4>6>2=1	**Degree of impacts by alternative: 9>4>6>2=1**	**Degree of impacts by alternative: 9>4>6>2=1**

Table 3.7-1:
Evaluation of Watershed Condition and Project Effects – Upper Clear Fork Cowlitz Watershed

Existing Condition	Effect of Proposed Action	Design and Assessment Considerations
Watershed Issues:		
Clearing and Grading in Riparian Reserves/ Riparian Reserve Functionality • Current risks to Riparian Reserves include some timber harvest, the construction of any new roads, dispersed/developed recreation, potential mass wasting, windthrow, and catastrophic fire (USDA 1998a). • The Riparian Reserves in the majority of the watershed are functioning properly because very little management activity has occurred in the riparian areas (USDA 1998a). • Salvage logging activities have been reported to reduce the number of standing large trees and number of in-stream logs, thereby reducing the LWD recruitment potential (USDA 1998a). • LWD is very abundant within the Lower Clear Fork Cowlitz subwatershed, which has more than 80 pieces per mile (USDA 1998a).	• There are approximately 395.3 acres of Riparian Reserves in the Upper Clear Fork Cowlitz watershed portion of the White Pass Study Area (refer to Table 3.3-5). The clearing and grading in Riparian Reserves range from approximately 4.1 acres in Alternative 9 to approximately 22.2 acres in Modified Alternative 4 (refer to Table 3.3-15). • The Action Alternatives would result in approximately 1.0 to 5.6 percent reduction in canopy cover within Riparian Reserves, with canopy cover remaining approximately 40.9 to 45.5 percent (refer to Table 3.3-15). • Populations of riparian dependent wildlife would be temporarily displaced during construction (refer to Section 3.6 – Wildlife). • The Action Alternatives would cause a slight reduction in the amount of LWD within Riparian Reserves due to the removal of trees for ski facility construction. Alternatives 2, 6 and Modified Alternative 4 would include development of lifts and trails in Hogback and/or Pigtail Basins, which are dominated by subalpine parkland vegetation. This vegetation type is comprised of comparatively smaller size classes than other plant communities in the White Pass Study Area, and is therefore less capable of providing LWD. Alternative 9 would remove approximately 4 acres of forest capable of providing LWD (refer to Table 3.3-15).	• All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas. • Construction prescriptions and Mitigation Measures in Table 2.4-2 include lop and scatter, with no removal of woody material from cleared areas. Wood would also be placed in stream channels to enhance channel complexity and reduce channel erosion. • No access corridors, staging areas, spoils piles, or other construction related materials would be placed in Riparian Reserves. Whenever feasible, potential impacts to Riparian Reserves would be minimized by bringing construction equipment and materials to the project site over snow (refer to Table 2.4-2).

Table 3.7-1:
Evaluation of Watershed Condition and Project Effects – Upper Clear Fork Cowlitz Watershed

Existing Condition	Effect of Proposed Action	Design and Assessment Considerations
Impacts to Riparian Habitat of Streams and Wetlands • The Lower Clear Fork Cowlitz subwatershed has 63.2 miles of streams (USDA 1998a). • The Lower Clear Fork Cowlitz subwatershed displays evidence of historic channel widening that is attributed to past timber management and road construction projects (USDA 1998a). • Millridge Creek is a sensitive stream to additional disturbances as a result of several slides originating from US 12 that have delivered large quantities of sediment. Additional sediment inputs will likely further affect Millridge Creek. Fifty-five percent of Millridge Creek has a Pfankuch stability rating of Fair and 45 percent has a rating of Poor (USDA 1998a). • Stream channels within the subwatershed are expected to become more stable as upslope vegetative recovery proceeds. Such changes will be associated with riparian stand structure improvements and reduction of sediment routing to stream channels (USDA 1998a).	• The potential direct impacts to wetlands would range from approximately 0.04 acre in Alternative 9, 0.09 acre in Alternative 2, 0.11 acre in Alternative 6, and approximately 0.12 acre in Modified Alternative 4 (refer to Table 3.3-13). These impacts would be avoided through implementation of Mitigation Measures in Table 2.4-2 and the use of BMPs. • Streams may directly be impacted through the construction of culverts and bridges. However, these stream crossings would be located primarily on first order, ephemeral and intermittent streams within the Upper Clear Fork Cowlitz watershed portion of the White Pass Study Area. • Implementation of the Action Alternatives would not alter stream functionality within the White Pass Study Area (refer to Section 3.3 – Watershed Resources). • There would be no change to the floodplain connectivity within the watershed as a result of the Action Alternatives (refer to Section 3.3 – Watershed Resources). • Millridge Creek is a perennial stream, the WEPP analysis (refer to Section 3.3 – Watershed Resources and Appendix L) details approximate soil detachment as a result of each Action Alternative within the Upper Clear Fork Cowlitz Watershed. As described, short-term (year of construction) sediment detachment generated within the White Pass Study Area for project activities would increase within a range from approximately 9 percent under Alternative 6 to 68 percent under Modified Alternative 4 for the Upper Clear Fork Cowlitz Watershed. Within the	• All Action Alternatives would avoid direct impacts to streams and wetlands where possible through the implementation of the Mitigation Measures and Management Requirements listed in Tables 2.4-2 and 2.4-3, the use of BMPs, and field fitting individual construction projects. • Utilities would cross streams by using aerial crossings (at ground elevation, refer to Chapter 2), and wetland impacts from utility trenching would be avoided altogether. • Vegetation would be maintained at a height of 3 feet above ground to prevent ground disturbance and to maintain shading and wildlife habitat. • Wetland impacts would be avoided by maintaining the existing contours and drainage patterns in wetlands that intersect proposed ski trails. • Vegetation removal in wetlands would be conducted by hand/chainsaw. No heavy equipment would operate in wetlands. • The tree removal prescription for each chairlift and its corresponding ski trails is outlined in Table 2.4-1. All construction techniques involve design components that are intended to avoid/minimize ground disturbance. These include over-the-snow access and construction and the use of helicopters. • Sediment impacts to streams and wetlands would be minimized through the implementation of the Mitigation Measures in Table 2.4-2 and the use of BMPs during construction activities.

Table 3.7-1:
Evaluation of Watershed Condition and Project Effects – Upper Clear Fork Cowlitz Watershed

Existing Condition	Effect of Proposed Action	Design and Assessment Considerations
	Upper Clear Fork Cowlitz Watershed, long-term (two to five years following construction), sediment detachment is expected to increase from approximately 3 percent under Alternative 9 to 10 percent under Modified Alternative 4 (Additional information on the results of the WEPP model can be found in Appendix L – WEPP Technical Report).	
Water Quality and Sediment Transport • Within the 5th field watershed, there are approximately 39.8 miles of road inside the existing riparian corridors (USDA 1998a). • The road density of the Lower Clear Fork Cowlitz subwatershed that White Pass lies within is approximately 1.7 miles/mile^2 and the road density in Riparian Reserves is 1.5 miles/mile^2 (USDA 1998a). • The Lower Clear Fork Cowlitz subwatershed has 79 road crossings and 1.25 road crossings per stream mile (USDA 1998a). • The Lower Clear Fork Cowlitz subwatershed has been identified as having high impacts to stream channels from bedload movement; most of this bedload is sediment associated with the Wilderness areas and to a much lesser degree, past management activities such as road construction and timber harvest. Because of the heavy sediment movement, enough sediment deposition has occurred to cause problems with stream channel migration (USDA 1998a). • Sediment introduced into streams within the watershed from management related events are slightly above background levels but well within range of natural variability (USDA 1998a).	• Alternative 2, Modified Alternative 4 and Alternative 9 include no new roads, thereby maintaining the existing road density of 1.5 miles/mile^2 in the White Pass Study Area. Alternative 6 includes the development of approximately 0.25 mile of new road in a Tier 2 Key Watershed/IRA, which would increase the road density to approximately 1.7 miles/mile^2 in the White Pass Study Area (refer to Table 3.3-10). Alternative 6 would require the decommissioning and obliteration of approximately 0.6 mile of road in the watershed to avoid a net increase in road mileage in the watershed. Under the Action Alternatives, there would be no change to the road density at the watershed scale. • Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils). • Implementation of the Action Alternatives is not expected to contribute to the listing of any stream on the Department of Ecology's 303(d) list since there would be no new point sources of pollution and water quality impacts are projected to be nominal (refer to Section 3.3 – Watershed Resources).	• Sediment impacts to streams and wetlands would be minimized through the implementation of the Mitigation Measures in Table 2.4-2 and the use of BMPs during construction activities. • Through implementation of a Stormwater Pollution Prevention Plan and the use of BMPs, no long-term changes in the pH, turbidity, and dissolved oxygen of streams within the White Pass Study Area and the watershed due to the Proposed Action are expected. • The tree removal prescription for each chairlift and its corresponding ski trails is outlined in Table 2.4-1. All construction techniques involve design components that are intended to avoid/minimize ground disturbance. These include over-the-snow access and construction and the use of helicopters.

Table 3.7-1:
Evaluation of Watershed Condition and Project Effects – Upper Clear Fork Cowlitz Watershed

Existing Condition	Effect of Proposed Action	Design and Assessment Considerations
• Currently all streams are maintaining Washington State temperature standards for Class AA waters (USDA 1998a). • None of the streams within the Clear Fork Cowlitz Watershed are on the Washington Department of Ecology 303(d) list (USDA 1998a). • Refer to Section 3.3 – Watershed for additional information regarding surface water quality standards and water quality within the White Pass Study Area.	• Understory vegetation would be maintained at a minimum height of 3 feet in areas that include clearing prescriptions with no grading (refer to Table 2.4-1) to minimize sediment delivery and to help keep stream temperatures cool. • Refer to the WEPP model discussion above. Additional information on the results of the WEPP model can be found in Section 3.3 and Appendix L – WEPP.	
Impacts to Flow Regime and Water Yield • Peak flow alterations within the main tributary streams from Mount Rainier National Park and Wildernesses are not expected to change over time except in areas where past human disturbance has affected the area (USDA 1998a). • The frequency of flooding and peak flows is expected to remain relatively constant throughout the Clear Fork Cowlitz watershed because 80 percent of the Clear Fork Cowlitz watershed is within Mount Rainier National Park or Wildernesses (USDA 1998a). Note that for the purposes of this EIS, this watershed has been modified to exclude the Mount Rainier National Park, and has been renamed the Upper Clear Fork Cowlitz watershed.	• The changes in the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to implementation of the Proposed Action would not be measurable at the mouth of the Flow Model Analysis Area analyzed for this EIS (refer to Section 3.3.3.6 – Flow Regime). • The hydrologic maturity within the White Pass Study Area may be reduced by removal of vegetation under the Proposed Action, however, the majority of canopy removal would take place outside of Riparian Reserves and in subalpine parkland, resulting in an average canopy cover of 40.9 to 45.5 percent (refer to Table 3.3-15).	• Implementation of the Lift and Trail Construction Techniques listed in Table 2.4-1, and the use of BMPs, would reduce the potential for changes in the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to the minimization of clearing trees and vegetation within the White Pass Study Area. • Alternatives 2, 6 and 9 minimize grading in Riparian Reserves during the development of ski area facilities. Impacts from grading to Riparian Reserves within the Upper Clear Fork Cowlitz River watershed range from 2.7 acres under Alternative 6 to 4.2 acres under Alternative 2 (refer to Table 3.3-15). Modified Alternative 4 would include 8.3 acres of grading in Riparian Reserves within the Upper Clear Fork Cowlitz River watershed, more than the other Action Alternatives due to the construction of trails 4-16, 4-17 and 4-18 (refer to Table 3.3-15). • Vegetation would be maintained at a minimum height of 3 feet above ground to prevent ground disturbance and to maintain shading and wildlife habitat.

Table 3.7-2:
Evaluation of Watershed Condition and Project Effects - Upper Tieton Watershed

Existing Condition	Effect of Proposed Action	Design and Assessment Considerations
Watershed Issues:		
Clearing and Grading in Riparian Reserves/ Riparian Reserve Functionality • Risks to Riparian Reserves include timber harvest, the construction of new roads, dispersed/developed recreation, low LWD recruitment potential, potential mass wasting, windthrow, and catastrophic fire (USDA 1998b). • The North Fork Tieton River has had little riparian timber harvest or other management and is rated functioning adequately relative to LWD (USDA 1998b). • It is estimated that less than 15 percent Equivalent Clearcut Area has been disturbed in the watershed, and unstable riparian areas are intact, so the watershed is rated to be functioning adequately (USDA 1998b). • The Riparian Reserves in the majority of the watershed are properly functioning because very little management activity has occurred in the riparian areas (USDA 1998b). • The disturbance regime in this watershed is functioning adequately because much of the watershed is within Wilderness. Timber harvest has been minimal so it has not altered the disturbance regime (USDA 1998b). • The amount of LWD in streams within the watershed is typically at natural levels (USDA 1998b).	• There are currently 237 acres of Riparian Reserves in the Upper Tieton watershed portion of the White Pass Study Area (refer to Table 3.3-5). The clearing and grading in Riparian Reserves range from approximately 0 acres in Alternative 2 to 20.3 acres in Alternative 9 (refer to Table 3.3-15). • The Action Alternatives would result in a 0 to 8.6 percent reduction in canopy cover within Riparian Reserves, with canopy cover remaining at approximately 40.9 to 49.5 percent (refer to Table 3.3-15). • Populations of riparian dependent wildlife would be temporarily displaced during construction (refer to Section 3.6 – Wildlife). • The Action Alternatives would cause a slight reduction in the amount of LWD within Riparian Reserves due to the removal of trees for ski facility construction. Alternatives 6 and 9 would include development of a 2.5-acre parking lot in the Upper Tieton River watershed, which would eliminate riparian function in approximately 1.9 acres of Riparian Reserves (refer to Table 3.3-15). Under Modified Alternative 4, the 7-acre parking lot would eliminate riparian function from approximately 2.1 acres of Riparian Reserves (refer to Table 3.3-15).	• All Action Alternatives minimize clearing and grading in Riparian Reserves by locating the proposed design outside Riparian Reserves to the extent possible. Ski trail design is intended to parallel Riparian Reserves while minimizing disturbance in riparian areas. • Construction prescriptions and Mitigation Measures in Table 2.4-2 include lop and scatter, with no removal of woody material from cleared areas. Wood would also be placed in stream channels to enhance channel complexity and reduce channel erosion. • No access corridors, staging areas, spoils piles, or other construction related materials would be placed in Riparian Reserves. Whenever feasible, potential impacts to Riparian Reserves would be minimized by bringing construction materials and equipment to the project site during the snowpack (refer to Table 2.4-2).

Table 3.7-2:
Evaluation of Watershed Condition and Project Effects - Upper Tieton Watershed

Existing Condition	Effect of Proposed Action	Design and Assessment Considerations
Impacts to Riparian Habitat of Streams and Wetlands • Most streams are considered to be functioning adequately for the channel type with deep pools within geomorphic constraints (USDA 1998b). • The majority of the watershed is rated as functioning adequately in regard to floodplain connectivity (USDA 1998b). • The streambank conditions of the North Fork Tieton River is rated functioning adequately (USDA 1998b).	• The potential direct impacts to wetlands would range from approximately 0.0 acres in Alternative 2, Modified Alternative 4, and Alternative 6, and 0.03 acre in Alternative 9 (refer to Table 3.3-13). These impacts would be avoided through implementation of Mitigation Measures in Table 2.4-2 and the use of BMPs as well as field fitting the individual construction projects. • Streams may be directly impacted through the construction of four bridges (Alternative 9). • The tree removal prescription for each chairlift and its corresponding ski trails is outlined in Table 2.4-1. • Implementation of the Action Alternatives would not alter stream functionality within the White Pass Study Area or within the watershed (refer to Section 3.3 – Watershed Resources). • There would be no change to the floodplain connectivity within the watershed as a result of the Action Alternatives (refer to Section 3.3 – Watershed Resources).	• All Action Alternatives would avoid direct impacts to streams and wetlands where possible through the implementation of the Mitigation Measures and Management Requirements listed in Tables 2.4-2 and 2.4-3, the use of BMPs, and field fitting the individual construction projects. • Utilities would cross streams by using aerial crossings, and wetland impacts from utility trenching would be avoided altogether. • Vegetation would be maintained at a minimum height of 3 feet above ground to prevent ground disturbance and to maintain shading and wildlife habitat. • Wetland impacts would be avoided by maintaining the existing contours and drainage patterns in wetlands that intersect proposed ski trails. • Vegetation removal in wetlands would be conducted by hand/chainsaw. No heavy equipment would operate in wetlands. • The tree removal prescription for each chairlift and its corresponding ski trails is outlined in Table 2.4-1. All construction techniques involve design components that are intended to avoid/minimize ground disturbance. These include over-the-snow access and construction and the use of helicopters.

Table 3.7-2:
Evaluation of Watershed Condition and Project Effects - Upper Tieton Watershed

Existing Condition	Effect of Proposed Action	Design and Assessment Considerations
Water Quality and Sediment Transport • None of the streams within the Upper Tieton watershed have been designated as "water quality limited" by the Washington State Department of Ecology on the 1996 or 1998 303(d) lists (USDA 1998b). • Temperatures in the tributaries are believed to be meeting the state water quality standard of 61ºF degrees for most of the summer months (USDA 1998b). • Sediment sources due to management appear to be limited within the watershed, and since most of it is undisturbed, this watershed is rated functioning adequately relative to sediment (USDA 1998b). • Only 2 of the 37 sub-drainages analyzed have a road density greater than 3.0 miles/mile^2 (USDA 1998b). • Refer to Section 3.3 – Watershed Resources for information regarding surface water quality standards and water quality within the White Pass Study Area.	• Under all Action Alternatives, there would be no new roads proposed in the Upper Tieton watershed portion of the White Pass Study Area, so there would be no change to the road density (refer to Table 3.3-11). • Ground disturbance would be minimized during project construction so that sediment delivery to streams and wetlands would be nominal (refer to Section 3.2 – Geology and Soils). • Implementation of the Action Alternatives is not expected to contribute to the listing of any stream on the Department of Ecology's 303(d) list since there would be no new point sources of pollution and water quality impacts are projected to be nominal (refer to Section 3.3 – Watershed Resources). • Understory vegetation would be maintained at a minimum height of 3 feet in areas that include clearing prescriptions with no grading (refer to Table 2.4-1) to minimize sediment delivery and to help keep stream temperatures cool.	• Sediment impacts to streams and wetlands would be minimized through the implementation of the Mitigation Measures and Management Requirements in Tables 2.4-2 and 2.4-3 as well as the use of BMPs during construction activities. • Through the implementation of a Stormwater Pollution Prevention Plan and the use of BMPs, no long-term changes in the pH, turbidity, and dissolved oxygen of streams within the White Pass Study Area and the watershed due to the Proposed Action are expected. • The tree removal prescription for each chairlift and its corresponding ski trails is outlined in Table 2.4-1. All construction techniques involve design components that are intended to avoid/minimize ground disturbance. These include over-the-snow access and construction and the use of helicopters. Under Alternative 9, over the snow construction would be less feasible due to the lower elevation of the development.

Table 3.7-2:
Evaluation of Watershed Condition and Project Effects - Upper Tieton Watershed

Existing Condition	Effect of Proposed Action	Design and Assessment Considerations
Impacts to Flow Regime and Water Yield • A minor amount of canopy alteration has occurred at White Pass Ski Area but not at a level which could measurably affect streamflows (USDA 1998b). • Due to the relatively low levels of harvest and roading, hydrologic patterns at the watershed level have not been changed significantly as a result of forest management activities (USDA 1998b). • There are several minor domestic uses from spring developments and groundwater wells for summer home system water supply and for the White Pass Ski Area (USDA 1998b).	• The changes in the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to implementation of the Action Alternatives would not be measurable at the mouth of the Flow Model Analysis Area analyzed for this EIS (refer to Section 3.3.3.5 – Flow Regime). • The hydrologic maturity within the White Pass Study Area may be reduced by removal of vegetation under the Action Alternatives. However, the majority of canopy removal would take place outside of Riparian Reserves. The hydrologic maturity of the watershed would not be measurably affected at the 5th field scale.	• Through the implementation of Lift and Trail Construction Techniques listed in Table 2.4-1 and the use of BMPs, there would be a small reduction of the changes in the timing, magnitude, duration, and spatial distribution of peak, high, and low flows due to the minimization of clearing trees and vegetation within the White Pass Study Area. Alternative 9 includes the highest impact to forest conditions with the removal of large trees in the existing SUP area (refer to Section 3.3 – Watershed Resources and Section 3.5 – Vegetation)

Table 3.7-3:
Evaluation of Riparian Reserves Standards and Guidelines for the White Pass Expansion Proposal Alternatives

1994 ROD Standard and Guideline	Alternative 1	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Roads Management:					
RF-2 – For each existing or planned road, meet ACS objectives by: a) minimizing road and landing locations in Riparian Reserves, b) completing watershed analyses prior to construction of new roads or landings in Riparian Reserves, 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 wetlands entirely	No new roads or landing areas would be developed under Alternative 1. Road operation and maintenance would be carried out based on current approvals and the annual operating plan, which would not include road obliteration or restoration.	No new roads or landing areas would be developed under Alternative 2. Road operation and maintenance would be carried out based on current approvals and the annual operating plan, which would not include road obliteration or restoration.	No new roads or landing areas would be developed under Modified Alternative 4. Road operation and maintenance would be carried out based on current approvals and the annual operating plan, which would not include road obliteration or restoration.	A 0.25-mile road would be developed within a Tier 2 Key watershed in the White Pass IRA under Alternative 6, directly impacting approximately 0.1 acre of Riparian Reserves and indirectly affecting an additional 0.5 acre during construction. The road would be designed to cross the Riparian Reserve as close to perpendicular as possible, in an effort to minimize road impacts to Riparian Reserves. Watershed analyses for the Clear Fork Cowlitz (USDA 1998a) and the Upper Tieton (USDA 1998b) have been conducted. The new road would be managed under the current annual operating plan. New culverts would be sized to pass the 100-year flow and debris. (refer to Table 2.4-2, MM6). All road construction would be	No new roads or landing areas would be developed under Alternative 9. Road operation and maintenance would be carried out based on current approvals and the annual operating plan, which would not include road obliteration or restoration.

Table 3.7-3:
Evaluation of Riparian Reserves Standards and Guidelines for the White Pass Expansion Proposal Alternatives

1994 ROD Standard and Guideline	Alternative 1	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
when constructing new roads.				conducted within the approved construction limits, and proper placement of BMPs would be conducted according to Management Requirement MR1 to insure that sediment introduction is minimized (refer to Table 2.4-3). Tree removal techniques include lop and scatter, with no landing sites required. Under Alternative 6, the proposed road would not be constructed in wetlands. Road operation and maintenance would be carried out based on current approvals and the annual operating plan, which would not include road obliteration or restoration.	

Table 3.7-3:
Evaluation of Riparian Reserves Standards and Guidelines for the White Pass Expansion Proposal Alternatives

1994 ROD Standard and Guideline	Alternative 1	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
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.	Watershed analyses for the Clear Fork Cowlitz (USDA 1998a) and the Upper Tieton (USDA 1998b) have been conducted. Under Alternative 1, no existing roads would be obliterated or reconstructed within the SUP area. Road management would be carried out based on current approvals and the annual operating plan. No existing road conditions requiring correction are known.	Watershed analyses for the Clear Fork Cowlitz (USDA 1998a) and the Upper Tieton (USDA 1998b) have been conducted. Under Alternative 2, no existing or proposed roads would be obliterated or reconstructed within the existing or proposed SUP area. Road management would be carried out based on current approvals and the annual operating plan. No existing road conditions requiring correction are known.	Watershed analyses for the Clear Fork Cowlitz (USDA 1998a) and the Upper Tieton (USDA 1998b) have been conducted. Under Modified Alternative 4, no existing or proposed roads would be obliterated or reconstructed within the existing or proposed SUP area. Road management would be carried out based on current approvals and the annual operating plan. No existing road conditions requiring correction are known.	Under Alternative 6, 0.25 mile of new road would be constructed in an IRA in a Tier 2 Key Watershed. In order to remain consistent with the Standards and Guidelines for Key Watersheds, 0.6 mile of existing road would be decommissioned and obliterated in order not to increase the mileage of road in the IRA and Key Watershed.	Watershed analyses for the Clear Fork Cowlitz (USDA 1998a) and the Upper Tieton (USDA 1998b) have been conducted. Under Alternative 9, no existing or proposed roads would be obliterated or reconstructed within the existing or proposed SUP area. Road management would be carried out based on current approvals and the annual operating plan. No existing road conditions requiring correction are known.

Table 3.7-3:
Evaluation of Riparian Reserves Standards and Guidelines for the White Pass Expansion Proposal Alternatives

1994 ROD Standard and Guideline	Alternative 1	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
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.	Under Alternative 1, no new culverts or bridges would be constructed (refer to Section 3.3 – Watershed).	Under Alternative 2, 1 new culvert would be constructed. This new culvert would be sized to pass the 100-year flow and debris (refer to Table 2.4-2, MM6 and Section 3.3 - Watershed).	Under Modified Alternative 4, 1 new bridge and 11 new culverts would be constructed. The new bridge and culverts would be sized to pass the 100-year flow and debris (refer to Table 2.4-2, MM6 and Section 3.3 - Watershed).	Under Alternative 6, four new culverts would be constructed. All new culverts would be sized to pass the 100-year flow and debris (refer to Table 2.4-2, MM6 and Section 3.3 - Watershed).	Under Alternative 9, 4 new bridges and 11 new culverts would be constructed. All new bridges would be sized to pass the 100-year flow and (refer to Table 2.4-2, MM6 and Section 3.3 - Watershed).

Table 3.7-3:
Evaluation of Riparian Reserves Standards and Guidelines for the White Pass Expansion Proposal Alternatives

1994 ROD Standard and Guideline	Alternative 1	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
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.	Under Alternatives 1 and 2, and Modified Alternative 4, no new roads would be constructed. Road management and maintenance would continue based on existing approvals and the current annual operating plan.			Under Alternative 6, the new road would be sloped to drain away from potentially unstable channels, fills, and hillslopes so that sediment from roads would not be transported to these areas. For all construction activities under Alternative 6, a SWPPP would be prepared to direct the use of BMPs, which would minimize sediment impacts during road construction. Under Alternative 6, no new watershed related management plans would be implemented.	Under Alternative 9, no new roads would be constructed. Road management and maintenance would continue based on existing approvals and the current annual operating plan.

Table 3.7-3:
Evaluation of Riparian Reserves Standards and Guidelines for the White Pass Expansion Proposal Alternatives

1994 ROD Standard and Guideline	Alternative 1	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Recreation Management:					
RM-1 – New Recreational Facilities within Riparian Reserves, including trails and dispersed sites, should be designed to not prevent meeting ACS objectives. For existing recreation facilities within Riparian Reserves, evaluate and mitigate impact to ensure that these do not prevent, and to the extent practicable, contribute to attainment of ACS objectives.	No new development would take place within Riparian Reserves and no restoration projects would be implemented in Riparian Reserves. Existing conditions would not prevent attainment of ACS objectives at the 5th field scale.	Under Alternative 2, Riparian Reserves would receive 17.7 acres of clearing and grading treatments (approximately 2.8 percent of the total Riparian Reserves in the White Pass Study Area). The Action Alternatives include Mitigation Measures, Management Requirements, and BMPs that are designed to maintain ground vegetation and shading, minimize impacts to LWD recruitment potential, and minimize erosion and sedimentation impacts (refer to Tables 2.4-2 and 2.4-3). Alternative 2 would not prevent attainment of ACS objectives at the 5th field scale.	Under Modified Alternative 4, Riparian Reserves would receive approximately 25.8 acres of clearing and grading treatments (approximately 4.1 percent of the total Riparian Reserves in the White Pass Study Area). The Action Alternatives include Mitigation Measures, Management Requirements, and BMPs that are designed to maintain ground vegetation and shading, minimize impacts to LWD recruitment potential, and minimize erosion and sedimentation impacts (refer to Tables 2.4-2 and 2.4-3). Modified Alternative 4 would not prevent attainment of ACS objectives at the 5th field scale.	Under Alternative 6, Riparian Reserves would receive approximately 12.6 acres of clearing and grading treatments (approximately 2.0 percent of the total Riparian Reserves in the White Pass Study Area). The Action Alternatives include Mitigation Measures, Management Requirements, and BMPs that are designed to maintain ground vegetation and shading, minimize impacts to LWD recruitment potential, and minimize erosion and sedimentation impacts (refer to Tables 2.4-2 and 2.4-3). Alternative 6 would not prevent attainment of ACS objectives at the 5th field scale.	Under Alternative 9, Riparian Reserves would receive approximately 24.4 acres of clearing and grading treatments (approximately 3.8 percent of the total Riparian Reserves in the White Pass Study Area). The Action Alternatives include Mitigation Measures, Management Requirements, and BMPs that are designed to maintain ground vegetation and shading, minimize impacts to LWD recruitment potential, and minimize erosion and sedimentation impacts (refer to Tables 2.4-2 and 2.4-3). Alternative 9 would not prevent attainment of ACS objectives at the 5th field scale.

Table 3.7-3:
Evaluation of Riparian Reserves Standards and Guidelines for the White Pass Expansion Proposal Alternatives

1994 ROD Standard and Guideline	Alternative 1	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
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.	No new developed recreation facilities would be constructed within Riparian Reserves. Existing detrimental conditions within Riparian Reserves in the SUP area would continue to exist due to the high density use in the existing SUP area. No specific ski area facilities have been identified as contributing to the non-attainment of ACS objectives.	Under the Action Alternatives, White Pass would provide additional ski facilities and terrain. All developed facilities would be designed and constructed to minimize impacts to Riparian Reserves. Impacts to Riparian Reserves would include clearing and grading, as described for RM-1. The Action Alternatives include Mitigation Measures, Management Requirements, and BMPs that are designed to maintain ground vegetation and shading, minimize impacts to LWD recruitment potential, and minimize erosion and sedimentation impacts (refer to Tables 2.4-2 and 2.4-3). As a result, the Action Alternatives would not retard or prevent the attainment of the ACS objectives at the 5th field watershed scale.			

Table 3.7-3: Evaluation of Riparian Reserves Standards and Guidelines for the White Pass Expansion Proposal Alternatives

1994 ROD Standard and Guideline	Alternative 1	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Fire/Fuels Management:					
FM-1 - Design fuel treatment and fire suppression strategies, practices, and activities to meet ACS objectives, and to minimize disturbance or 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	Under Alternative 1, no timber removal and slash burning would take place. The ACS objectives would continue to be met at the 5th field scale in both the Upper Tieton and Upper Clear Fork Cowlitz watersheds.	Under the Action Alternatives, all tree removal would be by manual methods outlined in Table 2.4-1. Felled trees would be lopped and scattered, or placed in streams. No other fuels treatment would take place. All understory vegetation less than 3 feet tall would be retained. The ACS objectives would continue to be met at the 5th field scale in both the Upper Tieton and Upper Clear Fork Cowlitz watersheds.			
General Riparian Area Management:					
RA-1 – Identify and attempt to secure in-stream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.	Under Alternative 1, no change to in-stream flows would take place. In-stream flows would remain at existing conditions at the 5th field scale in both the Upper Tieton and Upper Clear Fork Cowlitz watersheds.	Under all Action Alternatives, there would be no direct impacts to stream channels or aquatic habitat. For all Action Alternatives there could be a slight change to the timing, duration, or magnitude of low flow and peak flow conditions due to land cover alterations from implementation of the Action Alternatives. However, any changes in the timing, duration, or magnitude of low flow and peak flow conditions would not be measurable in the existing in-stream flows at the fifth field scale for both the Upper Tieton River watershed and the Upper Clear Fork Cowlitz River watershed (refer to Section 3.3.3.5 – Watershed Resources –Flow Regime).			

Table 3.7-3:
Evaluation of Riparian Reserves Standards and Guidelines for the White Pass Expansion Proposal Alternatives

<table>
<tr><th>1994 ROD Standard and Guideline</th><th>Alternative 1</th><th>Alternative 2</th><th>Modified Alternative 4</th><th>Alternative 6</th><th>Alternative 9</th></tr>
<tr><td>RA-2 – Fell trees in Riparian Reserves when they pose a safety risk. Keep felled trees on-site when needed to meet coarse woody debris objectives.</td><td>Under Alternative 1, no trees would be felled near Riparian Reserves.</td><td colspan="4">With oversight from Forest Service personnel, trees would be felled in Riparian Reserves to maintain coarse woody debris or when they pose a safety risk. All felled trees would be lopped and scattered along ski trail edges and in Riparian Reserves.</td></tr>
<tr><td>WR-3 – Do not use mitigation or planned restoration as a substitute for preventing habitat degradation.</td><td>Under Alternative 1, there would be no new impacts to Riparian Reserves.</td><td colspan="4">Under the Action Alternatives, impacts to Riparian Reserves have been minimized to the extent practicable. Mitigation Measures and Management Requirements listed in Tables 2.4-2 and 2.4-3 were created in conjunction with avoidance and minimization of Riparian Reserve impacts in order to help maintain or improve watershed conditions at the 5^{th} field scale.</td></tr>
<tr><td>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.</td><td>Under Alternative 1, no new watershed management or restoration plans would be implemented.</td><td colspan="4">Table 1.3-1 lists the federal, state, local, and tribal agencies that permits need to be obtained from during the implementation of the White Pass Expansion. The Mitigation Measures and Management Requirements listed in Tables 2.4-2 and 2.4-3 were created in conjunction with input from cooperating federal agencies to maintain the long-term ecological integrity of the 5^{th} field Upper Tieton and Upper Clear Fork Cowlitz watersheds.</td></tr>
</table>

3.8 AIR QUALITY

3.8.1 Affected Environment

3.8.1.1 Air Quality Standards and Regulations

National Ambient Air Quality Standards

The White Pass Study Area straddles the Yakima and Lewis County line. Three agencies have a role in air quality protection in Yakima County: EPA, WDOE, and the Yakima Regional Clean Air Authority. The Yakima Regional Clean Air Authority has primary air quality jurisdiction for all of Yakima County, and ensures that National Ambient Air Quality Standards (NAAQS) set by EPA and state standards set by WDOE are attained and maintained within the county (WDOE 1999). EPA has established health based standards for seven criteria pollutants including lead (Pb), particulates with aerodynamic diameters of less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), and nitrogen dioxide (NO_2). WDOE has an additional standard for total suspended particulate, added additional averaging times for SO_2 and O_3, a stricter standard for NO_2. The Southwest Washington Clean Air Agency has primary responsibility for protecting and managing air quality in Lewis County (in addition to four other southwest Washington Counties). National and Washington State air quality standards are shown in Table 3.8-1. Standards in parenthesis were approved by the EPA on September 21, 2006, as described below, and became effective on December 18, 2006.

Table 3.8-1:
National Ambient Air Quality Standards

Pollutant	National		Washington State
	Primary (2006 Revision)	Secondary (2006 Revision)	
Total Suspended Particulates			
Annual Geometric Mean[a]	no standard	no standard	60 $\mu g/m^3$
24-hour Average	no standard	no standard	150 $\mu g/m^3$
Lead (Pb)			
Quarterly Average	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	no standard
Particulates			
PM_{10}			
Annual Arithmetic Mean[b]	50 $\mu g/m^3$ (no standard)	50 $\mu g/m^3$ (no standard)	50 $\mu g/m^3$
24-hour Average	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
$PM_{2.5}$			
Annual Arithmetic Mean	15 $\mu g/m^3$	15 $\mu g/m^3$	no standard
24-hour Average[c]	65 $\mu g/m^3$ (35 $\mu g/m^3$)	65 $\mu g/m^3$ (35 $\mu g/m^3$)	no standard
Sulfur Dioxide (SO_2)			
Annual Average	0.03 ppm	no standard	0.02 ppm
24-hour Average	0.14 ppm	no standard	0.10 ppm
3-hour Average	no standard	0.50 ppm	no standard

Table 3.8-1:
National Ambient Air Quality Standards

Pollutant	National		Washington State
	Primary (2006 Revision)	Secondary (2006 Revision)	
1-hour Average	no standard	no standard	0.40 ppm[a]
Carbon Monoxide (CO)			
8-hour Average	10,000 μg/m^3	10,000 μg/m^3	10,000 μg/m^3
1-hour Average	40,000 μg/m^3	40,000 μg/m^3	40,000 μg/m^3
Ozone (O_3)			
1-hour Average[d]	no standard	no standard	0.12 ppm
8-hour Average	0.08 ppm	0.08 ppm	no standard
Nitrogen Dioxide (NO_2)			
Annual Average	0.053 ppm	0.053 ppm	0.05 ppm

[a]Annual standards never to be exceeded, short-term standards not to be exceeded more than once per year unless noted.
[b]EPA recently revoked the annual standards for PM_{10} (refer to text below).
[c]EPA recently changed the 24-hour $PM_{2.5}$ average to 35 μg/m^3 as per 40 CFR Parts 53 and 58 (refer to text below).
[d]Revoked by EPA in 2005, except for eight-hour O_3 nonattainment Early Action Compact areas (refer to text below), as per 40 CFR Parts 51 and 81
Note: Primary standards are listed in this table as they appear in the federal regulations; ambient concentrations are rounded using the next higher decimal place to determine whether a standard has been exceeded. The data in this report are shown with these unrounded numbers.
ppm = parts per million
μg/m^3 = micrograms per cubic meter.
Source: WDOE 1999. Source for PM_{10} Annual Arithmetic Mean and PM2.5 24-hour average: EPA 2006.

On September 21, 2006, the EPA approved new NAAQS for particulate matter (PM_{10} and $PM_{2.5}$). Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the EPA revoked the 50 μg/m^3 annual PM_{10} standard (EPA 2006). The 24-hour $PM_{2.5}$ standard was changed from 65 to 35 μg/m^3 because of the effects of small particle pollution on public health and welfare (40 CFR Parts 53 and 58). The new standards came into effect on December 18, 2006. Table 3.8-1, above, reflects the revisions to the NAAQS approved by the EPA in 40 CFR Parts 53 and 58.

On June 15, 2005, the EPA revoked the one-hour O_3 standard for all areas except 14 eight-hour O_3 nonattainment Early Action Compact areas (EPA 2005). No counties in Washington State are included on the list of areas.

However, Washington State regulations continue to require compliance with the annual PM_{10} and one-hour O_3 standards, as shown in Table 3.8-1 above (WAC 1989, 1980).

Two types of NAAQS are defined by the Clean Air Act Amendment of 1977, a primary standard and a secondary standard (USA 1977). Some pollutants are subject to both primary and secondary standards. Primary pollutants of concern within the White Pass Study Area are inhalable particulate matter (PM_{10} and $PM_{2.5}$), CO, O_3, SO_2, NO_2, and Pb. Secondary standards are established to protect the public welfare from any known or anticipated adverse effects associated with these pollutants such as soiling, corrosion, or damage to vegetation.

Prevention of Significant Deterioration

Air quality concerns in the White Pass Study Area are regulated by the 1963 National Clean Air Act as amended in 1966, 1970, 1977 and 1990 (USA 1963). The 1977 amendment provided for a Prevention of Significant Deterioration (PSD) program to prevent the growth of stationary industrial sources from causing a significant deterioration of air quality in areas that meet the NAAQS (attainment areas) (USA 1977). PSD regulations were established by the EPA to ensure that new or expanded sources of air pollution do not cause a significant deterioration in air quality in areas that currently meet ambient standards. The PSD requirements call for careful monitoring of actual air quality conditions and placement of limits on the "increment" of clean air that can be used by industrial projects. The intent of the PSD increments is to keep air quality in areas with concentrations meeting the NAAQS from dropping below the standards (i.e., keep pristine and clean areas clean) (USA 1977).

Under this provision, national parks larger than 6,000 acres and wilderness areas greater than 5,000 acres that were in existence at the time of the 1977 Clean Air Act Amendments were designated as Class I Airsheds, whereas the remainder of the country was designated Class II (USA 1977). The White Pass Study Area is located adjacent to the Goat Rocks Wilderness, where air quality is protected by designation as a Class I Airshed. The Mount Adams Wilderness and Mount Rainier National Park are also Class I Airsheds near the White Pass Study Area. The William O. Douglas Wilderness and lands within the White Pass Study Area are identified as a Class II Airshed. PSD increments for Class I and Class II Airsheds are shown in Table 3.8-2.

Table 3.8-2:
PSD Increments for Class I and Class II Airsheds

Pollutant	Averaging Period	Allowable Increments ($\mu g/m^3$)	
		Class I	Class II
Inhalable particle matter PM_{10}	Annual	4	17
	24-hour	8	30
Total suspended particle matter	Annual	5	19
	24-hour	10	37
Sulfur dioxide (SO_2)	Annual	2	20
	24-hour	5	91
	3-hour	25	512
Nitrogen dioxide (NO_2)	Annual	2.5	2.5

Note: $\mu g/m^3$ = Micrograms per cubic meter.
Source: USDA and USFS 1995b

Although the PSD permit provisions under the Clean Air Act apply only to major stationary sources of air pollution (motor vehicles are mobile sources), the EPA uses them to determine the degree of potential impacts of other sources on air quality. The EPA has developed a list of 28 major source categories to classify facilities for PSD regulations. A facility is considered to be a major source, and therefore subject to PSD regulations, if the facility falls within one of the 28 listed categories and emits more than 100 tons per year of any criteria pollutant, or if the facility is not listed and emits more than 250 tons per year of a criteria pollutant. The PSD regulations also set ambient impact increments that limit the allowable increase of ambient concentrations of criteria pollutants. Facilities and uses at White Pass do not require a PSD permit because the PSD permitting process applies only to large industrial facilities.

Compliance with NAAQS and Other Air Quality Standards

The regulating agencies establish regulations that govern both the concentrations of pollutants in the outdoor air and contaminant emissions from air pollution sources. Unless the state or local jurisdiction has adopted more stringent standards, the EPA standards apply. The WDOE and Yakima Regional Clean Air Authority maintain a network of air quality monitoring stations throughout Yakima County. In general, these stations are located where there may be air quality problems, and so they are usually in or near urban areas or close to specific large air pollution sources. Other stations are located in remote areas to provide an indication of regional air pollution levels.

Geographic areas in which a primary or secondary NAAQS are violated are designated as "non-attainment areas" for that particular pollutant. The White Pass Study Area has not been designated a "non-attainment area" for any air quality pollutant.

3.8.1.2 Existing Air Quality and Source of Background Pollutants

Existing Air Quality at White Pass

The air quality of the White Pass Study Area can be described as excellent to outstanding as it largely matches that of the nearby Wilderness Area Class I Airshed. Both the White Pass Study Area and the nearby Class I Airsheds are likely affected by regional haze, perhaps created by industrial activities in the Puget Sound area and the Yakima Valley, and the smoke from occasional wildfires during the summer months. Generally, air flows freely through White Pass to quickly disperse pollutants emitted in the area. The White Pass Study Area is not prone to atmospheric inversions. Few sources of pollutants exist within the area and any existing sources are minor. The existing sources of background pollutants at White Pass are described in detail in Appendix K – Additional Air Quality and Noise Information.

Four existing and historic conditions have been identified and inventoried in the White Pass Study Area that have the potential to periodically degrade air quality below pristine levels. These conditions include: 1) dust from highway maintenance particularly during the late winter and spring months; 2) emissions from parked and transient car and truck traffic, an emergency diesel generator and snow-grooming vehicles; 3) emissions from approximately 16 fireplaces in the White Pass Village condominiums; and 4) kitchen stack emissions from the restaurant and day lodge. There are negligible fireplace smoke emissions from the White Pass Study Area, as propane gas is used for heating and fireplace use. The "Worst Case Scenario" outputs of these sources are shown in Table 3.8-3.

Assumptions made for the "Worst Case Scenario" in Table 3.8-3 include:

- The number of operating fireplaces is 16.
- There is parking space for 1,109 vehicles; worst case scenario would have one-half of all vehicles leave in one hour, which is approximately 555 vehicles.
- All vehicles have a 12-minute cold start and a 6-minute run, so (Emission lb/hour) X (0.3 hour) = Total Output.
- There is one existing diesel generator in operation.
- There are two existing diesel groomers in operation.
- There are two existing kitchens in operation.

Table 3.8-3:
"Worst Case Scenario" Peak One-Hour Pollutant Emission Levels (lbs./hr) from Existing Sources in the White Pass Study Area

Sources	Pollutant	Emissions[a] (lbs./unit)	No. Units	Total Output (lbs.)
Fireplaces	PM10	0.17/hr	16	2.72
Highway Dust		0.012/VMT	555[c]	6.66
Vehicles		0.016/hr	555[c]	2.66[d]
Generator		0.23	1	0.23
Groomers		0.23	2	0.46
Kitchens		0.07	2	0.14
Total				**12.87**
Fireplaces	PM2.5b	0.088/hr	16	1.41
Highway Dust		0.006/VMT	555[c]	3.33
Vehicles		0.008/hr	555[c]	1.33[d]
Generator		0.11	1	0.11
Groomers		0.11	2	0.22
Kitchen		0.03	2	0.06
Total				**6.46**
Fireplaces	CO	1.27/hr	16	20.32
Vehicles		6.32/hr	555[c]	1,052.28[d]
Generator		4.87/hr	1	4.87
Groomers		4.87/hr	2	9.74
Kitchens		0.51/hr	2	1.02
Total				**1,088.23**

Table 3.8-3:
"Worst Case Scenario" Peak One-Hour Pollutant Emission Levels (lbs./hr)
from Existing Sources in the White Pass Study Area

Sources	Pollutant	Emissions[a] (lbs./unit)	No. Units	Total Output (lbs.)
Fireplaces	NOx	0.01	16	0.16
Vehicles		0.20	555[c]	33.30[d]
Generator		3.95	1	3.95
Groomers		3.95	2	7.90
Kitchens		0.07	2	0.14
Total				**45.45**
Fireplaces	SOx	0.002	16	0.03
Vehicles		0.009	555[c]	1.50[d]
Generator		0.454	1	0.45
Groomers		0.454	2	0.91
Kitchens		0.001	2	0.00
Total				**2.89**

[a] Emission Factor Source – USDA and USFS 1995b; generator/groomer from manufacturer, 260 bhp.
[b] $PM_{2.5}$ emissions estimated at 0.5 PM_{10}.
[c] 1,109 parking spaces currently exist at White Pass (refer to Section 3.12 – Transportation), worst case scenario has one half of all vehicles leave in one hour, which is approximately 555 vehicles.
[d] Vehicles given 12-minute cold start and 6-minute run, so (Emission lb/hour) X (0.3 hour) = Total Output

3.8.2 Environmental Consequences

All management activities proposed under the Action Alternatives will comply with air quality standards and rules administered by the EPA, WDOE and the Yakima Regional Clean Air Authority for the reasons described under each of the alternatives.

The pollutants of concern for this project are PM_{10} and $PM_{2.5}$, due to possible health and/or visibility impacts, and CO, due to possible health impacts. The primary sources of these pollutants during the wintertime are motor vehicles (especially cold-starting automobiles) and wood-burning appliances. Other primary pollutants, including hydrocarbons, Pb, SO_x, and NO_x, are of lesser importance for this project because the types of development activities proposed would not generate these pollutants in significant quantities. Therefore, the focus of this analysis is on PM_{10}, $PM_{2.5}$, and CO.

3.8.2.1 Alternative 1

Construction Impacts

Under Alternative 1, construction-related air quality impacts would not occur. White Pass would continue to operate under its SUP and other projects could be proposed that could have a minor impact on air quality. Any future project proposal presented to the USFS would be evaluated under the NEPA process.

Operational Impacts

Under Alternative 1, operational air quality impacts would be associated with maintaining the existing ski trail network and infrastructure.

Maintaining ski trails and lift corridors would require periodic brushing or mowing to exclude trees and reduce the height of shrubs. These operations would generate minor amounts of fugitive dust and minor exhaust emissions during the time of the maintenance operation. **Specific air quality impacts associated with these projects cannot be determined because there is no approved schedule for implementation. Nonetheless, the projects are relatively small in scope and would not be expected to have significant air quality impacts.**

It is assumed that the number of skiers visiting White Pass would likely grow slightly in the future (refer to Section 3.11-Recreation). Under Alternative 1, White Pass would not expand operations, so any additional air pollutant emissions created under Alternative 1 would be negligible.

3.8.2.2 Alternative 2

Construction Impacts

Implementation of Alternative 2 would include the construction of two new lifts, corresponding trails, and a mid-mountain restaurant, which would result in a total of approximately 19.8 acres of soil disturbance (refer to Table 3.2-3). Construction of these facilities would generate fugitive dust. Dust emissions would be generated primarily by wind blowing over exposed soil surfaces during grading, scraping, and movement of construction equipment and support vehicles around construction sites and staging areas.

Fugitive dust emissions are generally the largest source of PM_{10} during construction. Emissions depend on soil type, soil moisture content, and the total area of soil disturbance. **Dust emissions attributable to construction activities are not considered significant because they would be temporary and would not occur within a designated PM_{10} or $PM_{2.5}$ non-attainment area.** During the summer construction period, construction equipment, including a helicopter to install chairlift towers, would be an undefined low-level emission source of short-term air pollutants.

Such emissions would be intermittent, with dust dispersing at increasing distances from the emission source. It is unlikely that intermittent fugitive dust from construction activities would expose the public to ambient PM10 concentrations exceeding the ambient limits described in Section 3.2.8. As described in Section 3.2 – Geology and Soils and Section 3.3 – Watershed Resources, Mitigation Measures MM1 through MM11 would be implemented to minimize the effects of soil disturbance. Tables 2.4-3 and 2.4-4 also contain Management Requirements and Other Management Provisions that would be implemented to reduce the potential impacts to soils and watershed resources. Additionally, in line with local county requirements, a dust control plan would be obtained (refer to Management Requirement MR15 in Table

2.4-3) and dust abatement measures would be implemented should conditions warrant (refer to Other Management Provision OMP3 in Table 2.4-4).

Construction equipment powered by internal combustion engines would generate NO_2, reactive organic gases, odors, SO_2, CO, and PM_{10}. Detailed construction schedules and knowledge of the type, number, and duration of heavy equipment operations are necessary to accurately quantify construction-related emissions. This information is not yet available for this FEIS. **However, air quality impacts caused by construction equipment emissions would be short-term, occurring only when construction activities are taking place, and would have a minor impact on overall air quality.**

Operational Impacts

Air pollutant emissions would result from mobile equipment at the ski area (e.g., groomers) and from snowmobiles used by employees of White Pass. Equipment operated by White Pass would be maintained to satisfy all emission standards. Equipment at White Pass would generate localized, short-term emissions of NO_2, $PM_{2.5}$, PM_{10}, and volatile organic compounds. Most of the equipment operation would occur during the winter months when formation of regional photochemical smog is of little concern. It is unlikely that emissions from White Pass' mobile equipment would expose the public to air pollutant concentrations approaching the allowable ambient standards listed in Section 3.8.1, as ongoing operations do not approach standards.

Proposed actions that would affect air quality would be the addition of a new kitchen (mid-mountain day lodge) under Alternative 2. In addition, it has been estimated that a maximum of 850 cars (current and additional) would be started and moved in any one hour under Alternative 2, which is 295 vehicles more than the existing condition because the CCC is higher under Alternative 2. The maximum total daily number of parked vehicles at White Pass on a peak capacity day (100 percent CCC) is 1,700.

Assumptions made for the "Worst Case Scenario" in Table 3.8-4 include:

- The number of fireplaces is 16 for all alternatives.
- There is parking space for 1,109 vehicles under Alternative 1; worst case scenario would have one-half of all vehicles leave in one hour, which is 555 vehicles. On a peak capacity day (100 percent CCC) under Alternative 2, there would be 1,700 parked vehicles; worst case scenario would have one-half of all vehicles leave in one hour, which is 850 vehicles. On a peak capacity day under Modified Alternative 4, 1,505 vehicles would be parked; worst case scenario would have 723 vehicles leave in one hour. On a peak capacity day under Alternative 6, 1,435 vehicles would be parked; worst case scenario would have 718 vehicles leave in one hour. On a peak capacity day under Alternative 9, 1,279 vehicles would be parked; worst case scenario would have 640 vehicles leave in one hour.

- All vehicles have a 12-minute cold start and a 6-minute run, so (Emission lb/hour) X (0.3 hour) = Total Output.
- There is one generator for all alternatives.
- There are two groomers for all alternatives.
- There are two kitchens in Alternative 1 and three kitchens in Alternatives 2, 6, 9 and Modified Alternative 4.

Table 3.8-4:
"Worst-Case Scenario"
1-Hour Emission Levels from White Pass Pollutant Sources

Pollutant	Sources	Emission Output (lbs./hour)				
		Alt. 1	**Alt. 2**	**Mod. Alt. 4**	**Alt. 6**	**Alt. 9**
PM_{10}	Fireplaces[c]	2.72	2.72	2.72	2.72	2.72
	Highway Dust[a]	6.66	10.20	8.68	8.62	7.68
	Vehicles[a]	2.66	4.08	3.47	3.45	3.07
	Generator[c]	0.23	0.23	0.23	0.23	0.23
	Groomers[c]	0.46	0.46	0.46	0.46	0.46
	Kitchens[b]	0.14	0.21	0.21	0.21	0.21
	Total	**12.87**	**17.90**	**15.77**	**15.68**	**14.37**
$PM_{2.5}$[b]	Fireplaces[c]	1.41	1.41	1.41	1.41	1.41
	Highway Dust[a]	3.33	5.10	4.34	4.31	3.84
	Vehicles[a]	1.33	2.04	1.74	1.72	1.54
	Generator[c]	0.11	0.11	0.11	0.11	0.11
	Groomers[c]	0.22	0.22	0.22	0.22	0.22
	Kitchen[b]	0.06	0.09	0.09	0.09	0.09
	Total	**6.46**	**8.97**	**7.90**	**7.86**	**7.20**
CO	Fireplaces[c]	20.32	20.32	20.32	20.32	20.32
	Vehicles[a]	1,052.28	1,611.60	1,370.81	1,361.33	1,213.44
	Generator[c]	4.87	4.87	4.87	4.87	4.87
	Groomers[c]	9.74	9.74	9.74	9.74	9.74
	Kitchens[b]	1.02	1.53	1.53	1.53	1.53
	Total	**1,088.23**	**1,648.06**	**1,407.27**	**1,397.79**	**1,249.90**

Table 3.8-4:
"Worst-Case Scenario"
1-Hour Emission Levels from White Pass Pollutant Sources

Pollutant	Sources	Emission Output (lbs./hour)				
		Alt. 1	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9
NO_x	Fireplaces[c]	0.16	0.16	0.16	0.16	0.16
	Vehicles[a]	33.30	51.00	43.38	43.08	38.40
	Generator[c]	3.95	3.95	3.95	3.95	3.95
	Groomers[c]	7.90	7.90	7.90	7.90	7.90
	Kitchens[b]	0.14	0.21	0.21	0.21	0.21
	Total	**45.45**	**63.22**	**55.60**	**55.30**	**50.62**
SO_x	Fireplaces[c]	0.03	0.03	0.03	0.03	0.03
	Vehicles[a]	1.50	2.30	1.95	1.94	1.73
	Generator[c]	0.45	0.45	0.45	0.45	0.45
	Groomers[c]	0.91	0.91	0.91	0.91	0.91
	Kitchens[b]	0.00	0.00	0.00	0.00	0.00
	Total	**2.89**	**3.69**	**3.35**	**3.34**	**3.13**

[a] The number of parked vehicles increases from 1109 in Alternative 1 to 1700 under Alt. 2, 1505 under Mod. Alt. 4, 1435 under Alt. 6, and 1279 under Alt. 9. The worst case scenario of the number of vehicles leaving in one hour increases from 555 in Alt. 1 to 850 under Alt. 2, 723 under Mod. Alt. 4, 718 under Alt. 6, and 640 under Alt. 9.
[b] The number of kitchens increase from two to three in Alternatives 2, 6, 9 and Modified Alternative 4.
[c] The number of fireplaces, generators, and groomers remain constant under all alternatives

Increased use of the White Pass Ski Area is anticipated, requiring more vehicles for transportation. As shown in Table 3.8-5, the largest increase in pollutants would be for CO, with an increase of about 42.26 tons per year under Alternative 2. This increase, however, is negligible even under "worst-case" conditions as the existing conditions are very low. As the parking area is widespread, it is highly unlikely that the CO level in the White Pass Study Area would ever exceed the NAAQS standard during any one-hour period or PSD annual standards under Alternative 2.

