

Pacific
Northwest
Region

2005



Government Camp Trails Project

Environmental Assessment

Mt. Hood National Forest
Zigzag Ranger District



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CHAPTER I. PURPOSE AND NEED

1.1 Introduction

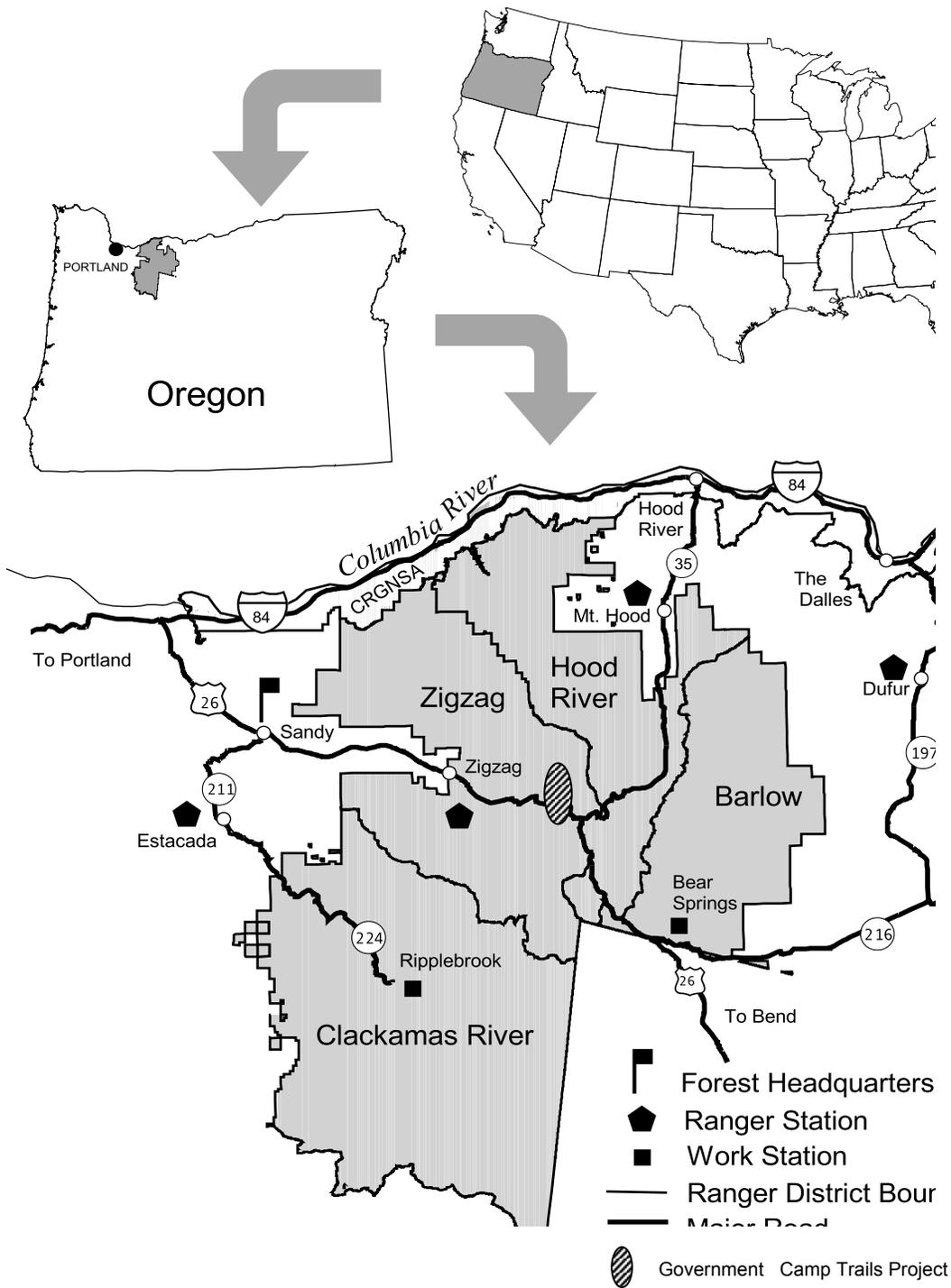
The community of Government Camp is located along Highway 26 on the south side of Mt. Hood (see Figure 1-1 Vicinity Map and Figure I-2 Project Area Map). It is a key destination for both summer and winter visitors. There are more than 150 full time residents in the town. The seasonal population is around 1500 people. As of 1989 there were over 500 residential properties in the community. Many more have been constructed in the last 15 years, with major resort type developments currently under construction. Forest recreation is the major economic engine that sustains the community. In 1989, the Clackamas County Board of Commissioners adopted the Government Camp Village Revitalization Plan and Report, prepared by the County's Transportation and Development Department. The adopted Plan designated an 8,960 acre Urban Renewal/Revitalization Area (also known as a Tax Increment Finance District – TIF) in Government Camp to improve business and economic development. Portions of the town's property taxes are set aside for improving or encouraging business and economic development in the community. The Revitalization Plan called for increased lodging and retail establishments, improved streetscape and building architecture in town and, developed and improved recreational opportunities in and around the town. A Government Camp TIF District Advisory Board was established with ski area and other business representatives, community residents and property owners.

