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.