As shown in Table 3.8-5, pollutants under all alternatives proposed for the White Pass Study Area are markedly below significant emission rates. Due to the low level of emissions associated with the project, complex modeling was deemed unnecessary. The emission outputs in Table 3.8-5 have been extended from one-hour to the one-day and annual levels to compare by alternative with PSD "significant emission rates."

Assumptions made for the "Worst Case Scenario" in Table 3.8-5 include:

- Fireplaces run for four hours per day and 90 days per year for all alternatives.

- Highway dust is in the air for four hours per day and highway dust occurs 40 days per year for all alternatives.
- Vehicles run for one hour per day and for 150 days per year for all alternatives.
- The generator, groomers, and kitchens all run for eight hours per day and 150 days per year for all alternatives.

Table 3.8-5:
"Worst Cast Scenario" Increased Air Quality Emission Rates by Alternative for the White Pass Study Area

Pollutant	PSD Significant Emission Rates[a]	Increased Emissions Rates				
		Alt. 1	Alt. 2	Modified Alt. 4	Alt. 6	Alt. 9
PM_{10}						
1-Hour (tons/hour)	-	0	0	0	0	0.00
1-Day[b] (tons/day)	-	0	0	0	0	0.00
Annual (lbs/year)	-	0	863	528	514	308
Annual[c] (tons/year)	15	0	0.43	0.26	0.26	0.15
$PM_{2.5}$						
1-Hour (tons/hour)	-	0	0	0	0	0.00
1-Day[b] (tons/day)	-	0	0	0	0	0.00
Annual (lbs/year)	-	0	425	258	251	148
Annual[c] (tons/year)	Not Established	0	0.21	0.13	0.13	0.07
CO						
1-Hour (tons/hour)	-	0	0	0.16	0.16	0.08
1-Day[b] (tons/day)	-	0	0	0.16	0.16	0.08
Annual (lbs/year)	-	0	8.45×10^4	4.84×10^4	4.70×10^4	2.48×10^4
Annual[c] (tons/year)	100	0	42.26	24.20	23.48	12.39
NO_x						
1-Hour (tons/hour)	-	0	0	0.01	0.01	0.00
1-Day[b] (tons/day)	-	0	0	0.01	0.01	0.00

Table 3.8-5:
"Worst Cast Scenario" Increased Air Quality Emission Rates by Alternative for the White Pass Study Area

Pollutant	PSD Significant Emission Rates[a]	Increased Emissions Rates				
		Alt. 1	Alt. 2	Modified Alt. 4	Alt. 6	Alt. 9
Annual (lbs/year)	-	0	2739	1596	1551	849
Annual[c] (tons/year)	40	0	1.37	0.80	0.78	0.42
SO_x						
1-Hour (tons/hour)	-	0	0	0	0	0.00
1-Day[b] (tons/day)	-	0	0	0	0	0.00
Annual (lbs/year)	-	0	957	546	529	277
Annual[c] (tons/year)	40	0	0.48	0.27	0.26	0.14

[a] USDA and USFS 1995b
[b] Assumptions made for 1-day calculations: fireplaces run for four hours/day, highway dust is in the air for four hours/day, vehicles run for one hour/day, and generator, kitchen, and groomers run for eight hours/day.
[c] Assumptions made for annual calculations: fireplaces run for 90 days, highway dust occurs 40 days/year, vehicles, kitchens, generators, and groomers run 150 days/year.
Note: 1 lb = 0.0005 tons

Due to the low level of additional emissions under Alternative 2, it is safe to assume that the Proposed Action would not significantly contribute to any visibility degradation in the nearby Class I areas. It is highly unlikely that the activities proposed under the Proposed Action would by themselves stimulate economic growth in either Lewis or Yakima County such that air quality levels would be indirectly affected in the White Pass Study Area and nearby Class I Airsheds.

3.8.2.3 Modified Alternative 4

Construction Impacts

Implementation of Modified Alternative 4 would include the creation of two new chairlifts and corresponding trails, a mid-mountain restaurant, trenching utilities to the restaurant, a new parking lot and rerouting the PCNST (0.1 acre of soil disturbance). The total soil disturbance impact for Modified Alternative 4 is approximately 44.4 acres including all clearing, grading, and all proposed developed surfaces (refer to Table 3.2-3). Construction of facilities would generate fugitive dust. Dust emissions would be generated primarily by wind blowing over exposed soil surfaces during grading, scraping, and movement of construction equipment and support vehicles around construction sites and staging areas.

Impacts of construction equipment powered by internal combustion engines would be similar to Alternative 2. **As described under Alternative 2, it is unlikely that intermittent fugitive dust from**

these construction activities would expose the public to ambient PM_{10} concentrations exceeding the ambient limits described in Section 3.2.8. As described in Section 3.2 – Geology and Soils and Section 3.3 – Watershed Resources, Mitigation Measures MM1 through MM11 would be implemented to minimize the effects of soil disturbance. Tables 2.4-3 and 2.4-4 also contain Management Requirements and Other Management Provisions that would be implemented to reduce the potential impacts to soils and watershed resources. Additionally, in line with local county requirements, a dust control plan would be obtained (refer to Management Requirement MR15 in Table 2.4-3) and dust abatement measures would be implemented should conditions warrant (refer to Other Management Provision OMP3 in Table 2.4-4).

Operational Impacts

Under Modified Alternative 4, air pollutant emissions would be as described for Alternative 2, except that Modified Alternative 4 includes a 7-acre parking lot with 946 additional parking spots. It has been estimated that a maximum of 723 cars (current and additional) would be started and moved in any one hour, which is 168 more than under existing conditions. These additional emission sources are additive to existing conditions and summarized in Table 3.8-4.

As shown in Table 3.8-4, pollutants under Modified Alternative 4 for the White Pass Study Area are markedly below significant emission rates. Due to the low level of emissions associated with the project, complex modeling and on-site air quality sampling was deemed unnecessary. The emission outputs in Table 3.8-5 have been extended from one-hour to the one-day and annual levels to compare by alternative with PSD significant emission rates. Increased use of the White Pass Study Area is anticipated and more vehicles would be required for transportation. As shown in Table 3.8-5, the largest increase in emissions would be for CO, with an increase of about 24.20 tons per year under Modified Alternative 4. This increase, however, is negligible even under "worst-case" conditions as the existing conditions are very low. It is highly unlikely that the CO level in the White Pass Study Area would exceed the NAAQS standard during any 1-hour period or PSD annual standards under Modified Alternative 4.

Due to the low level of additional emissions under Modified Alternative 4, it can be projected that Modified Alternative 4 would not significantly contribute to any visibility degradation in nearby Class I Airsheds. It is unlikely that Modified Alternative 4 would stimulate economic growth in either Lewis or Yakima County such that air quality levels would be indirectly affected in the White Pass Study Area and nearby Class I Airsheds (refer to Section 3.11 – Social and Economic Factors).

3.8.2.4 Alternative 6

Construction Impacts

Implementation of Alternative 6 would include the creation of one new chairlift, associated trails, a road to the bottom terminal of the lift, a new parking lot, and a mid-mountain restaurant. The total soil disturbance impact for Alternative 6 is approximately 15.3 acres including all clearing, grading, and all proposed developed surfaces (refer to Table 3.2-3). Construction of these facilities would generate fugitive dust. Dust emissions would be generated primarily by wind blowing over exposed soil surfaces during grading, scraping, and movement of construction equipment and support vehicles around construction sites and staging areas. **As described under Alternative 2, it is highly unlikely that intermittent fugitive dust from these construction activities would expose the public to PM_{10} concentrations exceeding the NAAQS described in Table 3.8-1.** As described in Section 3.2 – Geology and Soils and Section 3.3 – Watershed Resources, Mitigation Measures MM1 through MM11 would be implemented to minimize the effects of soil disturbance. Tables 2.4-3 and 2.4-4 also contain Management Requirements and Other Management Provisions that would be implemented to reduce the potential impacts to soils and watershed resources. Additionally, in line with local county requirements, a dust control plan would be obtained (refer to Management Requirement MR15 in Table 2.4-3) and dust abatement measures would be implemented should conditions warrant (refer to Other Management Provision OMP3 in Table 2.4-4).

Construction equipment powered by internal combustion engines would generate NO_2, reactive organic gases, odors, SO_x, CO, and PM_{10}. Air quality impacts caused by construction equipment emissions under Alternative 6 would be short-term, occurring only when construction activities are taking place, and would have a minor impact on overall air quality as described under Alternative 2.

Operational Impacts

Under Alternative 6, air pollutant emissions from the proposed activities would be similar to Alternative 2 and Modified Alternative 4 except that the Hogback Express lift and corresponding trails would not be built, thus reducing emissions in Hogback Basin due to the lesser amount of grooming needed. Additionally, the mid-mountain lodge would be developed closer to the existing ski area.

The proposed activities under Alternative 6 that would affect air quality include the addition of a parking lot with 340 additional parking spots. It has been estimated that a maximum of 718 vehicles (current and additional) would be started and moved in any one hour under Alternative 6, which is 163 more than under existing conditions. These additional emission sources are additive to existing conditions and summarized in Table 3.8-4.

As shown in Table 3.8-4, pollutants under Alternative 6 for the White Pass Study Area are markedly below significant emission rates. Due to the low level of emissions associated with the project, complex modeling was deemed unnecessary. The emission outputs in Table 3.8-5 have been extended from one-hour to the one-day and annual levels to compare by alternative with PSD significant emission rates. Increased use of the White Pass Ski Area is anticipated and more vehicles would be required for transportation. As shown in Table 3.8-5, the largest increase in pollutants would be for CO, with an increase of about 23.48 tons per year under Alternative 6. **This increase, however, is negligible even under "worst-case" conditions as the existing conditions are very low. It is highly unlikely that the**

CO level in the White Pass area would ever exceed the NAAQS standard during any 1-hour period or PSD annual standards under Alternative 6.

Visibility impacts would be as described for Modified Alternative 4.

3.8.2.5 Alternative 9

Construction Impacts

Implementation of Alternative 9 would include the creation of one new chairlift and associated trails, a new parking lot located within the existing permit area, and rerouting the PCNST (0.1 acre of soil disturbance). The total soil disturbance impact for Alternative 9 is approximately 38.9 acres, including all clearing, grading, and all proposed developed surfaces (refer to Table 3.2-3). Construction of these facilities would generate fugitive dust. Dust emissions would be similar to Alternative 2, but located within the existing ski area. As described in Section 3.2 – Geology and Soils and Section 3.3 – Watershed Resources, Mitigation Measures MM1 through MM11 would be implemented to minimize the effects of soil disturbance. Tables 2.4-3 and 2.4-4 also contain Management Requirements and Other Management Provisions that would be implemented to reduce the potential impacts to soils and watershed resources. Additionally, in line with local county requirements, a dust control plan would be obtained (refer to Management Requirement MR15 in Table 2.4-3) and dust abatement measures would be implemented should conditions warrant (refer to Other Management Provision OMP3 in Table 2.4-4).

Construction equipment powered by internal combustion engines would generate NO_2, reactive organic gases, odors, SO_2, CO, and PM_{10}. Air quality impacts caused by construction equipment emissions under Alternative 9 would be short-term, occurring only when construction activities are taking place, and would have a minor impact on overall air quality as described under Alternative 2.

Operational Impacts

Air pollutant emissions would result from mobile equipment at the ski area (e.g., groomers) and from snowmobiles used by employees of White Pass. Equipment operated by White Pass would be maintained to satisfy all emission standards. **White Pass' equipment would generate localized, short-term emissions of NOx, particulates and volatile organic compounds, and as described under Alternative 2, it is highly unlikely that emissions from this equipment would expose the public to air pollutant concentrations approaching the allowable ambient standards listed in Table 3.8-1.**

The proposed activities under Alternative 9 that would affect air quality include the addition of a parking lot with 340 additional parking spots. It has been estimated that a maximum of 640 cars (current and additional) would be started and moved in any one hour under Alternative 9, which is 85 more than under existing conditions. These additional emission sources are additive to existing conditions and summarized in Table 3.8-4.

As shown in Table 3.8-4, pollutants under Alternative 9 for the White Pass Study Area are markedly below significant emission rates, similar to Alternative 2, Modified Alternative 4, and Alternative 6. As shown in Table 3.8-5, the largest increase in pollutants would be for CO, with an increase of about 12.39 tons per year under Alternative 9. This increase, however, is negligible even under "worst-case" conditions, as the existing conditions are very low. **It is unlikely that the CO level in the White Pass Study Area would ever exceed the NAAQS standard during any 1-hour period or PSD annual standards under Alternative 9.**

Due to the low level of additional emissions under Alternative 9, it can be projected that Alternative 9 would not significantly contribute to any visibility degradation in the nearby Class I Airsheds. It is highly unlikely that Alternative 9 would stimulate economic growth in either Lewis or Yakima County, such that air quality levels would be indirectly affected in the White Pass Study Area and nearby Class I Airsheds (refer to Section 3.11 – Social and Economic factors).

3.8.3 Cumulative Effects

A cumulative effects analysis was performed for each watershed at the site scale (White Pass Study Area). Past, present and reasonably foreseeable projects occurring within each watershed area are included in the analysis. Identified projects with cumulative effects may include activities that are both inside and outside the White Pass Study Area, such as vegetation management along US 12 (UCFC-16). Within the discussions below, cumulative impacts to air quality are considered for short-term and long-term impacts. Cumulative impacts include short-term increases in fugitive dust and vehicle emissions due to construction, and increases in criteria air pollutants due to periodic emissions.

A list of past, present and reasonably foreseeable projects with air quality effects that overlap in space and time with the Action Alternatives and occurring within the Upper Tieton River watershed (refer to Table 3.8-6) are presented below. No past, present or reasonably foreseeable projects within the Upper Clear Fork Cowlitz River watershed that impact air quality were identified. For a description of project actions, refer to Tables 3.0-FEIS1 and 3.0-FEIS2 in Section 3.0.

Table 3.8-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Air Quality

Project Number	Project Name	Cumulative Effects
UT-2	White Pass Ski Area Sewer Line Replacement	Approximately 0.73 acre of grading will occur due to the excavation of the trench, resulting in fugitive dust and vehicle emissions. 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 air quality 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 will add to a cumulative, short-term increase in fugitive dust and vehicle emissions within the White Pass Study Area.
UT-3	White Pass Ski Area Generator Shed and Propane Tank	The generator and propane tank installed near the condominiums in 2001 will result in air pollutant emissions when the generator is in use. Project effects have temporal and spatial overlap with the proposed White Pass expansion. Due to the infrequent use of the generator, which is only used during power outages, the air quality effects are short-term, localized and likely not measurable. Combined with the White Pass expansion and other projects identified in this table that involve emissions, this project will add to a cumulative, short-term increase in air pollutants in the White Pass Study Area.
UT-18	Benton Rural Electric Association (REA) Power line Maintenance	Short-term air quality impacts from fugitive dust will occur during implementation of this project. Ongoing maintenance would overlap spatially and temporally with the White Pass expansion and would cumulatively add to short-term air quality effects from fugitive dust and vehicle emissions within the White Pass Study Area.
UT-30	US Cellular Backup power at White Pass Communications Site	The propane tank installed on Pigtail Peak to power a generator will result in air pollutant emissions when the generator is in use. Project effects have temporal and spatial overlap with the proposed White Pass expansion. Due to the infrequent use of the generator, which is only used during power outages, the air quality effects are short-term, localized and likely not measurable. Combined with the White Pass expansion and other projects identified in this table that involve emissions, this project will add to a cumulative, short-term increase in air pollutants in the White Pass Study Area.
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	This project would impact approximately 0.3 acre, and would result in short-term fugitive dust and vehicle emissions from construction activities. This project will overlap spatially and temporally with the White Pass expansion, resulting in a cumulative, short-term impact to air quality. No long-term air quality impacts are expected.

As described above, short-term, cumulative air quality impacts would result from fugitive dust created by construction and excavation activities, as well as vehicle emissions and road use within the White Pass Study Area. Long-term, cumulative air quality impacts would result from periodic, localized emissions from occasional generator use, as described for the two propane generator projects (near the condominiums and on Pigtail Peak). Neither the long-term nor the short-term cumulative air quality effects are expected to be measurable. The long-term increases are negligible due to the low concentration of increased pollutants. Both the short-term and long-term impacts to air quality would remain within the requirements for NAAQS and PSD increments outlined in the Clean Air Act, as well as state requirements for air quality.

No past, present or reasonably foreseeable projects would result in increased, long-term traffic and vehicle emissions. On a regional basis, the development under the Action Alternatives would not lead to a significant increase in traffic volumes (and resulting vehicle emissions) in either the Puget Sound or Yakima Valley airsheds (refer to Section 3.12 - Transportation). The ski traffic volume to White Pass is a small percentage of the traffic on US 12. The maximum daily increase in vehicles carrying skiers to White Pass under all Action Alternatives would have a negligible cumulative effect on air quality and visibility in Class I Airsheds, the Pigtail and Hogback Basins, and the Puget Sound and Yakima Valley regional airsheds. The negligible direct and indirect impacts on visibility would be additive to existing conditions. The addition of pollutants affecting visibility by additional ski area traffic under the Action Alternatives is small, and occurs during the winter months, during a period of mostly cloudy conditions and high precipitation. Because of these factors, it is likely that there would be a negligible cumulative effect on visibility under the Action Alternatives.

3.9 HERITAGE RESOURCES

3.9.1 Introduction

The National Historic Preservation Act (NHPA) of 1966 established the federal government's policy and programs on historic preservation. Section 106 of the Act requires federal agencies having direct or indirect jurisdiction over a proposed federal or federally assisted or permitted undertaking, to take into account the effects an undertaking may have on historic properties listed on or eligible for the National Register of Historic Places, and it affords the Advisory Council on Historic Preservation an opportunity to comment on such undertakings (USA 1966). The Washington State Office of Archaeology and Historic Preservation and the Advisory Council on Historic Preservation are the state and federal agencies, respectively, responsible for overseeing the management and protection of historic properties in compliance with the NHPA.

Historic resources are districts, sites, buildings, structures, and objects that contain evidence of past human activities. They include historic and prehistoric sites and properties of traditional religious and cultural importance.

Prehistoric heritage resources may include, but are not limited to the following, all of which predate the entry of Euroamerican trade goods and people into the region (roughly 9500 BC to 1800 AD):

- Isolated artifacts;
- Campsites (often marked by evidence of stone tool manufacture and use) and features (such as huckleberry drying trenches, peeled cedar trees) related to hunting and gathering forages; and
- Rock shelters/rock features used for shelter, markers, storage, ceremonial, or other uses.

Ethnographic archaeological sites are defined as properties that contain artifacts and features related to Native American lifeways which post-date the entry of Euroamerican trade wares and people into the region, and pre-date contemporary Native American uses of the landscape (roughly A.D. 1800 to 1945). Ethnographic period archaeological resources include items made from trade metals such as steel digging tools, clothes or implements decorated with trade beads.

Historic period heritage resources are defined as artifacts and features that relate directly to Euroamerican entry into, and utilization of, the landscape (roughly A.D. 1800 to 1945). Historic properties may include forts, homesteads, cabins, irrigation ditches, telecommunication lines, blazed trees, wagon roads, early Forest Service administrative improvements (including developments made by members of the Civilian Conservation Corps during the 1930s and 40s), and trash dumps. Archaeological sites that contain features and/or artifacts indicative of more than one temporal/cultural affiliation (e.g., an area that contains lithics and the remains of a 1902 homestead) are identified as multi-component properties.

The 1992 and 2001 NHPA amendments specify that properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization (traditional cultural properties) may meet the criteria for listing on the National Register. In carrying out its responsibilities under Section 106, a federal agency is required to consult with any Indian tribe that attaches religious and cultural significance to these properties, as described in 16 USC 470a(d)(6)(A) and (B). National Register Bulletin 38 defines a traditional cultural property as a property that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community (USDI 1994).

To be considered eligible for the National Register of Historic Places, heritage resources must meet one or more of the following criteria laid out in the NHPA: The quality of significance in American History, architecture, archeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, workmanship, feeling and association, and:

a) That are associated with events that may have made a significant contribution to the broad patterns of our history; or

b) That are associated with the lives of persons significant in our past; or

c) That embody the distinctive characteristics of a type, period, or method of construction that represent the work of a master, or that posses high artistic values, or that represent a significant and distinguishable entity whose component may lack individual distinction; or

d) That have yielded, or may be likely to yield, information important in prehistory and history (36 CFR 60). A property with traditional heritage value must meet the following eligibility criteria considerations (USDI 1994):

   i. The property must be tangible and discrete. "[It] should be clearly recognized at the outset that the National Register does not include intangible resources themselves. The entity evaluated must be a tangible property – that is, a district, site, building, structure, or object." (USDI 1994, 9).

   ii. The property must have clearly definable physical references that can be documented historically. "The National Register discourages nomination of natural features without sound documentation of their historical or heritage significance." (USDI 1994, 9). Furthermore, National Register designation of large land areas is warranted only when such areas contain multiple properties definable as a historic district by theme group or heritage significance.

iii. The traditional values attributed to the property must have a documentable history of at least 50 years (USDI 1994, 15).

iv. The property must be traditional and of integral importance to the ethnic group or Indian tribe (USDI 1994, 10).

v. The property's significance must be established through multiple lines of documentation (e.g., archaeology, history, oral tradition, ethnography, ethnohistory, or a preponderance of evidence in any one of these fields).

Besides the NHPA, a number of additional legislative and executive orders direct consideration of the cultural environment on NFSL and are relevant to the current project, including the American Indian Religious Freedom Act of 1978, Executive Order 11593 (1971), Executive Order 13007 (1996), and the Native American Graves Protection and Repatriation Act of 1990. Each of these laws and EOs are briefly discussed below.

The American Indian Religions Freedom Act of 1978 (P.L. 95-341) states that it is the policy of the United States to protect American Indians' right to believe, express and exercise their traditional religions, including but not limited to "access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites". The American Indian Religions Freedom Act of 1978 reaffirms the responsibility of federal agencies to evaluate their policies and procedures with the aim of avoiding infringements on Indian religious freedom, and to make a good faith effort to consult with Indian people about protecting Indian religious cultural rites and practices.

Executive Order 11593 requires agency heads to locate, inventory, and nominate all eligible cultural resources to the National Register of Historic Places and exercise caution until these inventories and evaluations are complete to ensure that no eligible federally owned property is transferred, sold, demolished or substantially altered. The order outlines procedures for meeting the inventory requirements of NHPA and NEPA and established the principal of "interim protection" which states that, until a resource has been evaluated, it must be treated as if it were eligible for the National Register of Historic Places.

Executive Order 13007 mandates that federal agencies protect and accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners. The order also mandates that agencies avoid adverse physical effects to such sites to the extent practicable and that they maintain the confidentiality of sacred sites. The executive order affirms that federal agencies should give reasonable notice of proposed actions or land management policies that may restrict future access to or ceremonial use of, or may adversely affect the physical integrity of, sacred sites.

The Native American Graves Protection Act (P.L. 101-601, implementing regulations at 43 CFR 10) addresses the rights of lineal descendants and members of Indian tribes, Alaska Natives, and Native Hawaiian organizations to retain certain human remains and precisely defined cultural items. It covers items currently in federal repositories as well as future discoveries. Federal agencies must consult with the most likely direct descendant or a culturally affiliated tribe or organization where an undertaking may affect an Indian grave site.

3.9.2 Field Surveys

Archaeological studies in the central Washington Cascades are limited, but recent investigations in the southern Washington Cascades indicate that archaeological sites have evidence of food plants (Mack and McClure 2002) and lithic resource utilization (McClure 1989; Zweifel and Reid 1991). A growing body of archaeological work in the uplands and mountainous regions of the southern Cascades is providing archaeologists with information on hunter-fisher-gatherer land use patterns in high elevation regions. Areas once considered little used may provide information about hunter-fisher-gatherer settlement patterns, resource procurement strategies, travel and trade routes, and religious practices. McClure (1989) surveyed portions of the Goat Rocks Wilderness, 10 miles south of the Project Area, and recorded seven high elevation sites (Cook and Moura 1986). Uebelacker (1980, 1986) examined hunter-fisher-gatherer and historic land use patterns and potential resource utilization in the southeastern Cascades, reporting that sites commonly occur in passes, saddles and gaps, along ridges, lakes, stream courses, springs, and in association with huckleberry fields in crestal uplands. Burtchard's (1998) work at Mount Rainier supports the growing recognition of the importance of montane landscapes to prehistoric people, and sample surveys more than quadrupled the total number of formally documented prehistoric archaeological localities in the park. The Mount Rainier archaeological record provides evidence of hunting-related use of the subalpine and alpine settings on all sides of the mountain between at least 5,000 and 2,000 years ago (Burtchard 1998).

In the watershed analysis of the Upper Tieton watershed (USDA 1998b), 110 heritage properties were identified. While this analysis did not cover the White Pass Study Area portion of the Upper Tieton watershed, a temporal/cultural association with major vegetative groups was made, and only four of the 110 heritage properties were found in the wet forest vegetative type found in the White Pass Study Area. This pattern may indicate that the probability of finding further archaeological properties in the Analysis Area, which is a part of the Upper Tieton watershed, is low.

In conformance with the NHPA, 36 CFR 800 Federal Regulations, the Amended Forest Plans, Wenatchee National Forest Heritage Resources Inventory Strategy and the Gifford Pinchot National Forest Probability Zones for Cultural Resources Survey, at least 17 archaeological sample surveys have been conducted in the White Pass Study Area between 1982 and the present (refer to Table 3.9-1). Four of these surveys (Cook 1986; Moura 1987; Dugas et al. 1997; Beidl 2004) were conducted in Hogback and

Pigtail Basins, in the vicinity of the area currently proposed for chairlift construction. In addition to pedestrian survey of proposed disturbance areas, two of these efforts also included shovel testing of project area landforms considered likely to contain cultural deposits (Moura 1987; Dugas et al. 1997). Only one cultural property, a segment of the historic Cascade Crest Trail (06-17-08-749), was identified in the Project Area by these surveys. The original Cascade Crest Trail route has been relocated and abandoned through most of the White Pass Study Area, and this segment of the historic trail is not considered eligible for listing on the National Register due to a lack of physical integrity. The other nearest documented site is an historic trail shelter built in the 1930s by the Civilian Conservation Corps at Leech Lake (06-17-08-108), approximately 2 miles northeast of the White Pass Study Area. The shelter, documented and dismantled in 1985 due to its deteriorated condition and concerns for public safety, is not eligible for listing on the National Register.

A variety of other cultural properties have been documented within about 6 miles of the White Pass Study Area. While these properties would not be directly or indirectly affected by the proposed actions, they do provide indications of prehistoric to historic uses of the general area. These properties include a trail shelter at Sand Lake (06-17-08-112), a lithic scatter (06-17-08-128), an historic camp associated with construction of Clear Lake Dam (06-17-08-130), an historic church camp (06-17-08-133), segments of the old Tieton Road (06-17-08-145), a peeled cedar tree (06-17-08-286), two talus pits (06-17-08-678), and an historic bridge (06-17-08-680).

Table 3.9-1:
Heritage Resource Investigations in the White Pass Analysis Area

Title	Authors	Year	Location	Heritage Resources Identified
Addendum Expansion Survey	Beidl	2004	Hogback Basin	Yes[a]
Half Pipe	Beidl	2003	East of Chair 5	None
Chair #4 Yurt	Beidl	2002	Above Chair 4	None
Yurt and Sewer Line	Beidl	2002	Leech Lake, US 12	None
Generator Shed	Beidl	2000	Office Area	None
Cabin/Office Reconstruction	Beidl	1998	Office Area	None
Expansion Archaeological	Dugas, et al.	1997	Hogback Basin	None
Proposed Five Year Master Plan	Johannsen	1995	Permit Area	None
NWAC Weather Station	Ottaway	1993	Pigtail Peak	None
Ski Lift and Hazard Tree	Ottaway	1993	Area East of Chairlifts 1/2	None
Leech Lake Dam Check	Geffen	1989	Leech Lake Vicinity	None
White Pass Sewer Expansion	Martinson	1991	Leech Lake	None
Additional Expansion Coverage	Moura	1987	Hogback Basin	None
X-Country Ski Trail Expansion	Moura	1987	Leech Lake, Dark Meadow	None
White Pass Ski Run Blasting	Hiler	1987	Between Chairlifts 1/3	None
Proposed Ski Area Expansion	Cook	1986	Hogback Basin	None
White Pass Chairlift #4	Hiler	1982	Chairlift 4 Route	None

[a] Segment of historic Cascade Crest Trail through White Pass Permit Area documented and evaluated.

In summary, archaeological survey work in the White Pass Study Area to date has not identified any National Register eligible heritage resources (historic properties) in or adjacent to the White Pass Study Area. A segment of the historic Cascade Crest Trail lacks the physical integrity of location and design to be listed on the National Register. A former Civilian Conservation Corps era trail shelter at Leech Lake was removed in the 1980s.

Appendix J provides a description of the Prehistory, Ethnohistory/Ethnography, History and a summary of the cultural properties at White Pass.

3.9.3 Reserved Treaty Rights

Indian tribes hold certain rights and privileges reserved under treaty, statute, and executive orders. Courts have recognized the origins of certain treaty rights as being "reserved" by tribes from land cessions made by the tribes to the United States rather than as rights "granted" to tribes by the United States. Indian reserved rights continue to be exercised by tribes and their members today under tribal regulation and remain enforceable under the supremacy clause of the Constitution until extinguished by express Congressional action. Portions of the White Pass Study Area within the Upper Tieton watershed fall within the area ceded by the Yakima Treaty.

Under the provisions of Article 3 of the Yakima Treaty in 1855, enrolled tribal members of the Yakama Nation and other Indian groups, specified in the treaty language, secured:

> The exclusive right of taking fish in all streams, where running through bordering said reservation (Yakima Reservation defined in Article 2), is further secured to said tribes and band of Indians, as also the right of taking fish in all usual and accustomed places, in common with the citizens of the Territory, and of erecting temporary building for curing them; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land.

3.9.4 Tribal Consultation

In 1997, members of the Yakama Nation expressed concerns that the cultural and spiritual values of the area are more than actual sites and any additional use and disturbance is of concern. Forest Service officials met with the Yakama Nation cultural committee in 1997 and 1998. On March 17, 1998, the Deciding Officer met with the Yakama Nation Cultural Program Manager and three Tribal Council Members. In the March 17 meeting, the Yakama Cultural Program Manager gave an explanation of how errors were made in the past in determining the boundary of the lands ceded by the Yakama in the treaty and how this affects the way the Forest Service needs to view the Yakama cultural interests in the lands around White Pass. One Yakama Councilman said there are sacred areas of concern to him in the area of the expansion proposal. In addition, the Cultural Program Manager told of Kamiakin's use of the Goat

Rocks, Hogback Basin, and other areas to the north and west of White Pass. He also told of the sacred nature of the high points along Hogback Ridge, following the line that is now the boundary of the Goat Rocks Wilderness. He expressed concern about protecting these high points now and in the future. Other concerns expressed by the Yakama Cultural Program Manager in the March 17 meeting were how more people accessing the expansion area will treat the land, the possible increase in litter, parking lot runoff and its effect on water quality and fisheries, and safety of people accessing the backcountry. Forest Service officials again met with the Yakama Indian cultural committee on July 23, 2004. No new concerns about the expansion proposal were raised.

A Forest Service line officer and staff met with officials of the Cowlitz Tribe on March 30, 2004. Concerns expressed about the proposal included the displacement of backcountry skiers and impacts to Wilderness due to easier access (increased visitation, sanitation and litter, public safety), a desire to monitor ground disturbance to protect any unidentified archaeological sites, building of roads in roadless areas, water use and cycling, and effects to natural resources if ski trails were salted in the spring. Tribal representatives expressed support for shuttle services to deal with highway traffic over road expansion (for its potential to minimize environmental impacts and provide economic benefits to nearby communities such as Packwood). Tribal members also indicated general support for roaded access to public recreation areas such as White Pass.

In response to the release of the DEIS in December 2004, the Yakama Nation submitted a comment letter (refer to Volume 3 – Response to Comments). A key component of this comment letter was an indication that:

> "We cannot stress enough that where this water originates high up in the mountains, on a ridge to where you look east is the ceded land of the Yakama Nation and to the west is usual and accustomed land of the Yakama Nation, will always be a sacred and sensitive place. A place which our people travel to and bless the sacred elements."

During the development of the FEIS, the Naches District Ranger met with representatives of the Confederated Tribes and Bands of the Yakama Nation natural and cultural resources staffs to describe the Preferred Alternative and solicit their comments. Subsequently, the Deputy Director, Division of Natural Resources submitted written comments in a letter dated October 6, 2006. The letter formally documented oral comments expressed during the meeting. There was general disappointment that the Preferred Alternative included expansion of the White Pass Ski Area into the Pigtail and Hogback Basins with a number of specific concerns cited, including:

- The significant cultural importance of the expansion area to the Yakama people.
- The economic viability of the ski area, particularly related to the uncertainty of sufficient snow pack and the expenses involved with expansion.

- Provisions for rehabilitating or restoring developed areas should the ski area cease to be viable.
- The effects of increased human activity on wildlife (harassment) and water quality (erosion, sediment and pollutants).
- The effects of improved access to and use of the adjoining Goat Rocks Wilderness.

3.9.5 Environmental Consequences

In conformance with the NHPA (as revised in 2001), 36 CFR 800 federal regulations, the Forest Plans as amended, Wenatchee National Forest Heritage Resources Inventory Strategy, and the Gifford Pinchot National Forest Probability Zones for Cultural Resources Survey, archaeological and ethnographic studies have been conducted in the White Pass Study Area. These surveys have not identified any National Register eligible, listed or potentially eligible cultural properties in the White Pass Study Area. While no historic properties have been located, an archaeologist would be on-site during construction-related activities.

The issue indicator used for heritage resources is the ability to mitigate adverse effects to historic properties located within the White Pass Study Area, and to protect American Indian access into Hogback Basin for the exercise of treaty rights, religious and other traditional uses.

3.9.5.1 Alternative 1 – No Action

Alternative 1 would have no impact on heritage resources or reserved treaty rights. There would be no ground-disturbing activities occurring outside the existing White Pass SUP area under the No Action Alternative. Current uses within the ski area and within Pigtail and Hogback Basins would remain unchanged.

3.9.5.2 Direct and Indirect Effects Common to All Action Alternatives

Under all Action Alternatives, there would be no effect to historic properties because none have been identified to date within the White Pass Study Area. The only potential direct or indirect impact to archaeological heritage resources would be from ground-disturbing activities in areas of dense vegetation, where surface visibility proved difficult during archaeological field surveys, and where as yet unidentified historic properties could exist. The relative risk to unidentified archaeological resources can be ranked according to the amount of new ground disturbance proposed.

The only clearing to mineral soil would be the minimum necessary for the foundations of the lift buildings and towers, spur road, new day lodge, waste disposal system, trail relocation, and utility installation, but some amount of ground disturbance would occur under all Action Alternatives. In addition, the PCNST re-route under Modified Alternative 4 would require ground disturbance. Ranking alternatives by the total amount of short-term grading impacts as a relative measure of new ground disturbance indicates 1.2 acres of short-term grading impacts under Alternatives 6 and 9, 4.8 acres under Alternative 2, and 12.9 acres under Modified Alternative 4 (refer to Table 3.2-3). The majority of the grading under Modified Alternative 4 is associated with the 7-acre parking lot located along US 12. As described in Section 3.2 – Geology and Soils and Section 3.3 – Watershed Resources, Mitigation Measures MM1 through MM11 would be implemented to reduce the effect of soil disturbance, and Mitigation Measures MM12, 13, and 14 would be implemented to minimize impacts to any as yet unidentified heritage resources (refer to Table 2.4-2). Table 2.4-3 and Table 2.4-4 contain Management Requirements and Other Management Provisions that would be implemented to reduce impacts to soils, watershed resources, vegetation, wildlife and other resources, as described in Chapter 3 (e.g., 3.2 – Geology and Soils, 3.3 – Watershed Resources, 3.4 – Fisheries, 3.5 – Vegetation, and 3.6 – Wildlife).

Archaeological monitoring would mitigate the relative risk of impacting as yet unidentified heritage resources. A professional archaeologist would monitor ground disturbing activities within the White Pass Study Area during construction. Tribes would be notified as to when construction would start so they could be present to observe activities that may uncover heritage resources. In the event that unanticipated heritage resources are located, all activity in the vicinity of the resource would stop pending notification and consultation with Forest Service archaeologists. Any newly identified historic properties identified in the expansion area prior to, during or following construction would be protected pursuant to conditions outlined in the White Pass Ski Area SUP, whereas it shall be the responsibility of the permit holder to ensure that (1) employees and contractors are aware that all heritage resources are protected by law and (2) discovery of such resources would be promptly reported to the Forest Service.

Direct and indirect effects to resources and values of concern to the Yakama Nation and Cowlitz Tribe would be avoided, to the greatest extent practical, by project design. Alternative 9, which would confine new development to the existing SUP area, best addresses tribal concerns related to expansion into Hogback Basin, but also proposes the most detrimental soil disturbance (refer to Table 3.2-3 and Section 2.3 – Geology and Soils), particularly relating to grading in the vicinity of perennial streams located in the northeast portion of the existing SUP area. Alternative 2 and Modified Alternative 4 are similar with respect to expansion into Pigtail and Hogback Basins, with two chairlifts and associated trails, a mid-mountain lodge, and an increase of the SUP by 767 acres. Under Alternative 6, there would be no development in the Hogback Basin. Development in Pigtail Basin under Alternative 6 would involve one chairlift and associated trails, and an SUP increase of 282 acres. Specific effects related to the displacement of backcountry skiers, US 12 traffic and shuttle service, potential construction of a road in roadless areas, and impacts to water, vegetation, fish and wildlife resources are discussed in other sections of this Chapter. In general, however, vegetation clearing would be the minimum necessary to connect existing openings where ski trails and lift corridors are proposed under all Action Alternatives. This clearing would be mainly trees and would not involve clearing to mineral soil or ground cover/brush removal, so the rest of the existing vegetation that may be important for use by the tribes would remain. Under Alternatives 2, 6 and Modified Alternative 4, the design and location of lift facilitated ski trails would avoid the high points along Hogback Ridge that may be of concern to the Tribe(s). Under all alternatives, tribal access to the area would persist, and medicinal and food plants would continue to be available in the project area. Water resources, including natural springs, would be protected as described in Section 3.3 – Watershed Resources. Big game, although their migration trails are not known to exist within the project area, would not be directly or indirectly adversely affected by the actions proposed under any alternative (refer to Section 3.6 – Wildlife). Finally, White Pass does not currently salt ski trails. The company has indicated it has no plans to do so in the future, and this activity is not part of any analyzed alternative.

3.9.6 Cumulative Effects

No known effects to historic or cultural properties are expected under the Action Alternatives. As described in Section 3.9.6.1, archaeological field surveys identified no historic properties or heritage resources within the White Pass Study Area. Impacts to unidentified heritage resources may arise due to grading, clearing and excavation actions during project implementation. Access by American Indians for traditional uses and the exercise of treaty rights will remain unchanged under all alternatives. However, coupled with the past, present and reasonably foreseeable projects in the vicinity of the White Pass Study Area, the White Pass expansion may be viewed by some tribal members as further diminishment of the values and resources associated with the White Pass area and Hogback Basin.

In summary, the effect to heritage resources from the White Pass expansion, coupled with the effects of past, present and reasonably foreseeable projects in the area, is an increase in the risk of damage to unidentified cultural and historical resources during soil disturbing activities, and increased perception of diminished values and resources in the White Pass Study Area by some tribal members.

3.10 SOCIAL AND ECONOMIC FACTORS

3.10.1 Introduction

Social and economic factors considered in this analysis include: environmental justice, population demographics, local economics, and ski area economics. The existing condition of each of these factors is briefly described, and potential social and economic impacts under each alternative are discussed.

The White Pass primary market includes Cowlitz, Lewis, Pierce, Thurston and Yakima Counties. The White Pass Study Area for Social and Economic Factors is the US 12 corridor extending from Packwood (Mile Post 128) to the area immediately west of Yakima on the eastern border of Naches (Mile Post 191). This area includes the White Pass SUP area and is most likely to be affected by the proposal. Additional information is provided regarding the economics of ski resort operations in general, with a focus on operations at White Pass. Some state data is included for purposes of comparison.

Historically, the majority of visits to White Pass have been attributed to day visits. White Pass' location between Olympia and Vancouver, WA (west on US 12) and Yakima (east on US 12), makes it an easy choice for day skiers in the market area. White Pass competes with Mission Ridge (adjacent to Wenatchee, Washington) within the local/day skier market, and with Crystal Mountain among visitors residing in the vicinity of Olympia, WA. While White Pass primarily serves the day-use market, it is one of two resorts in the Northwest with overnight lodging provided in condominium facilities near the base area and within a comfortable walking distance of chairlifts.[33]

3.10.2 Affected Environment

3.10.2.1 Environmental Justice

As directed by the Civil Rights Act of 1964, NEPA, and Executive Order 12898, all federal actions, programs, and policies shall identify and prevent and/or mitigate, to the greatest extent practicable, disproportionately high and adverse human health and environmental effects on minorities and low-income populations. Consistent with the USDA Departmental Regulation Number 5600-2, the term "minority" applies to the following population groups: (1) American Indian or Alaskan Native; (2) Asian or Pacific Islander; (3) Black, not of Hispanic Origin; (4) or Hispanic. A "low-income population" is defined as, "a group of low-income persons who live in geographic proximity to [one another], and, if circumstances warrant, migrant farm workers and other geographically dispersed/transient persons who will be similarly affected by USDA programs or activities" (USDA 1997). Commonly called "Environmental Justice," this policy applies to all federal programs, policies, and activities, including NEPA documents and this FEIS.

[33] Crystal Mountain also provides overnight accommodations (USFS 2004d).

Within the White Pass Study Area, the localities closest to the White Pass Ski Area include the community of Packwood in Lewis County and the Town of Naches in Yakima County. As a result, minority and low-income populations potentially located within these localities have the greatest potential to experience environmental and economic effects from the proposed White Pass expansion.

As described in Appendix J, the proposed development area is within traditional Yakama and Cowlitz (Taidnapam) territory. These tribes were consulted, and ethnographic and archaeological studies were completed. Refer to Section 3.9 – Heritage Resources and Reserved Treaty Rights for detail on the historic use of the White Pass Study Area by the Yakama Nation and Taidnapam peoples.

Table 3.10-1 provides population estimates for American Indian and Alaska Natives in Lewis and Yakima Counties. American Indians and Alaska Natives comprised 1.2 percent of the Lewis County population and 5.6 percent of the Yakima County population, as of the 2000 Census (U.S. Census Bureau 2000a). According to more recent estimates, American Indians and Alaska Natives comprised 1.3 percent of the Lewis County population and 4.4 percent of the Yakima County population in 2004 (U.S Census Bureau 2004, 2005).

Table 3.10-1:
Population Estimates for American Indian and Alaska Natives in Lewis and Yakima Counties

County	Estimated Population 4/1/90[a]	Estimated Population 7/1/99[a]	Estimated Population 7/1/04	4/1/90 – 7/1/99		7/1/99-7/1/2004		Percent of County Population – 7/1/99	Percent of County Population – 7/1/04
				Numeric Change	Percent Change	Numeric Change	Percent Change		
Lewis County	655	802	894[b]	147	22.4	92	11.5	1.2	1.3
Yakima County	11,413	12,399	9,818[c]	986	8.6	-2,581	-20.8	5.6	4.4

[a] Source of 1990 and 1999 data: U.S. Census Bureau 2000a
[b] Source for Lewis County 2004 demographics: U.S. Census Bureau 2005. Population demographics are estimates based on symptomatic data including birth records, death records, tax returns and immigration.
[c] Source for Yakima County 2004 demographics: U.S. Census Bureau 2004. Demographics are based on a survey.

As summarized in Table 3.10-2 and detailed in Illustration 3.10-1, minorities comprised approximately 18 percent of the total population of Washington State in 2000, while minorities accounted for 7 percent of Lewis County and 44 percent of Yakima County. Within Yakima County, 36 percent of the population is considered Hispanic/Latino in origin. Similarly, in 2004, minorities comprised approximately 19 percent of the total population of Washington State, 4 percent of Lewis County and 38 percent of Yakima County. Within Yakima County, 39 percent of the population was considered Hispanic/Latino in origin in 2004 (U.S Census Bureau 2004, 2005). The agricultural production in Yakima County creates a dependence on seasonal workers. In the past, much of this labor was provided by migrant workers. Many of these workers have settled in Yakima County, resulting in the high proportion of Latino/Hispanic residents. Most of the seasonal workforce is Latino/Hispanic, although most Latino/Hispanic residents are not seasonal laborers (Yakima County 1997). Within the White Pass Study Area, which includes the Town of Naches, the 1990 Census indicated that only 1.8 percent of the population was of "Mexican origin" (Town of Naches 1995). The discrepancy indicates that while Yakima County contains a large Hispanic/Latino population, the White Pass Study Area, from Naches to Packwood, contains a very small minority population.[34] Further evaluation of localities in the White Pass Study Area provided no indication that low income or minority populations exist within the White Pass Study Area (U.S. Census Bureau 2000a, 2000b, 2000c, 2004, 2005; Yakima County 1997; Town of Naches 1995, Washington State Employment Security 2001).[35]

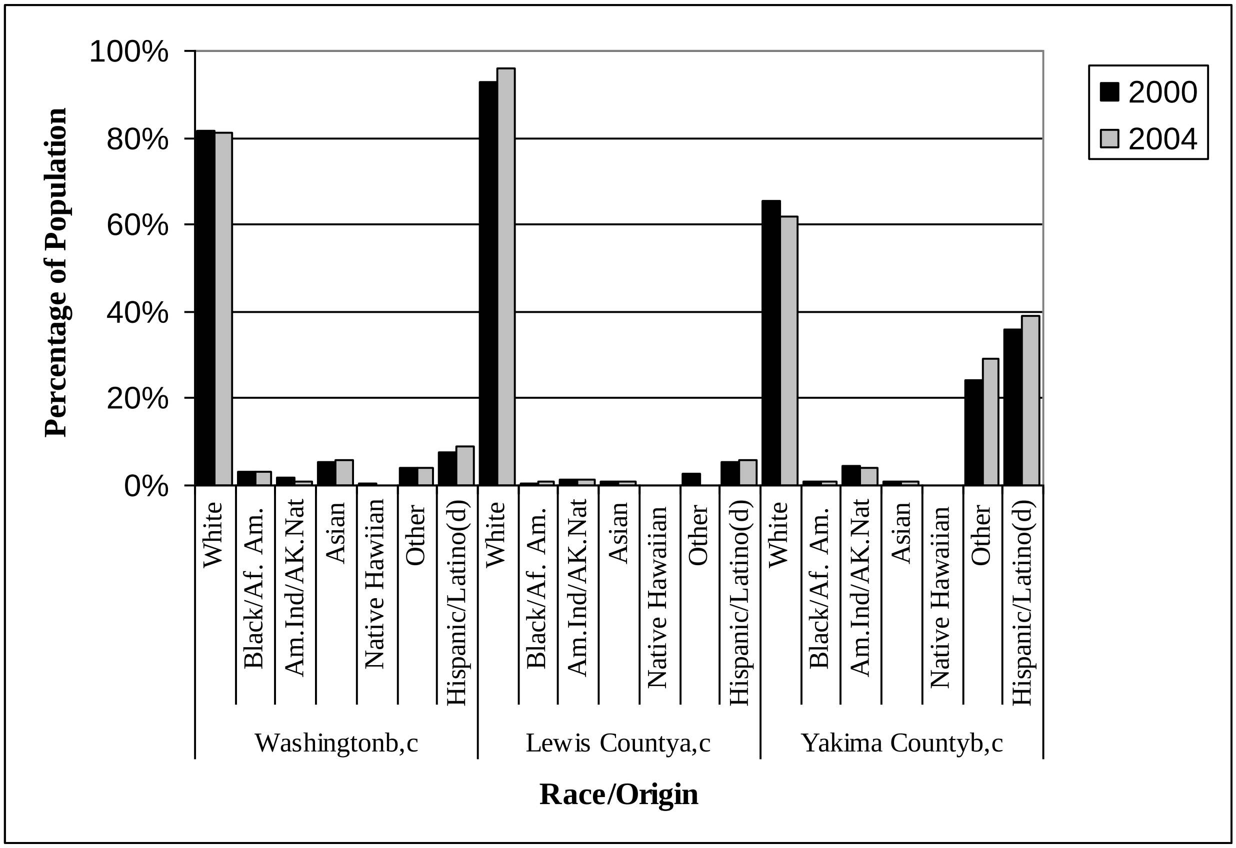
[34] The term minority is used to define people of non-Caucasian race, or of Hispanic origin.
[35] For purposes of this analysis, the term "low-income" is used to describe income below the poverty level. Following the Office of Management and Budget's (OMB's) Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to detect who is poor. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being "below the poverty level."

Table 3.10-2:
2000 and 2004 Population Distribution by Race and Hispanic or Latino Origin for Washington State and Lewis and Yakima Counties

Location	Race/Origin	2000[a]		2004[b]	
		Number of Residents	Percentage of Total Residents	Number of Residents	Percentage of Total Residents
Washington State					
	White	4,821,823	82%	4,908,982	81%
	Black/African American	190,267	3%	199,794	3%
	Am. Indian/Alaska Native	93,301	2%	73,888	1%
	Asian	322,335	5%	381,867	6%
	Native Hawaiian	23,953	0%	23,216	0%
	Other	228,923	4%	239,990	4%
	Hispanic/Latino[d]	441,509	7%	517,055	9%
	Total	**5,894,121**	**100%**	**6,063,048**	**100%**
Lewis County					
	White	63,772	93%	68,650[c]	96%[c]
	Black/African American	259	0%	362[c]	1%[c]
	Am. Indian/Alaska Native	840	1%	894[c]	1.2%[c]
	Asian	475	1%	533[c]	1%[c]
	Native Hawaiian	122	0%	140[c]	0%[c]
	Other	1,751	3%	960[c]	1%[c]
	Hispanic/Latino[d]	3,684	5%	4,427[c]	6%[c]
	Total	**68,600**	**100%**	**71,299**[c]	**100%**[c]
Yakima County					
	White	146,005	66%	140,389	62%
	Black/African American	2,157	1%	1,779	1%
	Am. Indian/Alaska Native	9,966	4%	9,818	4%
	Asian	2,124	1%	1,410	1%
	Native Hawaiian	203	0%	0	0%
	Other	54,375	24%	65,382	29%
	Hispanic/Latino[d]	79,905	36%	87,806	39%
	Total	**222,581**	**100%**	**225,351**	**100%**

[a] Source: U.S. Census Bureau 2000b
[b] Source: U.S. Census Bureau 2004. Demographics are based on a survey.
[c] Source: U.S. Census Bureau 2005. Population demographics are estimates based on symptomatic data including birth records, death records, tax returns and immigration.
[d] According to the U. S. Office of Management and Budget directive 15, the term Hispanic does not refer to a race, but an Origin. Therefore, persons of Hispanic Origin may be of any race. The Hispanic Origin statistics contained in this table represent the percentage of the total population that are of Hispanic Origin, regardless of race. Individuals of two or more races were included in the numbers for all races they identified, resulting in a percentage of more than 100% for the total population.

Illustration 3.10-1:
2000 and 2004 Population Distribution by Race and Hispanic or Latino Origin for Washington State and Lewis and Yakima Counties



[a] Source: U.S. Census Bureau 2005. Population demographics are estimates based on symptomatic data including birth records, death records, tax returns and immigration.
[b] Source: U.S. Census Bureau 2004. Demographics are based on a survey.
[c] Source: U.S. Census Bureau 2000b
[d] According to the U. S. Office of Management and Budget directive 15, the term Hispanic does not refer to a race, but an Origin. Therefore, persons of Hispanic Origin may be of any race. The Hispanic Origin statistics contained in this table represent the percentage of the total population that are of Hispanic Origin, regardless of race. Individuals of two or more races were included in the numbers for all races they identified, resulting in a percentage of more than 100 percent for the total population.

3.10.2.2 Population and Demographics

The White Pass Study Area is predominantly rural, as evidenced in Table 3.10-3 (refer to “Persons Per Square Mile”). Population growth in both Lewis (15.6 percent) and Yakima (17.9 percent) Counties was slower than the State (21.1 percent) between 1990 and 2000. Likewise, unemployment and poverty levels in the counties are higher than the State, with Washington State experiencing an unemployment rate of 4.1 percent as compared to 5.1 percent and 6.9 percent unemployment in Lewis and Yakima Counties, respectively. Consistent with population growth and unemployment rates, per capita and median family incomes are considerably lower in Lewis ($17,082 and $41,105, respectively) and Yakima ($15,606 and $39,746, respectively) Counties, as compared to the State of Washington ($22,973 and $53,760, respectively).

**Table 3.10-3:
Socioeconomic Indicators for Washington State
and Lewis and Yakima Counties**

Indicator	Washington	Lewis County	Yakima County
Population			
2000 [a]	5,894,121	68,600	222,581
2003[b]	6,131,445	70,404	226,727
2005[c]	6,287,759	72,449	231,586
Population % Change 2000-03	4.0%	2.6%	1.9%
Population % Change 2000-05	6.7%	5.6%	4.0%
Population % Change 1990-2000	21.10%	15.60%	17.90%
Per Capita Income [a]	$22,973	$17,082	$15,606
Median Family Income [a]	$53,760	$41,105	$39,746
Persons Living Below the Poverty Level [a]	10.60%	14.00%	19.70%
Percentage of Families Living Below the Poverty Level [a]	7.30%	10.40%	14.80%
Unemployment [a]	4.10%	5.10%	6.90%
Persons Per Square Mile[a]	88.6	28.5	51.8

[a] Source: U.S. Census Bureau 2000b.
[b] 2003 population estimate source: U.S. Census Bureau 2000c. Population demographics are estimates based on symptomatic data including birth records, death records, tax returns and immigration.
[c] 2005 population estimate source: U.S. Census Bureau 2005a. Population demographics are estimates based on symptomatic data including birth records, death records, tax returns and immigration.
Note: 2003 and 2005 population estimates are provided for reference. All economic indicators in this table are based on Census 2000 populations.

E.D. Hovee & Company (1999) indicated that as of the 2000 Census, the population of Packwood was 770, with a median age of 43.9 and 45 percent of the population over age 45. Packwood residents attribute the low representation of younger residents to the lack of family-wage employment. Young residents graduate from high school and leave the area in search of better economic opportunities. As of 1996, 73 percent of the job base, and 93 percent of the total wages paid in Packwood came from the manufacturing sector, which was predominantly forest products related. During this period, the unemployment rate in Lewis County was 1.8 times the statewide average (E.D. Hovee & Company 1999). The closure of the local mill in 1998 has further exacerbated the unemployment rate in Packwood, although no specific unemployment rate is available.

More recently, E.D. Hovee & Company (2005) indicated that there were 833 residents in Packwood in 2005. Approximately 52 percent of homes located within Packwood are seasonal and tourists visiting Lewis County spend approximately $130 million on goods and services, supporting 1,800 jobs and $1.4 million in local taxes (E.D. Hovee & Company 2005).

The population of Naches as of the 2000 Census was 643, with an unemployment rate of 4.2 percent (www.city-data.com 2004). The projected population growth from 2005-2015 for the White Pass market area is shown in Table 3.10-4. The average annual projected increase for the entire area is 2.16 percent for the ten-year development period (refer to Appendix D).