Recently, several major tourist-lodging developments in the community have been started, or are in the process of being approved for construction in the next 3 years. Business facades have been renovated and streetscape improvements are nearly completed. In 2001, the County and the TIF District worked with the Mt. Hood National Forest to complete a Government Camp Trails Master Plan that described new trails, reconstruction of existing trails, trailheads and trailhead parking, and signing.

This document is an environmental assessment of most of the projects described in the 2001 Trails Master Plan, and additional projects proposed and adopted since 2001 by the TIF Trails Subcommittee, the TIF Advisory Board, and the Clackamas County Board of Commissioners. Projects proposed in the Master Plan and additional needs identified since 2001; require an Environmental Assessment (EA) that complies with the National Environmental Policy Act (NEPA). This Government Camp Trails Project EA is intended to comply with NEPA and document the potential impacts of implementing the projects. Portions of the Government Camp Trails Project Area are outside the TIF District boundaries.

Figure I-1 – Mt. Hood National Forest Vicinity

Vicinity



1.2 Management Objectives

Management direction for the project area is prescribed by the 1990 Mt. Hood National Forest Land and Resource Management Plan (MHNF Forest Plan), as amended by the 1994 Record of Decision (ROD) for the Final Supplemental EIS on Management of Habitat for Late Successional and Old Growth Related Species within the Range of the Northern Spotted Owl (Northwest Forest Plan).

The Forest Management Direction for Recreation includes these pertinent statements:

- Foster coordination among all partners who provide outdoor recreation activities and settings.
- Be primary advocates and providers of outdoor recreation opportunities that are appropriate to a large natural forest setting.
- Seek bridging opportunities to tie local and State tourism strategies to the Forest mission.

Most of the project area is designated by the Northwest Forest Plan as “Administratively Withdrawn”. Administratively Withdrawn areas are managed pursuant to local Forest Plan direction. A portion of the project area is within “Riparian Reserves”. Riparian reserves are areas along streams, lakes, and wetlands (usually defined by a buffer area, two tree-heights wide on each side). Within Riparian Reserves, management direction is provided by the Aquatic Conservation Strategies of the Northwest Forest Plan to maintain water quality and protect riparian habitat. In addition to these designations, the Northwest Forest Plan includes specific standards and guidelines for Spotted Owl habitat and Key Watersheds. The proposed project is not within a Late Successional Reserve, or Critical Habitat Unit. A small portion of the project area near Trillium Lake is within a Key Watershed.

The MHNF Forest Plan allocated most of the project area to Winter Recreation Area (A11), a lesser portion to Scenic Viewshed (B2) and Still Creek Special Emphasis Watershed (B6), and a small amount of Barlow Road Special Interest Area (A4) and Keysite Riparian Area (A9). Following are the management goals for each of these areas in the project:

A11 - Winter Recreation Areas: are managed to “Provide areas for high quality winter recreation (and associated summer) opportunities including: downhill skiing, nordic skiing, snowmobiling, and snowplay within a natural appearing forest environment.