Table 3.10-4:
White Pass Market
Average Annual Population Growth Projections

County	Growth Projection 2005-2015
Cowlitz	2.67%
Lewis	1.95%
Pierce	1.71%
Thurston	2.70%
Yakima	1.79%
Average	2.16 %

Source: State of Washington 2002

3.10.2.3 Local Economics

White Pass sponsors visitor spending both at the ski area (e.g., lift tickets, food and beverage, rentals) as well as in the community of Packwood and Town of Naches (e.g., food and beverage, gas, ski equipment and apparel, rentals). In addition, White Pass Ski Area provides seasonal and full-time employment to local residents.

Both Packwood and Naches are economically depressed. Packwood lost almost half of its population during the 1990s due to mill and ranger station closures (Dean Runyan Associates 2004). The overall economy in Naches is good, due to agricultural production. However, small businesses within the central business area are struggling as the town shifts from an agricultural and logging economy to a bedroom community for the greater Yakima area (Town of Naches 1995).

In response to the reduced economic activity in these communities, numerous economic development strategies and other planning documents have been prepared, or are under preparation for Lewis County/Packwood, Yakima County/Naches and the US 12 corridor. These include the following:

Lewis County/Packwood

- Overall Economic Development Plan for Cowlitz and Lewis Counties (CWCOG & LCEDC 1997)
- Lewis County Industrial Needs Analysis (E.D. Hovee & Company 1997)
- Packwood Community Action Plan (E.D. Hovee & Company 1999)

- Northwest Economic Adjustment Initiative Assessment – Packwood, Lewis County, Washington (NWAIA 2002)
- Lewis County Profile (Washington State Employment Security 2001)
- Draft USDA Forest Service Packwood Work Center Utilization Analysis (Dean Runyan Associates 2004)
- East Lewis County Economic Opportunities Study (E.D. Hovee & Company 2005)

Yakima County/Naches

- Naches, Washington 1993 Community Development Plan (Pacificorp 1993)
- Town of Naches – Land Use Element (Town of Naches 1995)
- Plan 2015 – A Blueprint for Yakima County Progress. Chapter IV – Economic Development Element (Yakima County 1997)

US 12 Corridor

- US 12 Corridor Charette (USDI and NPS 2002)

The purpose of these documents, in general, is to evaluate the economic trends in the White Pass Study Area and to identify opportunities to improve the economic climate through commercial, industrial, and recreation-based initiatives.

Most recently, the Draft USDA Forest Service Packwood Work Center Utilization Analysis (Dean Runyan Associates 2004) evaluated the potential for new uses at the recently-abandoned Forest Service Packwood Work Center. The primary objective of the study states that:

> "Destination Packwood is interested in putting the site to use for the community and, in particular, enhancing Packwood's economic diversity and expanding the services available to the community and its visitors." (Dean Runyan Associates 2004, 1)

Furthermore, the National Park Service (USDI and NPS 2002) describes a study focusing on the corridors leading to Mount Rainier National Park, focusing on US 12. The document describes the US 12 region, the results of charettes regarding opportunities along the US 12 corridor, and next steps in the implementation of projects along the corridor. The report describes the relationship between gateway communities, public lands, residents and visitors:

> "Partnerships between gateway communities and public lands managers are emerging as critical strategies for identifying and pursuing shared regional goals. Although the US 12 region is a complex mosaic of land ownership and wide range of management goals, it is also a region of broadly shared interests, with opportunities for partnerships that will benefit public lands and local communities, travelers and residents.
>
> The charette process focused on the opportunities to be gained from strengthened relationships among these agencies and with other stakeholders in the US 12 corridor. Corridor stakeholders - local communities, Mount Rainier National Park, the two National Forests (Gifford Pinchot and Wenatchee)…have many shared interests:
>
> - a healthy, attractive landscape as a place to live and a place to visit;
> - sustainable, vital community economics;
> - healthy ecosystems, including fish and wildlife habitat;
> - functional, multi-modal transportation systems;
> - amenities to support great recreational travel experiences.
>
> These complementary goals are the starting point for partnerships and cooperation that can strengthen the region at the same time that it meets the individual needs of the corridor stakeholders." (USDI and NPS 2002, 3)

The role of White Pass as a stakeholder, and partner in recreation with the Forest Service is described in Draft USDA Forest Service Packwood Work Center Utilization Analysis (Dean Runyan Associates 2004):

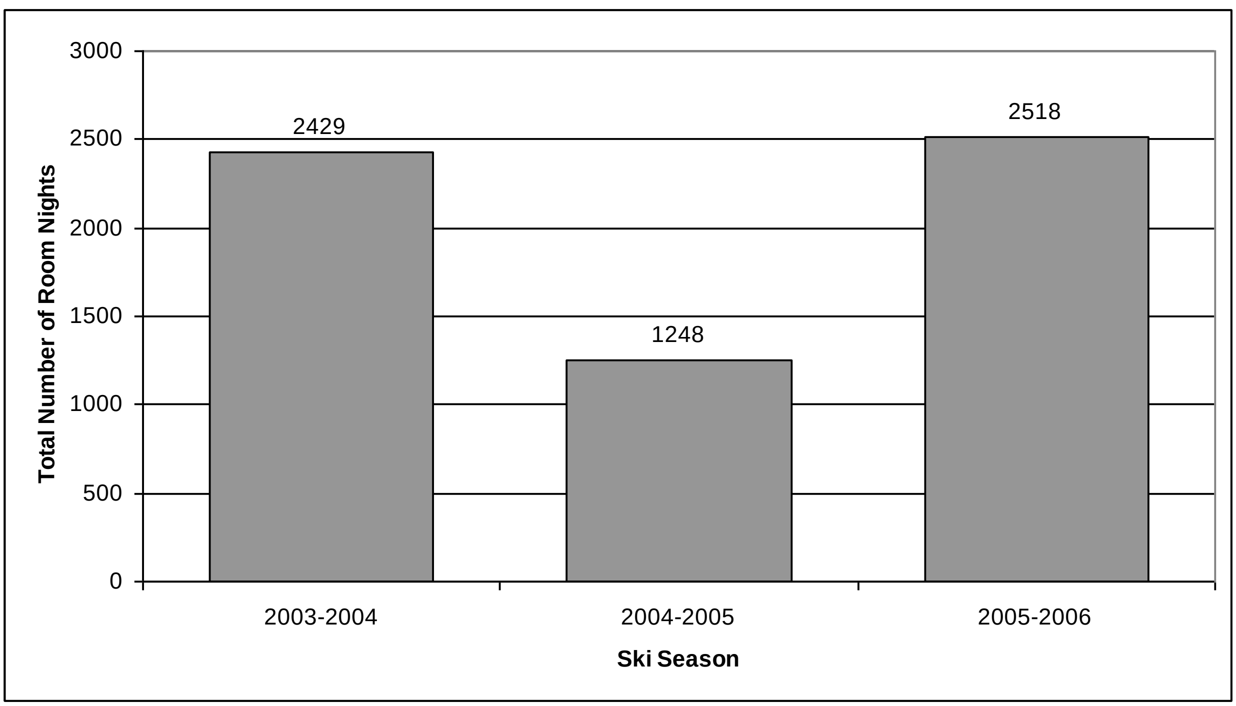
> "White Pass is a fairly low-key operation and, except for certain weekends, does not have large attendance. White Pass is on leased federal land, and for many years has been trying to expand into the adjacent slopes below Hogback Ridge…the expansion received approval from the U.S. Forest Service, but has been fought by environmental groups arguing that Hogback Basin is on roadless national forest land that could be critical to endangered species." (Dean Runyan Associates 2004, 24)

Although Dean Runyan Associates (2004) describes White Pass as a minor component of the overall economic improvement of Packwood, the Town of Naches – Land Use Element (Town of Naches 1995) identifies goals and policies of the Town of Naches, including:

> "Goal 6 – Make tourism a major component of Naches' economic base. Policy 6.1 – Provide activities and attract tourists, and make continuing identification of tourist preferences a basis for defining the focus of Naches' tourist programs and facilities". (Town of Naches 1995, 66)

During the public comment period for the DEIS, many comments were received suggesting that high visitation at White Pass results in an economic boost to the White Pass Study Area, while low visitation results in an economic down-turn (refer to Volume 3 - Response to Comments). In an effort to collect data to analyze these public comments, informal community discussions were held in September 2006 and data was obtained. A summary of the data collected for the 2003 to 2006 ski seasons from various accommodations in Packwood is shown in Illustration 3.10 FEIS 1. As suggested in the public comments on the DEIS, the 2004/2005 ski season overnight lodging market in the vicinity of Packwood exhibits approximately one-half of the room nights compared to 2003/2004 or 2005/2006 seasons. Given that the 2004/2005 season was a low snow season, the new data indicate that White Pass visitation does affect overnight lodging in the White Pass Study Area. For comparison, given an approximate room rate of $200.00 per room per night, the low snow season of 2004/2005 equates to a loss of approximately $250,000 compared to the 2005/2006 season.

Illustration 3.10 FEIS1:
Monthly Lodging Rentals and Revenue for Packwood Hotels



Source: Destination Packwood (2006) Destination Packwood has provided this data to USFS and collected this data from various local accommodation owners including Cabin Rental, Hotel Packwood, Mountain View Lodge, Crest Trail Lodge and Vacation Cabins.

With visitation averaging 109,782 visits over the past five years (PNSAA 2006) (refer to Section 3.11) and with sixty percent of skiers coming from western Washington (i.e., through Packwood) and forty percent of skiers coming from the east side (i.e., through Naches) (Dean Runyan Associates 2004) both communities are in a position to realize economic benefits from the operation of White Pass via off-site spending (e.g., food and beverage, ski equipment and apparel, rentals). While not a key driver of economics in the White Pass Study Area, White Pass has the potential to improve economic conditions. As depicted in Illustration 3.10 FEIS1, successful economics at White Pass is not expected to be the primary driver of local economics, based on this information. The overall economic health of the White Pass Study Area will rely on the continued success of the ski area, but also the success of some or all of the initiatives described above.

White Pass

Over the last five years, annual visitation at White Pass has accounted for 6-8 percent of Washington's total skier visits (PNSAA 2006a). White Pass' local, regional, and destination market competition primarily includes Washington State areas such as Crystal Mountain, The Summit-at-Snoqualmie, Stevens Pass, Mission Ridge, Mount Baker, and Whistler/Blackcomb Resort in British Columbia. Oregon ski areas, including the Mount Hood ski areas and Mount Bachelor, also operate within White Pass' regional market. Within its local day skier market, White Pass primarily competes with Mission Ridge, which also serves the Yakima market. Crystal Mountain also competes with White Pass in that skiers from the Olympia to Vancouver corridor can access White Pass or Crystal Mountain with similar travel times and level of effort.

Prior to 1998, White Pass exhibited visitation ranging from 80,000 to 90,000 annual visits (PNSAA 2004). During the 1997-98 ski season, White Pass exhibited over 103,000 visits. Since that time, annual visitation has been increasing, as demonstrated by the ten-year average of 108,620 annual visits and a five-year average of 109,782 skier visits (PNSAA 2006a).

For the 2003-04 season, White Pass supported 18 year-round employees and 144 seasonal workers. A large portion of these employees live in the White Pass Study Area.

Gross revenue at White Pass was approximately $4.2 million in 2005-06. White Pass paid approximately $34,000 in personal property tax, and $86,400 in USFS fees (White Pass Company 2006).

3.10.2.4 Skiing Trends

Illustration 3.10-FEIS 2 charts national skier visitation for the ten-year period from 1994-95 to 2005-06. The U.S. ski industry has, as a whole, performed strongly between 2000 and 2006, with three record-setting seasons in six years, including:

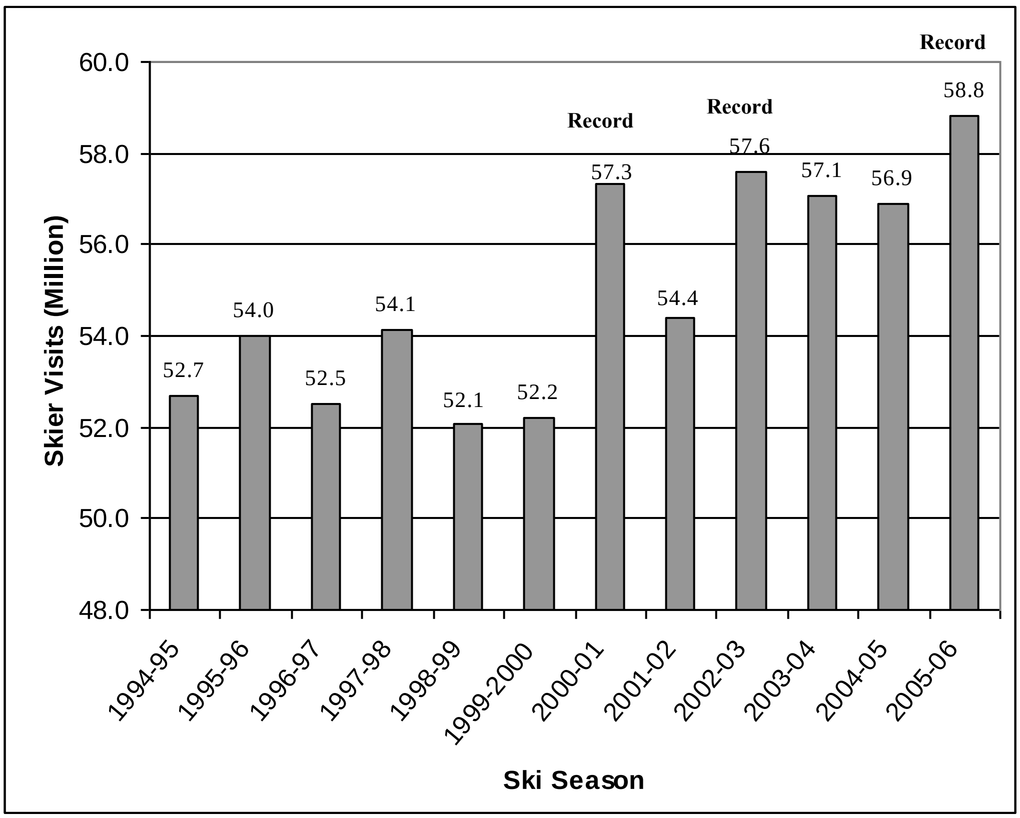
- A record-setting 57.3 million skier visits during the 2000-01 season (NSAA 2005).

- The 54.4 million 2001-02 season - despite September 11, the economic recession, and comparatively poor snow everywhere except the Pacific West (NSAA 2005).

- A record-setting 57.6 million skier visits during the 2002-03 season (NSAA 2005).Another record-setting 58.8 million skier visits during the 2005-06 season (NSAA 2006).

These strong results suggest that the industry may have moved into a new, higher performance range.

Illustration 3.10 FEIS2:
National Skier visitation 1996 - 2006



Source: NSAA 2006

During the 2001-02 season, Oregon and Washington both reported all-time record visitation for the first time (Kottke 2003). In the subsequent year (2002-03 season), the Pacific West was the only region to record a drop in skier visits (-12.6 percent) relative to the previous season (due to substantially worse snow and weather conditions – snowfall was down approximately 19 percent).[36] The region nonetheless recorded its 10th best season out of 25 seasons on record. Within the Pacific West, the Northern Pacific West resorts (Washington, Oregon, Northern California) were down sharply (-25.4 percent), while smaller losses were recorded in the Tahoe area (-4.4 percent) and Southern California/Southern

[36] The Kottke survey does not distinguish between the Pacific Northwest and the Southwest. The Pacific West includes Washington, Oregon, California, Nevada and Arizona.

Nevada/Arizona (-2.3 percent) during the 2002-03 season. The 2005-06 season showed another record year for Oregon resorts and a near-record season for Washington resorts (PNSAA 2006).[37]

Similar to national skier visit trends, skier visitation in Washington has fluctuated widely over the past decade (refer to Table 3.10-5 and Section 3.11). While unpredictable weather patterns are largely blamed for Washington's inconsistent or lack of skier visit growth, the absence of substantial lift upgrades, terrain expansion, and snowmaking capability, combined with competition from other regional destination resorts, such as Whistler/Blackcomb, Sun Valley, Big Sky, and a host of Colorado, Utah, and Tahoe area resorts have also contributed to the lackluster performance (Kottke 2003).

[37] Record visitation in Washington State occurred during the 2001/02 ski season with 2,151,544 visits. The 2005/06 season visitation was only 13,614 visitations short of meeting the record, with 2,137,930 ski visits. Refer to Section 3.11 for additional information.

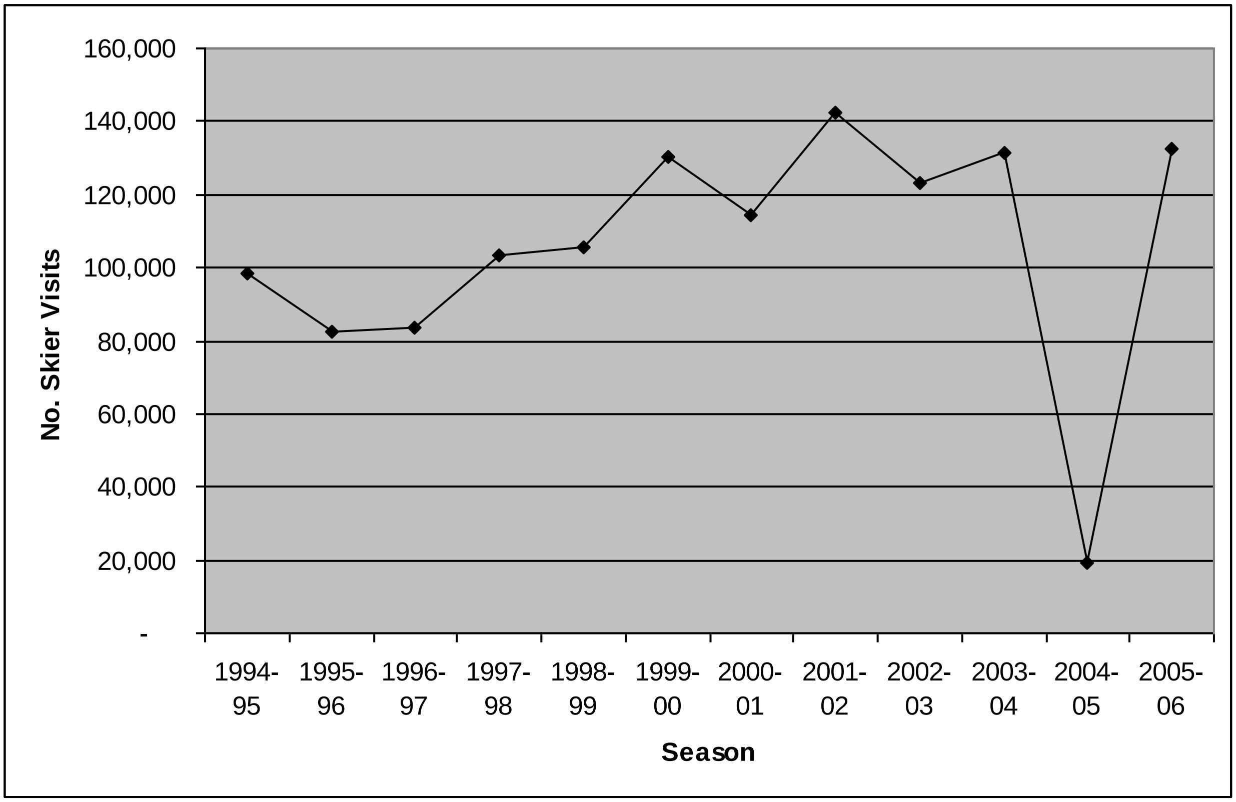
Table 3.10-5:
Washington State Skier Visits from 1994 to 2006

SKI AREA/RESORT	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Cascade (snowcat)	dno	dno	dno	250	679	329	nr	nr	dno	632	nr	nr
Crystal	320,983	264,633	302,673	318,536	311,335	332,276	230,506	391,595	255,370	348,933	123,242	371,811
49 Degrees North	50,914	43,000	49,925	52,210	66,164	65,922	59,905	76,866	52,503	71,508	28,016	75,639
Hurricane Ridge	3,425	nr	2,784	4,198	2,136	5,142	2,958	5,415	3,914	5,235	dno	2,541
Leavenworth	5,040	8,563	14,200	14,250	12,300	12,249	12,300	6,238	7,128	8,966	3,288	16,194
Loup Loup	22,168	26,420	15,559	9,215	27,000	15,935	5,700	16,000	13,907	13,434	1,180	19,721
Mission Ridge	105,738	84,764	92,570	79,091	96,529	108,194	91,372	111,162	89,815	109,085	23,021	116,387
Mt. Baker	134,728	111,504	111,246	114,534	124,477	138,602	123,493	134,822	107,472	115,000	81,322	204,000
Mt. Spokane	70,000	22,250	nr	50,797	62,852	72,080	85,055	94,764	46,322	87,520	19,844	90,493
North Cascade (helicopter)	368	488	522	331	409	663	594	428	360	389	212	nr
Ski Bluewood	54,225	10,067	45,851	48,007	54,501	49,332	49,836	61,679	27,048	43,024	3,393	37,452
Stevens Pass	703,343,	307,484	392,437	379,591	404,204	485,522	426,100	498,367	378,868	450,222	133,785	452,456
Summit at Snoqualmie	490,310	436,239	476,218	410,334	502,200	506,021	507,783	611,638	328,746	475,006	55,173	618,531
White Pass	98,666	82,318	83,555	103,332	105,833	130,152	114,415	142,570	123,349	131,226	19,061	132,705
Total, WASHINGTON	**1,762,052**	**1,399,869**	**1,587,540**	**1,584,676**	**1,770,619**	**1,922,419**	**1,710,017**	**2,151,544**	**1,434,802**	**1,860,180**	**491,537**	**2,137,930**

nr = No Record
dno = Did Not Operate
Source: PNSAA 2004, 2006

Prior to 1998, White Pass exhibited visitation ranging from 80,000 to 90,000 annual visits (PNSAA 2004). During the 1997-98 ski season, White Pass exhibited over 103,000 visits. Since that time, annual visitation has been increasing, as demonstrated by the ten-year average of 108,620 annual visits and a five-year average of 109,782 visits (PNSAA 2006a). Illustration 3.10 FEIS3 presents the growth in annual visitation at White Pass between the 1994-95 season and the 2005-06 season. The steady growth in demand for alpine skiing at White Pass has resulted in larger crowds, longer lift line wait times, and more crowded slope conditions. Additionally, White Pass has observed an increase in the number of days at or near capacity, up to a five-year average of 21.4 near capacity days (refer to Illustration 1-3).[38]

Illustration 3.10 FEIS3:
Annual Skier Visitation at White Pass (1994-2006)



Source: PNSAA 2004, 2006

[38] Near capacity visitation days include 90 percent CCC, 100 percent CCC and 110+ percent CCC. The five-year average includes the low 2004/2005 ski season.

3.10.3 Environmental Consequences

3.10.3.1 Environmental Justice

Alternative 1

Under Alternative 1, no new development would take place and no disproportionate social or economic impacts to minority or low-income populations, relating to White Pass, would occur within the White Pass Study Area.

Alternatives 2, 6, 9 and Modified Alternative 4

As noted in Section 3.10.2 – Affected Environment, very small **minority** or **low-income populations** have been identified within the White Pass Study Area and no environmental justice issues have been identified. Therefore, the potential does not exist for minorities or low-income populations to be disproportionately affected by implementation of any of the Action Alternatives. As indicated, while not a key driver of economics in the White Pass Study Area, White Pass has the potential to improve economic conditions, particularly in conjunction with some, or all of the initiatives described above.

Based on information from the Indian Claims Commission findings and on the Bureau of Indian Affairs interpretation of the district court's specified findings in United States v. Washington on Tribes' usual and accustomed fishing places, regarding tribal territorial boundaries at the time of treaty negotiations in the 1850s, the Yakama Nation was identified as a concerned Tribe. Members of the Yakama Nation continue to express concerns that the cultural and spiritual values of the area are more than actual sites and any additional use and disturbance is of concern. In addition, the Cowlitz (Taidnapam) traditional territory includes the White Pass Study Area. Refer to Section 3.9 – Heritage Resources for detailed information on these concerns and consultation that has taken place to date. At the same time, access to and use of the White Pass Study Area would remain open and available to all tribal people under all of the Action Alternatives.

3.10.3.2 Population and Demographics

Alternative 1

Under the No Action Alternative, no improvements or additional facility development at White Pass would occur. The population and demographics in the White Pass Study Area would remain as described in Section 3.10.2 – Affected Environment. This is not expected to have any measurable effect on population or demographics.

Alternatives 2, 6, 9 and Modified Alternative 4

Under the Action Alternatives, new ski area facilities would be installed at White Pass, allowing for increased employment and visitation at White Pass (described below). Dean Runyan Associates (2004) describes White Pass as a minor component of the overall economic conditions in the White Pass Study

Area and local economic data (refer to Illustration 3.10 FEIS1) suggest that the overnight lodging market is only partially dependent on visitation at White Pass. As a result of its relatively small position in the White Pass Study Area economy, additional development at White Pass is not expected to result in any measurable changes in the population or demographics in the White Pass Study Area.

3.10.3.3 Local Economics

Alternative 1

Alternative 1 would include no improvements or additional facility development at White Pass. Local economic conditions would continue to be strained in the White Pass Study Area. Potential economic benefits could result from the implementation of the plans described in Section 3.10-2 (refer to Section 3.10.4 – Cumulative Effects). As described above, White Pass is not a key economic driver in the White Pass Study Area, although many of the economic development strategies include the White Pass expansion as a component of the overall economic growth in the area. While White Pass has realized growth in visitation over the past decade (refer to Table 3.10-5, Illustration 3.10 FEIS3, and Section 3.11 – Recreation), the current facilities are becoming over-burdened (refer to Section 1.1.2). As a result, with no expansion, White Pass would not be in a position to participate in the overall strategies for economic growth in the White Pass Study Area. In addition, White Pass would not fulfill the Forest Service objective of meeting the public demand for recreation at appropriately designed facilities (USDA 1990a, 1990b; USDA and USDI 1994).

Alternatives 2, Modified Alternative 4, 6, and 9

The Action Alternatives would allow White Pass to more comfortably accommodate the recent increases in visitation, and to meet future demand for recreation at White Pass. By providing the most facilities, Modified Alternative 4 would provide the most opportunity for increased visitation and spending. Conversely, with the lowest potential for improved conditions at White Pass, Alternative 9 represents the least amount of potential to address growing demand (refer to Skiing Trends, below).

Under the Action Alternatives, economic conditions at White Pass would be altered through the creation of new ski area facilities, which would provide additional seasonal employment opportunities. Table 3.10-6 presents the additional employment at White Pass under the Action Alternatives.

Table 3.10-6:
Employment at White Pass

	Alt. 1 (Existing)	Alt. 2, Change/Total	Mod. Alt. 4 Change/Total	Alt. 6 Change/Total	Alt. 9 Change/Total
Full Time	18	2 / 20	2 / 20	1 / 19	1 / 19
Seasonal	144	24 / 168	20 / 164	18 / 162	12 / 156
Total	162	188	184	181	175

Source: White Pass Company 2004

With a population of 770 and a median age of almost 44 years, the creation of 12 (Alternative 9) to 24 (Alternative 2) seasonal jobs at White Pass would not result in significant improvement in employment conditions in Packwood, particularly given that these jobs would not be family-wage jobs, as described in E.D. Hovee & Company (1999). Similarly, with a population of 643 and a low unemployment rate, Naches would not benefit greatly from the creation of these seasonal jobs.

3.10.3.4 Capital Investments and Returns

The five alternatives and visitation projections are associated with significant differences in capital investments. Alternative 1 (No Action) includes no additional improvements or facilities at White Pass. The Action Alternatives include capital investments in lifts, buildings and other facilities. The costs of improvements for the Action Alternatives range from $3.8M to $10M.

The current and future lift revenue would become the main source of funds to support these investments. Lift revenue is also augmented by income from the sale of food and beverage, ski rentals/repairs and ski school. The upgrade of lifts, terrain and facilities in each Action Alternative would improve the skiing experience and thereby increase the ability of White Pass Ski Area to attract more skiers, and to a certain extent increase lift ticket prices. Increases in both skier visitation, displayed in Table 3.10-7, and lift ticket revenues throughout the projection period ultimately determine the investment returns for the project (refer to Table 3.10-7 and Appendix D).

Table 3.10-7:
White Pass Visitation Projection Comparisons

Visitor Projections	Alt. 1	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9
Year 1	109,782	149,782	149,782	123,782	115,782
Year 10	121,268	165,453	165,453	136,732	127,895
% Increase from Alt. 1/Year1	10%	51%	51%	25%	16%

The revenue associated with each visitor at White Pass was used to estimate future revenue per skier visit based on current trends and adjusted by the skier improvements associated with that alternative. In a similar manner the cost associated with each alternative was calculated based on the projected costs of the lifts, facilities, and infrastructure as well as additional expenses for operations (e.g., wages, insurance, cost of goods sold).

These numbers were then used to determine the number of visitors needed to reach operational break-even. Operational break-even represents the number of skiers needed in any given year to cover all costs that the mountain incurs in that year. The determination of a break-even point is an important measure used to assess the economic feasibility of each alternative.

The break-even analysis was completed using the current operational characteristics of White Pass and adding projected increases in skier visits and revenues per skier visit. Future yearly expenses were estimated using the current operational costs at White Pass and dividing these costs into fixed, variable and semi-variable expenses. The allocation of costs into these expense categories was important because the proposed alternatives affect these costs to a different degree.

- Fixed expenses occur regardless of skier volume and still remain when the mountain is closed or when there are fewer skiers at the mountain. Fixed expenses include depreciation expense, debt service, insurance, overhead and administrative costs.

- Semi-variable expenses are those that vary with both the length of the operating season and the volume of skiers at the mountain. These expenses include some portion of salaries and wages, slope grooming, maintenance, ski patrol, visitor services.

- Variable expenses include those that are directly tied to the number of skiers at the mountain and include items such as salaries and wages, food and bar, sales tax, etc.

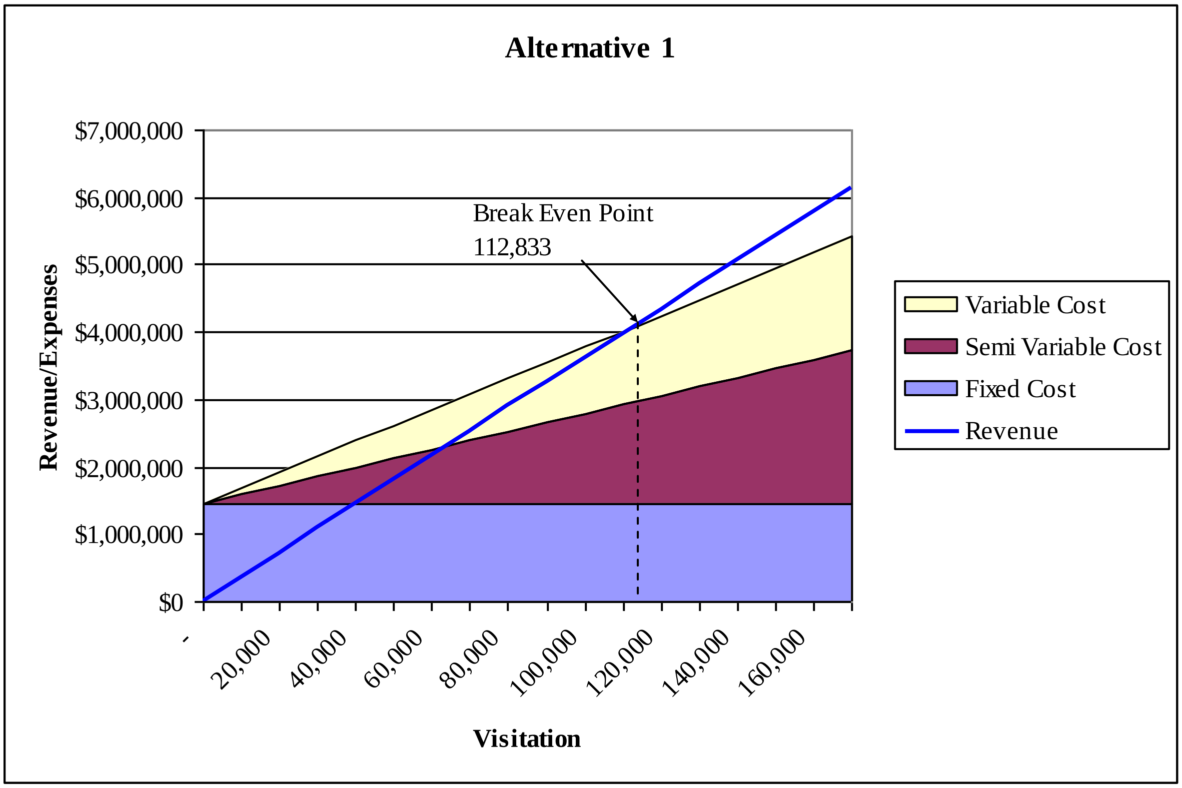
The debt service on capital investments for the proposed alternatives are, to a large extent, fixed operating expenses. These assets (lifts and buildings) are expensed (depreciated) using a fixed schedule, while other items such as terrain clearing are expensed as they occur and are also not dependent on skier visits. Some of the alternatives also add significant semi-variable and variable expenses due in part to increased wages and salaries associated with new lifts, slope grooming and other items associated with the improvements.

The break-even analysis was completed for a five-year period following the implementation of the alternatives by evaluating the revenue received per skier visit. The costs tied to each skier visit (variable and semi-variable expenses) were subtracted from the revenue per skier visit to determine a contribution margin. This number represents the amount the mountain would receive per skier visit to cover fixed operational costs. An operational break-even point was then computed as the number of skier visits needed to cover all fixed, semi-variable and variable expenses.

Alternative 1

Under the No-Action Alternative, the operating break-even would be attained at 112,833 skier visits (refer to Illustration 3.10-2). During the past five ski seasons (2000-01 to 2005-06), White Pass Ski Area averaged 109,782 skier visits, which is below the break-even point.[39] As shown in Table 3.10-7, skier visitation would increase by approximately ten percent under Alternative 1, to a total of 121,268. **As a result, the ski area operation would exceed the break even point by approximately 9,000 visits per year.**

Illustration 3.10-2:
Alternative 1 Break-Even Analysis (No Action)

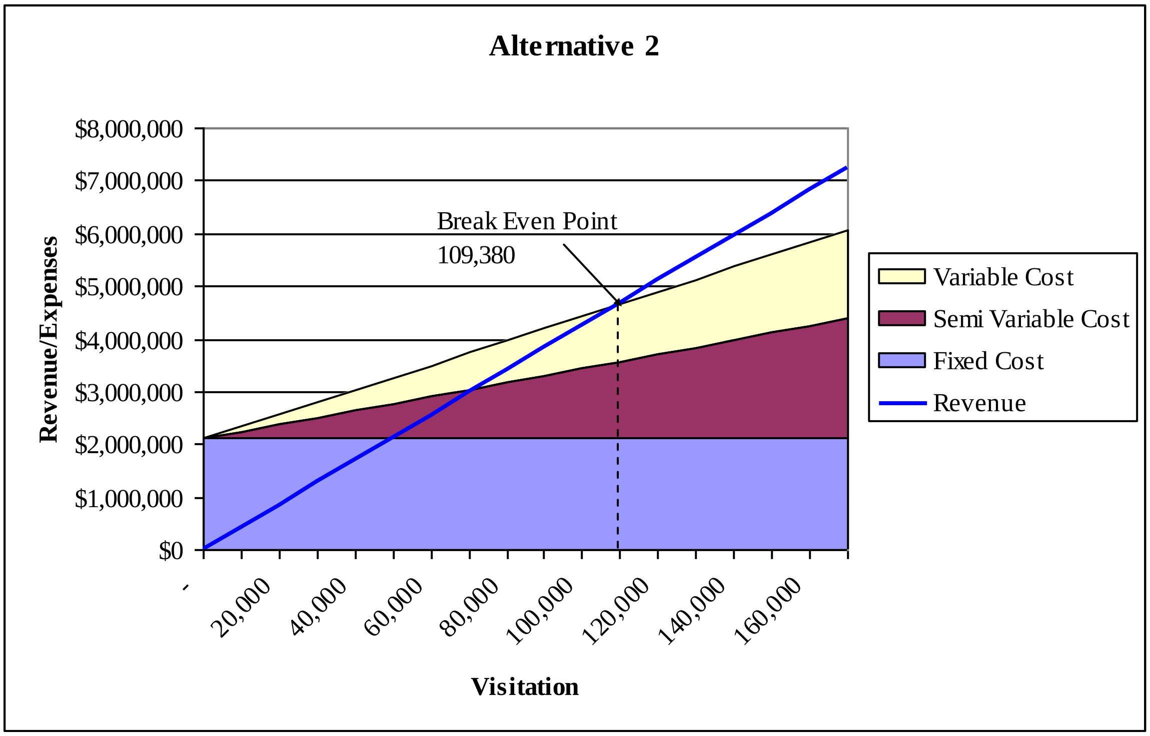


[39] This average incorporates the 2004/05 season, when the White Pass Ski Area was open for business a total of 24 days out of a usual average of 139 days per season (averaged from 1999/00 to 2005/06 ski seasons, excluding 2004/05 ski season). Excluding 2004/05 and 2005/06 seasons, the DEIS five-season average (1999/00 – 2003/04), totaled 128,000 skier visits, which is above the break-even point.

Alternative 2

Under Alternative 2, White Pass would be positioned to increase revenue per skier visit (refer to Appendix D – Social, Economic and Recreation Assumptions). With increased revenue per skier visit, the operating break-even point for White Pass would decrease to 109,380 skier visits. As shown in Table 3.10-7, visitation is projected to increase to approximately 165,453 in ten years under Alternative 2**. As a result, Alternative 2 would exceed the breakeven point by over 55,000 visits (Illustration 3.10-3).**

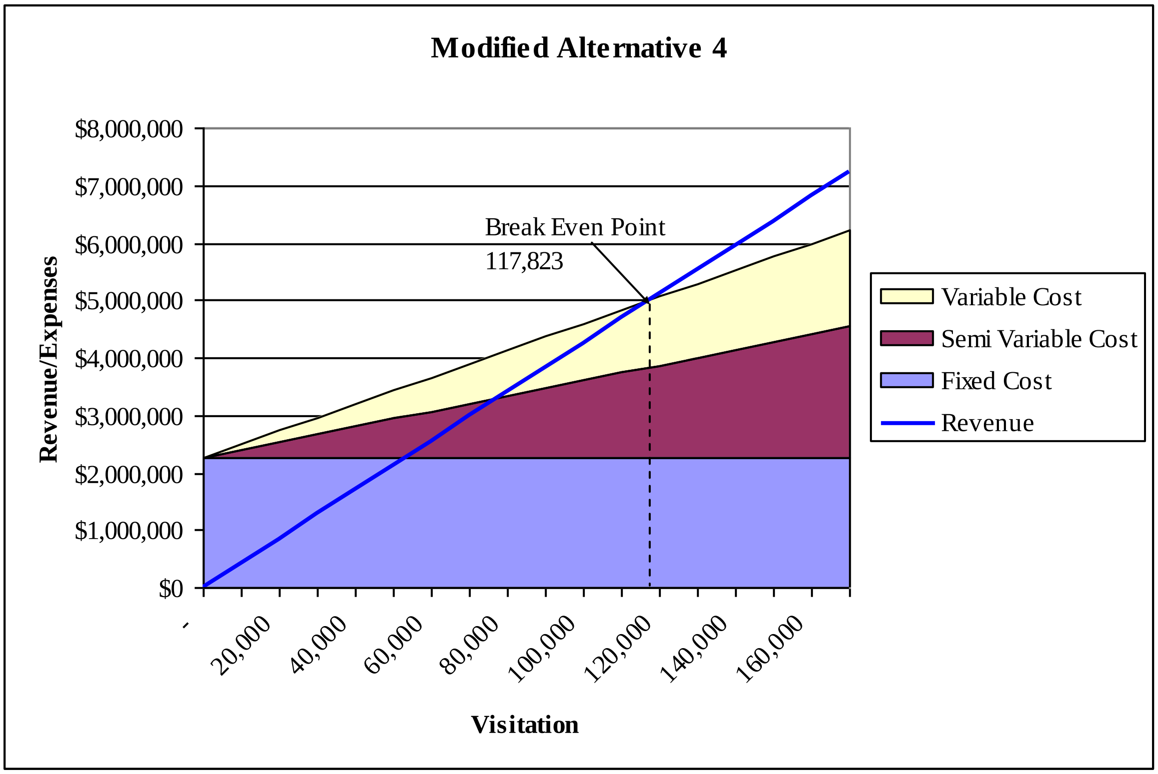
Illustration 3.10-3:
Alternative 2 Break-Even Analysis



Modified Alternative 4

The break-even point under Modified Alternative 4 would be approximately 117,823 skier visits (refer to Appendix D). This break even would be higher than Alternative 2 primarily due to the higher capital expenditures, including the construction of the new parking lot, an egress trail from the bottom of the *Hogback Express* chairlift (labeled 4-16 in Figure 2-4), trails 4-17 and 4-18 (refer to Figure 2-4), tree islands located around the *Lower Cascade* chairlift, grading of the Holiday trail and the waterline (or well) to the mid-mountain lodge. **As shown in Table 3.10-7, annual visitation under Modified Alternative 4 is projected to increase to 165,453 visits, roughly 48,000 visits higher than the break even point, as illustrated in Illustration 3.10-4.**

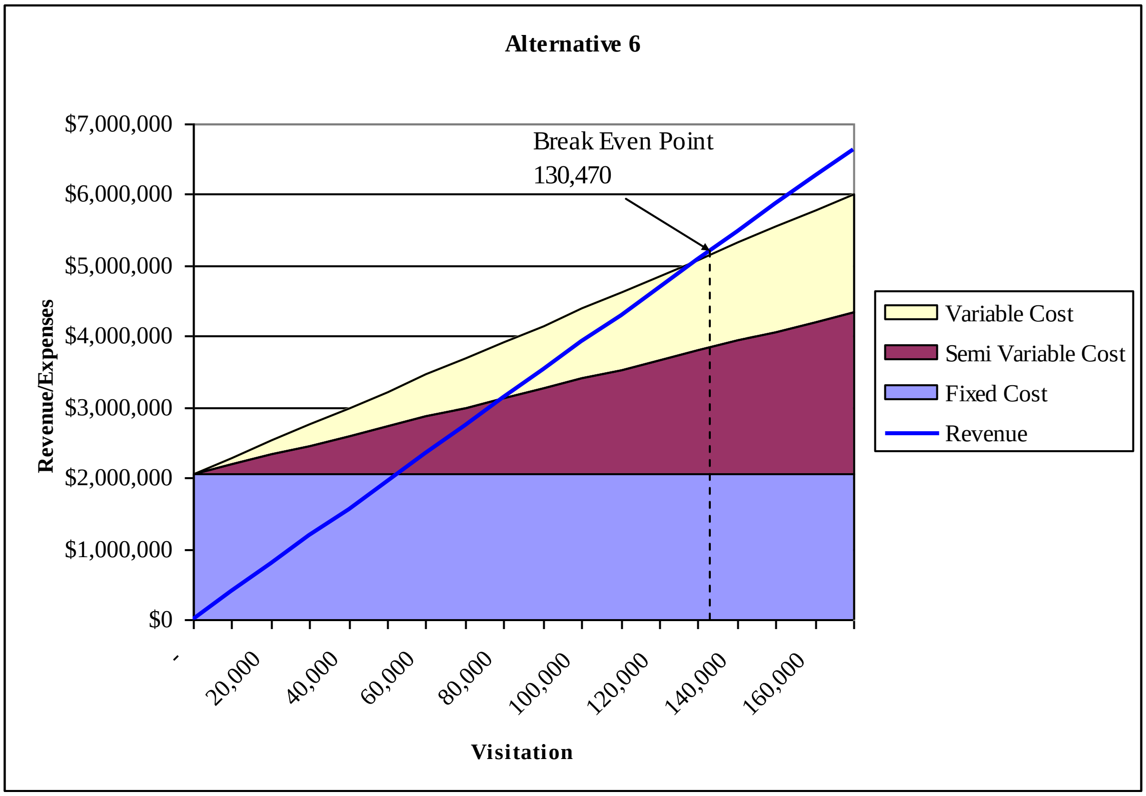
Illustration 3.10-4:
Modified Alternative 4 Break-Even Analysis



Alternative 6

Alternative 6 provides for less capital investment and operating expenses than Alternative 2 and Modified Alternative 4. However, as Alternative 6 provides fewer new facilities than Alternative 2 or Modified Alternative 4, the increase in revenue per skier visit is smaller, causing the break-even point to be higher than under the other alternatives (refer to Appendix D). The break-even point under Alternative 6 would be 130,470 visits (refer to Illustration 3.10-5), which would be approximately 6,000 visits below the projected annual visitation of 136,732 (refer to Table 3.10-7).

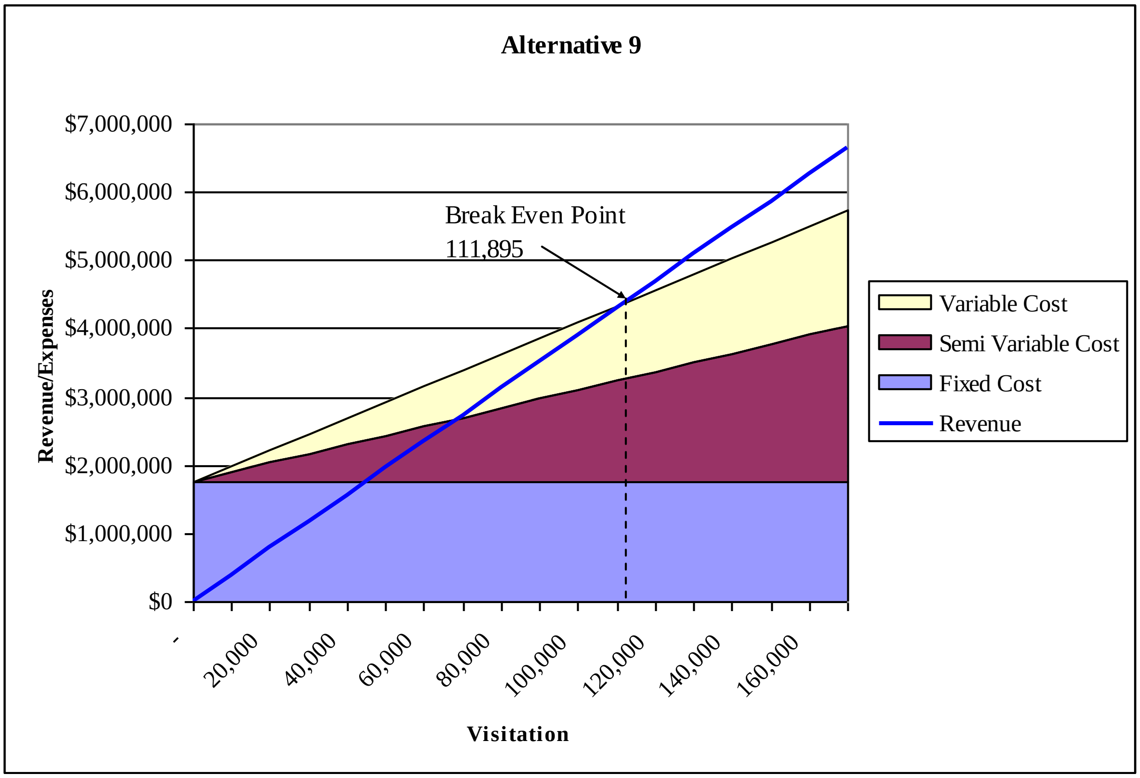
Illustration 3.10-5:
Alternative 6 Break-Even Analysis



Alternative 9

Alternative 9 also provides for less capital investment and operating expenses than Alternative 2 and Modified Alternative 4. Alternative 9 provides for less increase in revenue per skier visit than Alternative 2 or Modified Alternative 4. The break-even point under Alternative 9 would be 111,895 visits, which would be approximately 16,000 visits below the projected annual visitation of 127,895 (refer to Illustration 3.10-6).

Illustration 3.10-6:
Alternative 9 Break-Even Analysis



3.10.3.5 Skiing Trends

Alternative 1

Under Alternative 1, it is projected that visitation would increase at a nominal one percent per year, on average, due to the expanding population within the White Pass market. Over a ten-year projection period, based on one percent annual increases, visitation would increase from 109,782 visits to 121,268 as shown in Table 3.10-7.[40] This level of growth would allow White Pass to continue its current operation from an economic standpoint. **However, the increased demand for skiing at White Pass, coupled with the growth in the regional and national markets, would place White Pass in a position of not being able to meet the local demand for skiing.**

Assuming that future spending patterns in the White Pass Study Area would be similar to the current spending patterns, this growth rate would result in increased spending associated with White Pass, of about 10 percent over the current condition. It is anticipated that the majority of this spending would take place at White Pass, with increased lift ticket and restaurant sales.

Alternative 2 and Modified Alternative 4

As shown in Table 3.10-7, the alternatives with the development of two lifts in Pigtail and Hogback Basins are projected to result in the highest increase in visitation over the ten-year projection period. It is anticipated that skier visitation would increase dramatically after the opening of the new terrain at White Pass (estimated at 40,000 additional visits). After this "excitement" period, growth is anticipated to return to one percent per year (refer to Appendix D). Over the ten-year projection period, visitation at White Pass would increase by as much as 51 percent, as compared to the 10 percent under Alternative 1.

With this projected increase in visitation and spending at White Pass, Alternative 2 and Modified Alternative 4 represent the highest potential for White Pass to meet the public demand for facilities at White Pass and to operate at or above the break-even point, as shown in Illustrations 3.10-4 and 3.10-5.

Assuming that skier spending patterns would not change dramatically, spending associated with White Pass would increase by 51 percent. As under Alternative 1, it is assumed that the majority of this spending would take place at White Pass.

Due to its small position in the White Pass Study Area economy, and with the majority of spending taking place at the ski area, it is not expected that Alternative 2 or Modified Alternative 4 would significantly alter the economic conditions in Packwood or Naches.

[40] Based on the past five ski seasons, 2000-01 to 2005-06, including the 2004-05 low snow year. Comparatively, the averaged five ski seasons (1999-00 to 2003-04) in the DEIS identified that the White Pass Ski Area averaged 128,000 skier visits, with the ten year projection of 139,992 skier visits

Alternative 6

Spending would increase by approximately 25 percent based on an initial increase in visitation of 14,000 (as compared to 40,000 under Alternative 2 and Modified Alternative 4), and overall growth in visitation and spending of one percent per year over the ten-year projection period (refer to Appendix D). **Alternative 6 would operate above the break-even point. However, Alternative 6 provides reduced ability to meet increased demand, as compared to Alternative 2 or Modified Alternative 4, because projected visitation is only 6,000 visits above the break-even point, as compared to 55,000 and 48,000 visits above the break-even point for Alternative 2 and Modified Alternative 4.**

Alternative 9

Under Alternative 9, spending would increase by 16 percent based on the initial increase in visitation of 6,000 (as compared to 40,000 under Alternative 2 and Modified Alternative 4 and 14,000 under Alternative 6), and overall growth in visitation and spending of one percent per year over the ten-year projection period (refer to Appendix D). **Alternative 9 would operate above the break-even point for the ski area operation. However, Alternative 9 provides reduced ability to meet increased demand, as compared to Alternative 2 or Modified Alternative 4, because projected visitation is only 16,000 visits above the break-even point, as compared to 55,000 and 48,000 visits above the break-even point for Alternative 2 and Modified Alternative 4.**

3.10.4 Cumulative Effects

No past, present or reasonably foreseeable projects were identified as having any cumulative effect on local economies. As described in Section 3.10.3 – Environmental Consequences, the White Pass expansion is not projected to have a significant impact on employment or visitor spending in the White Pass Study Area, particularly Packwood and Naches, as the White Pass Ski Area is identified as a minor component of the local economy. However, the increased economic activity at White Pass, coupled with additional economic development initiatives in Naches and Packwood, has the potential to cumulatively improve the economic conditions in the White Pass Study Area (i.e., US 12 corridor from Packwood to Naches). For example, the U.S. Highway 12 Corridor Charette (USDI-NPS, 2002) indicates that the potential exists for hotels in Packwood to jointly sponsor a shuttle service to White Pass, and that Naches is considering a similar shuttle from a recreational staging/parking area in the center of town. By using these gateway communities as staging areas for skiers, White Pass would be positioned to attract regional destination skiers, similar to Mount Bachelor, Oregon, although substantially smaller.

The overall improvement to the developed recreation experiences at White Pass under the Action Alternatives, coupled with the projected increase in visitation at White Pass, would overlap in both space and time with a shuttle proposal, resulting in a cumulative improvement in the economic condition of the White Pass Study Area. However, of the economic development plans and initiatives described in Section

3.10.2 – Affected Environment, none of the projects have been determined to be reasonably foreseeable (i.e., proposed for implementation) as of publication of this FEIS.

No past, present or reasonably foreseeable projects, coupled with the White Pass expansion, were identified as having any cumulative effect on social and economic factors including environmental justice, population or demographics, as no environmental justice issues have been identified during the study of minority and low-income populations in the area.

In summary, cumulative effects would not result from the White Pass expansion, coupled with the effects of the past, present and reasonably foreseeable projects in the vicinity, as the White Pass Ski Area has been identified as a small portion of the local economy of the area. Potential cumulative impacts resulting in improved economic conditions in the area may occur due to proposed economic development initiatives in Naches and Packwood, coupled with the increased economic activity at White Pass. However, these initiatives have not been identified as reasonably foreseeable for inclusion in Tables 3.0-FEIS1 and 3.0-FEIS2 as of publication of this FEIS.

3.11 RECREATION

3.11.1 Introduction

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, with alpine skiing as the primary activity.[41] Cross-country skiing is also provided on 13.6 kilometers of trails at White Pass. Lift-served backcountry skiing also occurs in the vicinity of the White Pass SUP area.[42]

Historically, the majority of visits to White Pass have been attributed to day visits. White Pass' location between Olympia and Vancouver, WA (west on US 12), and Yakima, WA (east on US 12), makes it an easy choice for day skiers within this market. White Pass competes with Crystal Mountain, the Summit-at-Snoqualmie, and Stevens Pass within the local/day skier market. White Pass primarily serves the day-use market, which exhibits peak visitation primarily on weekends and holidays, and low visitation during weekdays. White Pass is one of two resorts in the Northwest with overnight lodging provided in condominium facilities near the base area and within a comfortable walking distance of the chairlifts.[43] The condominium units are offered on a year-round basis.

Skier visits ranged from a low of 19,061 visits during the 2004-05 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).

White Pass' local, regional, and destination market competition primarily includes Washington State areas such as Crystal Mountain, The Summit-at-Snoqualmie, Stevens Pass, Mission Ridge, Mount Baker, and Whistler/Blackcomb Resort in British Columbia. Oregon ski areas, including the Mount Hood ski areas and Mount Bachelor, also operate within White Pass' regional market.

3.11.2 Affected Environment

White Pass Ski Area alpine and Nordic facilities operate during the winter and shoulder season months. Guest facilities at White Pass include the Day Lodge, condominiums at the Village Inn and Summit House, and the store and gas station adjacent to the Village Inn.

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[41] 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.

[42] Backcountry skiers are those skiers that utilize the lift-served off-piste ski terrain in the White Pass vicinity. The term *off-piste* is used to describe skiable terrain that is not associated with the formal trail network, and typically includes gladed, open-bowl, chute, and other advanced to expert terrain types. *Lift-served backcountry* skiing can be defined as skiing the off-piste terrain that is not directly serviced by a chairlift system, but is a short hike or traverse from the chairlift. *Hike-to backcountry* skiing involves hiking to remote off-piste terrain without the aid of a chairlift system to gain elevation.

[43] Crystal Mountain also provides condominium lodging within its SUP area. Together, White Pass and Crystal Mountain are the only United States ski areas that provide condominium lodging on NFSL.