B6 – Keysite Riparian Areas: are managed to maintain or improve watershed, riparian, and aquatic habitat conditions and water quality for municipal uses and/or long term fish production. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices.

B2- Scenic Viewsheds: are managed to provide attractive, visually appealing forest scenery with a wide variety of natural appearing landscape features. Vegetation management activities will be utilized to create and maintain long term desired landscape character.

A9 – Keysite Riparian Areas: are managed to maintain or enhance habitat and hydrologic conditions of selected riparian areas, notable for their exceptional diversity, high natural quality and key role in providing for the continued production of riparian dependent resource values.

A4 – Barlow Road Special Interest Area: is managed to protect and, where appropriate, foster public recreational use and enjoyment of important historic, cultural, and natural aspects of our natural heritage. They should be preserved and provide interpretation of unique geological, biological, and cultural areas for education, scientific, and public enjoyment purposes.

Government Camp Drinking Water Protection Area: A portion of the project area is within the 582 acre Government Camp Drinking Water Protection Area. Although the boundary of the Government Camp DWPA has been identified, a Drinking Water Protection Plan has not been developed, and therefore, no management guidelines or protection standards have been established. The DWPA mapping indicates that the eastern portion of the DWPA in the Study Area drains toward Still Creek, and away from the Government Camp water supply. The Government Camp Water District is concerned about the source springs, water storage tanks, protection of underground water lines, and limiting public access to these areas to these areas, especially overnight dispersed camping (personal communication – Mary Ann Hill).

Resource-specific management direction is addressed by topic area in Chapter III.

1.3. The Purpose of and Need for Action

The overall objective of the Government Camp Trails Project is to provide a safe, low maintenance, trail system designed for year-round recreation that links Government Camp to key destinations in the Mt. Hood National Forest that surround the community. The trail system and trailhead parking should be designed to reduce conflicts with local businesses, ski areas, and residences.

1.3.1 - Proposed Action

The Proposed Action is to:

1. Construct 9.6 miles of new trails and reconstruct existing trails to a safe standard that is designed to minimize erosion and heavy maintenance.
2. Locate these new trails so that they are contiguous with the existing trails system, connect to the core areas of Government Camp and link to key recreation destinations including Trillium Lake, Timberline, Ski Bowl and Summit Ski Areas.
3. Construct one new trailhead parking area along the Lake Road. Enlarge one trailhead near Thunderhead Lodge. Improve directional signing to these trailheads and Glacier View and ODOT sno-parks to encourage trail users to park here and not in the parking areas adjacent to businesses and residences.

4. Upgrade bridge crossings along the existing Crosstown Trail for winter grooming to enhance Nordic skiing and snowshoeing.
5. The projects would be implemented between 2005 and 2010 as construction plans and funding is finalized.

Chapter II – Alternatives Including the Proposed Action, describes in more detail the Proposed Action. Following are explanations of the need for action that led to the development of the Proposed Action.

1.3.2 - Need for Action

Need for trail connectivity around the community with linkages to tourism and lodging development that exist or are being constructed: Currently, there are a series of discontinuous system trails and user-created trails around the community. The Government Camp Revitalization Plan (1989, amended 2001) developed by Clackamas County in concert with the community, outlines the plans for Government Camp to become a world class, year round recreation resort destination. The economic incentives in the Government Camp Tax Increment Financing District have led to millions of dollars being spent on recreational tourism and lodging developments completed, planned and underway in Government Camp (Clackamas County Economic Development, 2005). The plan outlines a need for a recreational trail system around the town with connectivity to key recreation destinations and accessible from the core business area and clusters of lodging to complement the large-scale development and improvements that are outlined in the Revitalization Plan. Trails that extend beyond the TIF District boundaries could not be funded with TIF funds.

***Proposed Action:** Design a contiguous year round trail system that accesses key recreation destinations such as Timberline Lodge, Ski Bowl, and Trillium Lake with connection to the core business areas and tourism and lodging developments in the community.*

Need for safely designed trail system: Recreation pressures have increased, and the types of recreation have diversified leading to some trail safety issues. Most of the trails open to mountain bikes around the community were never designed for that use. Trails graded too steep, increase bike speeds. Trails that are too narrow or without proper sight distance, increase the potential for collisions between users. Trail surfaces that are too rough, especially when combined with steep grades, can increase risk. Steep grades, excessive speeds, limited sight distance, and uneven tread can all create safety hazards for trail users, especially mountain bikers.