White Pass generates an average of 109,782 annual skier visits (PNSAA 2006a). Skiers and snowboarders primarily utilize ski trails within the SUP boundary but will exit the SUP boundary from Pigtail Peak in order to access backcountry ski terrain in Hogback Basin and the Goat Rocks Wilderness, particularly Miriam Basin and the Grand Couloir. As described in Section 3.0, the White Pass Study Area includes the existing SUP boundary as well as the proposed SUP boundary modifications. In addition, Nordic skiers utilize facilities in the base area (north of US 12) to access approximately 13.6 kilometers of Nordic terrain. White Pass is also a food drop and rest stop for hikers along the PCNST.

White Pass currently operates five lifts including four aerial lifts and one surface lift:

- Chair 1 (*Great White Express*) – Detachable Quad
- Chair 2 (*Pigtail)* – Double Chair
- Chair 3 (*Lower Cascade*) – Triple Chair
- Chair 4 (*Paradise*) – Double Chair
- *Platter* – Platter lift

The lift network at White Pass Ski Area provides access to 37 named trails on approximately 212.3 acres ranging from novice to expert slope gradients.

3.11.2.1 Alpine Skiing Analysis

Capacity

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.[44]

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) that 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. 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. For more discussion relating to CCC, refer to Appendix B - Mountain Plan

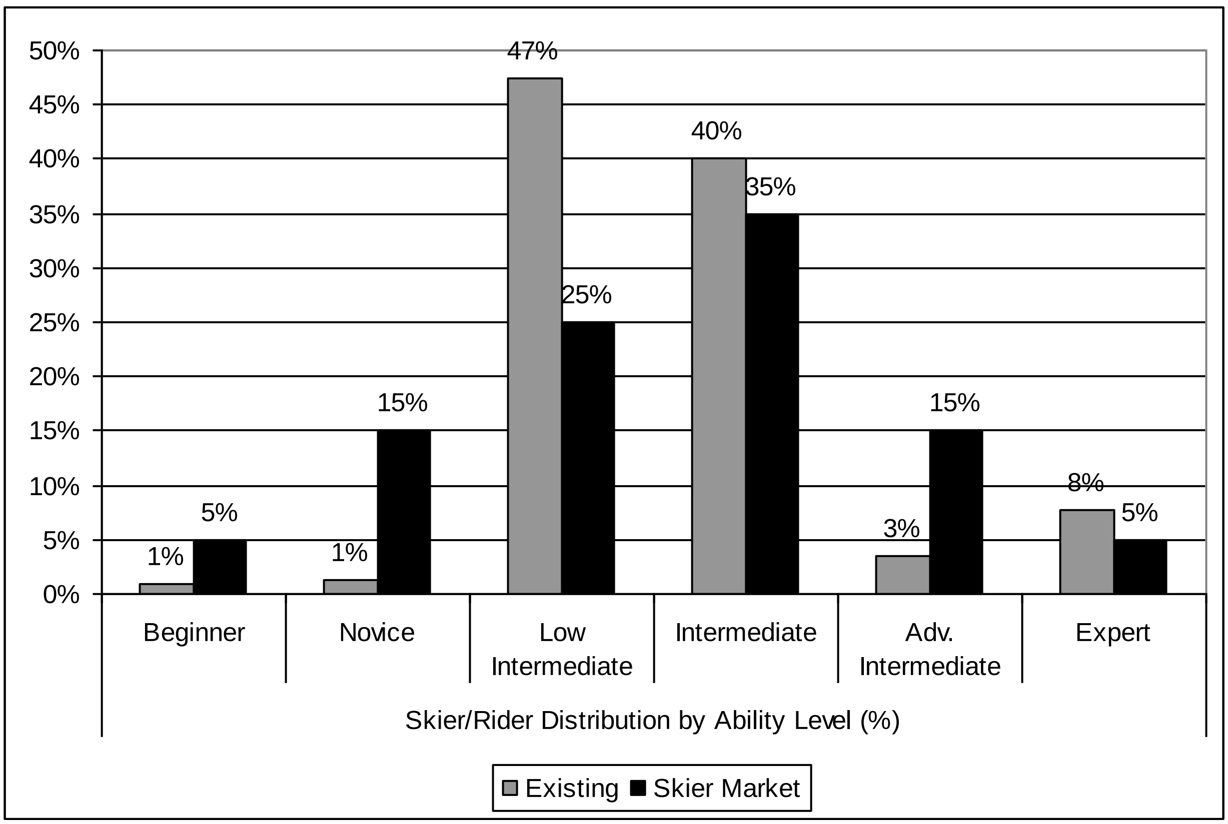
[44] Refer to Section 2.3.1 – Assumptions Common to All Alternatives for a description of CCC. CCC is commonly referred to as Skier-At-One-Time. Refer to Appendix B – Mountain Plan Specifications for additional information regarding CCC.

Specifications. At full operation, White Pass Ski Area operates five lifts accessing 37 designated ski trails, with a CCC of 2,670 guests per day.

Terrain Distribution, Trail Density and Circulation

Available ski terrain should accommodate the full range of skier ability levels consistent with market demand. The existing terrain at White Pass is predominantly characterized by low intermediate, intermediate and expert terrain. At full operation (e.g., all lifts operating) White Pass Ski Area's terrain distribution by skier ability level is as displayed in Illustration 3.11-1. White Pass' current terrain distribution is shown in gray while industry standard/market demand terrain distribution is shown in black.

Illustration 3.11-1:
Terrain Distribution by Ability Levels – Existing Conditions



Source: SE Group 2004

As shown in Illustration 3.11-1, White Pass currently has a significant abundance of low intermediate terrain, an abundance of intermediate and expert terrain, and a deficit of beginner, novice, and advanced intermediate terrain, as compared to industry standards.

The calculation of capacity for a ski area is based in part on the acceptable number of skiers that can be accommodated on each acre of ski terrain at any one given time. The widely accepted density criterion for ski areas in western North America is provided in Appendix B - Mountain Plan Specifications. White Pass trails are at or below the acceptable trail density (refer to Appendix B - Mountain Plan Specifications). The overall density index score shows that, on average, White Pass' trails are about half of acceptable densities. This is a desirable situation, indicating that White Pass' trails are typically not over-crowded. The density index score, however, does not take into account the circulation issues associated with the most significant terrain feature of White Pass, which is the prominent cliff band that crosses the area at mid-mountain level (approximately 5,300 feet elevation). This cliff band makes round-trip 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. The cliff-band separates the low to moderate level terrain, causing poor circulation for all but expert skiers who can negotiate the cliff band. In order to address this circulation issue, White Pass Company has developed the existing Holiday trail, which allows novice level and higher skiers to traverse around the cliff-band. Similarly, the existing Cascade and Main Street trails provide cat tracks for intermediate and higher level skiers to descend from the upper mountain to the lower mountain.

While these cat tracks allow non-expert skiers to negotiate the cliff line, the majority of skiers at White Pass (i.e., novice to intermediate skiers) are required to negotiate the long traverses over the cliff line, resulting in unacceptably high densities on these trails. In addition, expert trails such as Hourglass, Cascade Cliff and Waterfall cross over these cat tracks. At these intersections, skiers of all ability levels may be found in unacceptably high densities. This situation results in skier conflicts and detracts from the recreational experience of the White Pass skier.

Based on reported ski area observations, a majority of skiers use the Cascade cat track to either round-trip ski or return to base area facilities. An analysis done as part of the proposed 1999 Master Development Plan shows that skier densities on the Cascade track are roughly two times that of the recommended standard design criteria. This creates an undesirable situation that is compounded by the fact this is the primary route for skiers of all abilities to return to base area facilities.

The steady growth in demand for alpine skiing at White Pass has resulted in larger crowds, longer lift line wait times, and more crowded slope conditions. With an existing CCC of 2,670, White Pass has witnessed an increase in the number of days at or near capacity (refer to Illustration 1-3). In response to the growth in business, during the summer of 2003, White Pass expanded the capacity of the day lodge by 180 seats in an effort to meet the current demand. While the expansion of the lodge provides for additional restaurant seating, increased visitation has exacerbated skier circulation and distribution deficiencies and density issues on the egress routes from upper mountain lifts and trails that are used to access base area facilities during lunch time and at the end of the day.

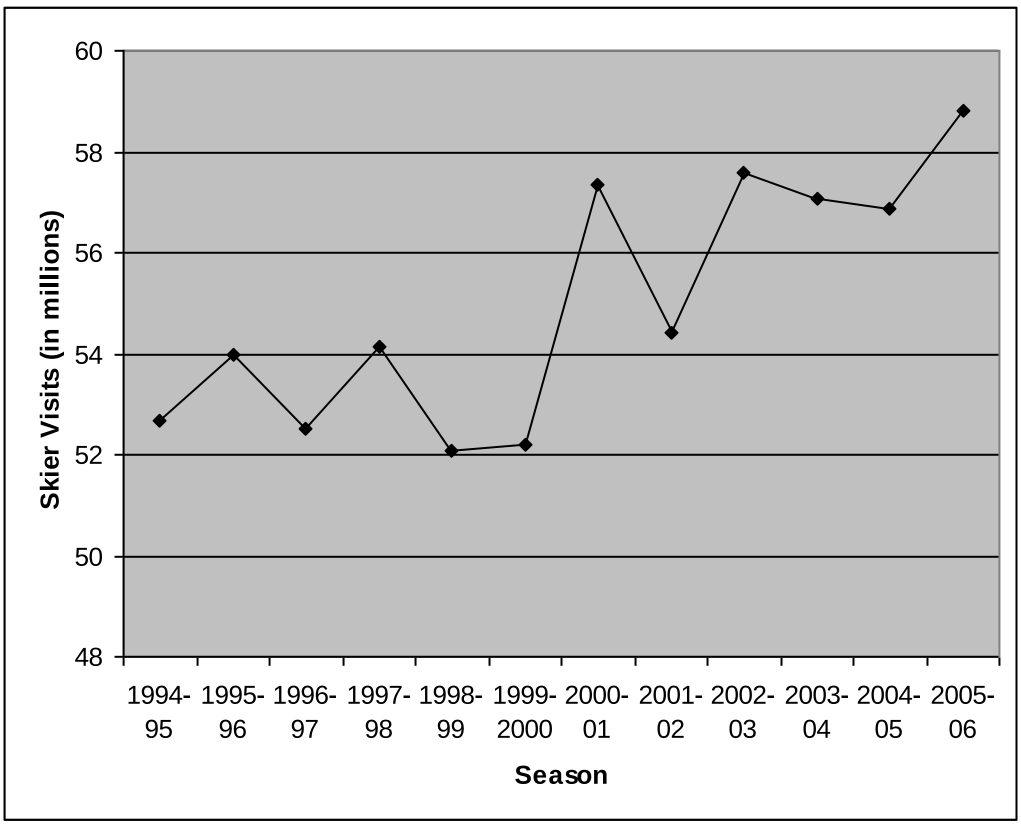
There is currently no Boundary Management Plan required as part of the existing SUP. Up until this year (ski season 2006-07), no ropelines were used along the boundary of the existing SUP, and only signage has been used. However, this season White Pass Company will be trialing the use of a ropeline along a portion of the southern boundary of the SUP area (McCarthy, pers. comm.). The ropeline trial is aimed to assist patrons from getting disoriented and entering the Goat Rocks Wilderness inadvertently (McCarthy, pers. comm.).

The current amount of 'Off-Piste' terrain within the existing SUP area is approximately 591 acres. Off-Piste terrain is calculated by subtracting the area of formal ski trails (in acres) from the area of the existing SUP area (in acres).

Visitation

National ski area visitation for the past 12 ski seasons is shown in Illustration 3.11-2. The 2000-01, 2002-03 and 2005-06 ski seasons experienced record ski visitation on a national level.

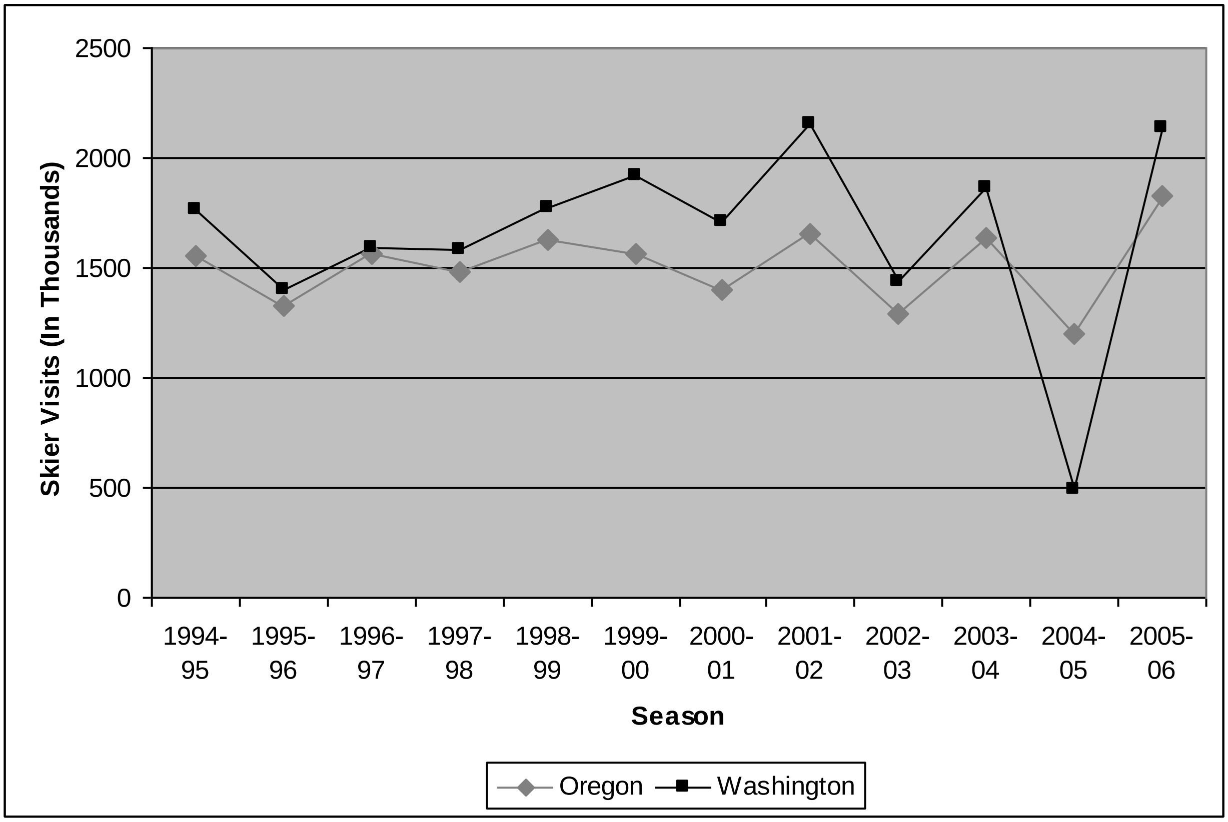
Illustration 3.11-2:
National Ski Area Visits (1994-2006)



1996-2005 visits: NSAA 2005
2005-06 visits: NSAA 2006

Oregon and Washington skier visits, in contrast, remain somewhat steady during this 12-season trend (refer to Illustration 3.11-3). The 2000-01, 2002-03, and 2004-05 seasons experienced fewer skier visits compared to the preceding year(s) largely due to low snowfall and poor weather conditions in the Northwest as compared to the rest of the nation.

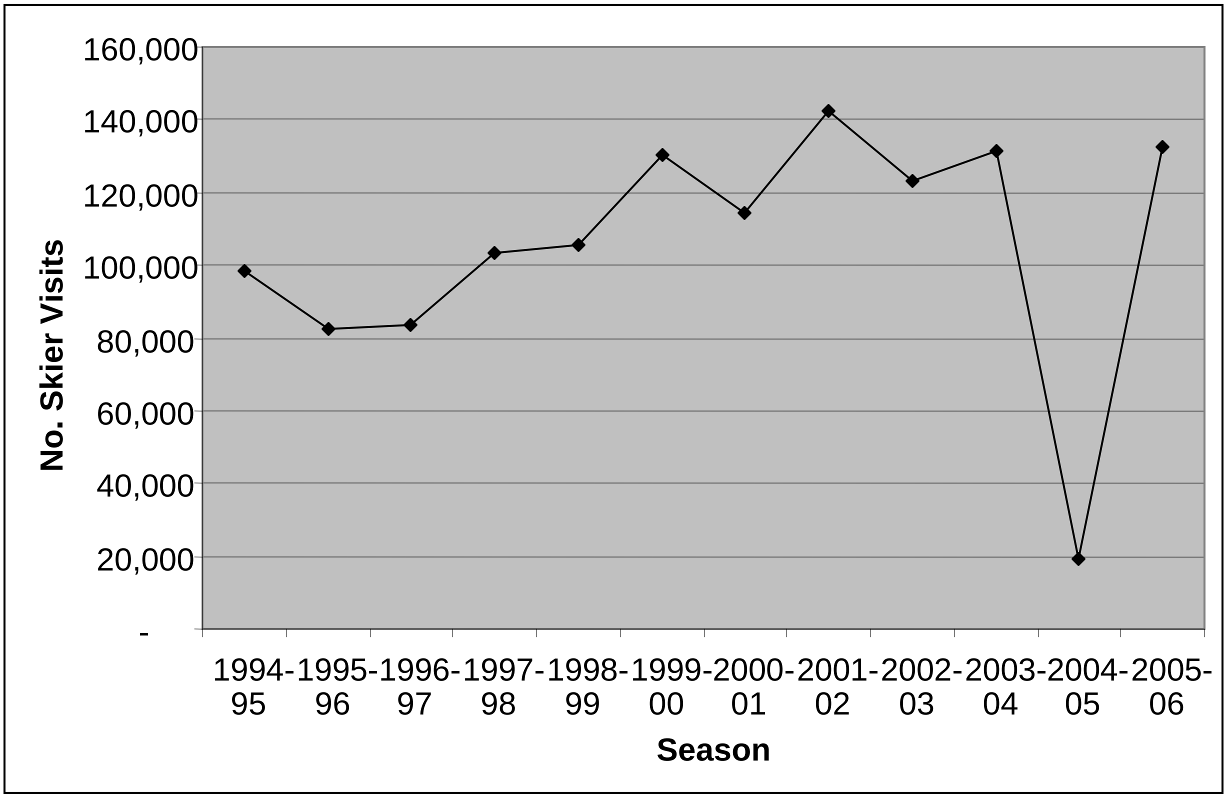
Illustration 3.11-3:
Oregon and Washington Skier Visits (1994-2006)



PNSAA 2006a

Prior to 1998, White Pass exhibited visitation ranging from 80,000 to 90,000 annual visits (PNSAA 2004). During the 1997-98 ski season, White Pass exhibited over 103,000 visits. Since that time, annual visitation has been increasing, as demonstrated by the ten-year average of 108,620 annual visits and a five-year average of 109,782 visits (PNSAA 2006a; Illustration 3.11-4). It is recognized that favorable or poor weather conditions have historically caused skier visits to fluctuate from year to year.

Illustration 3.11-4:
White Pass Skier Visits (1994-2006)



PNSAA 2006

Snow Conditions

As previously mentioned, skier visits are dependent upon snow conditions. High snowfall, prevailing winds and steep mid slopes create a low to moderate avalanche hazard potential in the present ski area. The more moderate slopes in Pigtail and Hogback basins present a much lower avalanche hazard. However, in adjacent backcountry areas outside the proposed expansion area, steep slopes, such as in Miriam Basin to the south, create a high avalanche hazard. Refer to Section 3.1 – Climate and Snow for a complete analysis of snowfall and snow conditons, including avalanche danger, at and around White Pass (including Pigtail Basin, Hogback Basin, Miriam Basin and the Grand Couloir).

3.11.2.2 Non-Alpine Skiing Analysis

Nordic Skiing

The Nordic trail system at White Pass encompasses approximately 13.6 kilometers over five distinct loop and connector trails. The *Zig Zag* Nordic trail (2.1 kilometers) is not included in the MDP, and operates under an annual SUP. The Nordic ski area is located north of US 12. The trail network varies in elevation from 4,300 feet to a high of 4,800 feet. Trails are maintained and groomed to provide both traditional kick and glide skiing as well as skate surfaces. The majority of the trails are intermediate, with some novice and advanced trails present. White Pass Ski Area has generated a five-year average of 2,991 Nordic skier visits per year (White Pass Company 2006). In conjunction with the Nordic trails, White Pass provides a network of snowshoe trails comprised of markers on trees and nestled among the Nordic trail network. No mechanized trail grooming or clearing is performed on the snowshoe trails. Nordic skiers and snowshoers can access Deer and Sand Lakes as well as other dispersed recreation opportunities via a combination of the groomed White Pass Nordic trails and cross-county travel.

Backcountry Winter Recreation

The Hogback Basin adjoins the Goat Rocks Wilderness along its southern and western boundaries. Overall, it is perceived as remote and difficult to reach, particularly during the winter. Use is relatively light. During the winter months, approximately 300 visitors use the Hogback Basin area for backcountry skiing and a few for snow cave camping (White Pass Company 2006). Other winter uses include Nordic skiing and snowshoeing, although specific counts for Nordic users are unavailable. This relatively low level of visitor use enhances opportunities for solitude, particularly during the non-skiing season when the White Pass Ski Area does not provide lift access to Pigtail Peak. The rolling topography and parkland vegetation provides screening and separates visitors from one another within short distances. The only sound of human activity is nearby US 12 and passing aircraft. While Hogback Basin is relatively close to U.S. 12, the large difference in elevation discourages hiking into the area from the highway and the sounds from the highway range from muffled to not evident. Thus, Hogback Basin offers good opportunities for isolation from the sights, sounds and presence of others, which is a desirable quality for those seeking primitive backcountry recreation experiences. The White Pass IRA, encompassing the majority of Hogback Basin, is used mostly in transition for those entering and leaving the adjacent Goat Rocks Wilderness during the summer months.

The entire Hogback Basin area is undeveloped, with the exception of the PCNST that passes through a portion of the area near its southern edge. This trail is a single tread, native surface that blends into the landscape. Natural physical and biological processes appear to be intact in the area. Within the portion of Hogback Basin proposed for expansion, slopes are relatively gentle, and support subalpine, parkland vegetation patterned in an array of openings and tree islands. There are intermittent background views of Mt. Rainier, Pinegrass Ridge, Divide Ridge, and views from the ridge top between Hogback Basin and the Goat Rocks Wilderness into Miriam Basin within the wilderness. Lifts and ski trail corridors in the adjacent White Pass Ski Area are discernible from some locations within Hogback Basin, but do not dominate the view. Overall, the natural integrity of the area is very high (refer to Section 3.15 – Visual Resources, Illustration 3.15-5).

The majority of backcountry skiing at White Pass occurs in the Hogback Basin, to the west of the existing SUP area. The area to the north, the northern limit of Hogback Basin, commonly referred to as the “Grand Couloir”, provides extreme skiing and snowboarding opportunities, as the gentle terrain above the cliff line becomes a steep, narrow canyon below the cliff line. Due to the challenging experience provided in the Grand Couloir, this area is very popular among the White Pass expert/extreme skiers, most of whom ride the lift at White Pass to access the area. Ski area personnel estimate that 65 percent of use occurs in the Hogback Basin, with the remaining 35 percent continuing on into Miriam Basin within the Goat Rocks Wilderness and the Grand Couloir (McCarthy, pers. comm.). Compared to many other backcountry skiing opportunities within the White Pass market area, Hogback Basin provides relatively easy access by taking a ski lift to the top of Pigtail Peak and traversing into the basin area. Accessing the backcountry in this manner is referred to as "lift-served." Estimates for this type of use ranged as high as 1,400 skiers in the 1980s; however, actual lift ticket purchases have averaged approximately 222 per year over the past five years (White Pass Company 2006).

Additional use may occur from skiers who ascend the existing alpine trails on the snow. These trails are located on very steep terrain, many exceeding 40 percent slope. Although no formal monitoring of this use has been conducted, estimates based on casual observations indicate a maximum of fifty skiers per season accessing the backcountry via this method.

Other backcountry skiing opportunities within the White Pass market area include Mt. Rainier National Park, other portions of the Goat Rocks and William O. Douglas Wildernesses, areas adjacent to Interstate 90 near Cle Elum and Roslyn, Washington and in the vicinity of Blewett Pass on US Highway 97, midway between Ellensburg and Leavenworth, Washington. These opportunities provide widely varying degrees of terrain difficulty and ease of access; however, there are thousands of acres available for this type of use within the region.

Overall, the Cascade Range holds substantial backcountry skiing opportunities. However, with the exception of the developed ski areas, access to the majority of this terrain requires considerable driving, effort, and available parking and/or services are often limited. Table 3.11-1 lists hike-to backcountry skiing areas within White Pass Ski Area's market area.

Table 3.11-1:
Hike-to Backcountry Skiing Areas within White Pass Ski Area's Market Area

Location	Parking	Approximate Round-Trip Distance (miles)	Notes	Skill Level[a]
Mount Rainier Vicinity				
Chinook Pass to Crystal Mountain	Chinook Pass or Cayuse Pass	6 miles	When Cayuse Pass is closed, route can be done in reverse	Advanced
Naches Peak	Chinook Pass or Cayuse Pass	2 miles		Intermediate
Yakima Peak	Chinook Pass or Cayuse Pass	2 miles		Advanced
Puyallup Cleaver	Nisqually Entrance of MRNP; West Side Road	11 miles (plus 11.5 miles by bike or hike)	Extended Tour; 7,000' elevation gain	Advanced

Table 3.11-1:
Hike-to Backcountry Skiing Areas within White Pass Ski Area's Market Area

Location	Parking	Approximate Round-Trip Distance (miles)	Notes	Skill Level[a]
Sunset Park	Nisqually Entrance of MRNP; West Side Road	7 miles (plus 15 miles by bike)	Extended Tour	Advanced
Van Trump Park	Nisqually Entrance of MRNP; Christine Falls or Nisqually Bridge	8 miles	4,500' elevation gain	Advanced
Tatoosh Range	Nisqually Entrance of MRNP; Narada Falls	4 miles		Advanced
Muir Snowfield	Paradise Parking Lot	9 miles	4,500' elevation gain	Intermediate
Nisqually Glacier	Paradise Parking Lot	9 miles		Advanced
Paradise Glacier	Paradise Parking Lot	7 miles		Advanced
I-90 East of Snoqualmie Pass				
Mount Daniel	Cle Elum River Road	14 miles	Overnight Tour; Approach on road April to June or by snowmobile; 4,500' elevation gain	Advanced
Jolly Mountain	Salmon La Sac Guard Station	12 miles	4,000' elevation gain	Intermediate
Blewett Pass Highway, US 97				
Porcupine Creek	Ingalls Creek Trail Access Road	22 miles	Overnight Tour; 6,000' elevation gain	Advanced
Diamond Head	Swauk Pass/Blewett Pass Sno-Park	5 miles		Advanced
Ingalls Peak	North Fork Teanaway River Road	11 miles	Overnight Tour	Advanced
Areas South of White Pass				
Goat Rocks Wilderness	North Fork Tieton River Road	17 miles	Extended Tour; 4,500' elevation gain; Approach possible from White Pass Ski Area	Advanced
Mount Adams	Timberline Forest Camp	10 miles	Overnight Tour; Over 6,000' elevation gain	Advanced
Mount Saint Helens	Marble Mountain Sno-Park	8 miles	5,500' elevation gain	Advanced

[a] Skill Level: Intermediate indicates ability to climb up and slide down moderate slopes, experience with winter conditions, camping, survival, alpine travel, and understanding of basics of avalanche hazard avoidance and navigation. Advanced indicates ability to ascend and descend steeper slopes under varying conditions, including tree and gully skiing in deep, soft, or icy snow conditions, and a high degree of skill in snow climbing and avalanche hazard avoidance.
Note: Most of the backcountry ski tours listed in this table are in locations that must be hiked to (hike-to backcountry) as opposed to accessed by chairlift (lift-served backcountry).
Source: Burgdorfer 1999

Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum (ROS) is a classification system created by the Forest Service that categorizes NFSL by its setting and defines classes of probable outdoor recreation activities and experience opportunities. In short, the land and water of NFSL are inventoried and mapped by ROS class to identify the types of opportunities they currently provide. The process comprises six land classes to aid in understanding physical, biological, social and managerial relationships, and to set parameters and guidelines for management of recreation opportunities. This is accomplished by inventorying three "settings" of an area: (1) physical – size, remoteness, and evidence of human activity, (2) social – number and type of human encounters, opportunity for solitude, and (3) managerial – the amount and type of restrictions placed on people's actions. Inventorying these settings helps identify the quality and quantity of recreation opportunities (USDA 1990a, 1990b).

Under the GPNF Forest Plan, the ROS classifies all management areas, except Wilderness, by defining accessibility, facilities, and visitor contact, direction and interpretation. Areas can be classified Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, or Roaded Modified (USDA 1990a). Under the WNF Forest Plan, the ROS classification system includes the categories above, as well as Rural and Urban (USDA 1990b). Refer to Chapter 7 – Glossary for a detailed description of the ROS land classifications used.

A ROS inventory has been made of the White Pass Study Area. The current ski area is inventoried as Rural in the base area due to its highly developed character, and Roaded Natural on the ski slopes. As described in the WNF Forest Plan, Rural areas are characterized by a substantially modified natural environment, where vegetation management and facility development is dominant, and managerial controls are numerous, but largely in harmony with the natural environment (WNF Forest Plan, page IV-29). Areas classified as Roaded Natural are predominantly natural appearing, where vegetation management and resource modifications are present, but harmonize with the natural environment. Pigtail and Hogback basins are currently in a Semi-Primitive Non-Motorized condition (Thorne, pers. comm.). As described in the GPNF Forest Plan, Semi-Primitive Non-Motorized areas do not contain roads or motorized vehicles, provide dispersed use, and take advantage of scenic views and points of interest. Under the GPNF Forest Plan allocation of 2L (Developed Recreation), the ROS standard for the Pigtail and Hogback basins is Roaded Natural (GPNF Forest Plan, page IV-101).

Pacific Crest National Scenic Trail

The PCNST traverses the Cascade Mountain and Sierra Mountain crests from Mexico to Canada. The PCNST is designated as part of the National Trails System Act. Section 7(a) of the 1968 Act established the relationship between the trail and the management of adjacent land:

> "Management and development of each segment of the National Trails System shall be designed to harmonize with and complement any established multiple-use plans for that

> specific area in order to ensure continued benefits from the land" (National Trails System Act – P.L. 90-543).

The selected management alternative in the *Comprehensive Management Plan for the Pacific Crest National Scenic Trail* (USDA 1982) clarifies the relationship between the trail and management of adjacent lands and is consistent with Section 7(a) of the 1968 Act. Specifically pertaining to National Forest lands, the Selected Alternative states:

> "The entire landscape and its scenic quality are important to the purposes of the Pacific Crest National Scenic Trail. Viewing and understanding resource management and other cultural activities are considered to be part of the normal character of the trail. The management of various resources will give due consideration to the existence of the trail and trail users within the multiple-use concept" (USDA 1982, 17).

The PCNST enters the area from the William O. Douglas Wilderness to the north, passes around the east end of Leech Lake and crosses US 12 to the east of White Pass. It then climbs through dense timber on a series of switchbacks on the eastern boundary of the ski area and crosses into the Goat Rock Wilderness northwest of Hell Lake. From there the trail follows the main ridge between Hogback Basin and Miriam Basin crossing the Wilderness boundary in several places. It re-enters the Wilderness where it crosses the saddle near Hogback Mountain and travels south towards Shoe Lake (refer to Figure 2-1).

The PCNST is utilized by hikers of all abilities, from day-hikers to those completing the entire trek from Mexico to Canada. Ski areas are often used by hikers to pickup food and materials that may have been mailed from friends or family members. This service makes extended hiking over several weeks to months possible. Ski area personnel estimate that approximately 250 to 300 food drops occur per year at the White Pass Ski Area. Stock users also commonly utilize the sections of the PCNST within the central and southern Washington Cascades and adjacent to the White Pass Ski Area for trips lasting one or several days.

The area traversed by the PCNST in and around the White Pass Ski Area is relatively undeveloped. PCNST users are within sights and sounds of development along the north side of US 12, including the Leech Lake Campground and boat launch, White Pass Horse Camp, and White Pass north and south trailheads. Along this portion of the PCNST, users are able to see large recreational vehicles, boats, horses, parking lots, pavement, and other facilities. Developed facilities on the south side of the highway are largely unnoticeable from the PCNST, with the only observations including developed facilities atop Pigtail Peak and the existing drainfield in the eastern part of the SUP boundary (refer to Section 3.15 – Visual Resources). The PCNST in and around the White Pass Ski Area, particularly Miriam, Pigtail and Hogback basins, provides a relatively primitive experience.

3.11.3 Environmental Consequences

3.11.3.1 Capacity

Alternative 1

Under Alternative 1, the White Pass Ski Area would continue to operate existing chairlifts and trails without any further development. White Pass would continue to operate at a CCC of 2,670. With increasing demand for skiing at White Pass (refer to Illustration 3.11-4) and an increasing number of days per season at or above capacity (refer to Illustration 1-3), the capacity of White Pass to absorb growing demand would be limited. In addition, the existing deficiencies at White Pass would remain unresolved, which would continue to detract from the recreational experience of the White Pass skier. Overall, by maintaining the current capacity, White Pass would not be in a position to respond to the need to meet the increased public demand for skiing at White Pass. **Over time, Alternative 1 would adversely affect White Pass' ability to provide sufficient capacity to support the local market, resulting in increased overcrowding, and a reduction in the recreation experience. As a result, it is expected that some skiers in the local market would become increasingly frustrated with skiing at White Pass or would look at other options.**[45] **Therefore, Alternative 1 would limit the ability of White Pass to meet the demonstrated demand for skiing at White Pass.**

Alternative 2 and Modified Alternative 4

Under Alternative 2 and Modified Alternative 4, White Pass would expand into Pigtail and Hogback basins with the development of two chairlifts, associated trails and a mid-mountain lodge (refer to Figures 2-2 and 2-4). The CCC of White Pass would increase from 2,670 to 4,250 under Alternative 2, or 3,800 under Modified Alternative 4. The increased capacity would allow White Pass to better meet the need to serve its growing market by providing sufficient ski terrain and facilities to meet the demand. Similarly, the increased capacity would allow for reduced densities on key access and egress areas that exhibit high skier densities under the existing condition (e.g., Cascade track), and, hence, would meet the need to improve circulation and dispersal in these key areas. Finally, the increase in capacity would allow White Pass to serve future growth in the skier market.

Alternative 6

Alternative 6 would include the development of one lift and associated trails in the expansion area (refer to Figure 2-6). Under Alternative 6, the CCC at White Pass would increase from 2,670 to 3,640. The lower CCC, as compared to Alternative 2 and Modified Alternative 4, is a result of adding one lift instead of two lifts. With expanded terrain, White Pass would be able to absorb some of the existing growth in demand for skiing, thereby partially meeting this need. However, this ability would be less than Alternative 2 or Modified Alternative 4, simply due to the comparatively smaller expansion.

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[45] 41 percent of scoping letters indicated that the public is frustrated with the current crowding at White Pass, and would look at other options without an expansion at White Pass.

Alternative 9

Under Alternative 9, one new chairlift, the *PCT* lift, would be constructed in the eastern portion of the existing SUP area (refer to Figure 2-8). Under Alternative 9, the CCC at White Pass would increase from 2,670 to 3,280. **With the lowest CCC of the Action Alternatives, and with no expansion into Hogback Basin, Alternative 9 represents the lowest potential for White Pass to meet the need to absorb the existing growth in demand. With the addition of one new lift and associated trails, as well as one new egress trail, issues relating to terrain distribution, poor circulation and densities would be partially addressed, thereby improving upon the existing condition. However these problems would continue under Alternative 9.**

3.11.3.2 Terrain Distribution, Trail Density and Circulation

Alternative 1

Under Alternative 1 (refer to Figure 2-1) White Pass would continue to operate 5 lifts with 37 named trails on approximately 212.3 acres of terrain. **As shown in Illustration 3.11-5, White Pass would continue to exhibit an abundance of low intermediate terrain, an abundance of intermediate and expert terrain, and a deficit of beginner, novice, and advanced intermediate terrain, as compared to industry standards.**

The cat tracks (Holiday and Cascade ski trails) at White Pass would continue to allow non-expert skiers to negotiate the cliff line. The majority of skiers at White Pass (i.e., novice to intermediate skiers) would continue to be required to use these cat tracks to negotiate the long traverses over the cliff line, resulting in unacceptably high densities on these trails. In addition, expert trails such as Hourglass, Cascade Cliff and Waterfall would continue to cross over these highly-used cat tracks. At these intersections, skiers of all ability levels would continue to be found in unacceptably high densities, resulting in additional skier conflicts and further detracting from the recreational experience of the White Pass skier.

Under Alternative 1, increased visitation would continue to exacerbate skier circulation and distribution deficiencies, and density issues on the egress routes from upper mountain lifts and trails that are used to access base area facilities during lunch time and at the end of the day. It would not meet the need for action with respect to terrain distribution, trail density, or circulation at the White Pass Ski Area.

Under Alternative 1, there would no alteration to the extent of ‘Off-Piste’ area within the existing SUP and expansion area.

Under Alternative 1, White Pass would continue to be limited by low snow coverage on terrain that accesses the base area facilities during the period from November to January, even with sufficient snow on the upper mountain.

Alternative 2

Alternative 2, as shown in Figure 2-2, represents White Pass Ski Area's Proposed Action.

Under Alternative 2, White Pass proposes to add approximately 70 acres of terrain on 15 new trails, all of which would be accessed from the two new lifts located in Pigtail and Hogback basins. Additional terrain would provide desirable low intermediate through advanced intermediate skiing. In addition, a two-story mid-mountain lodge would be constructed within the expanded SUP area to serve skiers utilizing the expanded area.

White Pass' terrain and skier distribution under Alternative 2 is shown in Illustration 3.11-5 and Table 3.11-2. Overall, the terrain distribution would be improved, with the addition of advanced intermediate skiing. As a result of the additional terrain at White Pass, the surplus of expert terrain would be reduced in terms of percentage of available terrain. **Under Alternative 2, White Pass would continue to exhibit a shortage of beginner and novice terrain.**

Illustration 3.11-5:
Terrain Distribution by Ability Levels – Proposed Upgrading – All Alternatives

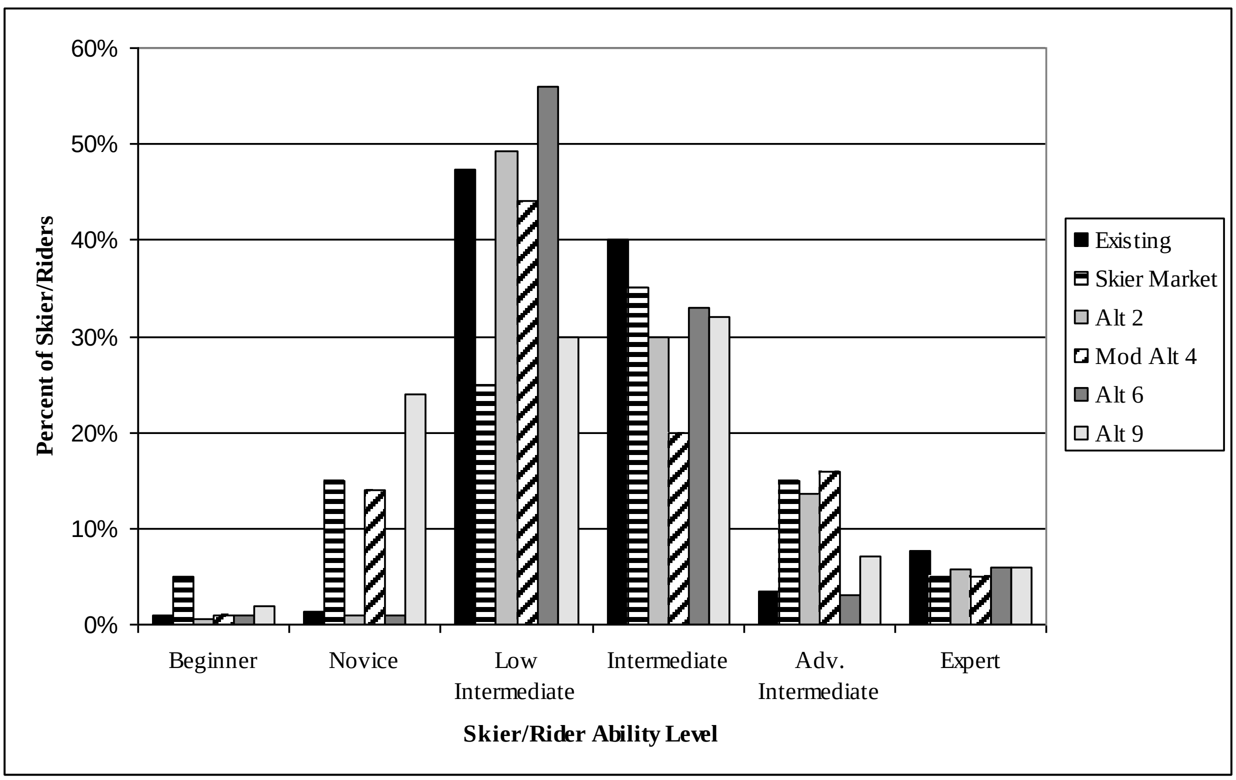


Table 3.11-2:
Acreage Distribution by Ability Levels – Proposed Upgrading – All Alternatives

Alternatives	Skier/Rider Distribution by Ability Level					
	Beginner	Novice	Low Intermediate	Intermediate	Advanced Intermediate	Expert
Existing	1%	1%	47%	40%	3%	8%
Skier Market	5%	15%	25%	35%	15%	5%
Alt 2	1%	1%	49%	30%	14%	6%
Mod Alt 4	1%	14%	44%	20%	16%	5%
Alt 6	1%	1%	56%	33%	3%	6%
Alt 9	2%	24%	30%	32%	7%	6%

Under Alternative 2, the available ski terrain would be more capable of accommodating the full range of ability levels, consistent with market demand, as compared to existing conditions. As shown in Illustration 3.11-5 and Table 3.11-2, advanced intermediate terrain would increase by approximately 42 acres bringing the skier distribution closer to skier market trends. The need to match terrain to market demand would be substantially improved with respect to these terrain types.

Construction of an access and egress trail to the expansion area would occur under Alternative 2. The access trail would be constructed approximately 850 feet south of the top terminal of the *Great White Express* lift on the existing Holiday trail. The egress trail would be constructed from the base terminal of the proposed *Basin* lift north to the existing Quail ski trail. The trails that would be constructed and used to access and egress new terrain in Pigtail and Hogback basins would have flat areas with slopes less than 10 percent extending 150 or more feet. These conditions may require some skiers to pole and skate their way into and out of the new terrain.

Under Alternative 2, the majority of White Pass' trails would continue to exhibit acceptable trail densities (refer to Appendix B – Mountain Plan Specifications), with the exception of the existing egress trails leading to the base area. Although both the lift network and ski terrain capacities would increase, the additional capacity would occur in areas that are situated away from the cliff band, without any additional improvements being made to the existing egress routes connecting the upper mountain (and expanded terrain) to base area facilities. **During the evening closure time, skier densities on the egress routes would become exacerbated as Hogback Basin area skiers leave the expansion area to return to the existing base area.** If needed, Alternative 2 includes the implementation of staggered closing times, where the Hogback Basin lifts would be closed earlier than the other lifts, in an effort to help reduce the potential for higher crowding on the egress trails (refer to Other Management Provision OMP11 in Table 2.4-4). During lunch, the addition of the mid-mountain lodge would provide additional services outside of the base area. Because skiers utilizing the expanded area (and possibly some skiers on the upper mountain) would utilize the new mid-mountain lodge, fewer people would ski back to the base area for lunch, which would result in reduced skier densities along the egress routes during mid-day, as compared to the evening egress. This would at least partially respond to the need to improve circulation in the cliff band area.

Under Alternative 2, there would be approximately 1,293 acres of 'Off-Piste' terrain within the existing SUP and expansion area. Off-Piste terrain is calculated as described in the existing condition. Actions that create new modified herbaceous vegetation communities (i.e., clearing for a ski trail) increase the amount of 'On-Piste' (formal) terrain, and decrease the amount of Off-Piste terrain. Impacts to existing modified herbaceous vegetation communities are not considered an increase in On-Piste acreage.

Under Alternative 2, White Pass would be less limited by low snow coverage on the lower mountain, with the new terrain in Pigtail and Hogback basins providing access to skier service facilities during the period from November to January (i.e., the mid-mountain lodge). With lifts, trails and a lodge facility in the expansion area, White Pass would be better able to accommodate skier demand during the early season by providing access to the *Basin* and *Hogback Express* pods.

Modified Alternative 4

Under Modified Alternative 4, White Pass would construct 18 trails, adding approximately 85 acres to the existing terrain, which would be accessed from the two new lifts located in Pigtail and Hogback basins (refer to Figure 2-4). Additional terrain would provide novice through advanced intermediate skiing, meeting the need for novice terrain at a higher level than Alternative 2. **There would continue to be a shortage of beginner terrain.** In addition, a two-story mid-mountain lodge would be constructed within the expanded SUP area to serve skiers utilizing the expanded area, as described for Alternative 2. White Pass would operate 7 lifts and 55 trails on approximately 298 acres.

Development of access, egress and ski trails in the Hogback and Pigtail basins would be as described under Alternative 2, with modifications to trail width and locations to minimize impacts to wetlands**.**

Unlike Alternative 2, Modified Alternative 4 includes construction of a new trail in the *Paradise* pod to provide consistent, true advanced intermediate terrain within the current SUP area. This new trail would position skiers higher on Lower Roller, allowing easier traverse to the proposed parking lot.

Revegetation of approximately 5.4 acres as tree islands on the lower mountain would occur under Modified Alternative 4, as described in Alternative 9. These tree islands would provide better separation of ability levels and enhance the visual quality of the area. Additionally, widening and re-grading of existing trails would improve the quality of skiing. Under Modified Alternative 4, the Holiday trail would be graded so that it could truly be classified as a novice trail, creating a more desirable route across the cliff band.

Unlike Alternative 2, Modified Alternative 4 would include an egress trail (Trail 4-16) from the bottom of the *Hogback Express* chairlift to the Quail ski trail to provide access to the base area from the lower Hogback Basin. This additional trail would create a decision point that would allow skiers in the Hogback Express pod to traverse back to existing facilities or to the bottom terminal of the Basin chairlift without having to ride to the top of the Hogback Express chairlift before returning. This would be a small, beneficial addition in meeting the need for improved circulation. Similar to the other egress trails that would be constructed, slope gradients along this trail would require some skiers to pole and skate, or some snowboarders to walk in order to traverse.

Aside from the additional egress trail leading from the bottom terminal of the *Hogback Express* chairlift, the effects to skier densities and facilities would be as described for Alternative 2.

Under Modified Alternative 4, a 7-acre parking lot (accommodating 946 vehicles) and ticket booth would be constructed near the lower terminal of the *Lower Cascade* chairlift. **The parking lot and ticket booth would provide a second entry point to White Pass. The portal would help to alleviate congestion at base area ticket booth facilities throughout the day. In addition, skiers would have the opportunity to exit the ski area from two access points, also helping to alleviate base area congestion at the end of the day. These facilities would contribute substantially to meeting the need to improve circulation and dispersal of skiers in the base area.**

Under Modified Alternative 4, there would be approximately 1,276 acres of 'Off-Piste' terrain within the existing SUP and expansion area. Calculation of Off-Piste and On-Piste terrain are as described under Alternative 2.

Similar to Alternative 2, under Modified Alternative 4, White Pass would be less limited by low snow coverage on the lower mountain, with the new terrain in Pigtail and Hogback basins providing access to skier service facilities during the period from November to January (i.e., the mid-mountain lodge). With lifts, trails and a lodge facility in the expansion area, White Pass would be better able to accommodate skier demand during the early season by providing access to the *Basin* and *Hogback Express* pods.

Alternative 6

Under Alternative 6, White Pass would construct seven trails totaling approximately 28.8 acres which would be accessed from one new lift located in Pigtail Basin (refer to Figure 2-6). Additional terrain would provide low intermediate skiing, a terrain ability that White Pass already has in abundance. **Because advanced intermediate terrain would continue to be in short supply, as compared to industry standards (refer to Illustration 3.11-5 and Table 3.11-2), the need to match terrain to market demand would not be met.**

The terrain associated with the *Basin* chairlift would provide access to a relatively small amount of additional terrain. Unlike Alternative 2 and Modified Alternative 4, people would not utilize the *Basin* lift to access other alpine skiing terrain (i.e., as a transportation lift, as in Alternative 2 and Modified Alternative 4). Rather, skiers in the expansion area of Alternative 6 would utilize the limited amount of terrain accessed by the *Basin* chairlift. **Consequently, terrain densities in this pod would be comparatively higher than industry standards, and conditions proposed under Alternative 2 and Modified Alternative 4 (refer to Appendix B - Mountain Plan Specifications). The need to improve circulation on the slopes would only minimally be met.**

The proposed mid-mountain lodge, located along the Quail trail, would affect the distribution of skiers returning to the base area during lunch similar to Alternative 2 and Modified Alternative 4. The addition of the mid-mountain lodge would provide additional services outside of the base area. As a result, it is anticipated that skiers utilizing the expansion area (and possibly some skiers on the upper mountain) would utilize the new mid-mountain lodge, resulting in fewer people skiing back to the base area during the day, in turn, reducing skier densities along the egress routes during mid-day. In contrast to Alternative 2 and Modified Alternative 4, locating the lodge within the existing SUP boundary should attract skiers from all areas on the upper slopes without having to utilize additional terrain and lifts. As a result, the proposed location in Alternative 6 may further reduce reliance on the egress trails leading to the base area, as compared to both Alternative 2 and Modified Alternative 4, better meeting the need to improve dispersal and circulation along these trails. However, if skier densities on egress trails increase to unacceptable levels, staggered lift closure times would be initiated to reduce crowding, as described in Other Management Provision OMP11 (refer to Table 2.4-4).

Under Alternative 6, a 2.5-acre parking lot (accommodating 340 vehicles) and ticket booth would be constructed near the lower terminal of the *Lower Cascade* chairlift. The parking lot and ticket booth would provide a second entry point at White Pass. The portal would help alleviate congestion at base area ticket booth facilities throughout the day. In addition, skiers would have the opportunity to exit the ski area from two access points, also helping to alleviate base area congestion at the end of the day. As with Modified Alternative 4, these facilities would contribute substantially to meeting the need to improve circulation and dispersal of skiers in the base area.

Under Alternative 6, there would be approximately 1,332 acres of ‘Off-Piste’ terrain within the existing SUP and expansion area. Calculation of Off-Piste and On-Piste terrain are as described under Alternative 2.

Under Alternative 6, White Pass would be somewhat less limited by low snow coverage on the lower mountain, with the new terrain in the *Basin* pod providing access to skier service facilities during the period from November to January (i.e., the mid-mountain lodge). With a lift, trails and a lodge facility in the expansion area, White Pass would be better able to accommodate skier demand during the early season by providing access to the *Basin* pod.

Alternative 9

Under Alternative 9, White Pass would construct one chairlift and seven 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 area (refer to Figure 2-8). A two-story mountain-top lodge with a 3,000-square foot footprint would be constructed at the summit of Pigtail Peak. In addition, White Pass would revegetate 5.4 acres of the lower mountain trail network. In total, White Pass would increase skiing by 48 acres within the existing SUP area.

Under Alternative 9, White Pass would operate 6 lifts and 44 trails on 260.6 acres. Additional terrain would provide beginner, novice, intermediate and advanced intermediate terrain. Grading of existing ski trails would result in a significant amount of terrain being re-classified from low intermediate to novice terrain, which would help bring White Pass' terrain distribution closer to industry standards (refer to Illustration 3.11-5 and Table 3.11-2). **The need for additional novice terrain would be well met under Alternative 9, but the response to the need to increase advanced intermediate terrain would remain well under market demand. However, the lift and trail development required to create the additional novice terrain would require removal of mature forest vegetation, grading, and structural stream crossings (i.e., bridges) (refer to Section 3.2 – Geology and Soils, Section 3.3 – Watershed Resources and 3.5 – Vegetation).**

The trails would be largely along the fall-line and would be varied in width and slope to provide terrain variety. All trails would avoid crossing the cliff band except for the egress from the bottom of the *Paradise* chairlift. This egress would provide an additional route from the upper mountain to lower base area in an effort to help reduce trail densities along egress routes. The trail would be constructed so that novice skiers could utilize the egress. In addition, existing terrain would be graded in order to provide more appropriate slope gradients for novice skiers. Particularly, grading would occur on the Holiday and Elevator Shaft trails to reduce slope gradients. Grading along the Holiday trail would provide more appropriate slope gradients for all skier abilities navigating the cliff band in order to access base area facilities from upper mountain trails and lifts. Also, the beginner trail off the *Platter* lift would be regraded to provide more consistent beginner terrain.

The addition of the mountain-top lodge would provide additional services outside of the base area. Similar to the other Action Alternatives, it is anticipated that some skiers would utilize the new mountain-top lodge, resulting in fewer people skiing back to the base area during the day, which would result in reduced skier densities along the egress routes during mid-day.

White Pass' trails would continue to be below the industry standards for trail density. The overall density index would improve under Alternative 9 primarily as a result of the grading that is proposed to reclassify several trails to their intended ability level ratings (refer to Appendix B - Mountain Plan Specifications). The creation of the novice route on the west side, from the bottom of the *Paradise* chair 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 increase egress capacity. Trail conditions under Alternative 9 would exhibit the greatest reduction in trail densities on egress trails, as compared to the other Action Alternatives. In addition, the most significant benefit of this alternative would be that it would improve the skiing experience of the existing mountain by providing for better circulation and flow of skiers, increasing egress capacity (thereby helping to alleviate the crowding on the existing Cascade cat track), and providing additional, and more varied, terrain below the cliff band. The need to improve circulation and dispersal of skiers on the slopes would be met.

Under Alternative 9, a 2.5-acre parking lot (accommodating 340 vehicles) and ticket booth would be constructed near the lower terminal of the Lower Cascade chairlift. The parking lot and ticket booth would provide a second entry point at White Pass. The portal would help alleviate congestion at base area ticket booth facilities throughout the day. In addition, skiers would have the opportunity to exit the ski area from two access points, also helping to alleviate base area congestion at the end of the day. As with Modified Alternative 4 and Alternative 6, these facilities would contribute substantially to meeting the need to improve circulation and dispersal of skiers in the base area.

Under Alternative 9, there would be approximately 1,331 acres of 'Off-Piste' terrain within the existing SUP and expansion area. Calculation of Off-Piste and On-Piste terrain are as described under Alternative 2.

Alternative 9 would provide no higher elevation skier services facilities with round-trip skiing access**. Therefore, under Alternative 9, White Pass would continue to be limited by low snow coverage on terrain that accesses the base area facilities during the period from November to January, even with sufficient snow on the upper mountain.**

3.11.3.3 Visitation

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 2005-15 for the market area is shown below by County. The average annual projected increase for the entire area is 2.16 percent for the ten-year development period, as shown in Table 3.11-3.

Table 3.11-3:
White Pass Market Area
Average Annual Population Growth Projections

County	2005-15
Cowlitz	2.67%
Lewis	1.95
Pierce	1.71
Thurston	2.70
Yakima	1.79
Average	**2.16%**

Source: State of Washington 2002

Alternative 1

Under the No Action Alternative, no improvements or additional facility development at White Pass would occur. Small incremental visitation growth (1.0 percent) would occur due to the expanding population base within the White Pass market from the base of 109,782 visits (average visits from 2000-01 to 2005-06). With a projected population growth rate of over 2 percent, it is anticipated that growth in visitation would be approximately one-half the population growth rate (refer to Appendix D – Social, Economic and Recreation Assumptions for a more detailed discussion of visitation projections and assumptions used in developing projections). **Facilities at White Pass would not meet the need to respond to current and anticipated growth in demand under the No Action Alternative.**

Alternative 2 and Modified Alternative 4

Alternative 2 and Modified Alternative 4 provide different variations of the development of a fixed grip chairlift in Pigtail Basin, a detachable quad in Hogback Basin, and a mid-mountain lodge in between the ski pods.

Development with two lifts within Pigtail and Hogback basins would generate the most interest and is the type of terrain expansion the White Pass skier market supports, based on the terrain distribution and circulation. A sizable increase in skier visitation would likely 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. **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.** As with Alternative 1, it is anticipated that growth in skier demand would be approximately one-half of the population growth rate after the market adjustment for the new facilities (i.e., an increase of 40,000 visits after completion of the project). Projected skier visits are shown in five-year increments in Table 3.11-4 below. **The facilities proposed under Alternative 2 and Modified Alternative 4 would equally respond to the need to meet this increase in demand at White Pass.**

**Table 3.11-4:
White Pass Visitation Projections**

	Alternative 1	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Year 1	109,782	149,782	149,782	123,782	115,782
Year 5	115,382	157,422	157,422	130,096	121,688
Year 10	121,268	165,453	165,453	136,732	127,895

Refer to Appendix D – Social, Economic and Recreation Assumptions for a more detailed discussion of visitation projections and assumptions used in developing projections.

Alternative 6

Alternative 6 represents a smaller expansion of the ski terrain at White Pass, with a correspondingly reduced ability to meet the growth in demand for alpine skiing at White Pass. **Therefore, it is likely that 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 with incremental growth due to expanded population in the White Pass market. **Accordingly, from a first year projection of 123,782 skier visits, future growth would increase at an annual rate of approximately 1 percent.** As with Alternative 1, it is anticipated that growth in skier demand would be approximately one-half of the population growth rate after the market adjustment for the new facilities. Projections are shown in five-year increments in Table 3.11-4 above.

Refer to Appendix D – Social, Economic and Recreation Assumptions for a more detailed discussion of visitation projections and assumptions used in developing projections.

Alternative 9

Alternative 9 would generate considerable interest with the mountain-top day lodge and provide some additional ski trails but would lack the interest generated by an expansion into the Hogback Basin area. White Pass would still see the incremental growth due to population increases within the market place; however, there would be no substantial increase in growth due to the limited scope of development. The need to respond to the increase in demand for additional alpine skiing at White Pass would only be partially met. Alternative 9 would be similar to the No Action Alternative, with a minor initial increase in visitation due to the limited improvements. As in all alternatives, visitation growth during the ten-year projection period has been estimated at an annual rate of 1 percent. As with Alternative 1, it is anticipated that growth in skier demand would be approximately one-half of the population growth rate after the market adjustment for the new facilities. Projections of skier visits are shown in five-year increments in Table 3.11-4 above.

Refer to Appendix D – Social, Economic and Recreation Assumptions for a more detailed discussion of visitation projections and assumptions used in developing projections.

3.11.3.4 Nordic Skiing and Snow Shoe Trails

Alternative 1

Under Alternative 1, the Nordic trail system at White Pass would continue to cover approximately 13.6 kilometers over five distinct loop and connector trails. No additions or modifications would occur. **The existing *Zig Zag* Nordic trail would continue to operate as an existing use that is not included in the existing term permit. As a result, operation of this loop would either be shut down after the 2007 season or would require an annual SUP from the Forest Service. In addition, the current snowshoe trail network would also operate without a term permit, and would similarly be shut down or included in an annual SUP. The need to fully integrate current Nordic and snow shoe operations into the MDP and SUP would not be met.**

Alternatives 2, 6, 9 and Modified Alternative 4

Under all Action Alternatives, the Nordic trail system, excluding the *Zig Zag* trail, would be redefined and incorporated into the MDP. The *Zig Zag* Nordic trail and snowshoe trail system would not be authorized under the SUP, and would be closed to use upon expiration of the current permit, unless future site-specific NEPA analysis determines otherwise. **The need to integrate the current snow shoe and Nordic operations into the MDP and SUP would not be fully met.**

3.11.3.5 Backcountry Winter Recreation

Alternative 1

In the short-term, Alternative 1 represents no impact to backcountry winter recreation opportunities (e.g., hike-to backcountry skiing, dispersed snow shoeing, camping, and hunting) within or outside the White Pass Ski Area. **Under Alternative 1, backcountry skiing trends at White Pass would continue to be as described for existing conditions**.

Over the long-term, it is expected that growth in demand for lift-served backcountry skiing near the White Pass Ski Area would exceed average visitation growth at White Pass, due to equipment advances (i.e., shaped and fat skis), which heighten the skill levels of alpine skiers, as well as improved skill levels on the part of snowboarders in general.[46] **No additional opportunities would be provided for lift-served backcountry skiing.**

Under Alternative 1, no new development would take place and the entire Hogback Basin would remain naturally intact. Mechanized rescue of visitors recreating in the Goat Rocks Wilderness would continue to periodically affect wilderness character.

[46] Growth in backcountry skiing would generally follow regional population growth, estimated at roughly 1 percent per year and growth in dispersed recreation in general, estimated at an additional 1 percent per year, for a total of 2 percent per year.

Under the ROS system, the White Pass Ski Area is inventoried and would continue to be classified as Rural and Roaded Natural while Pigtail and Hogback basins would continue to be classified as Semi-Primitive Non-Motorized.

Alternative 2 and Modified Alternative 4

Under Alternative 2 and Modified Alternative 4, White Pass would develop two chairlifts, associated trails and a mid-mountain lodge in Pigtail and Hogback Basins, where approximately 65 percent of the people who currently buy one-ride lift tickets at White Pass backcountry ski. **As a result, dispersed backcountry winter recreation (e.g., hike-to-backcountry, dispersed snow shoeing and camping) opportunities would likely be eliminated from Hogback Basin while additional lift-served backcountry skiing opportunities would be created. Alternative 2 and Modified Alternative 4 would increase the quantity of lift-served backcountry skiing terrain adjacent to White Pass Ski Area, particularly in Miriam Basin within Goat Rocks Wilderness.**

The displacement of backcountry winter recreation opportunities (e.g., backcountry skiers, dispersed snowshoers and campers) into Miriam Basin would move backcountry users to an area that is at a higher avalanche risk than either Hogback or Pigtail Basins. Steep slopes and cirque basins within Miriam Basin and the Goat Rocks Wilderness would create more difficult search and rescue situations, require more advanced skill sets amongst backcountry users and would require more effort for skiers to return to White Pass base area facilities, than under existing conditions. Implementation of Mitigation Measure MM15 (refer to Table 2.4-2) would require the development of a Boundary Management Plan that would include designation of no more than two gated ski area exit points along the boundary between Pigtail Basin (i.e., eastern Hogback Basin) and Miriam Basin, and one gated ski area exit point downslope of the proposed expansion area. The plan would also include signage indicating that skiers would be responsible for any search and rescue costs. The limitation on exit points and gravity of the search and rescue language would help to insure that only capable backcountry enthusiasts leave the ski area through the exit points, thereby minimizing the potential for search and rescue operations. With the Boundary Management Plan in place, it is unlikely there would be a substantial increase in the number of times search and rescue activities are required within the Wilderness. If mechanized rescues were necessary, there would be an effect on the immediate area’s wilderness character, however, the effects would be short-term (typically less than one day in length) and confined to the winter months. Aside from the increased potential for search and rescue, Alternative 2 and Modified Alternative 4 would not increase wilderness encounters or detract from the wilderness characteristics in the Goat Rocks Wilderness.

Management Requirement MR11 would reduce impacts to the wilderness character during construction of the proposed expansion by restricting helicopter operation to areas outside designated wilderness areas (refer to Table 2.4-3). Additionally, Management Requirement MR14 would reduce impacts to the physical, biological and social character of the wilderness by requiring control actions when Limits of Acceptable Change (LAC) conditions are exceeded.

Under Alternative 2 and Modified Alternative 4, the expansion of the White Pass Ski Area into Pigtail and Hogback basins would substantially change the backcountry character of Hogback Basin, at least for the lifetime of the White Pass Ski Area. Other Management Provision OMP5 would reduce impacts to the adjacent natural vegetation communities by marking maximum trail clearing limits, felling trees away from adjacent communities, and limiting maintenance techniques to manual methods within the mountain hemlock parkland community (refer to Section 3.5.3.1 – Vegetation Communities). Additionally, Mitigation Measure MM18 would require any danger trees that must be felled to be retained onsite (refer to Table 2.4-2).

The introduction of alpine ski facilities into Pigtail and Hogback basins would significantly reduce the opportunities for solitude during the winter operating season. Alpine skiers would be commonly found on the trails and skiing off-piste in Pigtail and Hogback basins. Skiers using lifts on developed slopes occur in concentrations that, while consistent with highly developed recreation sites, do not blend well with primitive, unconfined recreation and opportunities for solitude. In addition, the top and bottom terminals of the *Basin* and *Hogback Express* chairlifts would characteristically experience lift queues and skiers milling in these areas. Finally, the mid-mountain lodge would act as a locus of activity in the expansion area, particularly during the lunch period. During the non-skiing season, opportunities for solitude would be similar to the existing condition, with the exception of periods of facility construction and maintenance, since the ski area facilities would not be in operation.

Clearing would be required to connect natural openings within the proposed expansion area, but the gradual slopes and texture of the landscape would help to absorb the effects of the clearing within Hogback Basin (refer to Section 3.15 – Visual Resources). The lift alignments would traverse the area and would be obvious when in the immediate foreground of the visitor. These would not be readily discernable from points further away, and vegetation and topography would screen all development as viewed from the saddle between Hogback and Miriam basins. The mid-mountain lodge would introduce a permanent structure; however, the footprint is relatively small (2,000 square feet) within the context of the larger Hogback Basin, and use of specific Cascadian architectural design elements would help it blend with the surrounding landscape (refer to Section 3.15 – Visual Resources).

Use in the expansion area during the summer months is primarily along the PCNST. During the initial build-out of the proposed expansion, the sights and sounds of equipment would be noticeable, decreasing thereafter to occasional maintenance activities. Aside from these periods, dispersed recreation opportunities in Hogback Basin during the summer months would remain similar to the existing condition, as the ski area would not operate outside the ski season.

Hunting opportunities in Hogback and Pigtail basins would be affected very little, if at all. The area would remain open for hunting. Although hunting would not be allowed within 150 yards of the mid-mountain lodge during operation, it is unlikely that snow levels would be such that the lodge would be occupied during hunting season.

Under Alternative 2 and Modified Alternative 4, the existing Semi-Primitive Non-Motorized ROS class in the Pigtail and Hogback Basin areas would move toward the Roaded Natural ROS class because of the introduction of facilities and the increased use and encounters. With the design of the ski trails and implementation of Mitigation Measures MM19 and MM20 (refer to Table 2.4-2), this change would be consistent with the GPNF Plan, which specifies a Roaded Natural ROS standard for Management Prescription 2L.

Alternative 6

Alternative 6 includes the addition of a single chairlift, the *Basin* chairlift, and associated ski trails into Pigtail Basin (approximately 282 acres within Hogback Basin), the remainder of Hogback Basin would continue to be undeveloped.

Under Alternative 6, White Pass would develop the *Basin* chairlift and associated trails in Pigtail Basin, and construct a quarter-mile of road. **As a result, dispersed backcountry winter recreation (e.g., hike-to-backcountry skiing, dispersed snow shoeing, and camping) opportunities would be displaced from Pigtail Basin.** Lift-served backcountry skiing opportunities would still be available in the undeveloped portions of the Hogback Basin. The majority of Hogback Basin, which is a focus of the winter backcountry use, would remain unmodified and would continue to provide backcountry challenges, as would the Grand Couloir at the northern limit of the White Pass IRA. **Additional lift-served backcountry skiing opportunities would be created in Hogback Basin for those skiers who may not already be familiar with the terrain in Hogback Basin and who may become familiar with Hogback Basin as a result of the *Basin* chairlift.** However, backcountry skiers who currently utilize Hogback Basin might consider their backcountry opportunities in Hogback Basin as being substantially modified and would most likely venture to new, less used areas, particularly Miriam Basin in the Goat Rocks Wilderness. In this sense, the addition of the *Basin* chairlift would create new lift-served backcountry opportunities in the Goat Rocks Wilderness.

As with Alternative 2 and Modified Alternative 4, the displacement of backcountry winter recreation opportunities (e.g., backcountry skiing dispersed snowshoeing, and camping) into Miriam Basin would be to an area that is at a higher avalanche risk than both Hogback and Pigtail basins. The steep slopes and cirque basins within Miriam Basin and the Goat Rocks Wilderness would create more difficult search and rescue operations, require more advanced skill sets amongst backcountry users, and would require more effort for skiers to return to White Pass base area facilities, as compared to existing conditions. Implementation of Mitigation Measure MM15 (refer to Table 2.4-2) would require the development of a Boundary Management Plan that would include designation of no more than two gated ski area exit points along the boundary between Pigtail Basin and Miriam Basin, and one gated exit point downslope of the expansion area. The plan would also include signage indicating that skiers would be responsible for any search and rescue costs. The limitation on exit points and gravity of the search and rescue language would help to insure that only capable backcountry enthusiasts leave the ski area through the exit points, thereby minimizing the potential for search and rescue operations. With the Boundary Management Plan in place, it is unlikely there would be a substantial increase in the number of times search and rescue activities are required within the Wilderness. If mechanized rescues were necessary, there would be an effect on the immediate area's wilderness character, however, effects would be short-term (typically less than one day in length) and confined to the winter months. Aside from the increased potential for search and rescue, Alternative 6 would not increase wilderness encounters or detract from the wilderness characteristics in the Goat Rocks Wilderness.

Management Requirement MR11 would reduce impacts to the wilderness character during construction of the proposed expansion by restricting helicopter operation to areas outside designated wilderness areas (refer to Table 2.4-3). Additionally, Management Requirement MR14 would reduce impacts to the physical, biological and social character of the wilderness by requiring control actions when LAC conditions are exceeded.

Hunting opportunities in the Pigtail Basin would be affected very little, if at all. The area would remain open for hunting. Although hunting would not be allowed within 150 yards of the mid-mountain lodge during operation, it is unlikely that snow levels would be such that the lodge would be occupied during hunting season. Hunting opportunities in the remainder of Hogback Basin would remain unchanged from the existing condition.

Under Alternative 6, the introduction of a road and alpine ski facilities into Pigtail Basin would reduce the opportunities for solitude along the eastern portion of the Basin, particularly during the winter operating season.[47] Alpine skiers would commonly be found on the trails and skiing off-piste in Pigtail Basin, and the top and bottom terminals of the *Basin* chair would characteristically experience lift queues and skiers milling in these areas. The mid-mountain lodge would be constructed within the existing SUP area rather than in the proposed expansion area, eliminating the impacts of congestion within Hogback Basin that would occur around the lodge under Alternative 2 and Modified Alternative 4. Motorized use would occur on the proposed road during construction and maintenance activities, creating noise and visual intrusions that would eliminate the ability to seek solitude in this area. However, approximately 518 acres

[47] The road would include approximately 0.25 mile inside the White Pass IRA, which is also in a Tier II Key Watershed. In order for the Decision-makers to select this road and for the road to be constructed, the Regional Executive Interagency Committee would have to formally determine the construction of such a road would be consistent with the Aquatic Conservation Strategy, as outlined in the Northwest Forest Plan (USDA and USD, 1994). If the Roadless Area Conservation Rule is formally implemented, this road would not be allowed in the White Pass IRA, therefore construction techniques (as described in the other Action Alternatives) would be implemented.

in the remainder of Hogback Basin would remain undeveloped, and would continue to offer isolation from the sights, sounds, and presence of others, as would the surrounding Wilderness.

As with Alternative 2 and Modified Alternative 4, use in the expansion area during the summer months is primarily along the PCNST. During the initial build-out of the proposed expansion, the sights and sounds of equipment would be noticeable, decreasing thereafter to occasional maintenance activities. Aside from these periods, primitive recreation opportunities in Hogback Basin would remain similar to the existing condition, as the ski area would not operate outside the ski season. In addition, a portion of the Hogback Basin would remain undeveloped, providing continued opportunities for backcountry recreation uses.

Under Alternative 6, the ski area and facilities would change the ROS class in Pigtail Basin from Semi-Primitive, Non-Motorized to Roaded Natural because of the presence of a road, increased use and encounters in the area. Hogback Basin would remain Semi-Primitive, Non-Motorized.

Alternative 9

Under Alternative 9, backcountry winter recreation (e.g., backcountry skiing, dispersed snow shoeing and camping) trends and backcountry characteristics at White Pass would be as described for Alternative 1 (the existing condition) and use at White Pass Ski Area would be consistent with the Roaded Natural ROS classification established for the area. Hunting would be affected very little, if at all, as the area would remain open for hunting. Although hunting would not be allowed within 150 yards of the mountain-top lodge during operation, it is unlikely that snow levels would be such that the lodge would be occupied during hunting season. With the Boundary Management Plan in place, it is unlikely there would be a substantial increase in the number of times search and rescue activities are required within the Wilderness. If mechanized rescues were necessary, there would be an effect on the immediate area’s wilderness character, however, the instances would typically be short-term (less than one day in length) and confined to the winter months.

Management Requirement MR11 would reduce impacts to the wilderness character during construction of the proposed expansion by restricting helicopter operation to areas outside designated wilderness areas (refer to Table 2.4-3). Additionally, Management Requirement MR14 would reduce impacts to the physical, biological and social character of the wilderness by requiring control actions when LAC conditions are exceeded.

3.11.3.6 Pacific Crest National Scenic Trail

Alternative 1

Under Alternative 1, the PCNST would be unaffected, and would remain as described in Section 3.11.2 – Affected Environment.

Alternatives 2 and 6

Under Alternatives 2 and 6, the PCNST would remain in its current alignment. In contrast to existing conditions, hikers and stock users along the PCNST would be exposed to ski area development in Pigtail Basin, although there would not be a direct conflict in use between skiers and hikers along the PCNST because of seasonal use patterns**. The lift alignment over the PCNST and clearing for ski trails may have a negative impact on users of the PCNST by causing a break in the backcountry experience of the PCNST user. PCNST travelers would cross underneath the *Basin* chairlift one time at approximately 6,050 feet elevation and cross four ski trails for a distance of approximately 500 feet in a 0.25-mile long stretch of the PCNST.**

The towers and lift line would be evident to viewers; however, towers and lift terminals would be painted during construction to blend with surrounding vegetation (refer to Section 3.15 – Visual Resources and Table 2.4-2 - Mitigation Measure MM19). Saplings less than 3 feet in height would not be cut (refer to Section 3.15 – Visual Resources and Table 2.4-2, Mitigation Measure MM9). Evidence of tree removal may occasionally be visible, although stumps would be flush-cut and camouflaged (refer to Section 3.15 – Visual Resources and Table 2.4-2, Mitigation Measure MM19). Although users of the PCNST under Alternative 2 would notice the lift alignments, spectacular views of Mt. Rainier would continue to exist along this portion of the PCNST. Travelers along the PCNST may recognize areas of tree removal, however, much of the existing groundcover, consisting of scattered saplings, herbaceous and shrub vegetation would remain.

Considering the unique vegetative patterns in the subalpine environment of Pigtail Basin and the clearing that would occur to construct ski trails, hikers and casual observers would have a hard time distinguishing ski trails from existing conditions. However, the chairlift structures and clearing would be more noticeable. Duration of impact would be minimal (five to ten minutes of trail time) and views of Mt. Rainier would not be obstructed as a result of ski area development in Pigtail Basin.

During construction of the proposed expansion, Mitigation Measures MM 16 and MM17 would reduce the impacts to PCNST users by informing them of where and when construction activities would be taking place, and by restricting construction helicopter flights on high-use weekends and holidays (refer to Table 2.4-2).

Modified Alternative 4

Under Modified Alternative 4, the PCNST would be re-routed along the ridge between Pigtail/Hogback Basins and the Goat Rocks Wilderness. The re-route would eliminate a 1.2-mile existing segment of trail and create a new 0.93-mile trail segment that would bypass all ski area development in Pigtail Basin. Accordingly, under Modified Alternative 4, the PCNST would not cross underneath the *Basin* chairlift, nor would it cross any developed ski trails. On this basis, Modified Alternative 4 would preserve the continuity of the experience along the PCNST, as compared to Alternatives 2 and 6. The upper terminal of the *Basin* chairlift would be screened by vegetation from views along this portion of the PCNST. Although the re-route would bypass development, the alternate route would not afford as many views of Mt. Rainier as the existing alignment. Instead, hikers and stock users would travel along a ridge top, and would experience a combination of forest and openings, with some long distance views of Pinegrass Ridge and Divide Ridge and views into Miriam Basin, as discussed in Section 3.15 – Visual Resources.

During construction of the proposed expansion, Mitigation Measures MM 16 and MM17 would reduce the impacts to PCNST users by informing them of where and when construction activities would be taking place, and by restricting construction helicopter flights on high-use weekends and holidays (refer to Table 2.4-2).

In its re-routed location along the wilderness boundary, the revised segment of the PCNST would provide an experience similar to the portions of the trail that are currently in wilderness to the east and west. The re-routed portion of the PCNST would have no effect on wilderness encounters or other aspects of the wilderness character along the trail.

Alternative 9

Under Alternative 9, White Pass would construct one trail that would intersect the existing PCNST at approximately 5,100 feet elevation. Although there would not be a conflict in use between skiers and hikers along the PCNST because of the seasonal use patterns, clearing for trails may have a negative impact on users of the PCNST. In order to mitigate impacts to the PCNST, the trail would be re-aligned along a switchback on the trail to insure that the PCNST would remain outside of ski trail development. Approximately 225 feet of the trail would be relocated about 50 feet to the east outside the area proposed for development, so travelers would not perceive a break in experience.

During construction of the proposed expansion, Mitigation Measures MM 16 and MM17 would reduce the impacts to PCNST users by informing them of where and when construction activities would be taking place, and by restricting construction helicopter flights on high-use weekends and holidays (refer to Table 2.4-2).

PCNST use in Pigtail Basin would be as described under existing conditions.

3.11.4 Cumulative Effects

A cumulative effects analysis was performed for each watershed at the site scale (White Pass Study Area). Past, present and reasonably foreseeable projects occurring within each watershed area are included in the analysis. Within the discussions below, cumulative impacts to recreation are considered for short-term and long-term impacts. The cumulative effect on recreation is an increase in the quality, quantity and access to varied recreation opportunities in the White Pass Study Area, including an increase in lift-served backcountry skiing opportunities. Alternatively, the loss of hike-to backcountry ski terrain at

White Pass and other ski areas represents a cumulative effect on backcountry skiing. Although the backcountry skiing analysis includes effects outside of the White Pass Study Area, it is included to address public comments received during the public comment period.

A list of all past, present and reasonably foreseeable projects occurring within the Upper Clear Fork Cowlitz River watershed (refer to Table 3.11-5) and the Upper Tieton River watershed (refer to Table 3.11-6) that affect recreation within the White Pass Study Area are presented below. For a description of project actions, refer to Tables 3.0-FEIS1 and 3.0-FEIS2 in Section 3.0.

Table 3.11-5:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed on Recreation

Project Number	Project	Recreation
UCFC-17	White Pass Ski Area Yurt Construction	The yurt near Chair 4 was constructed in 2002, resulting in an increase in the quality of recreation in the White Pass Study Area by improving skier circulation. The effects of the project overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative long-term increase in the quality of recreation opportunities within the White Pass Study Area.
UCFC-21	White Pass Ski Area Day Lodge Remodel	The Day Lodge was remodeled in 2003 to accommodate increased demand for guest services at the White Pass Ski Area, resulting in an increase in the quality of the recreational experience within the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative long-term increase in the quality of recreational experiences within the White Pass Study Area.

Table 3.11-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Recreation

Project Number	Project	Recreation
UT-1	White Pass Ski Area Half Pipe Construction	The halfpipe construction in 2003 resulted in an increase in the quantity and variety of recreation in the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and other projects identified in this table, this project will add to the cumulative increase in the long-term quantity, quality and variety of recreational opportunities in the White Pass Study Area.
UT-4	White Pass Ski Area Relocation of Chair 3 and Platter Lift	The Platter Lift and Chair 3 were realigned to access better terrain, resulting in an increase in the quality of recreation in the White Pass Study Area. The effects of the project overlap temporally and spatially with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to a cumulative increase in the quality of recreation opportunities in the White Pass Study Area.

**Table 3.11-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects
in the Upper Tieton River Watershed on Recreation**

Project Number	Project	Recreation
UT-7	White Pass Ski Area Cross Country Yurt	The cross-country yurt was constructed in 2001, resulting in an increase in the quality of recreation in the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in the long-term quality of recreation opportunities within the White Pass Study Area.
UT-25	Zig Zag Nordic and Snowshoe Trails	Use of the *Zig Zag* Nordic trail and snowshoe trail system until the 2006-2007 winter season has increased the quantity and variety of recreation in the White Pass Study Area. As use of the *Zig Zag* Nordic trail and snowshoe trails will end prior to implementation of the White Pass expansion, the recreational effects of the two projects do not overlap temporally. However, access to these trails is available from within the White Pass Study Area. As use of the *Zig Zag* Nordic trail and snowshoe trail system will no longer continue, this project will result in a decrease in the quantity and variety of recreation available in the White Pass Study Area after 2007, and during implementation of the White Pass expansion.
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	This project would impact approximately 0.3 acre on Pigtail Peak, resulting in short-term interruptions in the ability to recreate in the area. This project will create noise and visual impacts to dispersed recreation in Pigtail Peak. The short-term construction related effects overlap spatially and temporally with the effects of the White Pass expansion. Combined with the White Pass expansion and other construction projects listed in this table, this project will add to the cumulative increase in short-term interruptions in the quality of recreation in the White Pass Study Area.

As described above, the projects described in the tables, coupled with the White Pass expansion, will result in a cumulative, long-term increase in the availability, quality and quantity of recreation opportunities within the White Pass Study Area.

However, the cumulative effects of the White Pass expansion are primarily centered on the backcountry component of recreation. Currently, hike-to backcountry skiers access terrain in Goat Rocks Wilderness from outside White Pass Ski Area boundaries. The elimination/displacement of lift-served backcountry skiing opportunities from Pigtail and Hogback Basins would increase use of backcountry ski terrain in Goat Rocks Wilderness. The increase in use of Miriam Basin and Goat Rocks Wilderness that is attributed to the development of Hogback/Pigtail Basins would have an impact on encounter rates and decrease the amount of available hike-to backcountry ski terrain within the Goat Rocks Wilderness. In addition, other ski areas, including Crystal Mountain, Alpental and Mission Ridge are expanding into areas currently accessed by either hike-to or lift-served backcountry skiers. Cumulatively, backcountry ski terrain throughout Washington will continue to receive pressure from the increased interest in backcountry skiing and expansion of developed ski facilities into these areas. However, this cumulative impact is not expected to result in an exceedance of LAC conditions, or in a degradation of wilderness character within the designated Wilderness areas surrounding the White Pass Study Area.

In summary, cumulative impacts to backcountry skiing associated with the implementation of the White Pass expansion would decrease backcountry opportunities in Pigtail and Hogback Basins, and increase pressure on Miriam Basin and the Goat Rocks Wilderness. Meanwhile, the Action Alternatives, combined with the past, present and reasonably foreseeable projects listed in Tables 3.11-5 and 3.11-6, would cumulatively increase the quantity, quality, and variety of developed recreation opportunities within the White Pass Study Area.

3.12 TRANSPORTATION

3.12.1 Introduction

The following section describes existing traffic on US 12, parking, roads, and pedestrian access in the White Pass Study Area. Scoping for this project identified parking as a significant issue for both crowding and safety concerns. Projected visitor use numbers are approximations based on expected changes at White Pass if the expansion were to occur. The rationale for these use figures is presented in more detail in Section 3.11 – Recreation and Appendix D – Social, Economic and Recreation Assumptions.

3.12.2 Affected Environment

Traffic service is usually measured in terms of Level of Service (LOS) (Transportation Resource Board 2000). LOS measures the quality of traffic service, and may be determined for each roadway segment based on average delays, congestion speed, volume to capacity ratio, or vehicle density by functional class. The various LOS ratings for roadway segments are defined as follows (Transportation Resource Board 2000):

- **LOS A** describes primarily free-flow operation at average travel speeds, usually about 90 percent of the free-flow speed for the arterial classification.

- **LOS B** represents reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the arterial classification.

- **LOS C** represents stable operations; however, ability to maneuver and change lanes in mid-block locations may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both, may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial classification.

- **LOS D** borders on a range in which small increases in flow may cause substantial increases in delay, and hence decreases in arterial speed. Average travel speeds are about 40 percent of free-flow speeds. LOS D is often used as a limiting criterion for design purposes.

- **LOS E** is characterized by significant delays and average travel speeds of one-third of the free-flow speed or less. LOS E is sometimes accepted as a limiting design criterion when restricted conditions make it impractical to consider a higher LOS.

- **LOS F** characterizes arterial flow at extremely low speeds, below one-third to one-fourth of the free-flow speed. Intersection congestion is likely at critical signalized locations with high delays and extensive queuing. LOS F is never used as a design standard. It represents a condition that is intolerable to most motorists.

3.12.2.1 US 12

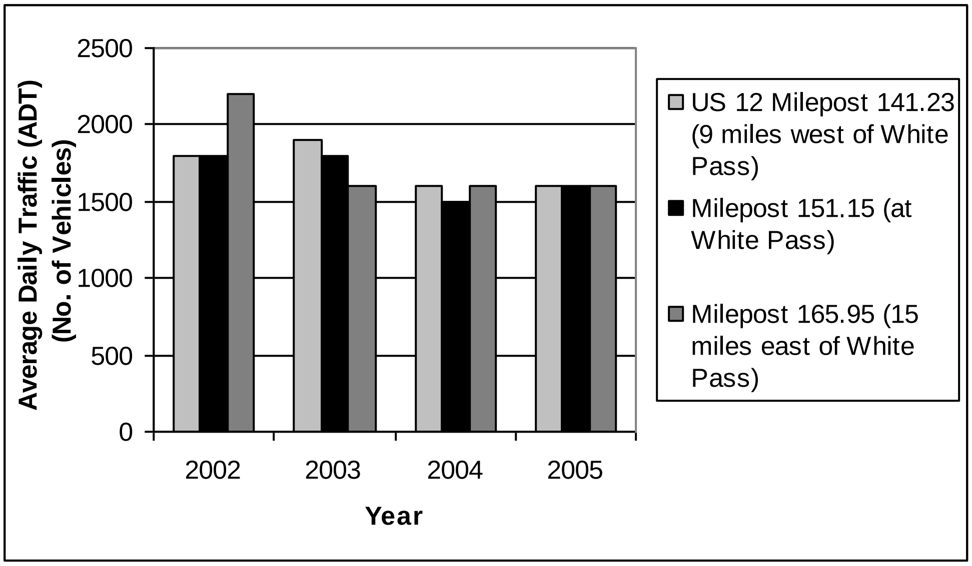
Access to White Pass Ski Area (approximate milepost 151) is provided on US 12. The White Pass Study Area is bisected by US 12 and includes several additional mountain service roads, which are closed to the public.

Construction of US 12 was completed in 1951. US 12 is a major transportation corridor for commerce, winter sports, and tourists, as well as recreational activities in the GPNF and OWNF. This two-lane paved highway is the southern-most highway crossing the Cascades in Washington. It consists of two lanes, a 24-foot running surface (total for both lanes), with shoulders varying from a minimum of 4 feet up to 38 feet on either side along the segment passing through the ski area.

Current traffic data for US 12 has been collected by WSDOT at milepost 185.25, which is approximately 34 miles east of White Pass, just west of the SR 410 intersection. The most current survey available is the 2005 Peak Hour Report which includes Average Daily Traffic (ADT) and the top 200 Peak Hour Volumes (WSDOT 2005). This report found the ADT to be 2,247 vehicles. The peak one-hour volume was recorded at 1,348 or 59.99 percent of ADT. Of the top 200 Peak Hourly Volumes measured at White Pass, nearly all of these occurred between July and November, with only 19 occurring during the operation of White Pass. During peak traffic 29.9 percent of vehicles were recorded traveling east while 70.1 percent were headed west (WSDOT 2005). The number of trucks using US 12 in the vicinity of White Pass has also been measured at milepost 185.25. WSDOT reports that 18 percent of all vehicles traveling on this part of US 12 are single, double, or triple trailer trucks (WSDOT 2005b).

In the section of US 12 in the vicinity of White Pass, between mileposts 135 and 177, WSDOT has estimated Average Daily traffic as 0-1,999 vehicles per day (WSDOT 2005a). Actual counts and estimates of Daily Traffic Volumes for 2002, 2003, 2004, and 2005 are shown in Illustration 3.12 FEIS1. Traffic operates at LOS B along US 12 in the vicinity of White Pass (USDI and NPS 2002).

Illustration 3.12 FEIS1:
Average Daily Traffic Volumes Near White Pass

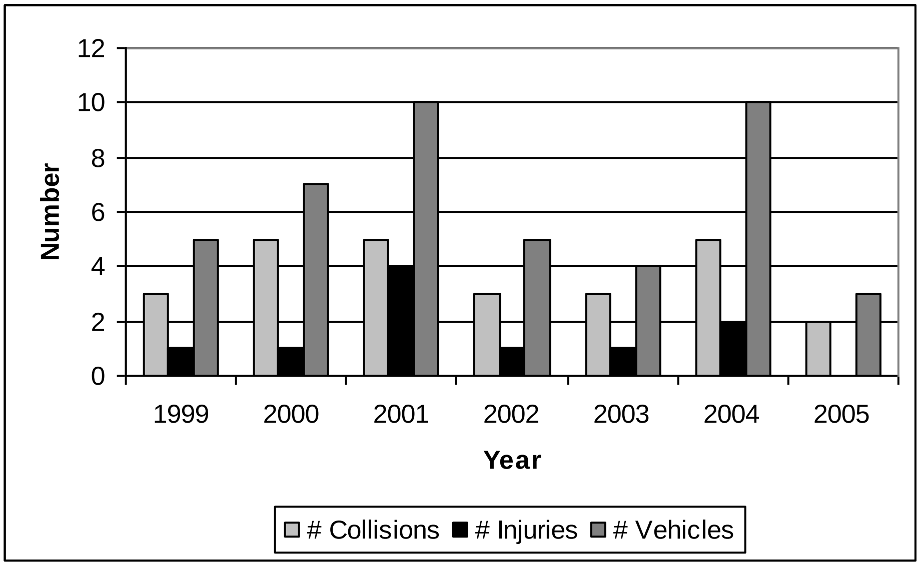


Note: ADT volumes for 2003, 2004, and 2005 at milepost 151.15, and 2003 ADT volumes at mileposts 141.23 and 165.95 are based on actual WSDOT traffic and vehicle counts. All others are estimated by WSDOT.
Source: WSDOT 2005a

The *U.S. Highway 12 Corridor Charette* (USDI and NPS 2002) reports that no segment of US 12 between Interstate 5 and Naches is designated as a High Accident Corridor, nor have any specific locations along the highway been designated as a "High Accident Location" (USDI and NPS 2002). The 12.55-mile segment from SR 123 (near the Mount Rainier National Park boundary) east to the Yakima County line exhibits an accident rate that is higher than the average accident rates for either Lewis or Yakima Counties. The accident rate along this segment of US 12 is 2.3 accidents per million vehicle miles traveled as compared to 1.36 accidents per million vehicle miles traveled in Lewis County and 1.49 accidents per million vehicle miles traveled in Yakima County. The segment ranks fourth highest among the 15 segments identified between Interstate 5 and Naches. The remainder of the corridor is at or below average accident rates.

The speed limit for the section of US 12 through the White Pass Ski Area is 35 mph. Accidents on this stretch of highway have been insignificant due to the reduced speed limit, good sight distance, and snow management. Although half of the guest parking at White Pass occurs along US 12, with guests walking along the highway to the ski area entrance, accidents have involved only vehicles (those parked as well as those entering and leaving the highway) rather than pedestrians and vehicles. Since 1999, 26 collisions involving 44 vehicles, resulting in ten injuries (no fatalities), have occurred during the operation of the ski area in the 4-mile stretch of US 12 in the immediate vicinity of White Pass (WSDOT 2006). Illustration 3.12 FEIS2 summarizes the number of collisions, injuries and vehicles involved in accidents within 2 miles of the White Pass Ski Area for each year since 1999.

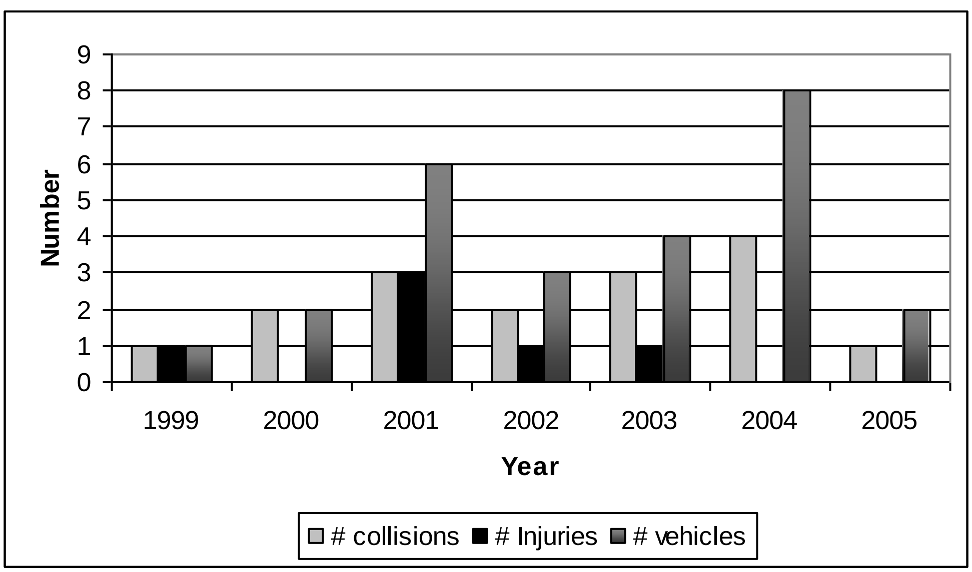
Illustration 3.12 FEIS2:
Collisions Within Two Miles of White Pass Ski Area



Source: WSDOT 2006

Since 1999, 16 collisions involving 26 cars and resulting in six injuries have occurred during the operation of the ski area in the vicinity of guest parking along US 12 (WSDOT 2006). Illustration 3.12 FEIS3 summarizes the number of collisions, injuries and vehicles involved in collisions within the parking area along US 12 (around mileposts 150.25 to 152.25) for each year since 1999.

Illustration 3.12 FEIS3:
Collisions Within Parking Area Along US 12 at White Pass Ski Area



Source: WSDOT 2006

The US 12 Corridor Charette (USDI and NPS 2002) indicates that the background growth in traffic would result in an increase in ADT from the existing 2,247 to 2,609 by 2017. In addition, the LOS is projected to reduce from LOS B to LOS C during this timeframe (USDI and NPS 2002). These background projections assume that some form of expansion will take place at White Pass (USDI and NPS 2002).

3.12.2.2 Parking

Parking at White Pass Ski Area occurs in six parking lots, as well as along the shoulders of US 12. Parking capacity at White Pass is a combination of 1,100 passenger vehicles and 9 buses. Based on 2.3 guests per vehicle and 40 guests per bus, a total of approximately 2,890 visitors can park at White Pass. The 1,100 passenger vehicle parking incorporates approximately 550 vehicles in the six existing lots, while parking for the remaining 550 vehicles is achieved along US 12 (McCarthy, pers. comm.). These parking lots include the overnight lot, which accounts for 130 vehicles, the main lot with 225 vehicles, the condominium lot with 70 vehicles, the Kracker Barrel lot with 75 vehicles, and the employee lot with 50 vehicles.

3.12.2.3 Roads

Table 3.12-1 presents the existing road length and road density within the White Pass Study Area. The majority of road length, 4.2 miles, is located in the Upper Tieton watershed, on the eastern portion of the SUP area. The remaining 2.6 miles of roads are located in the Upper Clear Fork Cowlitz watershed, on the western side of the SUP area. The road densities in the White Pass Study Area total 2.7 miles/mile^2, with a density of 6.0 miles/mile^2 in the Upper Tieton and 1.5 miles/mile^2 in the Upper Clear Fork Cowlitz watershed.

Table 3.12-1:
Existing Road Characteristics at White Pass

Parameter	Upper Clear Fork Cowlitz	Upper Tieton	Total
Paved (miles)	0.2	0.3	**0.5**
Unpaved (miles)	2.3	3.9	**6.2**
Total Road Length (miles)	2.6	4.2	**6.7**
Road Density (mi/mi^2)	1.5	6.0	**2.7**

3.12.2.4 Pedestrian Access

Skiers parking along US 12 must negotiate a walk of up to ¼-mile along the highway, usually wearing or carrying ski gear and/or with children, in order to access the ticket booth and other facilities. Similarly, those that park in the lots on the north side of US 12 must cross the highway to access the ticket booth, lodge or lifts. This situation results in potentially conflicting uses of US 12. As described above, no fatalities have been recorded since 1999 and no pedestrian accidents have been reported (WSDOT 2006).

However, the presence of pedestrians along US 12 in the vicinity of White Pass creates the potential for pedestrian-related accidents.

3.12.3 Environmental Consequences

3.12.3.1 Alternative 1

US 12

Under Alternative 1, no new development at White Pass would take place. Traffic would continue to follow patterns similar to historic trends. Growth in visitation at White Pass would increase at a rate of approximately 1 percent per year, which would be lower than, and in response to, the projected 2.6 percent average annual population growth rate in the White Pass Study Area (refer to Section 3.10 – Social and Economic Factors and Section 3.11 – Recreation). WSDOT projects an increase in ADT along US 12 from the existing 2,247 to 2,609 by the year 2017. **The current LOS B would be reduced to LOS C by 2017 (USDI and NPS 2002). As a result, traffic associated with the operation of White Pass is expected to fall within the projected increase in ADT on US 12. As under the existing condition, the majority of peak hourly volumes would occur during the non-skiing season. With increased traffic volumes and increased visitation at White Pass, it is expected that it would become increasingly difficult for White Pass guests to cross US 12 during busy periods of traffic and/or visitation. Additionally, the number of injuries and vehicles involved in collisions within the parking area along US 12 (around mileposts 150.25 to 152.25) would potentially continue to occur at a rate similar to the existing rates (refer to Illustrations 3.12 FEIS2 and 3.12 FEIS3).**

Parking

No new parking lots would be constructed. Parking capacity would remain unchanged from the existing condition, with a capacity of approximately 1,100 cars. With a CCC of 2,670 and the ability to park 2,890 visitors, the existing parking would be sufficient to cover all but peak visitation in the short-term. **However, with increasing visitation, over the long-term, it is anticipated that the parking lots at White Pass would become increasingly parked out.** Refer to Table 3.12 FEIS1 for a comparison of parking by alternative.

Table 3.12 FEIS1:
Summary of Parking at White Pass by Alternative

	Alternative 1[a]		Alternative 2		Modified Alternative 4		Alternative 6		Alternative 9	
CCC	2,670		4,250		3,800		3,640		3,280	
# Lots	6		6		7		7		7	
Additional Parking (acres)	N/A		N/A		7		2.5		2.5	
Cars in Additonal Parking (cars)[b]	N/A		N/A		946		340		340	
Parking Capacity	**Vehicle**	**Guests**	**Vehicle**	**Guests**	**Vehicle**	**Guests**	**Vehicle**	**Guests**	**Vehicle**	**Guests**
Car in Lots[c]	550	1,265	550	1,265	1,496	3,440	890	2,047	890	2,047
Busses in Lots[d]	9	360	9	360	9	360	9	360	9	360
Cars on US 12	550	1265	1141	2625	0	0	536	1,233	380	873
Total	**1,109**	**2,890**	**1,700**	**4,250**	**1,505**	**3,800**	**1435**	**3,640**	**1,279**	**3,280**

[a] The Alternative 1 summary is based on measured existing conditions provided by White Pass Ski Company (refer Section 3.12.2.2). Whereas, all other alternatives are prepared with reference to the relevant CCC.
[b] Assumes that a 2.5-acre parking lot accommodates approximately 340 cars, which equates to approximately 136 cars per acre.
[c] Car capacity is based on 2.3 guests per car. Additionally, parking along US 12 would not have a maximum but the limiting factor is how far guests are willing to walk to get to the White Pass Ski Area, assumed to be less than ½-mile.
[d] Bus capacity is based on 40 guests per bus.

Roads

No new road construction would take place under Alternative 1. Road mileage and road densities would remain as described in Table 3.12-1.

Pedestrian Access

With no new parking at White Pass, pedestrian access would be as described for the existing condition, with the majority of skiers having to walk along and/or across US 12 to access the ski area. Given the projected increase in traffic on US 12, this would increase the risk of a vehicle/pedestrian accident as compared to the existing condition.

3.12.3.2 Alternative 2

US 12

Under Alternative 2, visitation at White Pass is projected to increase by 40,000 in the first year after the expansion, followed by an annual growth rate of 1 percent (refer to Section 3.10 – Social and Economic Factors and Section 3.11 – Recreation). The CCC would increase from 2,670 to 4,250 guests. **As with Alternative 1, the current LOS B would be reduced to LOS C by 2017 (USDI and NPS 2002) including consideration of the increases in traffic volume resulting from the proposed expansion.**

In contrast to the additional trails and lifts proposed by this alternative, which would result in increases to the CCC, Alternative 2 does not expand parking capacity. As a result, the parking supply would limit resort visitation and could potentially result in increased vehicle/pedestrian conflicts on US 12. Outside the projected increases as described in Alternative 1, Alternative 2 is not projected to result in increased peak hour volumes or ADT along US 12. **Additionally, the number of injuries and vehicles involved in collisions within the parking area along US 12 (around mileposts 150.25 to 152.25) would occur at a rate higher than the current condition due to the possible increase in vehicle traffic of up to 591 cars along US 12 (refer to Illustrations 3.12 FEIS2 and 3.12 FEIS3). Similarly, on peak days at White Pass, the increase in CCC at White Pass could potentially provide for 1,360 more people (591 cars), which would be added to the morning peak inbound hour and the afternoon/evening peak outbound hour. This increase in vehicle traffic would result in a proportional increase in the number of peak hours that occur during the ski season, as compared to the existing 19 out of 200 peak hours (refer to Section 3.12.2.1 – US 12). However, the parking limitation, described above, would limit peak day vehicle traffic and may affect visitation due to a lack of available parking.**

Operation of an in-resort shuttle along US 12 would reduce the potential for conflicts between pedestrians and vehicles along US 12. However, the potential exists for conflicts between highway traveler vehicles and the in-resort shuttle operating along and across US 12, resulting in minor delays for through travelers. These delays would be consistent with the projected LOS C along US 12 at White Pass (USDI and NPS 2002). Approval from WSDOT and the Washington State Patrol would be required to implement the shuttle program.

Parking

As described above, Alternative 2 would not include additional parking at White Pass. Parking capacity would remain as described under Alternative 1. White Pass would initiate an in-resort shuttle service to the more distant parking areas (i.e., greater than 1,200 feet from the ski area and along US 12) to eliminate the need for additional parking lot construction. The shuttles would consist of two 35-passenger, open air trailers (similar to the shuttle system operated by Crystal Mountain).

With the existing ability to park 2,890 guests, based on parking 550 vehicles (1,265 guests) along US 12, 9 buses (360 guests) and 550 cars (1,265 guests) at the existing parking lots at White Pass, and a CCC of 4,250, parking would continue to be limited, particularly during peak days, when ski area capacity would exceed parking space by 591 cars (1,360 people). During these periods, White Pass visitors may choose to park further east/west along US 12, as described above. **Because no additional parking would be provided under Alternative 2, the occurrence of parked-out conditions would occur more often, particularly as daily visitation approaches the parking capacity of 2,890 visitors. White Pass visitors would likely park outside of the existing parking areas, or further east/west along US 12, which could further exacerbate the pedestrian conflict (and hence safety) on the highway during peak visitation periods. The use of pedestrian shuttles, described below, would mitigate the conflicts to**

some degree, while creating a new road hazard for US 12 motorists by placing a passenger shuttle along the already congested roadway.

Roads

No new road construction would take place under Alternative 2. As shown in Table 3.12-2, the road mileage and density would remain unchanged.

Table 3.12-2:
Road Characteristics at White Pass under the Action Alternatives

Road Parameter	Alternative 2	Modified Alternative 4	Alternative 6	Alternative 9
Upper Clear Fork Cowlitz Watershed				
Paved (miles)	0.2	0.2	0.2	0.2
Unpaved (miles)	2.3	2.3	2.65	2.3
Total Road Length (miles)	2.6	2.6	2.85	2.6
Road Density (mi/mi^2)	1.5	1.5	1.7	1.5
Upper Tieton Watershed				
Paved (miles)	0.3	0.3	0.3	0.3
Unpaved (miles)	3.9	3.9	3.9	3.9
Total Road Length (miles)	4.2	4.2	4.2	4.2
Road Density (mi/mi^2)	6.0	6.0	6.0	6.0

Note: Road characteristics under Alternative 1 are included in Table 3.12-1.

Pedestrian Access

Under Alternative 2, pedestrian access would be improved with the implementation of the shuttle system. White Pass visitors who park in the distant lots or along US 12 would be provided with the opportunity to ride the shuttle to access the ski area**. For visitors carrying gear and/or guarding children, the shuttle system would reduce the need to walk along or across the highway.**

It is expected that some White Pass visitors would be unwilling to wait for shuttles to arrive at pick-up sites. These individuals would continue to walk on the highway, and would represent less than 5 percent of the skiers in the remote parking areas, as is the case at Crystal Mountain (Steel, personal communication). **For those guests who would choose to walk along the highway, the potential for conflicts with US 12 motorists would increase.**

3.12.3.3 Modified Alternative 4

US 12

Under Modified Alternative 4, the LOS is expected to drop to C, and visitation is projected to increase as described for Alternative 2. The CCC would increase from 2,670 to 3,800 guests. As a result, impacts to traffic volumes and LOS would be similar to but less than Alternative 2, with a peak day increase of 396 new cars under Modified Alternative 4 as compared to 591 under Alternative 2 (both of which are included in the background LOS and ADT projection – refer to Section 3.12.2.1). However an additional parking lot would be constructed under Modified Alternative 4, which would alter the vehicle/pedestrian conflict when compared to Alternative 2, as detailed below.

Parking

A 7-acre parking lot would be constructed in the northeast corner of the existing SUP area, adjacent to the existing drainfield. This lot would accommodate approximately 946 cars, or approximately 2,176 guests, thereby eliminating the need to park along US 12. Parking along US 12 would not be permitted unless the parking lots are efficiently filled to capacity. A Pedestrian Management Plan (refer to Section 2.3.4.8) would be prepared prior to construction of the new parking lot. This plan would address the process for ensuring that no parking occurs on US 12 when capacity is available in parking lots, including the use of signage and parking attendants.

With the existing ability to park 1,625 guests in lots, the additional parking area would allow off-highway parking for approximately 3,800 guests in total. With a CCC under Modified Alternative 4 of 3,800, parking would accommodate peak capacity visitation at White Pass (refer to Table 3.12 FEIS1). As a result, Modified Alternative 4 would decrease the occurrence of parked-out conditions during peak visitation periods. By providing no parking along US 12, Modified Alternative 4 would also minimize the number of accidents associated with the parking along US 12, as compared to Alternatives 1 or 2.

Roads

Under Modified Alternative 4, no new road construction would take place. Road characteristics at White Pass would remain unchanged from the existing condition (refer to Table 3.12-2).

Pedestrian Access

Under Modified Alternative 4, the combined parking areas (existing and proposed) would accommodate all visitors on capacity days. As a result, guests who park in the new 7-acre parking lot would have improved access to the new ticket booth and the base area. **In addition, with sufficient parking at White Pass, Modified Alternative 4 would allow all users to park near the base area, thereby eliminating cars along US 12. Overall, Modified Alternative 4 would substantially lower the risk of vehicle/pedestrian accidents when compared to the other alternatives, because no cars would be parked along US 12.**

3.12.3.4 Alternative 6

US 12

Under Alternative 6, visitation at White Pass is projected to increase by approximately 14,000 the first year after the expansion, followed by an approximately 1 percent annual growth rate (refer to Section 3.10

– Social and Economic Factors and Section 3.11 – Recreation). The CCC would increase from 2,670 to 3,640. Impacts on LOS and traffic volumes would be less than Alternative 2 or Modified Alternative 4, with 326 new peak day cars.

Parking

A 2.5-acre parking lot would be constructed in the northeast corner of the existing SUP area, (refer to Figure 2-6). This lot would accommodate approximately 340 cars, or approximately 782 guests. **With the existing ability to park 2,890 guests, the increased parking area would allow for approximately 3,672 guests in total.**[48] **With a CCC of 3,640 (refer to Table 3.12 FEIS1), parking would accommodate capacity visitation at White Pass. Alternative 6 would not eliminate parking along US 12, as in Modified Alternative 4, but by providing a new parking lot, Alternative 6 addresses the potential for pedestrian/vehicle conflicts along US 12 better than Alternative 2 by providing additional off-highway parking. Alternative 6 would decrease the occurrence of parked-out conditions, as compared to Alternatives 1 or 2.**

Roads

While the other Action Alternatives include the development of no roads in the White Pass Study Area, under Alternative 6, a new permanent road, approximately 0.25-mile in length, would be constructed from the existing Quail trail to the base of the *Basin* chairlift within the White Pass IRA.[49] This road would serve as the egress trail from the *Basin* pod. Road development is included in Alternative 6 to evaluate the effects of road use for construction and operations, as opposed to over-the-ground (or snow) access with no roads (refer to Section 3.2 – Geology and Soils and Section 3.3 – Watershed Resources).

By creating an additional 0.25 mile of road, Alternative 6 would increase the mileage and density of roads in the Upper Clear Fork Cowlitz watershed. **As shown in Table 3.12-2, the road density in the Upper Clear Fork Cowlitz portion of the White Pass Study Area would increase from 1.5 miles/mile^2 to 1.7 miles/mile^2. In an effort not to increase the mileage of roads in the Upper Clear Fork Cowlitz Tier 2 Key Watershed, obliteration of 0.6 mile of Road 1284.016 (an existing native surface road located**

[48] Based on parking 550 vehicles (1,265 guests) along US 12, 9 buses (360 guests) and 550 vehicles (1,265 guests) at the existing parking lots at White Pass.

[49] This new permanent road would be constructed in the White Pass Inventoried Roadless Area, which is also in a Tier 2 Key Watershed (refer to Section 3.14 – Inventoried Roadless Areas). The Northwest Forest Plan (USDA and USDI 1994) Standards and Guidelines specifically prohibit this activity. Construction of the road would require a site-specific modification of the Standards and Guidelines, which would require a coordinated review by the Regional Interagency Executive Committee and Regional Ecosystem Office. If this road were to be selected in the ROD for this FEIS, the Decision could not be rendered until the Regional Interagency Executive Committee concurs that such a modification to the Standards and Guidelines is consistent with the objective of the Standards and Guidelines. Such coordination has not taken place as of the publication of this FEIS. In addition, a decision for road construction within an IRA is reserved to the Chief of the Forest Service, unless he should choose to grant an exception otherwise (FSM 1920, i.d. 1920-2004-1, section 1925.03).

approximately 1 mile northwest of White Pass) would occur under Alternative 6. As a result, the mileage of roads in the Upper Clear Fork Cowlitz watershed would decrease by 0.35 mile.

Pedestrian Access

Under Alternative 6, the total number of pedestrians, with moderate increases in visitation projected (refer to Table 3.11-4), would be comparable to the existing condition, due to the presence of the new parking lot. However, compared to the existing condition, on peak days, proportionately more of the new guests would be able to park off the highway. Skiers parked on US 12 and those in the new parking lot would be able to access the new ticket booth, reducing the potential for pedestrian and vehicle conflicts, as well as the amount of time and distance walking along US 12.