***Proposed Action:** Construct a multi-use trail system with grades, widths, tread, and structures designed to Forest Service Trail Standards for the intended user and level of difficulty.*

Need to reduce user conflicts: Many of the trail design flaws described above that create safety issues, can also increase conflicts between users. Mountain bike/hiker conflicts are usually found when bikes are going too fast, they cannot be seen (limited sight distance), or the trail is too narrow to accommodate both users. Winter non-motorized user conflicts are more recent.

Snowshoeing has greatly increased in the last five years leading to disgruntled skiers upset with snowshoers who walk over their cross-country ski tracks. In some cases, this is an education issue, however proper trail design can help accommodate lanes for both users. Winter grooming of Nordic trails can cause snow compaction and result in later snow melt in the spring. There is a need to have mountain bike and hiking trails melt out at a fairly uniform rate to prevent resource damage caused by bikers/hikers going around remaining snow drifts in the trail in spring.

Proposed Action: *Design the trail system with adequate width and site distance and signing to accommodate the various users and reduce conflicts between users. Trails that are both groomed Nordic trails and mountain bike/hike trails would have the bike/hike tread located to the edge of the Nordic trail corridor to reduce lingering snowdrifts on the trail caused by compacted snow from winter grooming.*

Need to reduce erosion and control sediment: The under designed system trails mentioned above, and “non-system” (user-created) trails that were never designed at all are causing erosion and drainage problems. Steep grades and inadequate water bars to control runoff are causing erosion and sedimentation. Drainage structures can be designed to control runoff, and still allow safe bike passage as seen on the Crosstown Trail. When trails pass through wet areas, soil is displaced and the trail (and impact) gradually widens when users try to go around the mud. Where trails cannot avoid wet areas, adequate structures must be constructed to prevent damage, erosion, sedimentation and protect vegetation. A designed, maintained trail system is needed to control existing and prevent additional erosion and drainage problems.

Proposed Action: *Construct a trail system that can accommodate the intended uses such as hiking, biking, and Nordic skiing and minimize trail erosion and control runoff.*

Need to design the trailhead parking and develop trailhead signing to reduce conflicts with businesses and residences: Parking in the core Government Camp business area and at Ski Bowl and Summit Ski Areas during peak weekends is limited. The business owners, residents and ski areas support the new trails linking to the core area and ski areas, but are concerned that trail users coming from outside the area would take up already limited parking spaces intended for their businesses. It is not possible to design a trail system with access points to the core businesses and eliminate the possibility that some trail users do not park there. Trailhead parking and destination signing for the trailhead parking needs to direct users to park away from the core area and ski areas.

Proposed Action: *Develop a new trailhead parking area along the Lake Road that is most convenient to trail users and is away from the Ski Bowl parking areas to reduce parking. Improve the Thunderhead Trailhead to encourage trail users to park there. Develop attractive directional trailhead signing to direct trail users to park at Glacier View and ODOT Sno-park and the Thunderhead and Lake Road Trailheads.*

Need to relocate trails, where possible, or clarify clear trail routes through congested areas with multiple uses to reduce conflict: The existing Summit Trail is located on the Lake Road that is the maintenance road between the Ski Bowl base area and Multorpor Lodge. In winter,

Ski Bowl runs snowmobiles, grooming equipment and horse pulled sleighs on the route shared by Nordic skiers and snowshoers. The Summit Trail is unsigned and undefined where it crosses the bottom of the Multorpor ski runs, the Multorpor snowplay area by the lodge, and the junior snowmobile play area, to where it connects with East Summit Trail. While this section is relatively short, it is not obvious to those trying to get to the East Summit Trail and who are unfamiliar with its location. During peak weekends, this area is heavily congested with downhill skiers, racers, race watchers, snowplayers, and Nordic skiers. Currently skiers are encouraged to go north onto private land to travel around the bottom of the snowplay area and back up past the front of the lodge to the East Summit Trail. The permittee that owns this private land is intending to develop the property. The trail should be clearly marked across public land in this congested area.

In summer, mountain bike routes previously developed by Ski Bowl, tie into the Lake Road and the ski area base lodges and are fee trails operated under the special use permit. The operator is concerned that mountain bikers on a common corridor trail system around the community not travel on their fee trails without a trail pass. Bikers on the Crosstown and East Summit Trail wanting to circle around the community are required to pay for a permit to travel from Multorpor Lodge to where the Lake Road terminates at the Ski Bowl Parking lot.

Proposed Action: *Relocate the West Summit Trail off of the Lake Road to reduce winter and summer trail use conflicts and make the West Summit Trail a common corridor in winter and summer. In the congested base area around Multorpor Lodge, locate the trail to stay on the Lake Road and pass at the bottom of the Cascade Chairlift, then skirt just south of the Multorpor Lodge between the Ski Patrol building to the north and the more advanced sledding hill to the south, connecting to the East Summit Trail. The trail route through this area would be fenced and/or signed with mutually agreed upon (between Permittee and Forest Service staff) design to get users through the area quickly. The summertime route for would be a non-fee common corridor for hikers/bikers and would stay on the road located to the south of the Lodge that passes directly north of the yurt and then connect with the East Summit Trail.*

Need: for more groomed trails: There are only three groomed trail systems on the Mt. Hood National Forest; Trillium Lake, Teacup and Mt. Hood Meadows. The first two ask for donations to cover grooming costs, are very popular and at capacity on peak weekends (Slagle and Fitzgerald, personal 2005). The Mt. Hood Meadows has a good trail system, but is not as crowded as the non-fee areas. Snow conditions on the south side of Mt. Hood can be marginal for Nordic skiing and snowshoeing, especially with rain on snow events, or long periods between snowstorms. Groomed trails tend to make Nordic skiing better in marginal snow conditions and longer into the season. There is a need for more groomed trail opportunities during peak times and to enhance Nordic and snowshoe conditions when snow conditions are marginal.

Proposed Action: *Upgrade the bridge crossings on the Crosstown Trail to accommodate a groomer. Design the new segments of the rest of the trail that loops around Government Camp to accommodate a groomer.*

1.4 Summary of Public Scoping and Issue Development

1.4.1 - Summary of Public Scoping

The scoping process was used to determine the scope of issues to be evaluated as part of this environmental assessment. Issues are used to develop alternatives to the Proposed Action that would be considered in this EA.

Informal scoping process began when the Government Camp Trails Master Plan was being prepared in 2000 and completed in 2001. Documentation of scoping done for the Master Plan appears in Appendix F. In late 2002 and early 2003, the forest staff met with Clackamas County staff, Government Camp TIF Advisory Board members, the TIF Trails Subcommittee, the Oregon Nordic Club, and a consortium of winter recreation representatives to discuss the Trails Master Plan, identify issues, and determine how to proceed with NEPA analysis.

The TIF Trails Subcommittee (made up of some local ski area permittees, Government Camp residents and business and property owners, and Zigzag District trails staff who provided technical input), met for nearly monthly meetings in winter/spring of 2003 and again in 2004 to review the Government Camp Trails Master Plan and finalize a Proposed Action and potential alternatives to the proposed action. The TIF Trails Subcommittee recommended the proposed action to the TIF Advisory Board, who in turn, recommended that the Clackamas County Commissioners (as the project proponent) allocate County TIF funds for the Forest Service to conduct NEPA planning to study the Proposed Action.

The formal scoping process began when the Forest posted an announcement and description of this project in the Winter (January) and Spring, 2004 issue of *Sprouts*, the Forest's quarterly newsletter that was used to provide information on proposed actions and encourage participation in and comment on proposed projects. *Sprouts* was sent to several hundred individuals as well as being available to the public at two Forest Service offices, visitor centers, and the Mt. Hood National Forest web site:
<http://www.fs.fed.us/r6mthood> (click on "Forest Publications").

In addition, the project was listed in the Summer and Fall, 2004 and Winter and Spring, 2005 issues of the *PALS Report (Planning, Appeals, and Litigation System)* which has replaced *Sprouts* in order to be more inclusive about all project actions and their status.