3.12.3.5 Alternative 9

US 12

Under Alternative 9, visitation at White Pass is projected to increase by approximately 6,000 the first year after construction of the in-fill facilities, followed by a 1 percent annual growth rate, which is lowest among the Action Alternatives (refer to Section 3.10 – Social and Economic Factors and Section 3.11 – Recreation). The CCC would increase from 2,670 to 3,280. Impacts on LOS and traffic volumes would be less than the other Action Alternatives due to the comparatively lower increase in visitation and capacity, resulting in approximately 170 additional cars on US 12 during a peak day.

Parking

Parking under Alternative 9 would be similar to Alternative 6, although the CCC would be less than the parking capacity. With the existing ability to park 2,890 guests, the additional parking area would allow for approximately 3,672 guests in total. With a CCC of 3,280 (refer to Table 3.12 FEIS1), parking would accommodate capacity visitation at White Pass. Alternative 9 would address pedestrian/vehicle conflicts in a manner that is similar to Alternative 6.

Roads

No new road construction would take place under Alternative 9. Road mileage and density would remain unchanged from the existing condition (refer to Table 3.12-2).

Pedestrian Access

With additional parking lots at White Pass, Alternative 9 would allow more users to park in the base area, thereby reducing the number of cars along US 12, as compared to Alternative 1. As a result of the new parking lot construction, guests who park along US 12 and those in the new parking lot would have improved access to the new ticket booth. Overall, this Alternative would lower the potential for vehicle/pedestrian conflicts as compared to Alternatives 1 or 2.

3.12.4 Cumulative Effects

A cumulative effects analysis was performed for each watershed within the White Pass Study Area for transportation, which is the US 12 corridor from Naches to Packwood. Past, present and reasonably foreseeable projects occurring within each watershed area are included in the analysis. Within the discussions below, cumulative impacts to transportation are considered for short-term and long-term impacts. The cumulative effects on transportation include an increase in the scenic quality of the US 12 corridor (a scenic byway), an increased volume of vehicles utilizing US 12, and a reduction of LOS from B to C.

A list of past, present and reasonably foreseeable projects occurring within the Upper Clear Fork Cowlitz River watershed (refer to Table 3.12-3) and the Upper Tieton River watershed (refer to Table 3.12-4) that affect transportation are presented below. For a description of project actions, refer to Tables 3.0-FEIS1 and 3.0-FEIS2 in Section 3.0.

Table 3.12-3:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Project in the Upper Clear Fork Cowlitz River Watershed on Transportation

Project Number	Project Name	Cumulative Effects
UCFC-3a	Palisades Scenic Viewpoint Project	The 2-acre Palisades Scenic Viewpoint was reconstructed in 2005, resulting in an increase in the scenic quality of US 12, a scenic byway. The effects of this project overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the long-term increase in scenic quality of US 12, a scenic byway.
UCFC-3b	Palisades Scenic Viewpoint Project Vegetation Mgmt	Approximately 1 acre of trees will be treated to improve the view from the Palisades Scenic Viewpoint, and will result in an increase in the scenic quality along US 12. The effects of this project overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in long-term scenic quality of US 12, a scenic byway.
UCFC-4	Mt Rainier/Goat Rocks Scenic Viewpoint	Approximately 0.75 acre of trees will be treated to highlight views of Mt. Rainier, resulting in an increase in the scenic quality along US 12. The effects of this project overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in the long-term scenic quality of US 12, a scenic byway.
UCFC-12	Rockfall Mitigation (between mileposts 143 and 149)	Removal of debris and slope stabilization on a rockfall slope resulted in an increase in the scenic character of the US 12 corridor. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in the long-term scenic quality of US 12, a scenic byway.

Table 3.12-3:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Project in the Upper Clear Fork Cowlitz River Watershed on Transportation

Project Number	Project Name	Cumulative Effects
UCFC-13	Highway 12 Paving Project (between Mile Posts 140.3 to 151.2)	Resurfacing on US 12 in 2004 resulted in an increase in the scenic character of the US 12 corridor by providing a new road surface along the scenic byway. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in the ability of US 12 to provide a travel experience expected of a scenic byway.
UCFC-14	Unstable Slope Repair Projects (between mileposts 145.61 and 145.77)	Unstable slope repair on US 12 will result in an increase in the scenic character of the US 12 corridor. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in the ability of US 12 to provide a travel experience expected of a scenic byway.
UCFC-15	Unstable Slope Repair Projects (between mileposts 141.8 and 144.4)	Unstable slope repair on US 12 will result in an increase in the scenic character of the US 12 corridor. Implementation of this project will overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the increase in the ability of US 12 to provide a travel experience expected of a scenic byway.
UCFC-16	Highway 12 Hazard Tree Removal	Hazard tree removal along the US 12 corridor will result in an increase in the scenic character of the US 12 corridor. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will maintain the cumulative increase in the ability of US 12 to provide a travel experience expected of a scenic byway.

Table 3.12-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Transportation

Project Number	Project Name	Cumulative Effects
UT-11	Clear Creek Overlook Reconstruction	The 1-acre Clear Creek Scenic Overlook will result in an increase in the scenic quality along US 12. The effects of the project will overlap spatially with the White Pass Study Area for transportation (US 12 corridor from Packwood to Naches). Temporally, the effects of the Clear Creek Overlook construction overlap with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in the long-term scenic quality of US 12, a scenic byway.

Table 3.12-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Transportation

Project Number	Project Name	Cumulative Effects
UT-19	Highway 12 Hazard Tree Removal	Hazard tree removal along the US 12 corridor will result in a maintenance of the scenic character of the US 12 corridor. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will cumulatively increase the ability of US 12 to provide a travel experience expected of a scenic byway.
UT-26	Highway 12 Rock Stabilization (at Mile Post 155)	Removal of debris and slope stabilization on a rocky side slope will result in an increase in the scenic character of the US 12 corridor. The effects of implementation of this project will overlap spatially with the White Pass Study Area for transportation (US 12). Temporally, the project overlaps with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in the ability of US 12 to provide a travel experience expected of a scenic byway.
UT-27	Highway 12 Rock Stabilization (at Mile Post 155)	Emergency repair of US 12 due to road washout in 2002 resulted in an increase in the scenic character of the US 12 corridor. The effects of this project will overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in the ability of US 12 to provide a travel experience expected of a scenic byway.
UT-33	Highway 12 Paving project (between Mile Posts 151.2 and 159)	Resurfacing on US 12 in 2004 resulted in an increase in the scenic character of the US 12 corridor by providing a new road surface along the scenic byway. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the increase in the scenic quality of US 12.
UT-34	Unstable Slope Repair Projects (between Mile Posts 156.32 and 156.56)	Unstable slope repair on US 12 resulted in an increase in the scenic character of the US 12 corridor. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in the ability of US 12 to provide a travel experience expected of a scenic byway.
UT-35	Unstable Slope Repair Projects (between Mile Posts 161.93 and 165.02)	Unstable slope repair on US 12 will result in an increase in the scenic character of the US 12 corridor. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in the ability of US 12 to provide a travel experience expected of a scenic byway.

The long-term, cumulative effect of the projects listed in the tables above, combined with the White Pass expansion, is an increase in the scenic quality of US 12, a scenic byway, due to the improvement of views and maintenance of visual quality along the corridor.

As described in Section 3.10 – Social and Economic Factors, ongoing economic development strategies along the US 12 corridor include:

Lewis County/Packwood

- Overall Economic Development Plan for Cowlitz and Lewis Counties (CWCOG &LCEDC, 1997)
- Lewis County Industrial Needs Analysis (E.D. Hovee & Company, 1997)
- Packwood Community Action Plan (E.D. Hovee & Company, 1999)
- Northwest Economic Adjustment Initiative Assessment – Packwood, Lewis County, Washington (NWAIA, 2000)
- Lewis County Profile (Washington State Employment Security, 2001)
- Draft USDA Forest Service Packwood Work Center Utilization Analysis (Dean Runyan Associates, 2004)

Yakima County/Naches

- Naches, Washington 1993 Community Development Plan (Pacificorp, 1993)
- Town of Naches – Land Use Element (Town of Naches, 1995)
- Plan 2015 – A Blueprint for Yakima County Progress. Chapter IV – Economic Development Element (Yakima County, 1997)

US 12 Corridor

- US 12 Corridor Charette (USDI-NPS 2002)
- White Pass Scenic Byway Corridor Management Plan (Lewis County, Gifford Pinchot National Forest and Okanogan-Wenatchee National Forests - draft, unpublished manuscript on file)

The most comprehensive of the published strategies is the US 12 Corridor Charette (USDI-NPS 2002). This document is the third in a series of studies that focus on the corridors leading to Mount Rainier. The document identifies the importance of gateway communities, such as Packwood and Naches, in the pursuit of shared regional goals.

While none of the strategies outlined in the US 12 Corridor Charette are known to be in a formal proposal, several relevant planning efforts are identified. These include the White Pass Scenic Byway Corridor Management Plan (draft, unpublished), which evaluates byway resources, provides design guidelines for visitor services, and proposes site enhancements along US 12. This plan, currently in draft form, focuses on improving the highway corridor as a destination for recreational travelers, and finding ways for tourism to contribute more to local economies. Directly relating to the transportation effects of White Pass, the US 12 Corridor Charette (USDI-NPS 2002) also identifies an opportunity for Packwood hotels to jointly sponsor a shuttle service to White Pass, as well as the potential for the development of a public parking area in Naches that could serve as a recreational staging area, providing shuttles to and from White Pass during the winter. While these planning efforts could impact transportation issues within the White Pass Study Area, these initiatives have not been identified as reasonably foreseeable for inclusion in Tables 3.0-FEIS1 and 3.0-FEIS2 as of publication of this FEIS.

The ADT and LOS projections through 2017, as described under Alternative 1, both include and provide opportunities for the strategic development of transportation and economic development projects along the US 12 corridor, including the expansion of White Pass. Therefore, the White Pass expansion has been incorporated in the long-term planning and projections for the US 12 corridor. As a result, the White Pass expansion would not result in additional cumulative impacts on traffic along US 12, other than those accounted for in background highway use projections. In conjunction with population growth and other increased uses along US 12, the White Pass expansion would cumulatively contribute to increased volumes and a reduction in LOS from B to C.

In summary, cumulative effects to transportation from the White Pass expansion, coupled with the effects of past, present and reasonably foreseeable projects listed in Tables 3.12-3 and 3.12-4, include an increase in traffic volumes along US 12, and a LOS reduction from B to C. However, the scenic quality of US 12 as a scenic byway will improve due to frequent improvements and maintenance.

3.13 UTILITIES AND INFRASTRUCTURE

3.13.1 Introduction

The following section describes the existing utilities and infrastructure within the White Pass Study Area (refer to Figure 1-4). For the purposes of this analysis, utilities are discussed under the following categories: structures, lifts, power, communications, water, and wastewater treatment.

3.13.2 Affected Environment

3.13.2.1 Structures

Refer to Figure 1-4 for the spatial arrangement of existing facilities.

Day Lodge: The White Pass day lodge was reconstructed over an existing day lodge during the 1969-70 construction season, with a major addition in 1988. During the summer of 2003, White Pass added approximately 2,000 square feet and 180 additional restaurant seats to the lodge in response to increasing visitation (refer to Section 3.11 – Recreation). The lodge, with three floors covering 22,000 square feet, is wood timber framed with stucco siding and a concrete foundation with stone veneer. The main floor (center) houses the cafeteria and provides most of the seating capacity. A 3,500-square foot outdoor deck is accessed off this floor.

Upper Maintenance Shop: This structure was constructed in 1966 and is used for lift, vehicle, and area maintenance support, employee lockers, and the mountain operations office. The building includes 1½ floors with 1,100 square feet dedicated to maintenance and 800 square feet for employee services.

Lower Maintenance Shop: The “Lower Shop” was purchased from the State of Washington and moved across the street to the ski area when WSDOT relocated their operations one-half mile west of the summit in 1976. The main snow grooming fleet is housed within this 3,200-square foot steel frame building.

Mountain Manager Residence: South of the maintenance shop and closer to the ski slopes is the three-story 3,400-square foot mountain manager residence.

General Manager’s Residence: This 1,200-square foot, 1.5 story structure is located near the Nordic system trailhead. It was constructed in 1998.

Ticket Booth: All lift ticket sales and ski school sales are handled from this 400-square foot structure with six point-of-purchase sales windows located between the day lodge and Chair 1 (*Great White Express*).

Guest Resort Complex: The Village Inn and Summit House is a 59-unit condominium complex located within the SUP area, on the north side of US 12. The condominium complex has the capacity to sleep 250. The Village Inn, developed in 1965-66, consists of 56 units in four buildings and a heated swimming pool. The Summit House, consisting of three units in one building, replaced the Ski View restaurant in 2000.

Yurts: In 2001, White Pass installed a 30-foot diameter yurt with a deck and flush toilet at the Nordic center to provide facilities for Nordic skiers. In 2002, a similar yurt and composting toilet were installed along the Quail trail to provide facilities for skiers in the *Paradise* pod.

Kracker Barrel Convenience Store: Located adjacent to the east end of the condominium complex, this structure was constructed as a general store and service station in 1965-66. In 1980, a second story was added for employee housing and in 1995, the two service bays were removed and building remodeled to include minor food service and indoor seating. The building has 3,200 square feet on the main floor and 1,900 on the second. An 850-square foot canopy provides shelter for two gasoline pumps and entry cover to the store.

Ski Clubs: Two ski clubs are present at White Pass. The Yakima Valley Ski Club is located in the base area, adjacent to the bottom terminal of *Lower Cascade*. The 2,000-square foot Yakima Valley Ski Club lodge was renovated in 2003. The recent renovations reduce a members need to load and haul equipment back and forth to the mountain each trip due to new oversized ski lockers. The locker area located in the lodge is heated and offers wall to wall carpeting. The Olympic Ski Club is located to the west of the base area facilities. These clubs operate under separate SUPs with the Forest Service.

3.13.2.2 Lifts

The existing chairlifts at White Pass include one high speed quad - Chair 1 (*Great White Express*), a triple – Chair 3 (*Lower Cascade*), and two doubles – Chair 2 (*Pigtail*) and Chair 4 (*Paradise*), as well as a surface tow – (*Platter*). Chairs 1 and 2 provide access to the summit, while Chair 3 and the Surface lift cater to beginners and include a teaching area. Chair 4 accesses the majority of intermediate terrain; however, this lift may only be reached from the summit of the mountain. Chairs 2 and 4 are top drive while chairs 1 and 3 are bottom drive. All lifts have auxiliary backup, generators with fuel storage tanks located above ground. Additional lift information and specifics are provided in Table 3.13-1.

Table 3.13-1:
Existing White Pass Lift Specifications

Lift Name	Lift Type	Vert. Rise	Horiz. Length	Slope Length	Hourly Capacity
		(ft.)	(ft.)	(ft.)	(pph)
1. Great White Express	Det. Quad	1,521	4,814	5,125	2,100
2. Pigtail	Double	1,493	4,628	4,987	900
3. Lower Cascade	Triple	510	2,166	2,232	1,800
4. Paradise	Double	712	2,675	2,804	1,200
5. Platter	Platter lift	66	512	517	400

3.13.2.3 Power

Electric power is provided by Benton Rural Electric Association (REA) via lines coming from the east. The transformer capacity is 2,970 kW; however, the existing line is not capable of delivering more than 1,550 kW to the summit. At some point during the expansion, electrical power needs would exceed this capacity and new, higher capacity lines would need to be constructed. Based on recent experience, it appears technically feasible to utilize the existing powerline corridor with upgraded conductors and utility poles.

In addition, the day lodge, maintenance shops, mountain manager's residence, and waste treatment facilities are served by a backup auxiliary 125 kW diesel powered generator. Within the existing SUP area, power to chairs 2 and 4 has been installed in the underground access road to the top of the mountain (refer to Figure 2-1). Chair 1 is adjacent to the main line and transformer, and Chair 3 and the platter are provided power from a spur from the main line.

3.13.2.4 Communications

Telephone services are provided by Century Tel. Relay stations are located within the White Pass SUP area, but do not interfere with daily operations.

3.13.2.5 Water

The water supply for White Pass is a tapped spring above the base area at an elevation of 5,200-feet, which provides water for the entire complex. Built into the domestic water system is a 52,000-gallon water storage tank with 350 gallons per minute recovery for fire protection (refer to Figure 1-4). A Certificate of Water Right from the WDOE approves the withdrawal of this water (WDOE 1976). During the 1996-97 season (Dec. 20 to March 16), the average peak weekend and holiday water use was 9,195 gallons/day (5 percent of capacity) for 1,870 skier visits, or an average of 4.92 gallons per visitor. On the highest visitor day use on record (2,949 skier visitors), 12,561 gallons were used (4.26 gal/visitor/day).

3.13.2.6 Wastewater

The ski area wastewater system was built between 1982-84 and includes both a 26,690-gallon septic tank and two separate drainfield halves, with a capacity of 12,000 gallons per day (GPD). There are two primary drainfields covering 16,300 square feet and one reserve drainfield covering 2,500 square feet. The septic tank capacity is 16,500 GPD. The system's overall design capacity is 12,000 GPD, and the current peak use of the treatment system is approximately 9,200 GPD (McCarthy 2005). In the event of a power outage, the base area diesel generator powers the primary wastewater system.

The resort area system on the north side of US 12 was rebuilt in 1991-92 and includes three levels of treatment: septic tank, re-circulating gravel filter (RGF) and drainfield. The total volume of the septic tanks is 24,570 gallons. The RGF consists of a 12,000 gallon re-circulating tank and a 4,000-square foot gravel filter. There are two primary drainfields covering 11,310 square feet and one emergency gravity-fed reserve drainfield covering 1,567 linear feet.

The operation and maintenance of these utilities requires White Pass to be in compliance with State and Federal laws and regulations. Wastewater treatment systems with capacities of less than 14,500 GPD, such as the current system at White Pass, are regulated by local county health departments (in this case, the Yakima County Department of Health), while larger wastewater treatment systems fall under the jurisdiction of WDOE (Kennedy, pers. comm.). Compliance with applicable laws and regulations is currently being met and is expected to continue into the foreseeable future.

3.13.2.7 Roads

The White Pass Study Area contains 6.6 miles of roads, all within the existing SUP area, including 6.2 miles of native surface roads (refer to Table 3.3-2). This road system provides access to the lifts and other upper-mountain facilities for White Pass maintenance personnel. The majority of the roads realize several vehicle trips per year. A total of 28 stream crossings (18 culverts and 10 fords – Table 3.3-2) require annual inspections and the road system requires annual inspection under the annual operating plan. Refer to Sections 3.2 – Geology and Soils and 3.3 – Watershed Resources for detailed description of the effects of roads and stream crossings.

3.13.3 Environmental Consequences

3.13.3.1 Alternative 1

Under Alternative 1, utilities and infrastructure would remain as described for the affected environment. The existing infrastructure would be sufficient to accommodate the projected growth in visitation at White Pass.

3.13.3.2 Alternative 2

Structures

Under Alternative 2, the existing structures would remain as described for Alternative 1. The proposed mid-mountain lodge would be located between the two new proposed chairlifts. The two-story lodge would have a 2,000-square foot building footprint. This building would provide guest seating for 150 people, limited food service, and composting toilets. As a result, the number of buildings in the White Pass SUP area would increase by one, and White Pass would be able to provide guest services at a mid-mountain location.

Lifts

Alternative 2 includes two new lifts, Chair 6 (*Basin)* and Chair 7 (*Hogback Express*) in Pigtail and Hogback Basins. Both of the proposed lifts would be quads. However, Chair 6 would utilize fixed grip technology while Chair 7 would be a high-speed detachable quad. Table 3.13-2 presents the lift system under Alternative 2. The lift installation would increase the uphill capacity at White Pass by 4,800 people per hour. The effect of the lifts on the ski experience is provided in Section 3.11 – Recreation.

Table 3.13-2:
White Pass Lift Specifications under Alternative 2

Lift Name	Lift Type	Vert. Rise	Horiz. Length	Slope Length	Hourly Capacity
		(ft.)	(ft.)	(ft.)	(pph)
1. Great White Express	Det. Quad	1,521	4,814	5,125	2,100
2. Pigtail	Double	1,493	4,628	4,987	900
3. Lower Cascade	Triple	510	2,166	2,232	1,800
4. Paradise	Double	712	2,675	2,804	1,200
5. Platter	Platter lift	66	512	517	400
6. Basin	Quad	617	3,497	3,560	2,400
7. Hogback Express	Det. Quad	867	4,041	4,162	2,400

Power

Under Alternative 2, the power demand in the White Pass Study Area would increase to 4,000 kW to serve the two proposed lifts and the mid-mountain lodge. **The existing Benton REA powerlines and transformer would be upgraded, either with additional powerline poles and/or with larger capacity conductors, all within the existing powerline corridor to accommodate the increased demand.** Power for the new lifts and lodge would be buried underground from the existing line near Chair 1, within the limits of proposed ski trails, with aerial crossings over streams.

Communications

Alternative 2 includes the installation of communication lines from the existing utility network on the mountain to the proposed expansion area in Hogback Basin. **Communication would be installed along existing and proposed ski trails in the same trench with power to minimize temporary ground disturbance when possible.** Communication lines would be installed between the top and bottom terminals of Chair 6 and Chair 7, as well as to the proposed mid-mountain lodge. The communications infrastructure would meet the needs of White Pass under Alternative 2.

Water

Under Alternative 2, potable water usage at the mid-mountain lodge would total approximately 225 gallons per day (McCarthy 2005). Potable water would be supplied by transporting water by snowcat in sanitized tanks to a 2,000-gallon sanitized storage tank at the mid-mountain lodge. A separate, 10,000 gallon water tank for fire protection would also be installed. Snowcats can transport approximately 500 gallons of water per trip, therefore requiring four trips to fully replenish the storage tank at the mid-mountain lodge for daily use. Water for both storage tanks would be transported from the base area. During times of peak visitation, it is anticipated that water would need to be transported every other day to adequately meet demand. However, under typical skier operation, it is anticipated that water replenishment would only need to occur twice weekly. **This method of water supply to the mid-mountain lodge would require a commitment of a snowcat and operator on a routine basis during the ski season, as compared to supplying the water through a well or pipeline (refer to Modified Alternative 4).**

Table 3.13-3 presents water demand under each alternative. Under Alternative 2, on a peak day (110 percent of CCC), water demand would increase from 12,561 gal/day (24 percent of capacity) to 23,001 gal/day (44 percent of capacity). This increased demand would be well below the storage capacity of 52,000 gallons.

Table 3.13-3:
White Pass Water Demand

Parameter	Alt. 1	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9
CCC	2,670	4,250	3,800	3,640	3,280
Peak Day[a]	2,949[1]	4,675	4,180	4,004	3,608
Peak Demand (gallons/day)[b]	12,561[1]	23,001	20,566	19,700	17,751
Average Demand (gallons/day)[c]	13,136	20,910	18,696	17,909	16,138
Gallons/user	4.92	4.92	4.92	4.92	4.92
% Capacity[d]	24%	44%	40%	38%	34%

[a] Based on highest skier visitation day measurements (refer to Section 3.13.2.5 – Water).
[b] For all except Alternative 1, Peak demand was calculated by multiplying Peak Day CCC by 4.92 (average water demand per skier based on measured current conditions).
[c] Calculated by multiplying CCC by 4.92 (average water demand per skier from existing conditions).
[d] Storage capacity is 52,000 gallons

Wastewater

Restroom facilities at the mid-mountain lodge would be provided by composting toilets, which generate little to no wastewater. Gray water (i.e., kitchen wastewater) and occasionally, liquid from the composting toilets would be disposed by using a RGF system, similar to the existing systems at White Pass, comprised of two septic tanks and drainfields. This system would provide secondary treatment. Capacities of the septic tanks would be sized to adequately accommodate water consumption at the lodge. The drainfield for the lodge would be approximately one-quarter acre in size and located down-slope of the lodge site, within the 50-foot building envelope for the lodge. Brazil (2004) indicates that the soils in the vicinity of the proposed lodge would provide excellent treatment and disposal of wastewater.

With increased water demand associated with the increased skier capacity at White Pass, the demand for wastewater treatment would increase. Under Alternative 2, the chairlifts in Pigtail/Hogback Basin would support a CCC of 1,580, or a peak use of 1,738 skiers at one time (refer to Appendix B). **Assuming 4.92 gallons per skier (as with water demand in Table 3.13-3), the wastewater treatment demand at the mid-mountain lodge would be the equivalent of 8,551 gallons per day if conventional flush toilets**

were used. However, the use of composting toilets would reduce this demand to approximately 225 gallons per day (refer to Section 3.13.3.2).

Table 3.13 FEIS1, presents total and base area wastewater treatment demand under each Action Alternative at peak CCC (110 percent of CCC).

Table 3.13 FEIS1:
Approximate White Pass Ski Area Wastewater Treatment Demand

Parameter	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9
CCC (Skiers)	4,250	3,800	3,640	3,280
Peak CCC (Skiers)[a]	4,675	4,180	4,004	3,608
Peak Base CCC[b]	2,937	2,937	2,937	3,608
Total Peak Wastewater Generation (gallons/day)[c]	23,001	20,566	19,700	17,751
Base Ski Area Wastewater Generation (gallons/day)[d]	14,450	14,450	19,700[e]	17,751[f]

[a] Peak usage suggested at 110 percent of CCC as per Appendix B – Mountain Plan Specifications.
[b] Peak Base CCC was calculated by subtracting Peak Hogback CCC from Peak (total) CCC.
[c] Skier wastewater usage is assumed to be 4.92 gallons/day (based on current average usage). Peak wastewater generation was calculated by multiplying Peak CCC by 4.92 gallons/day.
[d] Base ski area wastewater generation was calculated by multiplying Peak Base CCC by 4.92 gallons/day.
[e] Under Alternative 6, no composting toilets are used in the Hogback and wastewater from the mid-mountain lodge would be piped to the base area (refer to Section 3.13.3.4 – Alternative 6).
[f] Under Alternative 9, wastewater from the mountain-top lodge would be piped to the base area (refer to Section 3.13.3.5 – Alternative 9).
Note: Wastewater treatment demand under Alternative 1 is 9,200 GPD (McCarthy 2005).

The remaining 2,937 peak day skiers would generate approximately 14,450 gallons of wastewater in the base area, which is above the 12,000-gallon flow capacity of the existing wastewater treatment system. Therefore, the existing wastewater treatment facility would be upgraded to accommodate the increased visitation under Alternative 2. Upgrades to the sewage treatment system may include equalization and/or addition of a drainfield. For equalization, one or more tanks, would be installed underground in a previously-disturbed area immediately west of the existing day lodge, requiring disturbance of approximately 0.05 acre of ground for installation. During low-use periods, wastewater would be pumped from the storage tanks to the septic tanks and into the wastewater treatment system. Meanwhile, if an upgrade of the drainfield was required, the upgrade would be installed near the existing drainfield and parking lot and disturb approximately 0.03 acre.

Roads

Under Alternative 2, no new roads would be developed in the White Pass Study Area. All transport of construction equipment or materials would be limited to helicopter transport, transport over the snow, or use of low-impact equipment over the ground, with a focus on minimizing the number of entries needed (refer to Table 2.4-1). **No road construction would be required. Maintenance of lifts and buildings would include access over the snow during the spring and/or the use of all-terrain vehicles during**

the summer and fall.[50] In the proposal to the Forest Service, White Pass has indicated that this limited access, with no roads, would be sufficient for construction and maintenance. Therefore, Alternative 2 would maintain the current network of 6.6 miles of roads.

3.13.3.3 Modified Alternative 4

Structures

Under Modified Alternative 4, the proposed mid-mountain lodge would be a two-story building with a 2,000-square foot building footprint, including composting toilets. This building would have guest seating for 150 people, limited food service, and restroom facilities, as described for Alternative 2. A ticket booth would be constructed adjacent to the Yakima Ski Club building in association with a new 7-acre parking lot. The wooden structure would have a building footprint of 400 square feet and would include a composting toilet. As a result, the number of buildings in the White Pass SUP area would increase by two, and White Pass would be able to provide guest services at a mid-mountain location, similar to Alternative 2. In addition, the composting toilet adjacent to the proposed ticket booth would provide restroom access for those skiers in the eastern portion of the base area.

Lifts

Lifts for Modified Alternative 4 would be the same as described under Alternative 2, except the *Basin* lift would be a triple rather than a quad (refer to Figure 2-4). Table 3.13-4 presents the specifications for chairs 6 and 7 under Modified Alternative 4. The lift installation would increase the uphill capacity at White Pass by 3,600 people per hour. The effect of the lifts on the ski experience is provided in Section 3.11 – Recreation.

Table 3.13-4:
Chair 6 and 7 Lift Specifications under Modified Alternative 4

Lift Name	Lift Type	Vert. Rise	Horiz. Length	Slope Length	Hourly Capacity
		(ft.)	(ft.)	(ft.)	(pph)
6. Basin	Triple	617	3,497	3,560	1,800
7. Hogback Express	Det. Quad	867	4,041	4,162	1,800

Power

Under Modified Alternative 4, the power demand within the White Pass Study Area would be as described for Alternative 2, except that distribution to the lift terminals would be revised according to the terminal locations under Modified Alternative 4 (refer to Figure 2-5). The Benton REA would provide sufficient power through larger conductors and a larger transformer, as described for Alternative 2.

[50] Under Forest Service Manual 7705, a road is defined as "A motor vehicle travelway over 50 inches wide, unless designated and managed as a trail."

Communications

Under Modified Alternative 4, the effects to communications infrastructure in the White Pass Study Area would be as described for Alternative 2, except that distribution to the lift terminals would be revised according to the terminal locations under Modified Alternative 4 (refer to Figure 2-5). The communications infrastructure would continue to meet the needs of White Pass under Modified Alternative 4.

Water

Under Modified Alternative 4, on a peak day (110 percent of CCC), water demand would increase from 12,561 gal/day (24 percent of capacity) to 20,566 gal/day (40 percent of capacity), as shown in Table 3.13-3. In Modified Alternative 4, a waterline would be constructed from the base area to provide a water supply for the mid-mountain lodge. The waterline would be buried with power and communication lines, utilizing aerial crossings over streams. The aerial crossings would involve a rigid, insulated conduit and anchor bracing to hold the structure in place and provide resistance against snowpack. The installation of a waterline would be an extensive utility project when compared to the snowcat transportation of water described under Alternative 2. If the installation of a waterline is determined to be detrimental to resources or economically unfeasible, an on-site well would be drilled to provide a water supply for the proposed mid-mountain lodge.

If the well were 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 withdrawal would be approximately 225 gallons/day for potable use by the guests of the mid-mountain lodge. The well would be located upslope of the mid-mountain lodge, within the 50-foot building envelope surrounding the lodge, and would meet all construction and notice requirements of WAC 173-160 (1998). The operation and maintenance of this utility requires White Pass to be in compliance with State and Federal laws and regulations. Compliance with applicable laws and regulations is currently being met and is expected to continue into the foreseeable future. The well would be developed to provide water for 25 or more different people each day for 60 or more days within a calendar year, and authorization would be obtained as a Group A public water supply from the Washington State Department of Health under WAC 246-290 (WAC 2004a; Kennedy, pers. comm.). Additionally, the well water would be required to comply with state drinking water quality standards (WAC 2004b). **With proper maintenance, the operation of a well near the mid-mountain lodge would provide the most reliable source of water for potable and fireflow uses, with the least amount of infrastructure, due to the proximity to the 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 withdrawal and surface disposal of grey water through a septic drainfield (refer to Section 3.3 – Watershed Resources). In addition, the comparatively higher cost of pumping water from the base area to the lodge would make a waterline less desirable than an onsite well. Evaluation of both water supply systems for the lodge site allows for selection of the least environmentally damaging system at the time of construction.

Wastewater

Wastewater treatment and disposal under Modified Alternative 4 would be the same as Alternative 2, although the total demand for wastewater treatment would be slightly lower. Under Modified Alternative 4, the chairlifts in the Pigtail/Hogback Basin would support a CCC of 1,130, or a peak use of 1,243 skiers at one time (refer to Appendix B). **Assuming 4.92 gallons per skier (as with water demand in Table 3.13-3), the wastewater treatment demand at the mid-mountain lodge would be the equivalent of 6,116 gallons per day if conventional flush toilets were used (refer to Table 3.13 FEIS1). However, the use of composting toilets would reduce this demand to approximately 225 gallons per day. Secondary wastewater treatment would be as described for Alternative 2.**

The remaining 2,937 peak day skiers would generate approximately 14,450 gallons of wastewater in the base area each day, which is above the 12,000 gallon flow capacity of the existing wastewater treatment system. Therefore, as described under Alternative 2, the existing wastewater treatment facility would be upgraded to accommodate the increased visitation under Modified Alternative 4. Upgrades to the sewage treatment system may include equalization and/or addition of a drainfield. For equalization, one or more tanks would be installed underground in a previously-disturbed area immediately west of the existing day lodge, requiring disturbance of approximately 0.05 acre of ground for installation. During low-use periods, wastewater would be pumped from the storage tanks to the septic tanks and into the wastewater treatment system. Meanwhile, if an upgrade of the drainfield was required, the upgrade would be installed near the existing drainfield and parking lot and disturb approximately 0.03 acre. Additionally, the proposed composting toilet adjacent to the proposed ticket booth in the eastern portion of the base area would decrease the demand for wastewater treatment at the base area.

Roads

Under Modified Alternative 4, no new roads would be developed in the White Pass Study Area. All transport of construction equipment or materials would be limited to helicopter transport, transport over the snow, or use of low-impact equipment over the ground, with a focus on minimizing the number of entries needed (refer to Table 2.4-1). **No road construction would be required.** Maintenance of lifts and buildings would include access over the snow during the spring and/or the use of ATVs during the summer and fall. As described under Alternative 2, in the proposal to the Forest Service, White Pass has indicated that this limited access, with no roads, would be sufficient for construction and maintenance. Therefore, Modified Alternative 4 would maintain the current network of 6.6 miles of roads.

3.13.3.4 Alternative 6

Structures

Under Alternative 6, a ticket booth with composting toilet would be constructed near the Yakima Valley Ski Club, as described for Modified Alternative 4. Additionally, a two-story, mid-mountain lodge would be constructed along the existing Quail trail at the intersection with the proposed egress trail from the Chair 6 (*Basin*) pod. The footprint of the proposed lodge would be 2,000 square feet. This building would have guest seating for 150 people, limited food service, and restroom facilities, similar to Alternative 2. As a result, the number of buildings in the White Pass SUP area would increase by two, and White Pass would be able to provide guest services at a mid-mountain location. In addition, the composting toilet adjacent to the proposed ticket booth would provide restroom access for those skiers in the eastern portion of the base area.

Lifts

Alternative 6 includes Chair 6 (*Basin*) in Pigtail Basin (the eastern portion of the expansion area), in the same alignment as described for Alternative 2 and Modified Alternative 4 (refer to Figure 2-6). Unlike Alternative 2 or Modified Alternative 4, this lift would be installed as a detachable quad (refer to Table 3.13-2). The lift installation would increase the uphill capacity at White Pass by 2,400 people per hour. The effect of the lift on the ski experience is provided in Section 3.11 – Recreation.

Power

The power demand in the White Pass Study Area would increase to 3,500 kW to service Chair 6 and the mid-mountain lodge. The existing Benton REA powerlines would be upgraded with larger capacity conductors and transformers within the existing powerline corridor to accommodate the increased demand, as described under Alternative 2. Power for this lift and lodge would be buried underground, beginning at the current powerline near Chair 1, and within the limits of proposed ski trails, with aerial crossings over streams.

Communications

Alternative 6 communications infrastructure would be as described for Alternative 2, except that the system would serve only Chair 6 and the mid-mountain lodge, which would be located along the existing Quail trail. The communications infrastructure would continue to meet the needs of White Pass under Alternative 6.

Water

Water would be transported to the mid-mountain lodge from the existing water system through the installation of a supply line following the existing access road to the bottom terminal of Chair 4 along the Main Street and Quail trails.

Under Alternative 6, on a peak day (110 percent of CCC), water demand would increase from 12,561 gal/day (24 percent of capacity) to 19,700 gal/day (38 percent of capacity), as shown in Table 3.13-3.

Wastewater

Wastewater generated from the mid-mountain lodge would be piped to water treatment facilities in the base area. In order to minimize grading impacts associated with installation of the pipeline, both sewer and water would be installed in the same roadway. Installation of these lines would comply with County and State regulations for separation (typically 15 feet of horizontal separation).

With the existing overall design capacity of the ski area wastewater treatment system of 12,000 GPD, the demand for wastewater treatment (approximately 19,700 GPD) would exceed the capacity of the wastewater treatment facilities at White Pass (refer to Table 3.13 FEIS1). As such, White Pass would be required to upgrade the existing sewage treatment system by equalization and/or adding a drainfield. For equalization, White Pass would install storage tanks to hold wastewater during peak periods. One or more tanks, totaling approximately 8,000 to 15,000 gallons, would be installed underground in the previously disturbed area immediately west of the existing day lodge, requiring disturbance to approximately 0.05 acre of ground for installation. During low-use periods, wastewater would be pumped from the storage tanks to the septic tanks and into the wastewater treatment system. Meanwhile, if an upgrade of the drainfield was required, the upgrade would be installed near the existing drainfield and parking lot and disturb approximately 0.03 acre. Additionally, the proposed composting toilet adjacent to the proposed ticket booth in the eastern portion of the base area would decrease the demand for wastewater treatment.

Roads

Under Alternative 6, one new road, with a length of approximately 0.25 mile, would provide access to the bottom terminal of the *Basin* chairlift.[51] During construction, all construction materials and equipment would be transported to the bottom terminal site via the new road. For any construction activities above the bottom terminal site, all transportation of construction equipment or materials would be limited to helicopter transport, transport over the snow, or use of low-impact equipment over the ground, with a focus on minimizing the number of entries needed (refer to Table 2.4-1). Mitigation Measure MM11 details that the SWPPP would specify conditions under which 'over-the-ground' access would be allowed, in the event of low snow cover or poor snow conditions.

[51] This new permanent road would be constructed in the White Pass Inventoried Roadless Area, which is also in a Tier 2 Key Watershed (refer to Section 3.14 – Land Use). The Northwest Forest Plan (USDA and USDI 1994) Standards and Guidelines specifically prohibit this activity. Construction of the road would require a site-specific modification of the Standards and Guidelines, which would require a coordinated review by the Regional Interagency Executive Committee and Regional Ecosystem Office. If this road would be selected in the Decision on this EIS, the Decision could not be rendered until Regional Interagency Executive Committee concurs that such a modification to the Standards and Guidelines is consistent with the objective of the Standards and Guidelines. Such coordination has not take place as of the publication of this FEIS.

Maintenance of the *Basin* lift bottom terminal site would include vehicle access on the road, while the remaining lift maintenance would be carried out over the snow during the spring and/or using all-terrain vehicles during the summer and fall.

The new road would receive extensive use during construction. However, the mobilization of construction equipment and materials would still require "no-road" methods for all construction above the bottom terminal site. As such, the majority of construction would still be required to take place over the snow, with helicopters, or using low-impact equipment. Considering the added cost of constructing the road, it would likely not significantly benefit operations during construction, as compared to using other low-impact construction techniques, of the other Action Alternatives.

Similar to the existing road system, the new road would receive several vehicle trips per year for maintenance activities. With access to the bottom terminal of the lift, White Pass maintenance staff would be required to access the remaining facilities in the *Basin* pod in a manner similar to the other Action Alternatives (i.e., no road access). As a result, the overall maintenance utility of the road under Alternative 6 would be diminished, because the majority of the maintenance would be done over the snow, or using ATVs.

The new road would require four additional culverts. Both the road and the new culverts would require annual inspections under the annual operating plan. Refer to Section 3.2 – Geology and Soils and Section 3.3 – Watershed Resources for detailed description of the effects of roads and stream crossings.

In order not to increase the mileage of roads in the Clear Fork Cowlitz Tier 2 Key Watershed, obliteration of 0.6 mile of Road 1284.016, an existing native surface road located approximately one mile northwest of White Pass, would occur under Alternative 6. The road to be obliterated was originally constructed for timber harvest and is now in Late-Successional Reserve. The road segment to be obliterated is at an operational maintenance level 1 and is proposed to remain at this level into the future. Construction of the new road would only take place after obliteration of the existing road, for a net loss of 0.35 mile of road in the watershed.

3.13.3.5 Alternative 9

Structures

A two-story mountain-top lodge would be constructed at the summit of Pigtail Peak, within the existing SUP boundary. The proposed lodge would be a 3,000-square foot, two-story wooden structure. This building would have guest seating for 150 people, limited food service, and restroom facilities. A ticket booth would also be constructed adjacent to the new parking lot, as described for Modified Alternative 4. As a result, the number of buildings in the White Pass SUP area would increase by two, and White Pass would be able to provide guest services at a mountain-top location. In addition, the composting toilet adjacent to the proposed ticket booth would provide restroom access for those skiers in the eastern portion of the base area.

Lifts

Alternative 9 includes the installation of Chair 6 (*PCT*), a fixed-grip triple lift, in the eastern portion of the SUP area. Table 3.14-5 presents the lift specifications for Chair 6 under Alternative 9. The lift installation would increase the uphill capacity at White Pass by 1,800 people per hour. The effect of the lift on the ski experience is provided in Section 3.11 – Recreation.

Table 3.13-5:
Chair 6 Lift Specifications under Alternative 9

Lift Name	Lift Type	Vert. Rise	Horiz. Length	Slope Length	Hourly Capacity
		(ft.)	(ft.)	(ft.)	(pph)
6. PCT	Triple	519	2,855	2,919	1,800

Power

A new powerline would be required for the proposed *PCT* lift. Power would be trenched from the base lodge to the bottom terminal on existing trails. A spur for power to the top terminal would be installed from the existing line in the road to the summit. **The power demand at White Pass would increase to approximately 3,500 kW, as described for Alternative 6, and the Benton REA would increase the capacity of the conductors and increase the transformer capacity on the powerline supply to White Pass, thereby providing sufficient power to meet the demand, as described under Alternative 2.**

Communications

A communication line from the base lodge would be buried in the same trench as power to minimize ground disturbance. In addition, a communication line would be buried between the mountain-top lodge and the existing Chair 1 (*Great White Express*). The communications infrastructure would continue to meet the needs of White Pass under Alternative 9.

Water

Water would be transported by pipeline from the existing water source at the base area to the mountain-top lodge via the access road to the summit. Installation would require trenching and burial at a depth of no less than 8 feet to prevent freezing.

Under Alternative 9, peak day (110 percent of CCC) water demand would increase from 12,561 GPD (24 percent of capacity) to 17,751 GPD (34 percent of capacity), as shown in Table 3.13-3. Water storage would be sufficient to supply the increased demand under Alternative 9.

Wastewater

Wastewater from the mountain-top lodge would be piped from the proposed lodge to the existing treatment facilities near the base area via the summit access road. Installation of these lines would comply with both County and State regulations for separation (typically 15 feet of horizontal separation).

The 3,608 peak day skiers would generate approximately 17,751 gallons of wastewater in the base area per day, which is above the 12,000 gallon flow capacity of the existing wastewater treatment system (refer to Table 3.13 FEIS1). Therefore, the existing wastewater treatment facilities would not be sufficient to accommodate the increased visitation through storage of the over-capacity flows under Alternative 9.

As projected sewage treatment demand under Alternative 9 would exceed the capacity of the wastewater treatment facilities at White Pass, White Pass would be required to install storage tanks to hold wastewater during peak periods and/or construct an additional drainfield. For equalization, one or more tanks, totaling approximately 6,000 to 10,000 gallons, would be installed underground in the previously disturbed area immediately west of the existing day lodge, requiring disturbance to approximately 0.05 acre of ground for installation. During low-use periods, wastewater would be pumped from the storage tanks to the septic tanks and into the wastewater treatment system. Meanwhile, if an upgrade of the drainfield was required, the upgrade would be installed near the existing drainfield and parking lot and disturb approximately 0.03 acre. Additionally, the proposed composting toilet adjacent to the proposed ticket booth in the eastern portion of the base area would decrease the demand for wastewater treatment.

Roads

Under Alternative 9, no new roads would be developed in the White Pass Study Area. All transportation of construction equipment or materials would be conducted on existing roads within the SUP area. **Therefore, Alternative 9 would maintain the current network of 6.6 miles of roads.**

3.13.4 Cumulative Effects

A cumulative effects analysis was performed for each watershed at the site scale (White Pass Study Area). Past, present and reasonably foreseeable projects occurring within each watershed area are included in the analysis. Identified projects with cumulative effects may include activities that are both inside and outside the White Pass Study Area, such as the fiber optics line, described below (UCFC-19). Within the discussions below, cumulative effect to utilities and infrastructure are considered for short-term and long-term impacts. The cumulative effect on utilities and infrastructure is an increase in demand for power, water, wastewater treatment, roads and buildings, and an improvement of the communications infrastructure and services within the White Pass Study Area.

A list of past, present and reasonably foreseeable projects occurring within the Upper Clear Fork Cowlitz River watershed (refer to Table 3.13-5) and the Upper Tieton River watershed (refer to Table 3.13-6) that affect utilities and infrastructure are presented below. For a description of project actions, refer to Table 3.0-FEIS1 in Section 3.0 – Introduction.

Table 3.13-5:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed on Utilities and Infrastructure

Project Number	Project Name	Cumulative Effects
UCFC-17	White Pass Ski Area Yurt Construction	Construction of the yurt near Chair 4 resulted in an increase in the demand for power in the White Pass Study Area in order to light and heat the yurt. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in the long-term demand for power within the White Pass Study Area.
UCFC-19	Fiber Optics Line	The fiber optic line was installed in 2003, but has not yet been activated. This project resulted in an opportunity to increase the quality of communications services within the White Pass Study Area in the future. The effects of this project will overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase the long-term availability and quality of communications services available within the White Pass Study Area.
UCFC-21	White Pass Ski Area Day Lodge Remodel	The Day Lodge was remodeled in 2003 to accommodate increased demand for guest services as the White Pass Ski Area, resulting in an increase in the demand for power, water, and wastewater treatment within the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in the long-term demand for utilities and infrastructure within the White Pass Study Area.

Table 3.13-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Utilities and Infrastructure

Project Number	Project	Utilities
UT-2	White Pass Ski Area Sewer Line Replacement	Approximately 0.4 mile of existing sewer line from the condominiums to the drainfield will be replaced, resulting in an improvement in the conveyance system for sewage within the White Pass Study Area. This project overlaps spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in the long-term quality of sewage treatment infrastructure in the White Pass Study Area.

Table 3.13-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Utilities and Infrastructure

Project Number	Project	Utilities
UT-3	White Pass Ski Area Generator Shed and Propane Tank	The generator, shed and propane tank constructed adjacent to the condominiums in 2001 resulted in an increase in the availability of power in the White Pass Study Area. The effects of the generator overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the projects listed in this table, this project will add to the cumulative increase in the long-term quantity and availability of power in the White Pass Study Area.
UT-4	White Pass Ski Area Relocation of Chair 3 and Platter Lift	During the realignment of the Platter Lift and Chair 3, additional lighting was installed to improve night-skiing opportunities, resulting in an increase in the demand for power in the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass Expansion and the projects listed in this table, this project will add to the cumulative increase in the long-term demand for power utilities within the White Pass Study Area.
UT-5	US Cellular Tower	Construction of the US Cellular tower on Pigtail Peak resulted in an increase in demand for power, and an increase in the availability and quality of communications services within the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and projects listed in this table, this project will add to the cumulative increase in the long-term demand for power utilities and the long-term quantity and quality of communication services within the White Pass Study Area.
UT-6	White Pass Ski Area Restaurant/Condo Conversion	Conversion of the restaurant into three condominiums in 1999 resulted in an increase in demand for power, water, sewage treatment, roads and communications services within the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and projects listed in this table, this project will add to the cumulative, long-term demand for utilities and infrastructure within the White Pass Study Area.
UT-7	White Pass Ski Area Cross Country Yurt	The cross-country yurt was constructed in 2001, resulting in an increase in demand for power, water and sewage treatment within the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and other projects listed in this table, this project will add to the cumulative, long-term increase in the demand for utilities and infrastructure within the White Pass Study Area.
UT-8	White Pass Ski Area Manager's Cabin	The 1,825-square-foot Manager's Cabin resulted in an increase in demand for power, water, sewage treatment, and communications services within the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the other projects listed in this table, this project would add to the cumulative, long-term increase in demand for utilities and infrastructure within the White Pass Study Area.

Table 3.13-6:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Utilities and Infrastructure

Project Number	Project	Utilities
UT-9	White Pass Ski Area Manager's Office	The 1,094-square-foot Manager's Office resulted in an increase in demand for power, water, sewage treatment, and communications services within the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the other projects listed in this table, this project would add to the cumulative, long-term increase in demand for utilities and infrastructure within the White Pass Study Area.
UT-12	Fiber Optic Line	The fiber optic line was installed in 2003, but has not yet been activated. This project resulted in an opportunity to increase the quality of communications services in the future. The effects of this project will overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will increase the availability and quality of communications services within the White Pass Study Area.
UT-30	US Cellular Backup power at White Pass Communications Site	Installation of a propane tank and generator on Pigtail Peak resulted in an increase in the availability of power in the White Pass Study Area. The effects of the generator overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the projects listed in this table, this project will result in an increase in the cumulative, long-term quantity and availability of power in the White Pass Study Area.
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	Improvements to the cell tower on Pigtail Peak will result in an increase in the quality and availability of communications services in the White Pass Study Area. The effects of the generator overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the projects listed in this table, this project will result in an increase in the cumulative, long-term quality and availability of communications infrastructure and services in the White Pass Study Area.

The long-term, cumulative effect of the projects listed in the table above, combined with the effects of the White Pass expansion, is an increase in the demand for power, water, wastewater treatment, roads, communications, and other infrastructure within the White Pass Study Area. As described in Section 2.3, the Action Alternatives include improvements to the current wastewater facilities at White Pass to accommodate the increased demand. In addition, the Action Alternatives include upgrades to the power supply to meet the increased demand. The other infrastructure at White Pass is sufficient to meet the projected demand for utilities. Additionally, combined with the communications improvements associated with the White Pass expansion, the communications-related projects listed in the table above will result in a cumulative, long-term improvement to the communications services and infrastructure within the White Pass Study Area.

As described in Section 3.10 – Social and Economic Factors, ongoing economic development strategies along the US 12 corridor include:

Lewis County/Packwood

Overall Economic Development Plan for Cowlitz and Lewis Counties (CWCOG & LCEDC, 1997)

Lewis County Industrial Needs Analysis (E.D. Hovee & Company, 1997)

Packwood Community Action Plan (E.D. Hovee & Company, 1999)

Northwest Economic Adjustment Initiative Assessment – Packwood, Lewis County, Washington (NWAIA, 2000)

Lewis County Profile (Washington State Employment Security, 2001)

Draft USDA Forest Service Packwood Work Center Utilization Analysis (Dean Runyan Associates, 2004)

Yakima County/Naches

Naches, Washington 1993 Community Development Plan (Pacificorp, 1993)

Town of Naches – Land Use Element (Town of Naches, 1995)

Plan 2015 – A Blueprint for Yakima County Progress. Chapter IV – Economic Development Element (Yakima County, 1997)

US 12 Corridor

US 12 Corridor Charette (USDI-NPS, 2002)

White Pass Scenic Byway Corridor Management Plan (Lewis County, Gifford Pinchot National Forest and Okanogan-Wenatchee National Forests - draft, unpublished manuscript on file)

The most comprehensive of these strategies is the *US 12 Corridor Charette* (USDI-NPS, 2002). This document is the third in a series of studies that focus on the corridors leading to Mount Rainier. The document identifies the importance of gateway communities, such as Packwood and Naches, in the pursuit of shared regional goals.

While none of the strategies outlined in the US 12 Corridor Charette are known to be in a formal proposal, several relevant planning efforts are identified. These include the White Pass Scenic Byway Corridor Management Plan (draft, unpublished) which evaluates byway resources, provides design guidelines for visitor services and proposes site enhancements along US 12. This plan, currently in draft form, focuses on improving the highway corridor as a destination for recreational travelers, and finding ways for tourism to contribute more to local economies. The US 12 Corridor Charette (USDI-NPS 2002) also identifies an opportunity for Packwood hotels to jointly sponsor a shuttle service to White Pass, as well as the potential for the development of a public parking area in Naches that could serve as a recreational staging area, providing shuttles to and from White Pass during the winter. Coupled with the increasing demand for utilities and infrastructure in the White Pass area, these planning efforts would likely build upon the available and planned utility upgrades, such as increased power transmission to the area and available cellular telephone service. However, these initiatives have not been identified as reasonably foreseeable for inclusion in Tables 3.0-FEIS1 and 3.0-FEIS2 as of publication of this FEIS.

The Lewis County Department of Public Works is in the process of developing a public sewage collection, treatment and disposal system for the downtown business area of Packwood, WA. This project will increase the availability of sewage treatment in the area surrounding White Pass. However, the Packwood sewage system is in the early preliminary planning stage, and therefore was determined not to be sufficiently foreseeable for inclusion in this analysis.

In combination with the past, present, and reasonably foreseeable projects described in Tables 3.13-5 and 3.13-6, the proposed White Pass expansion would result in a cumulative increase in the demand for utilities such as power, water, sewage treatment, communications, roads and other infrastructure, and a cumulative improvement of the communications services and infrastructure within the White Pass Study Area.

3.14 INVENTORIED ROADLESS AREAS

3.14.1 Background

In 1979, the U.S. Forest Service conducted a nationwide Roadless Area Review and Evaluation (RARE II) to inventory roadless areas on NFSL throughout the United States. Among these roadless areas were the Goat Rocks Addition #6036, south of US 12 in the vicinity of White Pass, and Cougar Lakes #6032, north of US 12, in the same vicinity.

Passage by Congress of the Washington Wilderness Act (P.L. 98-339) in 1984 resulted in the designation of several of the RARE II areas as Wilderness in Washington State, including the addition of 23,000 acres of the Goat Rocks Addition #6036 to the Goat Rocks Wilderness adjacent to White Pass (refer to Figure 3-43). Congress further specified in the legislation that areas in the State of Washington not designated as wilderness by the Act "shall be managed for multiple use in accordance with land management plans pursuant to Section 6 of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Planning Act of 1976: ***Provided that such areas need not be managed for the purpose of protecting their suitability for wilderness designation prior to or during revision of the initial land management plans*** [emphasis added] (P.L. 98-339, Section 5[b][3])." In addition, Congress removed 800 acres in Hogback Basin from the Goat Rocks Wilderness, to be considered specifically for its "significant potential for ski development" (Senate Report 98-461, May 1984).

The implementing regulations of the National Forest Management Act (36 CFR 219.17), issued in 1982, required the Forest Service, unless otherwise provided by law, to evaluate roadless areas and consider them for recommendation as "potential wilderness areas during the Forest planning process…" Forest Service direction in Forest Service Manual 1923 and 2320 and in Forest Service Handbook 1909.12, Chapter 7, required that an inventory of areas with wilderness potential be conducted, that these inventoried areas be evaluated for potential recommendation as wilderness, and that management direction be provided for all of these lands. Because of the provisions of the Washington State Wilderness Act, roadless areas in Washington State were inventoried during Forest planning (refer to Appendix C of the Forest Plan Environmental Impact Statements) and management direction was developed. No recommendations for wilderness designation were made.

During the roadless area inventory phase of the Gifford Pinchot Forest planning process, the 800-acre Hogback Basin removed from Wilderness by the 1984 Washington Wilderness Act was combined with a remaining portion of the Goat Rocks Addition #6036 to create the White Pass IRA. This IRA is located west of, and immediately adjacent to, the existing White Pass Ski Area. In identifying this area as an IRA, the *Environmental Impact Statement for the Gifford Pinchot Land and Resource Management Plan* also acknowledged the intent of the deletion of the 800-acre Hogback Basin area from Wilderness to provide for possible expansion of the White Pass Ski Area (refer to FEIS for the GPNF Forest Plan, pages C-181 and C-182.) The area was allocated to Developed Recreation and it was anticipated that the associated

Recreation Opportunity Spectrum class would change from Semi-Primitive Non-Motorized to Roaded Natural as a result of developments associated with future ski area expansion.

3.14.2 Management of Inventoried Roadless Area

The management direction for lands within each IRA that was specified through Forest planning has since been augmented by subsequent rulemaking and directives.

In January 2001, the Roadless Area Conservation Rule ("Roadless Rule") was adopted by the Forest Service. This rule established prohibitions on road construction, reconstruction and timber harvesting, with some specific exceptions, in IRAs on NFSL. The IRAs to which this rule applies were defined in the Roadless Rule as those identified "in a set of inventoried roadless area maps, contained in Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, dated November 2000…" (36 CFR 294.11). In the vicinity of White Pass, the White Pass IRA, Goat Rocks Adjacent IRA, and William O. Douglas Adjacent IRA, are all subject to this rule.

In 2005, the 2001 Roadless Rule was replaced by the State Petitions for Inventoried Roadless Area Management Rule, which established a petitioning process that provided Governors an opportunity to "seek establishment of or adjustment to management requirements for National Forest System inventoried roadless areas within their States" (36 CFR 294, 25654). One year later, on September 20, 2006, the U.S. District Court for the Northern District of California set aside the 2005 Rule and reinstated the 2001 Roadless Rule. As of the publication date of this FEIS, the 2001 Rule applies to management of the IRAs within and adjacent to the proposed expansion area.

As mentioned above, the 2001 Roadless Rule generally prohibits road construction and reconstruction, and the cutting, sale, or removal of timber within an IRA, with certain exceptions (seven of these applying to roads, and five exceptions for the cutting, sale or removal of timber). The preamble to the Roadless Rule notes that management actions not requiring the construction of new roads would still be allowed (36 CFR 294). For agency consistency, the definition of a road was included in the 2001 Rule (36 CFR 294.11). These definitions are the same as those adopted in the final National Forest System Road Management Rule (36 CFR 212) and policy.

The preamble to the 2001 Roadless Rule also clarified the provision that "'timber cutting, sale or removal in inventoried roadless areas is allowed when incidental to implementation of a management activity not otherwise prohibited by this rule." Among the examples given were trail construction or maintenance, and "other authorized activities such as ski runs and utility corridors" (36 CFR 294, 3258).

The 2001 Rule does not prohibit future special use developments in IRAs. However, timber cutting, sale or removal and road construction or reconstruction associated with these uses are made subject to the prohibitions and rule exceptions described in 36 CFR 294.12 and 294.13.

In addition to the 2001 Roadless Rule, current direction for management of IRAs is provided by a USDA Forest Service Interim Directive for the protection of roadless areas (Interim Directive 1920-2006-1). This Interim Directive, which is effective until July 16, 2007, specifies the decision authority for the exceptions provided in the 2001 Rule.

3.14.3 IRA Criteria

As utilized during the RARE II process and refined in Forest Service Handbook 1909.12, Chapter 70, there are specific criteria that qualify an area for placement on the roadless inventory. Either criteria 1 and 3, or criteria 2 and 3, must be met (USFS 1992):

1. Areas contain 5,000 acres or more.
2. Areas contain less than 5,000 acres but can meet one or more of the following criteria:
    a. Areas can be preserved due to physical terrain and natural conditions.
    b. Areas are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.
    c. Areas are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of its size.
3. Areas do not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100th meridian (sec. 71.12).

The Forest Service Handbook guidance further provides criteria for developments that, if present, would not disqualify a potential wilderness area from inclusion in the roadless inventory (USFS 1992). Those relevant to the analysis of the IRAs in the vicinity of, or overlapping with, the proposed project area include:

1. Electronic installations, such as cell towers, television, radio, and telephone repeaters and the like, provided their impact is minimal.
2. Recreation improvements such as occupancy spots or minor hunting or outfitter camps. As a general rule, do not include developed sites. Areas with minor, easily removable recreation developments may be included.
3. Timber harvest areas where logging and prior road construction are not evident, except as provided in Section 71.12 for areas east of the 100th meridian.

4. Ground-return telephone lines, electric lines, and powerlines, if a right-of-way has not been cleared.

As part of the analysis for the White Pass Ski Area expansion project, these criteria were applied to determine whether the IRAs within the White Pass Study Area would continue to qualify for placement on the inventory, and to assess the impact that implementation of the proposed ski area expansion would have on the qualifications of these IRAs, or portions of IRAs, for inclusion in the inventory of potential wilderness areas. The results of this analysis are provided in the following sections.

3.14.3.1 Application of Inventory Criteria to IRAs within the White Pass Study Area

There are three IRAs within the White Pass Study Area. The following presents a brief description of each with respect to the criteria that qualify these IRAs for placement on the inventory of areas with wilderness potential. The conclusions regarding these IRAs are consistent with the inventory of potential wilderness areas conducted as part of Forest Plan revision.

Goat Rocks Adjacent IRA

Located in the eastern portion of the White Pass SUP area and extending to the Goat Rocks Wilderness east of, and outside the SUP area, this IRA was established during the Forest planning process as a portion of the former Goat Rocks IRA #6036. The several smaller parcels not incorporated into wilderness by the Washington Wilderness Act, a total of 7,357 acres, were re-inventoried in 1990 during Forest planning of the Goat Rocks Adjacent IRA.

The Goat Rocks Adjacent IRA parcel within the White Pass Study Area is approximately 247.8 acres in size. Although it contains less than 5000 acres, it meets the acreage exceptions for placement on the inventory of potential wilderness areas because of its juxtaposition with the Wilderness boundary. However, substantial recreational developments have occurred here over the last 50 years. As shown in Figure 3-43, a majority of this parcel (approximately 6.05 acres) contains buildings, ski trails, utilities and mountain roads associated with the White Pass Ski Area. The use of mechanical equipment for the clearing and maintenance of ski trails, access roads and other facilities is evident. Although the facilities adhere to the required visual quality standards, they remain apparent to ski area visitors, as is typical of developed recreation sites (refer to Section 3.15 – Visual Resources). Because of the level of development, this portion of the Goat Rocks IRA no longer meets the criteria for inclusion in the inventory of areas with wilderness potential (USFS 1992, 71.11).

Under the WNF Forest Plan, this parcel of the Goat Rocks Adjacent IRA was allocated to Administratively Withdrawn – RE-1 (Developed Recreation) to incorporate the White Pass Ski Area SUP area and other lands with recreation facilities in the vicinity (refer to Figure 3-43).

Approximately one-third of this parcel (143.7 acres) is located between the eastern boundary of the White Pass SUP area and the Goat Rocks Wilderness, further to the east. With the exception of the PCNST, which passes through the IRA from north to south, it is currently undeveloped, and will remain so. Because there are no proposals for expansion into this portion of the Goat Rocks Adjacent IRA, it will not be discussed further.

William O. Douglas Adjacent IRA

The William O. Douglas Adjacent IRA is made up of several relatively small parcels scattered along the William O. Douglas Wilderness boundary. Approximately 955 acres (4 percent) of this IRA is located in the far northwest corner of the existing SUP area, extending north to the William O. Douglas Wilderness. It contains the White Pass Nordic trail system, with the exception of the *Zig Zag* trail (refer to Figure 3-43). These trails are maintained, including vegetation clearing to a width of approximately 18 feet. Although this portion of the IRA is within the influence zone of concentrated public use along US 12, around Leech Lake, and in the nearby Village Inn, Kracker Barrel store and gas station, it remains relatively undeveloped. The Nordic trail is groomed with a motorized trail groomer, but the intrusion is minor and could easily be removed. As such, this IRA parcel continues to meet the criteria for inclusion in the inventory of areas with wilderness potential (USFS 1992).

Under the Wenatchee Forest Plan, the William O. Douglas Adjacent IRA within and adjacent to the White Pass SUP boundary is allocated to Administratively Withdrawn – RE-1 (Developed Recreation).

The remainder of this IRA (21,983 acres) is located outside the White Pass SUP area, along the William O. Douglas Wilderness boundary. It is currently undeveloped. Since there are no proposals for development within any portion of the IRA, it will not be discussed further.

White Pass IRA

Located to the immediate west of the White Pass Ski Area SUP area, and extending south and west to the Goat Rocks Wilderness, this IRA is comprised of the 800 acres in Hogback Basin removed from Wilderness by the Washington Wilderness Act (P.L. 98-339), as well as the portions of the Goat Rocks Addition #6036 that were not added to Wilderness. The White Pass IRA adjoins the Goat Rocks Wilderness along its southern and western boundaries (refer to Figure 1-2). Although it contains less than 5,000 contiguous acres, the 1,160-acre White Pass IRA meets the acreage exceptions for placement on the inventory of areas with wilderness potential because of its juxtaposition with the Goat Rocks wilderness boundary.

The entire IRA is undeveloped, with the exception of the PCNST that passes through a portion of the area near its southern edge. This stock and foot trail is a single tread, native surface that blends into the landscape. Natural physical and biological processes appear to be intact in the area. Within the portion of the White Pass IRA proposed for expansion, slopes are relatively gentle, and support subalpine parkland vegetation patterned in an array of openings and tree islands. There are intermittent background views of Mt. Rainier, Pinegrass Ridge, Divide Ridge, and views from the ridge-top between the IRA and the Goat Rocks Wilderness into Miriam Basin within the Wilderness. Lifts and ski trail corridors in the adjacent White Pass Ski Area are discernible from some locations within the IRA, but do not dominate the view. Its adjacency to the Goat Rocks Wilderness to the south provides a "seamless" extension of undeveloped and pristine terrain. As a result, the White Pass IRA continues to meet the criteria for inclusion in the inventory of areas with wilderness potential (USFS 1992).

Under the Gifford Pinchot Forest Plan, the White Pass IRA is allocated to Management Area 2L – Developed Recreation Area.

3.14.4 Environmental Consequences

Alternative 1

Under Alternative 1, no new development associated with the White Pass Ski Area expansion project would occur. The permit area would continue to operate as it does currently. The status of the Goat Rocks Adjacent and White Pass IRAs with respect to their inclusion in the inventory of potential wilderness areas would remain unchanged (refer to Section 3.14.4).

Alternative 2

Goat Rocks Adjacent IRA Under Alternative 2, there would be no new development within the Goat Rocks Adjacent IRA. The characteristics of this IRA would remain unchanged beyond the existing level of development. As stated above (refer to Section 3.14.4), the 247.8-acre portion of the IRA within the White Pass SUP area no longer qualifies for placement on the inventory.

White Pass IRA Alternative 2 proposes expansion of the White Pass Ski Area into Hogback Basin, within the White Pass IRA, with two chairlifts, 15 new ski trails and a mid-mountain lodge (refer to Figure 2-2).

A total of approximately 19.6 acres of development would occur on portions of the 767-acre proposed expansion area under Alternative 2. Vegetation would be removed on approximately 19.7 acres for construction of the proposed *Basin* and *Hogback Express* chairlifts, ski trails, the mid-mountain lodge, and utility lines, leaving evidence of corridors and the use of mechanical equipment. Because some of these developments are linear, the effects would be spread across the IRA from east to west (refer to Figure 2-3). Lift towers and alignments would be obvious in the immediate foreground of the visitor. The 2,000-square foot lodge would be a permanent structure within the IRA.

Mitigation Measures would reduce impacts to the vegetation by using existing clearings to the extent possible, marking maximum trail clearing limits, felling trees away from adjacent vegetation, and limiting maintenance techniques to manual methods within the mountain hemlock parkland community (refer to Section 3.5.3.1 Vegetation Communities). Even so, this level of development would result in the eventual removal of 767 acres (66 percent) of the White Pass IRA from the inventory of potential wilderness areas because it would no longer meet the criteria for inclusion (USFS 1992).

The remaining 393 acres of the White Pass IRA to the north is outside the proposed expansion area and would remain undeveloped. Although it would be cut off from the Goat Rocks Wilderness boundary to the south by the proposed expansion developments, this portion of the White Pass IRA is contiguous along its western boundary with the Goat Rocks Wilderness, and as such, would continue to meet the inventory criteria (USFS 1992).

Modified Alternative 4

Goat Rocks Adjacent IRA Under Modified Alternative 4, a 7-acre parking lot and a new, 400-square foot ticket booth would be developed in the eastern portion of the existing SUP area. Approximately half of the parking lot would be located within the Goat Rocks Adjacent IRA (refer to Figure 2-4), and the ticket booth might intrude as well, depending upon the final footprint. In addition, Modified Alternative 4 incorporates grading on the Holiday trail within the Goat Rocks Adjacent IRA to meet the requirements of novice terrain.

As described above, the portion of the Goat Rocks Adjacent IRA within the SUP area has already been substantially developed and no longer meets the criteria for inclusion on the inventory of potential wilderness areas (USFS 1992). Furthermore, the parking lot and ticket booth would be constructed within the influence zone of US 12. For these reasons, the trail grading and construction of the parking lot and the new ticket booth would have no effect.

White Pass IRA The development of two new lifts, 17 ski trails, the 2,000-square foot mid-mountain lodge, utilities, and water supply line or well within the 767 acres of Hogback Basin (refer to Figure 2-4) would affect the placement of the White Pass IRA on the inventory of potential wilderness areas for the same reasons described in Alternative 2, with one slight difference. Vegetation clearing for ski trails would increase to approximately 21.5 acres in the mountain hemlock parkland, a distinctive feature of the IRA. In addition, a segment of the PCNST would be relocated to the Wilderness boundary, resulting in less than half an acre of ground and vegetation disturbance. As with Alternative 2, Mitigation Measures/design criteria and Other Management Provisions (refer to Section 2.4) would reduce impacts to the natural vegetation by marking maximum trail clearing limits, felling trees away from adjacent vegetation, and limiting maintenance techniques to manual methods within the mountain hemlock parkland community (refer to Section 3.5.3.1 – Vegetation Communities). The former location of the PCNST segment would be allowed to revegetate naturally. Even so, the level of development proposed under Modified Alternative 4 would result in the eventual removal of the 767-acre Hogback Basin portion of the White Pass IRA from the inventory of potential wilderness areas because it would no longer meet the criteria for inclusion (USFS 1992).

The effects to the remaining 393 acres of the White Pass IRA to the north would be identical to Alternative 2. There would be no development of this area, and given its juxtaposition along its western boundary with the Goat Rocks Wilderness, would continue to qualify for placement on the inventory.

Alternative 6

Goat Rocks Adjacent IRA Impacts to the Goat Rocks Adjacent IRA under Alternative 6 would be similar to those described for Modified Alternative 4, with the exception that the proposed parking lot would be reduced to 2.5 acres. This would slightly reduce the extent of clearing and grading needed within the Goat Rocks Adjacent IRA. However, as noted above, a 247.8-acre portion of the Goat Rocks Adjacent IRA within the SUP area has already been substantially developed and no longer meets the criteria for inclusion on the inventory of potential wilderness areas (USFS 1992).

White Pass IRA Alternative 6 proposes expansion of the White Pass Ski Area into approximately 282 acres within the White Pass IRA. Facilities would be scaled back as compared to Alternative 2 and Modified Alternative 4, and would include a single lift (*Basin*) with seven associated ski trails, and a utility corridor for power and communications. The utility corridor would be trenched into the proposed ski trail clearings and into the proposed 0.25 mile of road that would be constructed within the White Pass IRA (refer to Figure 2-6 for location of the developments, including the proposed road).[52] Motorized use would occur on the proposed road during construction and maintenance activities.

The mid-mountain lodge would be located within the existing White Pass SUP area rather than in the proposed expansion area, eliminating the impacts of clearing and construction for this permanent structure within the IRA. The proposed developments would affect about one-third of the acreage in the White Pass IRA that is proposed for expansion under either Alternative 2 or Modified Alternative 4, and the same visual screening evident in Alternative 2 and Modified Alternative 4 would apply in Alternative 6. However, the effects of the clearing and some grading on approximately 15.3 acres would leave evidence of the use of mechanical equipment, and the lift towers and their alignment would be obvious in the immediate foreground of the visitor.

Development within approximately 282 acres in the White Pass IRA would introduce landscape alterations as well as a segment of road. This area could no longer be managed in an essentially natural,

[52] The road would include approximately 0.25 mile inside the White Pass IRA, which is also in a Tier II Key Watershed. In order for the Decision-makers to select this road and for the road to be constructed, the Regional Executive Interagency Committee would have to formally determine the construction of such a road would be consistent with the Aquatic Conservation Strategy, as outlined in the Northwest Forest Plan (USDA and USDI 1994). If the Roadless Area Conservation Rule is formally implemented, this road would not be allowed in the White Pass IRA, therefore construction techniques (as described in the other Action Alternatives) would be implemented.

unimpaired condition and would no longer be considered unroaded. For these reasons, this portion of the White Pass IRA would no longer meet the criteria for placement on the inventory of areas with wilderness potential (USFS 1992).

There would be no development within the approximately 878 remaining acres of the IRA, including much of Hogback Basin. Because it is bordered on two sides by Wilderness, it would be possible to continue to manage this portion of the White Pass IRA in a natural, unaltered condition that would connect seamlessly with the adjacent Wilderness. It would continue to meet the criteria for placement on the inventory of potential wilderness areas (USFS 1992).

Alternative 9

Goat Rocks Adjacent IRA There would be additional development within the 247.8-acre portion of the Goat Rocks Adjacent IRA that is within the existing SUP area. This would include construction of the new *PCT* chairlift, clearing and some grading for seven new ski trails, trenching of utilities into existing roads and trails, and rerouting of a short segment (225 feet) of the PCNST. The new 2.5 acre-parking area and ticket booth would be developed to the north and outside of the IRA boundary.

The development of the *PCT* chairlift and associated ski trails in the Goat Rocks Adjacent IRA would further degrade the roadless character of the 247.8-acre portion of the IRA within the White Pass SUP boundary. Because the vegetation here is densely-spaced, mixed conifers, full clearing with some grading would be required. The impacts of this would be evident, since trees could not be retained and a majority of the understory vegetation would be removed on approximately 35.3 acres of mixed conifer vegetation communities. The lift towers and their alignment would remain obvious developments within the IRA. However, for the reasons described under Modified Alternative 4, that portion of the Goat Rocks Adjacent IRA within the SUP area is substantially developed and no longer meets the criteria for inclusion on the inventory of potential wilderness areas (USFS 1992).

White Pass IRA Alternative 9 proposes no developments within any portion of the 1,160-acre White Pass IRA. Its roadless characteristics as described under the existing condition would remain unaltered. The White Pass IRA would continue to meet the criteria for placement on the inventory as a potential wilderness area (USFS 1992).

Tables 3.14 FEIS1 and 3.14 FEIS2 summarize the level of development that would occur in the Goat Rocks Adjacent IRA and the White Pass IRA under each alternative (current developments are reflected in the No Action Alternative 1 for comparison).

Table 3.14 FEIS1:
Goat Rocks Adjacent IRA Inventoried Acres (within the SUP area)

Characteristic	Alt. 1 (Existing)	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9
Number of Lifts	0	0	0	0	1
Number of Ski Trails	17	17	17	17	24
Acres of existing trails/ trails to be cleared	66.2	0	1.29	0	26.28
Number of Buildings	0	0	0	0	0
Acres of all other existing cleared area/clearing	6.1	0	1.71	0.02	0.14
Road length	12,375 ft	12,375 ft	12,375 ft	12,375 ft	12,375 ft
Total Acres Affected	72.3	0	3.00	0.02	26.41
Net Qualifying Acres [a]	0	0	0	0	0

[a] Net Qualifying Acres represents the area of the IRA that is not common with a proposed SUP expansion area. Example: IRA - ProSUP = X

Table 3.14 FEIS2:
White Pass IRA Inventoried Acres

Characteristic	Alt. 1 (Existing)	Alt. 2	Mod. Alt. 4	Alt. 6	Alt. 9
Number of Lifts	0	2	2	1	0
Number of Ski Trails	0	15	18	7	0
Acres of existing trails /trails to be cleared	0	16.53	19.39	8.35	0
Number of Buildings	0	1	1	0	0
Acres of all other existing cleared area/clearing	0	3.08	3.72	2.61	0
Road length	0	0	0	1,705 ft	0
Total Acres Affected	0	19.60	23.11	10.96	0
Net Qualifying Acres [a]	1,383.78	372.11	372.11	893.09	1,383.78

[a] Net Qualifying Acres represents the area of the IRA that is not common with a proposed SUP expansion area. Example: IRA - ProSUP = X

3.14.5 Cumulative Effects

No past, present or reasonably foreseeable projects have been identified that would result in impacts to IRAs within the White Pass Study Area. For a description of project actions, refer to Tables 3.0-FEIS1 and 3.0-FEIS2 in Section 3.0.

Over recent history, the most visible effect on IRAs has been the outcome of the 1984 Washington Wilderness Act, which designated the William O. Douglas Wilderness, expanded the Goat Rocks Wilderness, and withdrew from Wilderness 800 acres in Hogback Basin, now included in the White Pass

IRA. This change has been included in the existing condition for this analysis. The White Pass expansion would affect the White Pass and Goat Rocks IRAs and the potential for wilderness designation as described in Section 3.14.4. Other than the impacts of the White Pass expansion, no cumulative effects would result from the past, present and reasonably foreseeable projects listed in Tables 3.0-FEIS1 and 3.0-FEIS2.

3.15 VISUAL RESOURCES

3.15.1 Introduction

White Pass Company's proposal, which involves the development of two ski lifts and associated trails, a mid-mountain day lodge, and enlarging the White Pass SUP area to include approximately 767 acres of Hogback Basin, has the potential to affect the scenic resources of the area. As such, the scenic quality of the area will be analyzed in the context of the management direction, goals, and objectives of the Forest Plans, as amended and the Pacific Crest National Scenic Trail.

3.15.1.1 Management Guidelines

Since the publication of the Visual Management System (VMS) handbook in 1974, substantial advances in research and technology, as well as a significant increase in demand for high quality scenery, guided the Forest Service to update their system for scenic resource management. In 1996, the Forest Service developed the Scenery Management System (SMS) (USDA 1995) to more effectively and efficiently integrate scenic values and landscape aesthetics in Forest Plans, and incorporate human values into ecosystem management. The SMS is to replace the VMS during the planning of new projects or Forest Plan revisions as initially directed by the Chief in the SMS handbook. Specifically, the Chief stated: "begin using the concepts and terms contained in this Handbook as you work on new projects or initiate forest plan revisions" (USDA 1995). Subsequent correspondence further directs the Forest Service to utilize and adopt the SMS and its concepts (USDA 1996, 1997b, 1998e). As a result, this analysis includes reference to both the VMS and SMS. Following are summaries of the key features of each system.

Visual Management System

The goal of landscape management on all NFSL is to manage for the highest possible visual quality, commensurate with other appropriate public uses, costs, and benefits. Since the mid-1970s, the Forest Service has operated under the guidance of the VMS for inventorying, evaluating, and managing scenic resources on NFSL. The VMS provides a system for measuring the inherent scenic quality of any forest area as well as a measurement of the degree of alteration for use in inventory and management.

Visual Quality Objectives (VQOs), as defined within the VMS, are based on the physical characteristics of the land and the sensitivity of the landscape setting as viewed by humans. VQOs define how the landscape will be managed, the level of acceptable changes to the landscape character permitted in the area, and under what circumstances management activities or recreational development may be allowed. Applicable VQOs are based on land allocations established by the Forest Plan and discussed below.

For further information on the Visual Resources Management System and its use, refer to National Forest Landscape Management Handbooks (USFS 1974).

Scenery Management System

The SMS was developed to eventually replace the VMS; its principles and premises are based not only on research findings but on over 20 years experience with implementing the VMS. In October 1996, *Landscape Aesthetics: A Handbook for Scenery Management* (USDA 1995) was released to begin the transition to the SMS. This Handbook 701 supercedes AH-462, National Forest Landscape Management, Volume 2, Chapter 1, The Visual Management System, Issued April 1974.

Full adoption of the SMS is to occur as each National Forest revises its land and resource management plan. Direction for scenery management is contained within forest plan goals, objectives, standards, and guidelines. For Forests not currently undergoing the forest plan revision process, or for those requiring extensive time for revision, application of the SMS may occur at the sub-forest or project level.

At the time of this FEIS, neither the Gifford Pinchot nor the Wenatchee National Forest Land and Resource Management Plans have been updated. For this FEIS, both the VMS and SMS will be used to describe the existing landscape and evaluate the range of alternatives' effects on the landscape, as initially directed by the Chief of the USFS and subsequent direction (USDA 1995, 1996, 1997b, 1998e).

The SMS uses four distance zones to describe the part of a characteristic landscape that is being inventoried or evaluated - immediate foreground (0 to 300 feet from viewpoint), foreground (300 feet to 0.5 mile from viewpoint), middle ground (0.5 to 4 miles from viewpoint) and background (over 4 miles from viewpoint).

SMS terminology differs from the VMS, and updated research findings are incorporated. Conceptually, the SMS differs from the VMS in that it increases the role of constituents throughout the inventory and planning process and borrows from, and is integrated with, the basic concepts of Ecosystem Management. The SMS pertains primarily to the social/cultural dimension of ecosystem management, but also has links to the biological and physical. Key elements and two of the most important aspects of the new SMS process are "sense of place" and "Special Places".

Special Places

Special Places are important primarily as destinations. They occur at different scales of the ecosystem ranging from an entire national forest or ranger district to a more localized area to a very specific site that may encompass only a few acres. From a landscape aesthetics viewpoint, the recreation experience, scenic setting, available facilities, and sense of place are important aspects in meeting user expectations.

The SMS measures the degree of "intactness" and "wholeness" of the landscape with "scenic integrity." SMS utilizes Scenic Integrity Levels (SIL) in much the same way that the VMS uses VQOs. The frame of reference for measuring achievement of SIL is the valued attributes of the "existing" landscape character "being viewed."

Sense of Place

Sense of place, for most people, refers to the rich and varied meanings of places and emphasizes people's tendency to form strong emotional bonds with places (Williams and Stewart 1998, 19). The importance of this concept is that it places humans in the landscape and is a tool to help managers understand the importance of places to people when doing planning or management activities. Scenery contributes to a sense of place, a mutually shared image. The majority of the recreation-oriented people who visit the National Forests have an image of what they expect to see. Such an image or mental picture is generated by available information concerning a particular area and the person's experience with that or similar areas (USDA 1995, 30). Additional constituent information can be gathered to fully address a more in-depth analysis of peoples' attachment to the landscape for reasons aside from recreation to fully understand the landscape character of a place. The focus for this assessment is the recreation-oriented user. Consequently, the White Pass Study Area has features and attractions that have special value.

While the WNF and GPNF have not revised their current Forest Plans, sense of place mapping has been conducted for the Naches District of the WNF, identifying White Pass Ski Area as having its own sense of place. In addition, Hogback Basin in the Cowlitz Valley District of the GPNF has been identified as having its own sense of place. US 12 from the GPNF boundary to the intersection with Highway 410, near Oak Creek, has been designated as a Scenic Byway (USDA and WSDOT 2000). Table 3.15-1 presents the qualifying characteristics of these unique places within the White Pass Study Area.

Table 3.15-1:
Sense of Place in the White Pass Study Area

Name of Place	Activities	Aspects/Sense of Place
White Pass Ski Area	• Downhill Skiing • Cross-country Skiing	• Ski resort setting • Developed facilities and commercial businesses on highway. • Rural setting
Hogback Basin	• Summer Hiking • Winter Backcountry Skiing and Snow Cave Camping	• Roaded Natural ROS • Unique Vegetative Community • Outstanding Destination for Regional Backcountry Skiing
US 12 – White Pass Scenic Byway	• Pleasure Driving • Scenic Viewing • Fall Color Viewing	• Outstanding diversity of vegetation types, geological formations, and wildlife. • Historic values • Scenic attractions • Roaded Natural setting

Source: Naches Ranger District, Cowlitz Valley Ranger District

3.15.1.2 Management Direction

The White Pass Study Area is located on public lands on both the Naches Ranger District of the Okanogan-Wenatchee National Forests and the Cowlitz Valley Ranger District of the Gifford Pinchot National Forest. Therefore, this FEIS evaluates the visual effects of the alternatives under both sets of Forest Plan direction, using the VMS and the SMS. Table 3.15-2 describes the relationship between VQOs and SIL as contained in the SMS (USDA 1995, 2-4).

Table 3.15-2:
Relationship between VQOs and SIL

Scenic Integrity Level/VQO	Condition	Perception, Degree of Deviation
Very High/ Preservation	Unaltered	None. Existing landscape character is intact with only minute deviations.
High/Retention	Appears Unaltered	Not Evident. Deviations may be present but must repeat form, line, color and texture of characteristic landscape in scale.
Moderate/Partial Retention	Slightly Altered	Evident, but not Dominant. Noticeable deviations must remain visually subordinate to landscape character.
Low/Modification	Moderately Altered	Dominant. Deviations begin to dominate but borrow valued attributes such as size, shape, edge and patterns of natural openings or vegetative types.
Very Low/ Maximum Modification	Heavily Altered	Very Dominant. Deviations strongly dominate valued landscape character. They may not borrow attributes such as size, shape, edge and pattern but should be shaped to blend with natural terrain.

Source: USDA 1995, 2-4

Okanogan-Wenatchee National Forest

The 1990 Wenatchee National Forest Land and Resource Management Plan prescribed VQOs for management areas throughout the forest as viewed from designated viewpoints. The White Pass Study Area is located along the White Pass Viewshed Corridor. Lands within the Wenatchee National Forest are allocated RE-1 Developed Recreation and have a prescribed VQO of Retention which corresponds to an SIL of High. Implicit in the RE-1 Developed Recreation allocation is the essential role of constructed facilities and the resulting environmental modification. Structures and other modifications must meet identified design, placement and appearance standards; however, by definition, their presence does not necessarily reduce the visual quality level to the degree they would in other land allocations or settings. A greater tolerance for environmental modifications and their effects on visual quality standards is incorporated into the RE-1 Developed Recreation allocation.

Gifford Pinchot National Forest

The 1990 Gifford Pinchot National Forest Land and Resource Management Plan prescribed VQOs for management areas throughout the forest as viewed from designated viewpoints. The White Pass Study Area is located along the White Pass Viewshed Corridor. Lands within the Gifford Pinchot National Forest are allocated 2L Developed Recreation and have a prescribed VQO of Retention which corresponds to an SIL of High. Constructed facilities and the resulting tolerance for environmental modifications are also incorporated into the 2L Developed Recreation allocation as previously described under the RE-1 Developed Recreation allocation.

Pacific Crest National Scenic Trail

The selected management alternative in the *Comprehensive Management Plan for the Pacific Crest National Scenic Trail* (USDA 1982) clarifies the relationship between the trail and management of adjacent lands and is consistent with Section 7(a) of the National Trails System Act. Specifically pertaining to National Forest lands, the selected alternative states:

> "The entire landscape and its scenic quality are important to the purposes of the Pacific Crest National Scenic Trail. Viewing and understanding resource management and other cultural activities are considered to be part of the normal character of the trail. The management of various resources will give due consideration to the existence of the trail and trail users within the multiple-use concept" (USDA 1982, 17).

Activities authorized by this analysis will seek to provide a setting and experience consistent with the predominant existing trail features.

White Pass Scenic Byway

The National Scenic Byways Program is part of the U.S. Department of Transportation, Federal Highway Administration. The program is a grass-roots collaborative effort established to help recognize, preserve and enhance selected roads throughout the United States. The White Pass Scenic Byway begins at the boundary of the Gifford Pinchot National Forest and continues east to the junction of US 12 and State Highway 410. Along the way, the byway passes its namesake, White Pass. Lands at White Pass are under USDA Forest Service administration as part of the Gifford Pinchot National Forest, and the highway is managed under a permit/easement by the Washington Department of Transportation. A local advocacy group is developing a Corridor Management Plan for the White Pass Scenic Byway. Corridor Management Plans have no regulatory authority but aim to spur collaborative stewardship efforts at the local level. The Washington State Department of Transportation has also designated this route as part of the White Pass State Scenic Byway. Activities authorized by this analysis will seek to be consistent with management of the byway.

3.15.2 Affected Environment

The land allocation in the Wenatchee National Forest portion of the White Pass Study Area is RE-1 (Developed Recreation) and the allocation in the Gifford Pinchot National Forest portion is 2L (Developed Recreation).

As defined in the Wenatchee Forest Plan, the Goal and Description of RE-1 is as follows:

> "Provide developed recreation in an Urban to Semi-Primitive Recreation Opportunity Spectrum (ROS) setting. This prescription is applicable to existing and potential developed recreation sites within the full spectrum of ROS settings. The areas allocated to this use include only the specific site on which development takes place. This prescription is also applicable to existing and potential Alpine (downhill) ski areas including trails, tows or lift facilities, shelters, lodges, services and parking lots. Associated developments such as skating rinks, toboggan trails, etc. may be present. Potential sites allocated to this prescription will be managed to protect or enhance the future values and conditions desired." (USDA 1990b, IV-159)

In the Gifford Pinchot Forest Plan, the Desired Future Condition for 2L is:

> "Roads, buildings, ski lifts, tables, docks, and other physical facilities are evident, but design and construction will repeat the color, shapes and lines of the surroundings. Openings usually exist to accommodate facilities and provide scenic views; trees and other vegetation will vary widely in type and size." (USDA 1990a, IV-101)

It is important to recognize that the developed recreation allocations in both Forest Land and Resource Management Plans provide a set of visual standards that deviate from those commonly applied in other land use allocations. Specifically, they anticipate and allow for more alteration or development as integral to providing the developed recreation experience. These improvements must still meet specified design, placement and appearance standards, but they are expected features on the landscape and do not decrease the VQO or SIL as rapidly as in other forest settings. Consequently, the criteria for meeting certain VQO or SIL levels are intentionally different than those for other allocations.

3.15.2.1 Visual Analysis Areas

In order to analyze existing visual conditions, the analysis area has been subdivided into five smaller, individual areas, as identified in Figure 3-46 and the representative photos in Section 3.15.2.3. Each of these areas comprises a distinctive, viewed portion of the landscape in the vicinity of the White Pass Study Area. Effects will be disclosed based on visual changes to the landscape character as viewed from specific, critical viewpoints (refer to Section 3.15.3 – Environmental Consequences) within each area. The following presents a brief description of each visual analysis area, its land allocation, and desired future conditions as they relate to each area. Also, the distance zones from each critical viewpoint are provided.

Area 1

Area 1 is located in the northwest portion of the existing SUP area along forested, northwest facing slopes. Area 1 is in the foreground of view points #5, #6 and #7 and in the middleground of view points #1-#4. Area 1 is allocated to 2L, and exhibits two long ski trails, which traverse the slope from the *Paradise* pod to the base area. In relation to the desired future condition, Area 1 exhibits openings that have been created for facilities. The VQO is Retention. With the existing ski area facilities, Area 1 exhibits the defining aspects of the White Pass sense of place (i.e., ski resort setting – refer to Table 3.15-1).

Area 2

Area 2 is a densely forested section of the northeastern portion of the existing SUP area, along north facing slopes. Area 2 is in the immediate foreground of view points #5 and #7, the foreground of View Point #6 and in the middleground of view points #1-#4. Area 2 is in the RE-1 allocation, and coincides with the RE-1 description with its potential for developed recreation, and the presence of ski trails surrounding the area. The VQO is Retention. With no currently developed ski area facilities, Area 2 exhibits the rural setting that defines the White Pass sense of place (refer to Table 3.15-1).

Area 3

Area 3 is located along US 12 in the most visible portions of the White Pass Study Area, including cleared and graded areas, buildings and ski lifts. Area 3 is in the immediate foreground of View Point #7, foreground of view points #5 and #6, and in the middleground of view points #1-#4. Area 3 is located in both the RE-1 and 2L allocations, as it straddles the Forest boundary. The evidence of physical facilities, including ski area infrastructure, is consistent with the desired future condition for 2L and the description for RE-1. The VQO is Retention. Due to the commercial, developed nature of Area 3 in a rural, ski resort setting, Area 3 shows the defining qualities of the White Pass sense of place (i.e., ski resort setting – refer to Table 3.15-1).

Area 4

Area 4 is located in the upper elevation of the existing SUP area, in the immediate foreground of View Point #6, foreground of view points #5 and #7, and middleground of view points #1-#4. Area 4 contains ski area development, including the facilities at the summit of Pigtail Peak. Area 4 is allocated to both RE-1 and 2L due to its location in both Forests. As with Area 3, the presence of ski area facilities corresponds to the desired future condition for 2L and the description for RE-1. The VQO is Retention. With the existing ski area facilities, Area 4 exhibits the defining aspects of the White Pass sense of place (i.e., ski resort setting – refer to Table 3.15-1).

Area 5

Area 5 includes the upper elevation portions of Pigtail and Hogback Basins, which correspond to the proposed expansion area. Area 5 is in the immediate foreground, foreground and middleground of view points #1-#4, in the foreground and middleground of View Point #6, and in the middleground of view points #5 and #7. Area 5 is located entirely in 2L lands and with no existing development, the area does not currently exhibit the developed character that is described in the desired future condition for 2L lands. The VQO is Retention. With no development, Area 5 exhibits the defining qualities of the Hogback Basin sense of place (refer to Table 3.15-1).

Pacific Crest National Scenic Trail

The PCNST travels a corridor along the eastern and southern portions of the White Pass Study Area, including areas 2, 4 and 5. The PCNST is in the immediate foreground of view points #1-#3, and the foreground of view points #4-#7. Passing adjacent to the existing ski area, immediate foreground and foreground views from the PCNST include undisturbed forest, with occasional views of ski area development (e.g., ski trails) in the middleground. The VQO is Foreground Retention.

US 12

US 12 bisects the existing White Pass SUP area, passing through a range of landscapes in areas 2 and 3. US 12 is in the immediate foreground of View Point #7 and the middleground of View Point #5. The road passes through both 2L and RE-1 lands. Accordingly, the highway provides views of the developed facilities at White Pass. Within the ski area, the VQO is Retention.

3.15.2.2 Landscape Character and Visual Absorption Capability

The Landscape Characteristics and Visual Absorption Capability (VAC) for each area are documented below. VAC is the relative ability of the land to absorb use and still meet prescribed VQOs established by the respective Forest Plans. The VAC is used in determining the relative ability of any landscape to accept human alteration without loss of landscape character or scenic condition. In areas rated high, it is easier for the landscape to accept change; in areas rated low, it is more difficult to blend in activities. In general, the higher the diversity of the landscape, the higher its visual absorption capacity.

The SMS Handbook (USDA 1995) indicates that slope is the most important VAC factor on mountainous terrain, while vegetative cover is the most important factor on gently rolling landscapes. Soils and geology are also important factors. Features such as cliffs, rock outcrops and slide areas can provide natural openings from which to borrow in the design of human alterations to the landscape. Soil productivity is highly correlated to vegetation, and is taken into consideration when evaluating the vegetation factor.

In this analysis, the VAC parameter is used as a measure of the relative importance of activities that affect the landscape. A major consideration is the location of the viewer (i.e., critical viewpoints) in relationship to viewing the landscape. Another consideration is the type of activity to be placed upon the landscape. Together these factors allow for a determination of VAC as high, medium or low.

Areas 1 and 2

Areas 1 and 2 are characterized by continuous, uniform dense stands of high-elevation conifers in a natural condition including mountain hemlock, Pacific silver fir, Engelmann spruce, and Alaska yellow cedar (refer to Section 3.5 – Vegetation). With the exception of the access road and return ski trail on the west side of the existing ski area (refer to Figure 3-46), the forest landscape appears natural. Area 1 is comprised of slopes ranging from 20 percent to nearly 100 percent. Heavy timber screens much of Area 1 from viewers along US 12. Area 2, although similar in character to Area 1, has more gentle slopes and is less exposed to viewers along US 12.

Due to the dense, natural appearing timber stands and steep slopes throughout the majority of areas 1 and 2, their capability to absorb visual changes is low. VAC is particularly low in Area 1 due to the slope that makes its entire face visible. Clearing along these slopes could create strong form and lines evident to viewers along US 12 and viewpoints along, and north of US 12. Closer to US 12, areas 1 and 2 exhibit low slope gradients with large trees along the highway. As a result, the VAC of areas 1 and 2 immediately adjacent to US 12, including View Point #7 is relatively high.

Area 3

Area 3 consists of clearing, grading and development (including buildings, lift terminals and chairlifts) associated with the White Pass Ski Area. The area has been developed for winter recreation and vegetated with grasses and forbs (refer to Section 3.5 – Vegetation). Several trails and access roads traverse across the hillside. Most of the area is visible on the south side of US 12, including the existing day lodge, several maintenance buildings and chairlift towers. On the north side of US 12, condominiums, the Krackerbarrel store/gas station, and. about 5 acres of gravel surface parking area are quite visible. During the winter most of the area north of US 12 is partially screened by high banks of snow. In the summer this area is partially screened by deciduous vegetation. Development at White Pass is characteristic of what one may expect to see associated with a developed ski area.

Area 3 has been developed in a manner that is consistent with the Forest Plan allocations (RE-1 and 2L). The development has created a more diverse landscape, as seen from View Point #7 and along US 12. Accordingly, Area 3’s ability to absorb change is high. Further development would continue to add to the developed character, and would be consistent with existing developed nature of the area.

Area 4

Although somewhat similar in slope and vegetation to areas 1 and 2, Area 4 has been developed as a ski resort consistent with Forest Plan management objectives and allocations by construction and clearing for lift corridors and ski trails. Development of ski terrain in Area 4 has retained tree islands comprised of mountain hemlock and pacific silver fir creating distinct form and line not characteristic of the more dense slopes of areas 1 and 2. The *Great White*, *Pigtail* and *Paradise* chairlifts are the most prominent features on Area 4 and lie in a straight, uphill clearing that is evident from view points #6 and #7, and other points along US 12. These developed features are consistent with the desired future condition for 2L and the description of RE-1 lands. The *Great White* and *Pigtail* chairlifts rise above the cliff line, out of the foreground view, from US 12. The *Paradise* chairlift and trails are not evident from the lower mountain (View Point #7) or US 12, but the *Paradise* pod is visible in the middleground view from Viewpoint 2.

Area 4 has been developed with chairlift corridors and ski trails, yet the area appears to be generally forested, when viewed from all critical viewpoints. This area provides a visual transition, from the heavily groomed slopes and conditions described for Area 3 to Hogback Basin. Developed features are consistent with the Forest Plan allocations (i.e., developed recreation facilities), and create a landscape that is more diverse than a similar, undeveloped forest would appear. On this basis, the VAC of Area 4 is moderate. Further development would add to the developed nature of the area and would blend in.

Area 5

Pigtail and Hogback Basins comprise Area 5. Both basins are undeveloped except for the PCNST that passes through the area from Goat Rocks Wilderness at elevation 5,850 feet, until it breaches the saddle between Goat Rocks Wilderness and Hogback Basin at an approximate elevation of 6,250 feet (refer to Figure 3-46). The PCNST is a low impact single tread native surface trail that blends into the landscape. The vegetative patterns in Pigtail and Hogback Basins differ in structure from the dense forests described for areas 1-4. Subalpine parklands populated by mountain hemlock, subalpine fir and occasional Engelmann spruce interspersed with swales consisting of shrub and herbaceous species comprised primarily of lupine, beargrass, Indian paint brush and huckleberry species characterize this area (refer to Section 3.5 – Vegetation). Pigtail and Hogback Basins are visible from upper elevations within the existing SUP area including Pigtail Peak (View Point #6).

In Area 5, Pigtail and Hogback Basins have more gentle slopes than the rest of the White Pass Study Area, and the subalpine parkland vegetation pattern provides a diverse array of openings and tree islands throughout the area. Area 5 is unseen from US 12 and the majority of the existing ski area (i.e., Viewpoints 5 and 7, and US 12) and only seen in an oblique view from View Point #6 on Pigtail Peak and Viewpoints 1 - 3 along ridges of the basin. From these points, the VAC of the basin is high. From the ground, the gradual slopes obscure much of the basin from viewers, most of whom are traveling the PCNST, and immediate foreground views are most prominent due to the predominance of parkland vegetation. The VAC of the basin within the foreground is dependent upon the type of development. As viewed from View Point #6 (foreground and middleground), the parkland vegetation exhibits linear openings (glades), which would allow for lift and trail clearing to blend in to the surrounding conditions, as compared to the distinct clearing patterns and strong form and line created by trail and lift development in Area 3. The VAC from View Point #6 is high. From Viewpoints 1-3 (immediate foreground and foreground), the predominant glades provide a highly diverse landscape that is comprised of natural openings and tree islands. The creation of additional openings through tree island removal could blend with these natural features, resulting in a high VAC.

3.15.2.3 Critical View Points

In order to analyze potential visual impacts associated with proposed development on NFSL, seven critical viewpoints have been displayed (refer to Figure 3-46 and the representative photos below). These viewpoints are intended to represent the most commonly traveled and used viewpoints, in and adjacent to the ski area, from which development may affect the scenic quality and integrity of the area.

It is impractical to undertake a visual analysis of the entire area as a whole. Consequently, seven viewpoints were chosen to represent visually sensitive areas within the planning area, including the PCNST corridor. Fieldwork and GIS analysis were used to choose the most appropriate viewpoints and to accurately evaluate the effects.

View Point #1 – Along PCNST - Saddle between Hogback and Miriam Basins

View Point #1 is located in Area 5, which is allocated to 2L. Immediate foreground, foreground and background views dominate the views from the PCNST at the saddle between Hogback and Miriam Basins (refer to Illustration 3.15-1). From this view point, foreground topography and vegetation screen middleground views. Immediate foreground and foreground views are dominated by subalpine parkland and herbaceous plant communities. Saplings ranging in height from 2-8 feet are scattered throughout the landscape. Background views are dominated by sweeping views of the Cascade Range and partial views of Mt. Rainier. Existing views from View Point #1 meet the prescribed VQO of Retention, which corresponds to an SIL of High.

Illustration 3.15-1:
View Point 1 – Saddle between Hogback and Miriam Basin on the PCNST

View Point #2 – Ridge between Hogback and Miriam Basins

View Point #2 is located in Area 5 (2L allocation) on the ridge between Hogback and Miriam Basins, near the location of the proposed upper terminal of Chair 5, as proposed in Alternative 2, Modified Alternative 4, and Alternative 6 (refer to Figures 2-2, 2-4 and 2-6), and near the location of the proposed PCNST reroute in Modified Alternative 4. To the north and west toward the proposed development area, immediate foreground and foreground views dominate, with 4-20-foot tall saplings and trees screening middleground views (refer to Illustration 3.15-2). Facing east along this ridge, the existing *Paradise* lift top terminal on Pigtail Peak can be viewed in the middleground in some locations. Intermittent background views of Mt. Rainier occur through gaps in foreground trees but are rare. To the south and east, the terrain drops away and long distance views of Pinegrass Ridge, Divide Ridge and views into Miriam Basin dominate the scenery. Views from View Point #2 meet the prescribed VQO of Retention, which corresponds to an SIL of High.

Illustration 3.15-2:
View Point 2 – Along Proposed PCNST Reroute – Ridge between Hogback and Miriam Basins

View Point #3 – Along PCNST underneath Proposed Chairlift

View Point #3 is located in Area 5 (2L allocation) on the PCNST directly underneath the alignment of Chair 6, as proposed in Alternative 2, Modified Alternative 4, and Alternative 6 (Figures 2-2, 2-4 and 2-6). A tree island in the immediate foreground dominates upslope and downslope views from the PCNST at this location (refer to Illustration 3.15.3). In the foreground, adjacent to the tree island, are meadows and glades, ranging from 50 to 100 feet in width and consisting of a diverse patchwork of herbaceous plant communities and saplings ranging in height from 3-8 feet. Intermittent background views of Mt. Rainier exist through tree openings. Views from View Point #3 meet the prescribed VQO of Retention which corresponds to an SIL of High.

Illustration 3.15-3:
View Point 3 – Along PCNST – Underneath Proposed Chairlift

View Point #4 – Along PCNST Reroute in Miriam Basin (Eliminated from Detailed Analysis)

View Point #4 was originally located to evaluate the visual impacts associated with a re-route of the PCNST into Miriam Basin. This re-reroute has been eliminated from the range of alternatives (refer to 2.2.2 - Other Project Elements Considered). As a result, no analysis is provided for View Point #4 in the Environmental Consequences.

View Point #5 – Along PCNST – Within Existing SUP Boundary

View Point #5 is located in Area 2 (RE-1 allocation) within the existing White Pass SUP boundary, east of the existing ski trail clearing and development (refer to Figure 3-46). Immediate foreground and foreground views dominate the landscape from View Point #5, due to the predominance of mature forest. The forest vegetation restricts both middleground and background views. Large trees comprised of mountain hemlock, western hemlock, noble fir and pacific silver fir, with an understory of huckleberry species dominate immediate foreground and foreground views (refer to Illustration 3.15-4). The viewing area is primarily undisturbed except for the immediate foreground view of the PCNST that ascends the steep slope in the vicinity of the viewpoint. Existing ski trail development associated with the White Pass Ski Area is discernable through the foreground trees but largely unnoticeable to the casual observer. Views from View Point #5 meet the prescribed VQO of Retention, which corresponds to an SIL of High.

Illustration 3.15-4:
View Point 5 – Along PCNST – Within Existing SUP Boundary

View Point #6 – Pig Tail Peak to Hogback Basin

View Point #6 is located in Area 4, along the boundary between the two national forests (2L and RE-1), within the existing SUP area and atop Pigtail Peak (refer to Figure 3-46). Although immediate foreground and foreground views include lift terminals, cleared ski trail corridors, and signage associated with the White Pass Ski Area, middleground and background views dominate views from View Point #6. Gentle slopes and diverse parkland vegetative patterns comprising Pigtail and Hogback Basins are clearly evident from View Point #6 (refer to Illustration 3.15-5). Background views consisting of peaks within Goat Rocks Wilderness, the Cascade Range to the north, and Mt. Rainier dominate views from Pigtail Peak. Views from View Point #6 meet the prescribed VQO of Retention which corresponds to an SIL of High.

Illustration 3.15-5:
View Point 6 – Pig Tail Peak to Hogback Basin

View Point #7 – Along US 12

View Point #7 is located in Area 3 (RE-1 and 2L allocations), adjacent to the Krackerbarrel store/gas station on the north side of US 12 (refer to Figure 3-46). Immediate foreground views consist of the highway and several base area facilities, (including the gas station, condominiums, parking areas, base lodge, maintenance facilities) which dominate views along the highway. Alder shrubs and large trees dominate roadside vegetation adjacent to base area facilities along the south side of the highway (refer to Illustration 3.15-6). Relatively undisturbed-appearing vegetation along US 12 contributes to a natural-appearing setting and meets the prescribed VQO of Retention, which corresponds with an SIL of High. WSDOT occasionally maintains the vegetation immediately along the highway, which creates a "mowed" look along the roadway shoulder. However, after mowing, the shrubs grow new foliage, and appear more natural for the majority of the time. The existing ski area development has resulted in the removal of woody vegetation and the installation of ski lifts and facilities in the foreground of View Point #7. The ski area is evident and more reflective of a rural to urban setting and landscape character that is relevant to the land use objectives of the area, including modification of the landscape character. The evidence of physical facilities, including ski area infrastructure, is consistent with the desired future condition for 2L and the description for RE-1. In addition, the developed facilities are in character with the values that define the sense of place at White Pass Ski Area. Considering the future condition and sense of place, the foreground view of the ski area from View Point #7 meets the prescribed VQO of Retention, which corresponds with an SIL of High.

Illustration 3.15-6:
View Point 7 – Along US 12

3.15.3 Environmental Consequences

The visual effects of the alternatives were evaluated by comparing the existing landscape character and Scenic Integrity with the conditions that would exist under each alternative. For purposes of this analysis, the landscape character refers to the positive attributes of the landscape, while the scenic integrity describes interactions that deviate from the natural landscape character, including interactions such as vegetation treatments, position and duration of view, and Visual Absorption Capability.

Page 2-4 of the SMS (USDA 1995) provides a comparison of the five levels of SIL described in the SMS (USDA 1995) with the corresponding levels of existing scenic conditions and visual quality levels described in the VMS (USFS 1974). Visual Quality Standards in a developed recreation allocation anticipate and allow for more alterations or development as integral to providing the developed recreation experience. Specifically, as an example, an SIL of high equates to a VQO of retention, which allows for deviations that repeat the form, line, color, texture, and pattern common to the landscape character and scale (USDA 1995; refer to Table 3.15-2 – Relationship between VQOs and SIL). An SIL of Very High corresponds to a VQO of Preservation. Thus, an SIL of High allows for evidence of deviation (although noticeable deviations must remain visually subordinate to the landscape character), whereas an SIL of Very High would require preservation.

Illustration 3.15-FEIS 1, below, shows an example of a developed recreation facility in the landscape meeting a VQO of retention as presented on page H-17 of the SMS (USDA 1995). This photograph shows the Pine Marten Lodge and top terminal of a detachable-quad chairlift at Mt Bachelor Ski Area. The lodge and chairlift design and material selection are designed to keep the form, line, color and texture with the natural landscape in mind (USDA 1995).

Illustration 3.15- FEIS1:
An Example of a Developed Recreation Facility with a VQO of retention

Source: USDA, 1995, pg H-17

A conceptual sketch has been created to show the scale and Cascadian architectural style of the proposed mid-mountain lodge (refer to Figure 3-44). A visual simulation for the parking lot proposed under Modified Alternative 4, and Alternatives 6 and 9 has been created for View Point 7 – Along US 12 (refer to Figure 3-45). Proposed facility design was developed based on winter season viewing, when the contrast is most pronounced (particularly with respect to the contrast between openings and vegetated slopes). The designs "borrow" from the natural landscape patterns: a mosaic of openings, including talus slopes; feathering of the clearings needed for ski facilities; and use of earth tones that match the area rock and soil. By reducing color contrast and emphasizing a mosaic landscape character, proposed developments are intended to blend into the background throughout all seasons of the year. Figures 3-46, 3-47, 3-48 and 3-49 depict the locations of the scenic areas and critical view points.

3.15.3.1 View Point #1 – Along PCNST - Saddle between Hogback and Miriam Basins

Alternative 1

Under Alternative 1, no additional development would occur within the White Pass Study Area. Visual conditions would remain unchanged. Barring any natural vegetation-altering events, the landscape would continue to appear as described for Viewpoint #1 in Section 3.15.2.3.

Alternative 2, Modified Alternative 4, and Alternative 6

Under Alternative 2, Modified Alternative 4 and Alternative 6, vegetation and topography would screen all development, as viewed from the saddle between Hogback and Miriam Basins. As such, development within Pigtail and Hogback Basins would continue to meet the prescribed VQO of Retention and associated SIL of High, as viewed from View Point #1.

The aspects of Hogback Basin, White Pass Ski Area, and US 12 that contribute to their sense of place would be retained in Alternative 2, Modified Alternative 4 and Alternative 6.

Alternative 9

Under Alternative 9, no development would occur in Pigtail or Hogback Basins, and visual conditions would remain unchanged. As such, views from View Point #1 would continue to meet the prescribed VQO of Retention and associated SIL of High. The aspects of Hogback Basin, White Pass Ski Area, and US 12 that contribute to their sense of place would be retained under Alternative 9.

3.15.3.2 View Point #2 – Ridge between Hogback and Miriam Basins

Alternative 1

Under Alternative 1, no additional development would occur within the White Pass Study Area. Visual conditions would remain unchanged. Barring any natural vegetation-altering events, the landscape would continue to appear as described for View Point #2 in Section 3.15.2.3.