Public meetings for scoping on the Government Camp Trails Project, where the proposed trails projects were explained and discussed were held in several venues including:

- Government Camp Tax Increment Finance District Advisory Board Meetings open to the public and generally attended by Government Camp business owners, residents, property owners, and county staff. The trails project was on the agenda or discussed at more than seven of the monthly meetings between October, 2003 and March, 2005. Discussion took place about the Trails Master Plan and Forest Service NEPA planning process, finalization of the proponent's proposed action, and status reports on NEPA planning progress including alternatives to the proposed action.

- Oregon Nordic Club Annual Winter Fair in November, 2003 and November, 2004 and a presentation at their March, 2003 meeting. The components of the Master Plan were presented at the March meeting, with more specifics at the November 2003 meeting. More specific information about the proposed action and alternatives to the proposed action were presented at the November, 2004 meeting.
- A Zigzag Ranger District Open House held May 11, 2004 at the Lion's Club in Welches to present and get public participation and input on District projects including the Government Camp Trails Project.
- Oregon State Parks and Recreation, Metro and Assorted City/County Trails Planning staff and Trail User Representatives. The Government Camp Trails project was described to the group for general information sharing.
- Mt. Hood Chamber of Commerce Meeting held March 1, 2005 in Welches, where the proposed trail system was presented to the Chamber members and feedback was requested.

Zigzag Recreation staff met with the ski area permittees (Jeff Kohnstamm at Timberline and Kirk Hanna at Ski Bowl), to discuss the Government Camp Trails Project. Portions of proposed trails pass through their permit area and discussions centered on design criteria to ensure their concerns were addressed and conflicts were minimized.

There have been numerous conversations with Clackamas County Transportation and Development staff and Oregon Department of Transportation (ODOT) personnel to review preliminary trail plans, discuss Highway 26 ODOT maintenance projects, and prepare funding collection agreements for completing NEPA.

1.4.2 - Public Input to the Planning Process

Much of the public input on the Government Camp Trails Project was positive. Some interested individuals suggested particular routes. The following input was given to the District to consider in the planning process for all alternatives. There is also an explanation of how the input was addressed in the planning process.

- “Common corridor” trails adjacent to private landowners or through permitted ski areas have the potential to cause use conflicts. To the extent reasonably possible, locate trails and trailheads to minimize conflicts with adjacent landowners and permittee operations. Groomed Nordic trail can tend to hold snow later into the spring which can delay use of the mountain bike trail located underneath the groomed Nordic trail.

The proposed trail system was designed where possible to avoid conflicts with private landowners and permittees. In one area at Ski Bowl Ski Area, the trail location options were limited. The Proposed Action included design criteria to minimize conflicts and another alternative was also developed and analyzed as requested by the permittee. Trail design criteria on Nordic/mountain bike trails allow for the mountain bike tread to be

located to the edge of the open Nordic trail corridor so that there is not as much snow on them and they melt out and are useable, sooner than the rest of the trail corridor.

- Provide a loop around Government Camp and trails that do not require special permits for segments that pass through a short section of a ski area. Maintain a common corridor through these areas for both summer and winter.

The Proposed Action was developed with input from all the permittees in an effort to get support for a common corridor concept for the loop trail around the community.

- Future development in and around Government Camp, including preliminary interest expressed in exchanging National Forest system lands around the perimeter of the town for private lands elsewhere, has the potential to modify the setting or access to trails proposed in this project. Anticipate these developments when known, and where possible, locate trails and trailheads to minimize conflicts and enhance recreation opportunities for future developments.

The Proposed Action was designed to where possible avoid conflicts with future land exchange parcels. It is expected that any future land exchange would include a trail easement for the trail in its proposed location, or relocation of the trail if it conflicts with development plans.

- The trails must be maintained in the future so that the public can use them and the trails are not causing adverse resource impacts. Maintenance of the trail system should be guaranteed before trails are constructed.

The Forest has over 1000 miles of system trails and insufficient funds allocated by Congress every year to adequately maintain all of them. There is some resistance to adding trail miles to the inventory and emphasis at the Regional level to fund reconstruction of existing trails, over construction of new trails. Exceptions to this emphasis are made in cases where expected use of the trail is high, the trail connects to local communities or a regional trail system, and/or where there is high commitment by partners (cash and in-kind services) to construct and/or maintain the trail system. There are several entities who have expressed a willingness to help fund construction of portions of a trail system in the Government Camp area.

The Recreation Fee Demo Program that was underway for several years has just been replaced with the 2005 Federal Lands Recreation Enhancement Act (FLREA). These authorities included the Northwest Forest Pass, which has greatly helped offset deferred trail maintenance backlogs. Trails constructed under this project could be considered as candidates for the Northwest Forest Pass Program to cover long-term trail maintenance. Volunteers and partner organizations are very active in helping the District maintain and groom trails in the Government Camp area and may be willing to adopt these trails. Other trail maintenance options will also be considered. The Forest and the community have a joint interest and intent to maintain the trails across National Forest system land in this area.

1.4.3 - Issues with the Proposed Action

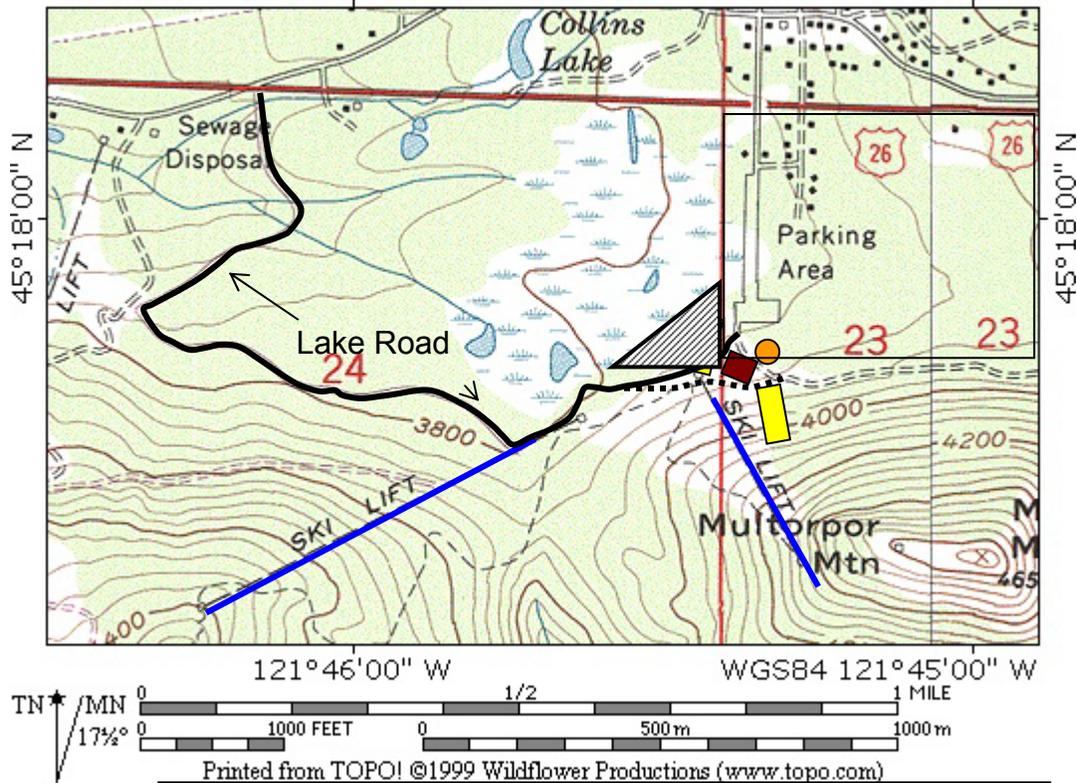
Issue: The Proposed Action to maintain a common corridor through the base area near Multorpor Lodge may create user conflicts during peak congested times during winter.

Early in the public scoping process, Ski Bowl staff said that maintaining a common corridor at the bottom of the Multorpor lifts (Multorpor, Rope Tow and Cascade Lifts) past the Lodge during peak congested times in winter was an issue for them. There are downhill skiers, races, race onlookers, snowplayers, and other people all located directly east, west, south and north of the Multorpor Lodge. See Figures I-3 and I-4 for a diagram of where these are located. As mentioned in the needs for proposed action, efforts to locate the trail away from the congested area is hampered by a combination of the wetlands in the Fen, a triangle of private land owned by the Ski Bowl permittee that they intend to develop, and the steeper ski run slope to the south, leaving no optimal trail location.