Alternatives 2 and 6

View Point 2 was chosen to evaluate impacts associated with the implementation of Modified Alternative 4, which includes a PCNST reroute along this portion of the ridge between Hogback and Miriam Basins. Under Alternatives 2 and 6, the upper terminal of the *Basin* chairlift would be located within 130 to 400 feet of View Point #2. The immediate foreground vegetation at this view point would remain undisturbed. Under Alternatives 2 and 6, new development would not be evident from View Point #2, although it is not expected that viewers would visit this view point without the PCNST re-route proposed in Modified Alternative 4. Clearing associated with lift and trail development would be similar to existing vegetative patterns and would slightly open views to Mt. Rainier to the northwest, thereby mimicking the subalpine parkland pattern. Any future repairs or upgrades to the existing facilities would include measures to reduce visual effects, including the use of vegetative screening, compatible colors and texture, and a Cascadian Architecture theme for any upgrades to buildings (refer to Table 2.4-2, Mitigation Measure MM22). As a result of Mitigation Measure MM22, visual conditions from View Point #2 would improve with facility maintenance and upgrades. **As a result, under Alternatives 2 and 6, the existing landscape character would be retained and the prescribed VQO of Retention, which corresponds to an SIL of High, would continue to be met.**

The upper terminal of the *Basin* chairlift would not be visible to the viewer from View Point #2, since the color of the upper terminal would be chosen to blend with the adjacent vegetation (refer to Table 2.4-2, Mitigation Measure MM19). **On this basis, the view from View Point #2 would continue to meet the prescribed VQO of Retention and the corresponding SIL of High, particularly given that viewers would not be expected to visit View Point #2 under Alternatives 2 and 6.**

The sense of place in Hogback Basin would be adversely affected by the installation of facilities and the presence of alpine skiers and snowboarders in the winter, but a Roaded Natural ROS would remain during the skiing season, and to a greater degree, during the non-skiing season. Therefore, Alternatives 2 and 6 would retain some of the aspects that contribute to the sense of place in Hogback Basin.

The White Pass Ski Area sense of place would be retained, with additional developed recreation facilities in a rural setting contributing to the sense of place. Along US 12, the sense of place would remain unchanged, as expansion to the west would not be visible to travelers along the highway.

Modified Alternative 4

Under Modified Alternative 4, the upper terminal of the *Basin* chairlift would be located in the same location as under Alternatives 2 and 6. As such, clearing associated with lift and trail development, and the visibility of the terminal would be similar to the description for Alternatives 2 and 6. **As a result, under Modified Alternative 4, the existing landscape character would be retained and the prescribed VQO of Retention, which corresponds to an SIL of High, would continue to be met.**

In addition, the PCNST would be re-routed south to the ridge and around the proposed chairlift to pass through View Point #2 in order to avoid a chairlift crossing. Immediate foreground and foreground vegetation and topography would screen lift and trail development from View Point #2 along the PCNST reroute between Hogback and Miriam Basins. As described in Mitigation Measure MM23, the trail re-route would be cleared and maintained to a 24-inch tread of mineral soil and a 6-foot clearing of trees and woody shrubs. The trail would be located to avoid the removal of trees over 8 inches DBH wherever possible. **Considering the unique vegetative patterns in the subalpine environment of Pigtail Basin and the nature of the clearing that would occur to construct ski trails, hikers and casual observers would have a hard time distinguishing ski trails from existing conditions. However, the chairlift structures and clearing would be more noticeable. Duration of impact would be minimal (five to ten minutes of trail time) and views of Mt. Rainier would not be obstructed as a result of ski area development in Pigtail Basin.**

As described for Alternative 2, implementation of Mitigation Measure MM22 would improve visual conditions from View Point #2 due to visual enhancement of the existing facilities associated with future maintenance and upgrades.

The PCNST reroute to View Point #2 would reduce the viewer's exposure to lift and trail development in Pigtail and Hogback Basins under Modified Alternative 4. However, the reroute would provide somewhat less stunning views of Mt. Rainier as compared to the other alternatives. Long distance views of Pinegrass Ridge, Divide Ridge, and views into Miriam Basin would be provided similar to the view from the existing PCNST immediately to the south of the proposal.

The sense of place in Hogback Basin would be adversely affected by the installation of facilities and the presence of alpine skiers and snowboarders in the winter, but a Roaded Natural ROS would remain during the skiing season, and to a greater degree, during the non-skiing season. Therefore, Modified Alternative 4 would retain some of the aspects that contribute to the sense of place in Hogback Basin.

Along US 12, the introduction of a new parking lot along the highway would be consistent with the White Pass Ski Area sense of place. Highway travelers currently pass through the White Pass Study Area and developed facilities along the highway are expected. Under Modified Alternative 4, the parking lot would be screened by existing vegetation and views from US 12 would continue to meet the prescribed VQO of Retention and corresponding SIL of High.

Alternative 9

Under Alternative 9, no development would occur in Pigtail or Hogback Basins. Development within the existing ski area would be faintly discernable in the middleground from View Point #2. The visibility of this development would be consistent with the desired future condition for 2L lands. As such, views from View Point #2 would continue to meet the prescribed VQO of Retention and corresponding SIL of High.

The sense of place in Hogback and Pigtail Basins would not be affected by ski area development under Alternative 9. Development would be consistent with the sense of place at both White Pass Ski Area and along US 12 since the additional ski lift, trails and new parking lot that would be evident from the highway are an expected part of this developed ski area.

As described for Alternative 2, implementation of Mitigation Measure MM22 would improve visual conditions from View Point #2 due to visual enhancement of the existing facilities associated with future maintenance and upgrades.

3.15.3.3 View Point #3 – Along PCNST- Underneath Proposed Chairlift

Alternative 1

Under Alternative 1, no additional development would occur within the White Pass Study Area. Visual conditions would remain unchanged.

Alternative 2, Modified Alternative 4 and Alternative 6

Under Alternative 2, Modified Alternative 4 and Alternative 6, the alignment of the *Basin* chairlift would be located directly overhead from the existing PCNST. Clearing associated with the lift alignment would remove a tree island along this portion of the PCNST. The removal of vegetation in the subalpine parkland would not introduce any form or line that is uncharacteristic of the existing landscape. Saplings less than 3 feet in height would not be cut (refer to Table 2.4-2, Mitigation Measure MM9). Evidence of tree removal may occasionally be visible, although stumps would be flush-cut (Table 2.4-2, Mitigation Measure MM20). Clearing associated with lift and trail development (which would include buried utility lines and exposed stream crossings at ground surface elevation) would be similar to existing vegetative patterns and would slightly open views to Mt. Rainier to the northwest, thereby mimicking the subalpine parkland pattern and retaining the existing landscape character. As a result, the vegetative disturbance under Alternatives 2, Modified Alternative 4 and Alternative 6 would continue to meet the prescribed VQO of Retention, which corresponds to an SIL of High.

The upper terminal of the *Basin* lift would be located approximately 1,000 feet uphill (slope distance) of View Point #3, and would be somewhat obscured by topography in the foreground - one would have to look up to see the terminal site, which would be subordinate to the surrounding foreground views. **The color of the upper terminal would be chosen to blend with the adjacent vegetation (refer to Table 2.4-2, Mitigation Measure MM19). The visibility of the chairlift cables and chairs in the immediate foreground of View Point #3 and the obscured view of the top terminal in the foreground would be consistent with the desired future condition for the 2L allocation, which states that "Roads, buildings, ski lifts, tables, docks, and other physical facilities are evident, but design and construction will repeat the color, shapes and lines of the surrounding. Openings usually exist to accommodate facilities and provide scenic views; trees and other vegetation will vary widely in type and size" (USDA 1990a, IV-101). On this basis, the view from View Point #3 would continue to meet the prescribed VQO of Retention and the corresponding SIL of High.** Under Modified Alternative 4, the visual effects to View Point #3 would be the same as Alternatives 2 and 6, but the PCNST would be re-routed away from View Point #3. As a result, PCNST users would no longer access View Point #3.

The sense of place in Hogback Basin would be adversely affected by the installation of facilities and the presence of alpine skiers and snowboarders in the winter, but a **Roaded Natural** ROS would be attained during the skiing season, and to a greater degree, during the non-skiing season. **Therefore, Alternative 2, Modified Alternative 4 and Alternative 6 would retain some of the aspects that contribute to the sense of place in Hogback Basin.**

Under Alternative 2, Modified Alternative 4 and Alternative 6, the White Pass Ski Area sense of place would be retained, with additional developed recreation facilities in a rural setting contributing to the sense of place. Along US 12, the sense of place would be changed through the introduction of a new parking lot along the highway; however it would be consistent with the White Pass sense of place.

Highway travelers currently pass through the White Pass Study Area where developed facilities along the highway are expected.

Alternative 9

Under Alternative 9, no development would occur in Pigtail or Hogback Basins. Development within the existing ski area would not be discernable from View Point #3. As such, views from View Point #3 would continue to meet the prescribed VQO of Retention and corresponding SIL of High.

Effects to sense of place in Hogback Basin, White Pass Ski Area and US 12 would be as described for View Point #2.

3.15.3.4 View Point #5 – Along PCNST – Within Existing SUP Boundary

Alternative 1

Under Alternative 1, no additional development would occur within the White Pass Study Area. Visual conditions would remain unchanged.

Alternatives 2 and 6

Under Alternatives 2 and 6, no additional development would be discernable from View Point #5. Views would continue to meet the prescribed VQO of Retention and corresponding SIL of High along the PCNST at View Point #5.

View Point #5 provides no views of Hogback Basin, so there would be no effect to the sense of place in Hogback Basin. With no development taking place in the vicinity of View Point #5, the sense of place of White Pass Ski Area and US 12 would remain unchanged under Alternatives 2 and 6.

Modified Alternative 4

Under Modified Alternative 4, visual effects would be as described for Alternatives 2 and 6. Terrain modifications (i.e., grading) on the Holiday trail would be undertaken, however, these modifications would not be visible from the PCNST due to foreground views being dominated by large trees in the upper story and huckleberry species in the understory.

As such, views from View Point #5 would continue to meet the prescribed VQO of Retention, corresponding SIL of High, and sense of place would remain unaffected under Modified Alternative 4.

Alternative 9

Under Alternative 9, the PCNST would be rerouted to the east of View Point #5 to avoid the proposed ski trail clearings in the *PCT* pod. Rerouting the PCNST would minimize visual impacts to travelers. As described in Mitigation Measure MM23, the re-routed trail would be cleared and maintained to a 24-inch tread of mineral soil and a 6-foot clearing of trees and woody shrubs. Additionally, the trail would be located to avoid the removal of trees over 8 inches DBH wherever possible. Foreground views would continue to be dominated by large trees consisting of western hemlock, mountain hemlock, noble fir, pacific silver fir and huckleberry species in the understory, although clearings associated with ski trails may also be evident**. Due to the relatively large trees and steep slope, the VAC in this area is comparatively high, and the alterations to the landscape from development would be similar to the existing ski facilities. Views would continue to meet the prescribed VQO of Retention and corresponding SIL of High along the PCNST at View Point #5.**

The sense of place in the White Pass Ski Area and along US 12 would be changed by the installation of ski area facilities and the presence of alpine skiers in the winter. These alterations would be consistent with the defining characteristics of the White Pass Ski Area sense of place (i.e., ski resort setting, developed facilities and commercial businesses on highway – refer to Table 3.15-1). Development under Alternative 9 would not be discernible from, nor have an effect on Hogback Basin. Therefore the Hogback Basin sense of place would be unchanged.

3.15.3.5 View Point #6 – Pigtail Peak to Hogback Basin

Alternatives 1 and 9

Under Alternatives 1 and 9, no development would occur within Pigtail or Hogback Basins. As such, visual conditions would remain unchanged and views would continue to meet the prescribed VQO of Retention and corresponding SIL of High. Facilities within the existing ski area under Alternative 1 would appear as described in Section 3.15.2.3 for Viewpoint #6. Under Alternative 9, any future repairs or upgrades to the existing facilities would include measures to reduce visual effects, including the use of vegetative screening, compatible colors and texture, and a Cascadian architecture theme for any upgrades to buildings (refer to Table 2.4-2, Mitigation Measure MM22). As a result of Mitigation Measure MM22, visual conditions from View Point #6 would improve with facility maintenance and upgrades.

Alternative 2 and Modified Alternative 4

Although Alternative 2 and Modified Alternative 4 would have slightly different trails in the *Basin* and *Hogback Express* pods, visual impacts would appear identical in the foreground and middleground from View Point #6.

Pigtail and Hogback Basins represent foreground and middleground views from Pigtail Peak. Under Alternative 2 and Modified Alternative 4, the access trail from Pigtail Peak to the bottom terminal of Chair 5 would be somewhat apparent in the foreground, as viewed to the south. No other development would take place in the foreground. **Due to the high VAC in Area 5 and the narrow design of the access trail, the prescribed VQO of Retention and the corresponding SIL of High would continue to be met in the foreground of View Point #6.**

In the middleground, clearing and tree island removal for trail development in Pigtail and Hogback Basins would follow existing vegetative patterns and utilize natural tree openings for trail alignment. Although clearing would be required to connect natural openings, the high VAC associated with gradual slopes and the diverse subalpine parkland texture of the landscape would allow the landscape to absorb the effects of clearing. In terms of vegetation manipulation, the prescribed VQO of Retention and the corresponding SIL of High would continue to be met in the middleground.

As viewed from View Point #6, the two new chairlifts, the lodge, and associated infrastructure would appear in the middleground. These structures would be designed to blend with the surrounding landscape and the lodge would adhere to a Cascadian architectural theme to maintain scenic quality (refer to Mitigation Measure MM19 in 2.4-2 and Management Requirement MR12 in Table 2.4-3). The lift structures would traverse the area but would be subordinate to the surrounding landscape, due in part to the high VAC (i.e., low gradient slopes and diverse vegetative structure) and the implementation of Mitigation Measure MM19. Application of Mitigation Measure MM22 would ensure that any future reconstruction of existing facilities, would be similar in character and architecturally compatible with the established landscape and would comply with the approved site development plans (refer to Table 2.4-2).

The visibility of the proposed chairlifts and lodge in the middleground of View Point #6 would be consistent with the desired future condition for the 2L allocation, which states that "roads, buildings, ski lifts, tables, docks, and other physical facilities are evident, but design and construction would repeat the color, shapes and lines of the surroundings. Openings usually exist to accommodate facilities and provide scenic views; trees and other vegetation would vary widely in type and size" (USDA 1990a, IV-101). In addition, as a result of Mitigation Measure MM22, visual conditions of the existing facilities as viewed from View Point #6 would improve through facility maintenance and upgrades. On this basis, the view from View Point #6 would continue to meet the prescribed VQO of Retention and the corresponding SIL of High.

The sense of place in Hogback Basin would be adversely affected by the installation of developed facilities and the presence of alpine skiers in the winter, but a Roaded Natural ROS would remain during the skiing season, and to a greater degree, during the non-skiing season. Therefore, Alternative 2 and Modified Alternative 4 would retain some of the aspects that contribute to the sense of place in Hogback Basin.

In addition, the White Pass Ski Area sense of place would be retained, with additional developed recreation facilities in a rural setting contributing to the sense of place. The US 12 corridor is not apparent when viewing Hogback Basin from Pigtail Peak. Therefore, no evaluation of the effect on the US 12 sense of place is made.

Alternative 6

Under Alternative 6, one chairlift and associated trails would be developed in Pigtail Basin. Accordingly, potential impacts would be similar to Alternative 2 and Modified Alternative 4 in the near middleground (i.e., Pigtail Basin) and existing conditions would be maintained in the remainder of the middleground (i.e., Hogback Basin). Within the current White Pass SUP area, any future repairs or upgrades to the existing facilities would include measures to reduce visual effects, including the use of vegetative screening, compatible colors and texture, and a Cascadian Architecture theme for any upgrades to buildings (refer to Table 2.4-2, Mitigation Measure M22). As a result of Mitigation Measure MM22, visual conditions of the current SUP area as seen from View Point #6 would improve over time. **Accordingly, development would remain visually subordinate to the surrounding landscape and views would continue to meet the prescribed VQO of Retention and corresponding SIL of High.**

Effects on sense of place in Hogback Basin, White Pass Ski Area and US 12 would be as described for Alternative 2 and Modified Alternative 4.

3.15.3.6 View Point #7 – Along US 12

View Point #7 was created in order to analyze impacts along US 12 associated with the development of the proposed parking lot under Modified Alternative 4, and Alternatives 6 and 9.

Alternatives 1 and 2

Under Alternatives 1 and 2, no development is proposed that would impact views from View Point #7. Immediate foreground and foreground views consisting of base area facilities (including the gas station, condominiums, parking areas, base lodge and maintenance facilities) and the highway would continue to dominate views along the highway. Alder shrubs and large trees would dominate roadside vegetation adjacent to base area facilities along the south side of the highway (refer to Illustration 3.15-6), although WSDOT would periodically maintain this vegetation, creating a "mowed" appearance for up to several months at a time during the spring through fall, and throughout the winter. Undisturbed-appearing forest vegetation along US 12 through the ski area would continue to contribute to a natural-appearing setting and would meet the prescribed VQO of Retention which corresponds with an SIL of High. The ski area would continue to be evident and more reflective of a rural to urban setting and landscape character that is relevant to the land use objectives of the area, including modification of the landscape character. The evidence of physical facilities, including ski area infrastructure, would remain consistent with the desired future condition for 2L and the description for RE-1. In addition, the developed facilities would continue to be in character with the values that define the sense of place at White Pass Ski Area (refer to Table 3.15-1).

The rural setting aspect of the White Pass sense of place would remain unchanged, and as a result, the sense of place along US 12 would remain unchanged. Hogback Basin is not visible from Viewpoint #7, so no evaluation of the Hogback Basin sense of place is provided for this viewpoint.

Modified Alternative 4 and Alternatives 6 and 9

Under Modified Alternative 4 and Alternatives 6 and 9, a parking lot would be constructed within the foreground, low-gradient portion of the forest cover described along the highway in Area 2. The Modified Alternative 4 parking lot would be larger than under Alternatives 6 and 9, however the view from View Point #7 would be similar. Clearing would be set back from the highway approximately 220 feet. **An opening in the canopy for the entrance to the lot would be evident. However, foreground vegetation composed of alder shrubs and large trees would remain to help screen proposed clearing and parking lot development from viewers along US 12 (refer to Figure 3-45), as required by Mitigation Measure MM21 (refer to Table 2.4-2).**

Development would not be discernable to the casual observer. Clearing would be consistent with the existing built environment comprising the base area at White Pass and representative of what one would expect in a developed ski area. The presence of the parking lot would shift the landscape character of this portion of Area 2 into the more rural setting of Area 3. Nonetheless, the Forest Plan description for RE-1 indicates that “this prescription is also applicable to existing and potential Alpine (downhill) ski areas including runs, tows or lift facilities, shelters, lodges, services and parking lots” (USDA 1990b, IV-159). With this direction, and given that Area 3 meets the prescribed VQO of Retention, the development of the parking lot under Alternatives 6, 9, and Modified Alternative 4 would continue to meet the prescribed VQO of Retention.

The sense of place in the White Pass Ski Area would be changed by the presence of the parking lot. The new parking lot would enhance the user’s experience by providing safe parking on the ski area side of the highway. As such, this alteration would be consistent with the defining qualities of the White Pass sense of place (i.e., ski resort setting, developed facilities – refer to Table 3.15-1).

Similarly, the US 12 sense of place would remain unchanged with additional ski area development along the highway being similar to the existing development, which is a component of the highway corridor. **As such, views from View Point #7 would continue to meet the prescribed VQO of Retention and a corresponding SIL of High.**

3.15.4 Cumulative Effects

A cumulative effects analysis was performed for each watershed at the site scale (White Pass Study Area). Past, present and reasonably foreseeable projects occurring within each watershed area are included in the analysis. Identified projects with cumulative effects may include activities that are both inside and outside the White Pass Study Area, such as US 12 paving (UCFC-13), which passes through the White Pass Study Area. Within the discussions below, cumulative impacts to visual resources are considered for short-term and long-term impacts. The cumulative effect to visual resources is an increase in the developed character and additional visual evidence of developed recreation within the White Pass Study Area.

A list of past, present and reasonably foreseeable projects occurring within the Upper Clear Fork Cowlitz River watershed (refer to Table 3.15-3) and the Upper Tieton River watershed (refer to Table 3.15-4) that affect visual resources are presented below. For a description of project actions, refer to Table 3.0-FEIS1 in Section 3.0 – Introduction.

Table 3.15-3:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed on Visual Resources

Project Number	Project Name	Cumulative Effects
UCFC-3a	Palisades Scenic Viewpoint Project	The 2-acre Palisades Scenic Viewpoint was reconstructed in 2005, resulting in an increase in the scenic quality of US 12, a scenic byway. The effects of this project overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the long-term increase in scenic quality of US 12, a scenic byway.
UCFC-3b	Palisades Scenic Viewpoint Project Vegetation Management	Approximately 1 acre of trees will be treated to improve the view from the Palisades Scenic Viewpoint, and will result in an increase in the scenic quality along US 12. The effects of this project overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in long-term scenic quality of US 12, a scenic byway.
UCFC-4	Mt. Rainier/Goat Rocks Scenic Viewpoint	Approximately 0.75 acre of trees will be treated to highlight views of Mt. Rainier, resulting in an increase in the scenic quality along US 12. The effects of this project overlap spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in the long-term scenic quality of US 12, a scenic byway.
UCFC-11	Air Quality Monitoring Building	The construction of an air quality monitoring station on Pigtail Peak resulted in an increase in the developed character of the White Pass Study Area. The effects of this project overlap spatially and temporally with the White Pass expansion. Coupled with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in the long-term developed character of the White Pass Study Area.
UCFC-13	Highway 12 Paving Project (between Mile Posts 140.3 to 151.2)	Resurfacing on US 12 in 2004 resulted in a road surface with a more noticeably black surface. The effects of this project overlap spatially and may overlap temporally with the implementation of the White Pass expansion. Visual impacts due to this project will be short-term, as the road surface will become lighter and less noticeable with time. Combined with the White Pass expansion and the other projects listed in this table, this project will contribute to a cumulative short-term impact on visual resources within the White Pass Study Area.

**Table 3.15-3:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed on Visual Resources**

Project Number	Project Name	Cumulative Effects
UCFC-17	White Pass Ski Area Yurt Construction	Construction of the yurt near Chair 4 resulted in an increase in the developed character of the White Pass Study Area. The effects of this project overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in the long-term developed character of the White Pass Study Area.
UCFC-21	White Pass Ski Area Day Lodge Remodel	The Day Lodge was remodeled in 2003 to accommodate increased demand for guest services at the White Pass Ski Area, resulting in an increase in the developed character of the White Pass Study Area. The effects of this project overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in the long-term developed character of the White Pass Study Area.

**Table 3.15-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects on the Upper Tieton River Watershed on Visual Resources**

Project Number	Project Name	Cumulative Effects
UT-1	White Pass Ski Area Half Pipe Construction	The construction of a half pipe resulted in an increase in the developed character of the White Pass Study Area. The effects of this project overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative long-term increase in the developed character of the White Pass Study Area.
UT-3	White Pass Ski Area Generator Shed and Propane Tank	The construction of a generator shed adjacent to the condominiums resulted in an increase in the developed character of the White Pass Study Area. The effects of this project overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative long-term increase in the developed character of the White Pass Study Area.
UT-5	US Cellular Tower	The construction of a cell tower on Pigtail Peak resulted in an increase in the developed character of the White Pass Study Area. The effects of this project overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative long-term increase in the developed character of the White Pass Study Area.
UT-7	White Pass Ski Area Cross Country Yurt	The cross-country yurt was constructed in 2001, resulting in an increase in the developed character of the White Pass Study Area. The effects of this project overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative long-term increase in the developed character of the White Pass Study Area.

**Table 3.15-4:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects on the Upper Tieton River Watershed on Visual Resources**

Project Number	Project Name	Cumulative Effects
UT-8	White Pass Ski Area Manager's Cabin	The construction of a Manager's Cabin in 1998 resulted in an increase in the developed character of the White Pass Study Area. The effects of this project overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative long-term increase in the developed character of the White Pass Study Area.
UT-9	White Pass Ski Area Manager's Office	The construction of a Manager's Office in 1998 resulted in an increase in the developed character of the White Pass Study Area. The effects of this project overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative long-term increase in the developed character of the White Pass Study Area.
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	The replacement of a cell tower and building addition in Pigtail Peak will result in an increase in the developed character of the White Pass Study Area. This project will overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative long-term increase in the developed character of the White Pass Study Area.
UT-33	Highway 12 Paving project (between Mile Posts 151.2 and 159)	Resurfacing on US 12 in 2004 resulted in a road surface with a more noticeably black surface. The effects of this project overlap spatially and may overlap temporally with the implementation of the White Pass expansion. Visual impacts due to this project will be short-term, as the road surface will become lighter and less noticeable. Combined with the White Pass expansion and the other projects listed in this table, this project will contribute to a cumulative short-term impact on visual resources.

The cumulative, long-term effect of the projects listed in the table above, combined with the effects of the White Pass expansion, is an increase in the developed character of the White Pass Study Area due to the increased visibility of developed recreation infrastructure and additional buildings. These developments are consistent with the desired future condition for 2L, and the goal and description for RE-1 lands under the GPNF and OWNF Forest Plans, respectively. Additionally, the prescribed VQO of Retention, and the corresponding SIL of High, would continue to be met. Cumulative impacts on the scenic quality of the White Pass Scenic Byway (US 12) are analyzed in Section 3.12-4.

3.16 NOISE

3.16.1 Affected Environment

A description of the A-weighted decibel (dBA) scale used to describe sound and factors that affect sound levels can be found in Appendix K – Additional Air Quality and Noise Information.

3.16.1.1 Noise Standards and Regulations

State, county, and local noise regulations specify standards that restrict both the level and duration of noise measured at any given point within a receiving property. The maximum permissible environmental noise levels depend on the land use of the property that contains the noise source (e.g., industrial, commercial, or residential) and the land use of the property receiving that noise.

White Pass lies within both Lewis and Yakima counties, but only Yakima County has noise regulations. However, any expansion activity at White Pass would not be regulated by Yakima County Ordinances because sounds originating from construction or refuse removal equipment and sounds from any forest harvesting activity are exempt from Yakima County Ordinances. Therefore, the Washington State regulations would apply to the project. The Washington Administrative Code (WAC) establishes limits on the levels and duration of noise crossing property boundaries. Allowable maximum sound levels depend on the zoning of the noise source and the zoning of the receiving property, as shown in Table 3.16-1.

Table 3.16-1:
Maximum Allowable Noise Levels

Environmental Designation for Noise Abatement of Noise Source	Environmental Designation of Noise Abatement of Receiving Property		
	Class A (dBA)	Class B (dBA)	Class C (dBA)
Class A (residential/recreational)	55	57	60
Class B (commercial)	57	60	65
Class C (industrial)	60	65	70

Source: WAC 1975

The WAC noise code also identifies a number of noise sources or activities that are exempt from the noise limits described above (WAC 1994):

- Sounds created by traffic on public roads;
- Sounds created by warning devices (such as back-up alarms); and

- Sounds from blasting and from construction equipment are exempt from the standards during the day (7:00 a.m. to 10:00 p.m. weekdays and from 9:00 a.m. to 10:00 p.m. on weekends) in rural and residential districts.

3.16.1.2 Existing Noise Sources and Levels

The White Pass Study Area is in a relatively remote forested area, is sparsely populated, and has no sensitive receptors nearby. The largest noise impact within the White Pass Study Area is the passing traffic on US 12. Its level varies with traffic density and can be heard on the upper slopes of the existing ski area. This traffic noise can rarely be heard in Pigtail or Hogback Basin, where solitude remains. The most apparent non-natural noise in Pigtail and Hogback Basins is the occasional noise from low-level U.S. Army helicopters, U.S. Navy jets, and other military aircraft passing through the area.

Typical background noise levels in coniferous recreational areas range from 35 to 45 dBA in the summer daytime and 30 to 35 dBA in the winter daytime (Harrison 1980). Sound levels within the existing SUP are not uncharacteristic for this type of land use, as vegetation and snow cover absorb nearly all of the human caused noise. Even during winter operations, the noise level in the existing SUP area remains near background. Electric motors used on the lifts and limited snowmaking increase noise levels above background in the vicinity of these facilities. In addition, the passing of snow groomers and snowmobiles used for administration and maintenance occasionally breaks the natural silence.

3.16.2 Environmental Consequences

Information about construction site noise levels and the noise levels from snowmaking can be found in Appendix K – Additional Air Quality and Noise Information.

3.16.2.1 Alternative 1

Construction Impacts

Under Alternative 1, no new construction-related noise impacts would occur at White Pass. Any future project proposal presented to the Forest Service would be evaluated under the NEPA process.

Operational Impacts

The typical operational noise impacts during the winter under Alternative 1 would include normal ski area operations, limited snowmaking, occasional avalanche control, and auxiliary diesel backup. During the summer, the typical operational noise impacts would be associated with operating and maintaining the existing ski trail network and infrastructure for short periods of time. Maintaining ski trails and lift corridors would require periodic brushing or mowing to exclude trees and reduce the height of shrubs. Such activities would not be expected to have significant noise impacts, so overall noise levels currently experienced at White Pass would not increase.

The sounds of human activities usually go unheard within Pigtail and Hogback Basins. Occasionally during the winter months the distant sounds of the *Paradise* lift operation and skiers using the present permit area would be heard in the Pigtail Basin. In addition, there would be infrequent sounds created by passing backcountry skiers and overhead aircraft. Sounds of vehicle traffic other than an occasional snow groomer would not be heard within the basins. Occasionally during the winter months, the muffled boom from ski patrol avalanche control would be heard (White Pass Ski Area, however, uses explosives infrequently for avalanche control). These conditions would continue under Alternative 1. These ongoing effects are consistent with state, county and local regulations governing the levels and duration of noise.

3.16.2.2 Alternative 2

Construction Impacts

Under Alternative 2, noise associated with excavation and construction of new chairlifts, trails, and the mid-mountain lodge would be the most noticeable impacts associated with the Proposed Action, and would occur over the period of one summer. Noise impacts from construction activities would be temporary and would occur throughout the expanded SUP area and nearby parts of the adjacent Goat Rock Wilderness Area. **During construction, there would be a temporary increase in noise levels in Hogback and Pigtail Basins, as well as in adjacent areas of the Goat Rocks Wilderness, due to the use of various types of construction equipment and the hauling of materials within the project area. Construction noise impacts would be localized, short-term, and generally limited to daytime hours during the summer of construction.** The exact noise levels would depend on the type of equipment being used and the duration of use. **A helicopter would be used for the installation of chairlift towers and upper terminals over a ten day period. During helicopter usage, the localized noise levels would be quite high relative to other times of the year. Daytime construction noise levels from helicopter use is estimated to be approximately 65 dBA at 350 feet, which is higher than typical daytime background levels of 35-45 dBA.** The types of ground equipment used for this project would typically generate noise levels between 80 and 90 dBA at a distance of 50 feet while equipment is operating. **During the ten days of helicopter use in the project area, the noise level would periodically be quite high in Hogback and Pigtail Basins, as well as in the adjacent portions of Goat Rocks Wilderness. The pristine noise level experienced by those using the PCNST and Wilderness areas during this period would also be altered during the use of ground equipment within the project area, but the audible noise would not be expected to travel as far.** Construction would be limited to daytime hours only and would be expected to occur over one summer season only. Notices would be posted on the trail or at the trailhead to alert PCNST travelers about the possible construction noise that might be audible to them (refer to Mitigation Measure MM16 in Table 2.4-2).

During this construction period sounds would be local and would have little effect on other resource values, including wildlife. Big game and other wildlife may be affected and choose to temporarily move to more quiet areas in the surrounding forestlands during the period of helicopter and/or other construction operation. It is unlikely that there would be any long-term adverse impact from this noise source (refer to Section 3.6 –Wildlife).

Operational Impacts

Under Alternative 2, operational noise levels during the winter time would be slightly increased over existing conditions due to the more developed nature of the site.

Winter time operational noise level differences under Alternative 2 would result in more traffic on US 12, increased operation of maintenance vehicles (e.g., groomers), and increased operation of chairlifts. Chairlift noise levels are difficult to discern, as there are many factors that influence noise (drive/return terminal, snow, detachable vs. non-detachable, etc.). Doppelmayr has recorded noise levels between 73-78 dBA when standing underneath a chairlift drive terminal with no snow or people around (Doppelmayr, pers. comm.). Occasional avalanche control and auxiliary diesel backups are temporary noise impacts that would also occur during normal winter operations at White Pass.

Ski trails would be mechanically groomed and the periodic sounds of snow groomers would be heard in both Pigtail and Hogback Basins and in adjacent portions of the Goat Rocks Wilderness during operations (generally at night and in the early morning). The mid-mountain day lodge and the upper chairlift terminal would be serviced by over-snow machines whose sound would occasionally be audible to those in the basin. The use of existing snowmaking equipment in the base area would not be audible in the expansion area.

Typical operational noise impacts during the summer would be associated with maintaining the existing ski trail network and infrastructure in distinct locations, which could potentially be audible to PCNST travelers and users of the adjacent Goat Rocks Wilderness Area during working hours for two to three days each summer.

Overall, it is not expected that daytime operation levels would increase by more than 3 dBA with the project, and therefore no audible impact is expected (a 3dBA increase is the doubling of sound energy, which is generally considered the level of human perception). These effects are consistent with the state, county and local regulations governing the acceptable levels and duration of noise.

3.16.2.3 Modified Alternative 4

Construction Impacts

Under Modified Alternative 4, noise associated with excavation and construction of new chairlifts, trails, and buildings would be the most noticeable impacts associated with the project, and would be similar to the impacts described under Alternative 2. Notices would be posted on the trail or at the trailhead to alert PCNST travelers about the possible construction noise that might be audible to them (refer to MM16 in Table 2.4-2). In addition, terrain modification on Holiday and trail construction in the *Paradise* pod would temporarily increase noise levels in the vicinity of these projects during construction due to the use of heavy equipment and hauling of materials. The actual sound level would depend on the type of equipment being used, the duration of use, weather conditions and individual human perception of the noise. **Noise impacts from construction activities under Modified Alternative 4 would be temporary and would occur throughout the project area in the summer time.**

Operational Impacts

Sound levels under Modified Alternative 4 would be similar to those described for Alternative 2, in Hogback and Pigtail Basins. Within the existing SUP area, the improvements to terrain (i.e., Holiday, *Paradise* pod) would not result in a noticeable increase in machinery operation or associated noise. Thus, Modified Alternative 4 would be consistent with the state, county and local regulations governing the levels and duration of noise.

3.16.2.4 Alternative 6

Construction Impacts

Under Alternative 6, noise associated with excavation and construction of the new *Basin* lift, the associated trails, the proposed mid-mountain lodge, and new road would be the most noticeable impacts associated with the project. These noise impacts would likely be less than the expected noise impacts that are described under Alternative 2 because the *Hogback Express* would not be built, therefore limiting noise impacts to the Pigtail Basin. Notices would be posted on the trail or at the trailhead to alert PCNST travelers about the possible construction noise that might be audible to them (refer to MM16 in Table 2.4-2). During construction there would be a temporary increase in sound levels due to the use of heavy equipment and hauling of materials. The actual sound level would depend on the type of equipment being used and the duration of use. **Noise impacts from construction activities under Alternative 6 would be temporary, slightly less than as described under Alternative 2, and would occur throughout the project area in the summer time.**

Operational Impacts

Following build-out of the proposed project, noise levels under Alternative 6 would be similar to those that are currently experienced in the existing SUP area during the winter time, including the operation of chairlifts, snow groomers, and vehicle traffic on US 12. Sound levels would be elevated over existing conditions due to the more developed nature of the site and would be less than the impacts described under Alternative 2 because the *Hogback Express* would not be built. **It is not expected that daytime operation levels under Alternative 6 would increase by more than 3 dBA with the project, and therefore no audible impact is expected. These effects are consistent with state, county and local regulations governing the acceptable levels and duration of noise.**

3.16.2.5 Alternative 9

Construction Impacts

Under Alternative 9, noise associated with excavation and construction of the new *PCT* chairlift and corresponding trails would be the most noticeable impacts associated with the project and would be similar to the expected noise impacts that are described under Alternative 2, except that all noise generation would occur within the existing SUP Area. During construction there would be a temporary increase in noise levels due to the use of heavy equipment and hauling of materials within the existing SUP. The actual noise level would depend on the type of equipment being used, the duration of use, weather conditions and individual human perception of the noise. Noise impacts from construction activities under Alternative 9 would be temporary and would occur throughout the project area during the summer time. Under Alternative 9, no new noise impacts are expected in Pigtail and Hogback Basins since the SUP boundary would not be expanded. Noise impacts to PCNST travelers and Goat Rocks Wilderness users under Alternative 9 would be similar to Alternative 2 due to the proximity of construction activities to the Wilderness boundary, even though the PCNST is affected in a different location than under Alternative 2. Notices would be posted on the trail or at the trailhead to alert PCNST travelers and Wilderness area users about the possible construction noise that might be audible to them (refer to MM16 in Table 2.4-2).

Operational Impacts

Following build-out of the project, sound levels under Alternative 9 would be similar to those that are currently experienced in the SUP area during the winter time, including the operation of chairlifts, snow groomers, and vehicle traffic on US 12. Sound levels would be elevated over existing conditions due to the more developed nature of the site and would also be the same as described under Alternative 2. **It is not expected that daytime operation levels under Alternative 9 would increase by more than 3 dBA with the project, and therefore no audible impact is expected. Under Alternative 9, no new noise impacts are expected in Pigtail and Hogback Basins because the SUP boundary would not be expanded. As with the other Action Alternatives, these effects are consistent with state, county and local regulations governing the acceptable levels and duration of noise.**

3.16.3 Cumulative Effects

A cumulative effects analysis was performed for each watershed at the site scale (White Pass Study Area). Past, present and reasonably foreseeable projects occurring within each watershed area are included in the analysis. Within the discussions below, cumulative impacts to noise are considered for short-term and long-term impacts. The cumulative effect on noise is a short-term increase in noise levels due to construction and maintenance activities, and a long-term noise increase due to the operation of ski facilities and increased activity within the White Pass Study Area.

A list of past, present and reasonably foreseeable projects occurring within the Upper Clear Fork Cowlitz River watershed (refer to Table 3.16-2) and the Upper Tieton River watershed (refer to Table 3.15-3) that affect noise are presented below. For a description of project actions, refer to Table 3.0-FEIS1 in Section 3.0 – Introduction.

Table 3.16-2:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Clear Fork Cowlitz River Watershed on Noise

Project Number	Project Name	Cumulative Effects
UCFC-16	Highway 12 Hazard Tree Removal	Hazard tree removal along the US 12 corridor will result in periodic increases in noise levels within the White Pass Study Area. This project overlaps spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in short-term periodic noise within the White Pass Study Area. No long-term noise impacts will result from this project.
UCFC-20	Benton Rural Electric Association (REA) Power Line Maintenance	Power line maintenance will result in periodic increases in noise levels within the White Pass Study Area. The effects of this project overlap spatially with the White Pass Study Area. Temporally, the effects of periodic powerline maintenance overlap with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in short-term periodic noise within the White Pass Study Area. No long-term noise impacts will result from this project.

Table 3.16-3:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Noise

Project Number	Project Name	Cumulative Effects
UT-2	White Pass Ski Area Sewer Line Replacement	Approximately 0.4 mile of existing sewer line from the condominiums to the drainfield will be replaced, resulting in a short-term increase in noise levels within the White Pass Study Area during construction. The effects of this project overlap spatially with the White Pass expansion and temporally during the construction phase of the project. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in short-term construction noise within the White Pass Study Area. No long-term noise impacts will result from this project.
UT-3	White Pass Ski Area Generator, Shed and Propane Tank	The generator and propane tank installed near the condominiums in 2001 will result in increased noise levels when the generator is in use. The effects of the project overlap spatially and temporally with the White Pass expansion. Noise created by the periodic use of the generator during power outages will be localized and infrequent. Combined with the White Pass expansion and other projects identified in this table, this project will add to the cumulative, short-term increase in noise within the White Pass Study Area.

Table 3.16-3:
Cumulative Effects of Past, Present, and Reasonably Foreseeable Projects in the Upper Tieton River Watershed on Noise

Project Number	Project Name	Cumulative Effects
UT-18	Benton Rural Electric Association (REA) Power line Maintenance	Power line maintenance will result in periodic increases in noise levels within the White Pass Study Area. The effects of this project overlap spatially with the White Pass Study Area. Temporally, the effects of periodic powerline maintenance overlap with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in short-term periodic noise within the White Pass Study Area. No long-term noise impacts will result from this project.
UT-19	Highway 12 Hazard Tree Removal	Hazard tree removal along the US 12 corridor will result in periodic increases in noise levels within the White Pass Study Area. This project overlaps spatially and temporally with the White Pass expansion. Combined with the White Pass expansion and the other projects listed in this table, this project will add to the cumulative increase in short-term periodic noise within the White Pass Study Area. No long-term noise impacts will result from this project.
UT-30	US Cellular Backup Power at White Pass Communications Site	The generator and propane tank installed on Pigtail Peak will result in increased noise levels when the generator is in use. The effects of the project overlap spatially and temporally with the White Pass expansion. Noise created by the periodic use of the generator during power outages will be localized and infrequent. Combined with the White Pass expansion and other projects identified in this table, this project will add to the cumulative, short-term increase in noise within the White Pass Study Area.
UT-31	Cellular Phone Carrier Improvements at White Pass Communication Site	The replacement of a cell tower and building addition in Pigtail Peak will result in a short-term increase in the noise level within the White Pass Study Area. This project will overlap spatially and temporally with the implementation of the White Pass expansion. Combined with the White Pass expansion and other projects listed in this table, this project will add to the cumulative increase in short-term construction noise within the White Pass Study Area.

The cumulative effect of the projects listed in the tables above, coupled with the effects of the White Pass expansion, is a short-term increase in the noise levels within the White Pass Study Area. This short-term noise level increase will be periodic and localized, and will result from construction and maintenance activities. These short-term noise level increases, however, are expected to remain consistent with noise levels and duration limits set by any state or local regulations.

The cumulative, long-term noise effect resulting from the White Pass expansion will be similar and additive to that created by the current recreational use of White Pass. This noise includes lift operation, limited snowmaking, occasional avalanche control and diesel backup during the winter, as well as ski trail and infrastructure maintenance during the summer. Additionally, noise generated by lift operation would extend into a larger area not previously subject to mechanical noise (i.e., the Hogback Basin). However, the most noticeable would be the additional vehicle noise created by the projected growth in traffic over time (refer to Section 3.12 – Transportation). This increase in traffic noise would not be readily apparent in Pigtail Basin, Hogback Basin, or the Goat Rocks Wilderness Area due to their distance from US 12. Occasional noise from U.S. Army helicopters, U.S. Navy jets, and other military and private aircraft would continue to be heard in the Hogback Basin. Increased noise levels are not expected to be noticeable, as they will increase by less than 3 dBA, as described in Section 3.16.2 – Environmental Consequences. This long-term noise level increase would remain consistent with state and local regulations governing acceptable levels and duration of noise.

In summary, the effects of the White Pass expansion, coupled with the past, present, and reasonably foreseeable projects described above, would cumulatively increase noise levels in the short-term due to construction and maintenance, and in the long-term noise due to operations. As described above, this cumulative increase in long-term noise levels is generally expected to be inaudible (less than 3 dBA), and both short-term and long-term noise increases would remain within the requirements of state and local noise regulations.

3.17 DISCLOSURES

3.17.1 Introduction

NEPA requires consideration of the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity (40 CFR 1502.16). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of recent and future generations of Americans (NEPA Section 101).

As per the NEPA requirements, this section discusses the following topics: short-term uses and long-term productivity; unavoidable adverse impacts; irreversible and irretrievable commitments of resources; effects on social groups, consumers, civil rights, minority groups, women, and environmental justice; effects on American Indian rights; effects on farmlands, rangelands, and forestlands; effects on energy requirements and conservation potential; and the urban quality and the design of the built environment, including the reuse and conservation potential.

3.17.2 Short-Term Uses and Long-Term Productivity

The Multiple Use - Sustained Yield Act of 1960 requires the Forest Service to manage NFSL for multiple uses, including timber, recreation, fish and wildlife, range and watershed. All renewable resources are to be managed in such a way that they are available for future generations. Trail clearing prescriptions can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grown again if the productivity of the land is not impaired.

Additional short-term impacts include grading associated with trail and lift construction. Grading impacts would be partially mitigated through Mitigation Measures, Management Requirements and Other Management Provisions (refer to Tables 2.4-2, 2.4-3, and 2.4-4).

Managing the productivity of the land is a complex, long-term objective. All Action Alternatives protect the long-term productivity of the White Pass Study Area through the use of specific Forest Plan Standards and Guidelines, and Mitigation Measures, Management Requirements, and Other Management Provisions. Long-term productivity could change as a result of various management activities (e.g., trail clearing and subsequent vegetation management) proposed in the alternatives. Ski area management activities would have direct, indirect and cumulative effects on the economic, social and biological environment (refer to Sections 3.10 – Social and Economic Factors, 3.5 – Vegetation and 3.6 – Wildlife).

Soil and water are two key factors in ecosystem productivity, and these resources would be protected in all alternatives to avoid damage that could take years to correct. Habitat and species productivity are best measured by Management Indicator Species identified by the USFS. Management Indicator Species are used to represent the habitat requirements of wildlife species found within the White Pass Study Area. All alternatives would provide and protect, to a reasonable extent, the wildlife habitat necessary to contribute to the maintenance of viable, well-distributed populations of existing native and non-native species. The abundance and diversity of wildlife species depends on the quality, quantity and distribution of habitat, whether for breeding, feeding or resting. By managing habitat of indicator species, the other species associated with the same habitat would also benefit (refer to Section 3.6.2.7). The alternatives are consistent with Standards and Guidelines (refer to Section 3.1.1 – Forest Plan Amendment), and include Mitigation Measures, Management Requirements, and Other Management Provisions for maintaining long-term habitat and species productivity. The alternatives vary in degree of risk to wildlife habitat and habitat capability (refer to Section 3.6).

3.17.3 Unavoidable Adverse Impacts

Implementation of the Action Alternatives would result in some unavoidable adverse impacts. Although the design of the Proposed Action and the alternatives include Mitigation Measures, Management Requirements, and Other Management Provisions (refer to Tables 2.4-2, 2.4-3, and 2.4-4) to reduce potential adverse impacts, some adverse impacts could occur that cannot be completely mitigated. The unavoidable adverse impacts identified below are those that are expected to occur after implementation of the Mitigation Measures, Management Requirements, and Other Management Provisions, or that cannot be completely mitigated away. While these impacts are anticipated, they are of limited scope as analyzed and described in the referenced sections of this FEIS.

3.17.3.1 Geology and Soils

The Action Alternatives would result in a loss of productive soils associated with the clearing, grading, and construction associated with proposed lift towers and terminals (e.g., *Basin*, *Hogback Express*, or *PCT* chairs), parking lot (2.5 acres for Alternatives 6 and 9, and 7 acres for Modified Alternative 4), lodge construction, and trail grading (Holiday trail grading and egress trail grading to Hogback Basin lifts). The construction of the lift towers, trails and other facilities would result in the conversion of potentially productive soils to a developed condition rendering these areas non-productive (refer to Chapter 2 and Section 3.2 – Geology and Soils).

3.17.3.2 Watershed

The Action Alternatives would result in an increase of solar exposure reaching streams and wetlands, stemming from the loss of vegetation (refer to Section 3.3 – Watershed Resources). Additionally, all Action Alternatives would increase the number of stream crossings, and increase the amount of potentially unstable stream banks.

3.17.3.3 Vegetation

The Action Alternatives would result in a loss of mixed conifer and mountain hemlock parkland communities associated with the clearing and grading of ski trails and lift corridors. Modified Alternative 4, Alternative 6 and Alternative 9 would result in clearing in forest stands with old-growth characteristics (the Medium tree – Multi-story – Closed Canopy forest structure). Alternative 9 would result in the most clearing in forest stands with old-growth characteristics, as compared to the other alternatives (refer to Section 3.5 – Vegetation). Alternative 2, Modified Alternative 4, and Alternative 6 would result in a loss of mountain hemlock parkland communities (refer to Section 3.5.3.1).

3.17.3.4 Recreation

Alternative 2 and Modified Alternative 4 would result in a loss of backcountry skiing opportunities and an alteration of the roadless character of Hogback and Pigtail basins. Alternative 6 would result in a loss of backcountry skiing opportunities and an alteration of the roadless character of Pigtail Basin. Alternative 2, Modified Alternative 4 and Alternative 6 would result in the elimination of a portion of the White Pass Inventoried Roadless Area from placement on the inventory of potential wilderness areas for the life of the ski area (refer to Section 3.11 – Recreation). Modified Alternative 4 would result in an altered experience for PCNST users. While the PCNST reroute would maintain an uninterrupted experience for hikers, a change in the experience would occur nonetheless. Alternatives 2 and 6 would result in an altered experience for PCNST users, as a chairlift would interrupt the wilderness experience of the hiker. Alternative 9 would result in an altered experience for PCT users. As described for Modified Alternative 4, while the PCNST reroute in Alternative 9 would maintain an uninterrupted experience for hikers, a change in the experience would occur nonetheless (refer to Section 3.15 – Visual Resources).

3.17.3.5 Wildlife

The Action Alternatives would result in a decrease in Nesting, Foraging and Roosting as well as dispersal habitat for Northern Spotted Owl, which May Affect and is Likely to Adversely Affect northern spotted owl (refer to Section 3.6 – Wildlife).

3.17.3.6 Visual Resources

Increased development in Pigtail and Hogback basins under Alternative 2, Modified Alternative 4 and Alternative 6 would result in a more developed character of the Hogback Basin, with a VQO of retention (refer to Section 3.15 – Visual Resources).

<u>3.17.4 Irreversible and Irretrievable Commitments of Resources</u>

Irreversible commitments of resources are those that are forever lost and cannot be reversed. Irretrievable commitments of resources are considered to be those that are lost for a period of time and, in time, can be replaced.

3.17.4.1 Geology and Soil Resources

Irreversible commitments of soil and geologic resources resulting from the Action Alternatives would be limited to the loss of small areas of productive soil from excavation and construction of the lift terminals and towers, parking area and lodge (refer to Section 3.2 – Geology and Soils). No prominent geologic features would be removed or impacted by the Action Alternatives. Irretrievable commitments of soil and geologic resources resulting from the Action Alternatives include the loss of soil productivity in graded areas for the life of the White Pass operation.

3.17.4.2 Watershed Resources

Irretrievable commitments of watershed resources would result from the loss of shading vegetation on streams and wetlands for the duration of ski trail vegetation management operations (refer to Section 3.3 – Watershed Resources). Irretrievable commitments would result from stream crossings (culverts and bridges) on streams for the duration of their use (refer to Section 3.3.3.1).

3.17.4.3 Vegetation Resources

The loss of mixed conifer and mountain hemlock parkland vegetation in developed areas would be irretrievable as long as the area is maintained as a ski area (refer to Section 3.5 – Vegetation). Should the time come that the ski area would no longer be desired or viable, then use of the area would be discontinued and structures removed, resulting in the gradual return of conditions to a pre-development state.

3.17.4.4 Wildlife Resources

Irretrievable commitments of wildlife resources include the loss of mixed conifer and mountain hemlock parkland habitat in areas proposed for development under the Action Alternatives for as long as the ski area is active (refer to Section 3.6 – Wildlife). Additionally, the construction of ski trails would result in an irretrievable loss of forested habitat through the creation of new forest edge areas. These edge areas would impact small, terrestrial animals (i.e., low mobility species such as mollusks and frogs) that are adapted to microhabitats within forested areas.

3.17.4.5 Recreation

Irretrievable commitments of land use include loss of backcountry opportunities in Hogback and Pigtail Basins under Alternative 2, Modified Alternative 4, and Alternative 6. The changes to backcountry opportunities would be irretrievable for the life of the White Pass operation, but not irreversible, as the impacted areas would be returned to a non-developed character upon closure of the ski area (refer to Section 3.15 – Visual Resources). Loss of roadless character would likely be irreversible, since Pigtail and Hogback basins would no longer qualify for placement on the inventory of potential wilderness areas.

3.17.4.6 Visual Resources

Increased development in the Pigtail and Hogback basins under Alternative 2, Modified Alternative 4 and Alternative 6 would result in a more developed character of the Pigtail and Hogback basins, with a VQO of retention. Visual impacts would be irretrievable for the life of White Pass operations, but not irreversible, as the impacted areas would be returned to a non-developed character upon closure of the ski area (refer to Section 3.15 – Visual Resources).

3.17.5 Effects on Social Groups, Consumers, Civil Rights, Minority Groups, Women, and Environmental Justice

As directed by the Civil Rights Act of 1964, NEPA, and Executive Order 12898, all federal actions, programs, and policies shall identify and prevent and/or mitigate, to the greatest extent practicable, disproportionately high and adverse human health and environmental effects on minorities and low-income populations. No disproportionate impacts to social groups, consumers, civil rights, minority groups, and women are expected from the Action Alternatives (refer to Sections 3.9 and 3.10).

3.17.6 Effects on American Indian Rights

Archaeological survey work in the White Pass Study Area to date has not identified any National Register eligible heritage resources (historic properties) in or adjacent to the project area. Under all alternatives there would be no effect to historic properties because none have been identified to date within the White Pass Study Area. The only direct or indirect impact to archaeological heritage resources would be from ground-disturbing activities in areas of dense vegetation where surface visibility proved difficult during archaeological field surveys, and where as yet unidentified historic properties could exist.

Access by American Indians for traditional uses and the exercise of treaty rights would remain unchanged under all alternatives. Direct and indirect effects to resources and values of concern to the Yakama Nation would be avoided, to the highest extent practical, by project design. Additionally, the Yakama Nation have historic interests in this area and have been contacted in reference to the Proposed Action and environmental analysis (refer to Section 3.9 – Heritage Resources).

3.17.7 Effects on Farmlands, Rangelands, and Forestlands

There is no farmland or rangeland located within the White Pass Study Area. The Project Site is surrounded by forest land; the Proposed Action and Action Alternatives would alter or remove approximately 29 to 85 acres of forest for as long as the ski area is managed. The White Pass Study Area is located in the OWNF and GPNF.

All Action Alternatives would include a non-significant amendment (as defined under the National Forest Management Act) to the 1990 Gifford Pinchot National Forest Land and Resource Management Plan. This amendment would modify the Standards and Guidelines to allow for downhill ski trails and other ski area infrastructure to cross riparian influence areas within the existing SUP area and the proposed expansion area (refer to Section 2.3.1.1).

3.17.8 Effects on Energy Requirements and Conservation Potential

The existing Benton REA power lines and transformer would be upgraded with larger capacity conductors on the existing alignment to accommodate the increased demand associated with the proposed ski lifts and mountain lodge.

While there is a transformer capacity of 2,970 kW, the existing line is not capable of delivering more than 1550 kW to the summit. Expansion under all Action Alternatives would require upgrading the power line into the area (refer to Section 3.13 – Utilities and Infrastructure).

3.17.9 Urban Quality and the Design of the Built Environment, Including the Reuse and Conservation Potential

The goal of landscape management on all NFSL is to manage for the highest possible visual quality, commensurate with other appropriate public uses, costs, and benefits. In 1996, the Forest Service developed the Scenery Management System (USDA 1995) to more effectively and efficiently integrate scenic values and landscape aesthetics in Forest Plans, and incorporate human values into ecosystem management. The Scenery Management System is to replace the Visual Management System during the planning of new projects or Forest Plan revisions as initially directed by the Chief in the Scenery Management System handbook.

Section 2.3.1.6 outlines the various clearing prescriptions used for all Action Alternatives, including full clearing with grading, full clearing without grading, tree island removal, and tree island retention. Table 2.4-1 in Section 2.4 further describes lift and trail construction techniques. The use of feathering, scalloping and tree island removal prescriptions soften the developed character of the White Pass Study Area. No roads are proposed under any of the Action Alternatives, except Alternative 6 (refer to Section 2.3).

From a landscape aesthetics viewpoint, the recreation experience, scenic setting, available facilities, and sense of place are important aspects in meeting user expectations. Under the Action Alternatives, the proposed mid-mountain/mountain-top lodge, chairlift and other facility design and material selection are designed to keep with the form, line, color and texture with the natural landscape in mind (USDA 1995) (refer to Section 3.15 – Visual Resources for further details).

As described in Mitigation Measure MM22 (refer to Table 2.4-2), the replacement of existing facilities (not part of the proposed development), would be similar in character and architecturally compatible with the established landscape. Additionally, reconstruction of facilities would comply with the approved site development plan.