Ski Bowl staff suggested that an alternative be developed to route skiers from where the new West Summit Trail comes out of the woods, across the Multorpor Ski Lift, up the northwest side of Multorpor Mountain and around the south side of the mountain to tie in with the Barlow Trail or the East Summit Trail. They did not want a 20 foot cleared Nordic trail located on the route of their existing Optimator Trail because it would change the setting of this single track mountain bike route. Their issue and proposal was used to develop Alternative 3. No other issues with the Proposed Action were identified.

Figure I-3 – Congested Use Area around Ski Bowl and Multorpor Lodge

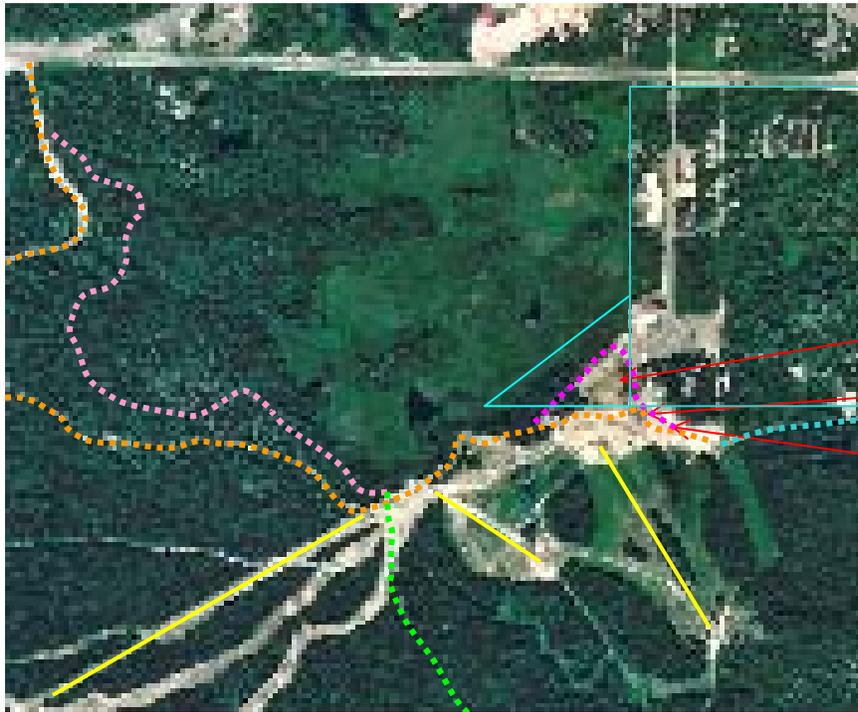
TOPO! map printed on 05/17/05 from "PORTLNDN.TPO" and "Untitled.tpg"
 121°46'00" W WGS84 121°45'00" W



Congested Use Area

- = Multorpor Lodge
- = Snowplay Runs
- = Kiddie Snowmobile rides
- = Ski Lift or Rope Tow
- = Lake Road and Existing common corridor
- = Private land owned by Ski Bowl Permittee

Figure I-4 – Photo of Congested Use Area



Snowplay area
Multorpor Lodge
Kiddie Snowmobile area

-  Proposed West Summit Fen Trail
-  Existing Summit Trail route used by trail users
-  Existing route thru private land also used by trail users
-  Existing East Summit Trail
-  Proposed 1.7 mile route around Multorpor Mt.
-  Approximate private property line adjacent to Forest system lands.
-  Downhill ski lifts

CHAPTER II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 - Development of Alternatives

This section describes and compares the alternatives considered for the Government Camp Trails System including parking. It includes a description and map of each alternative considered. The Proposed Action was developed using the Government Camp Trails Master Plan as a starting point, with additions and deletions made to better respond to the purpose and needs identified in Chapter I. The alternative to the Proposed Action (Alternative 3) was developed around the issue identified in Chapter I.

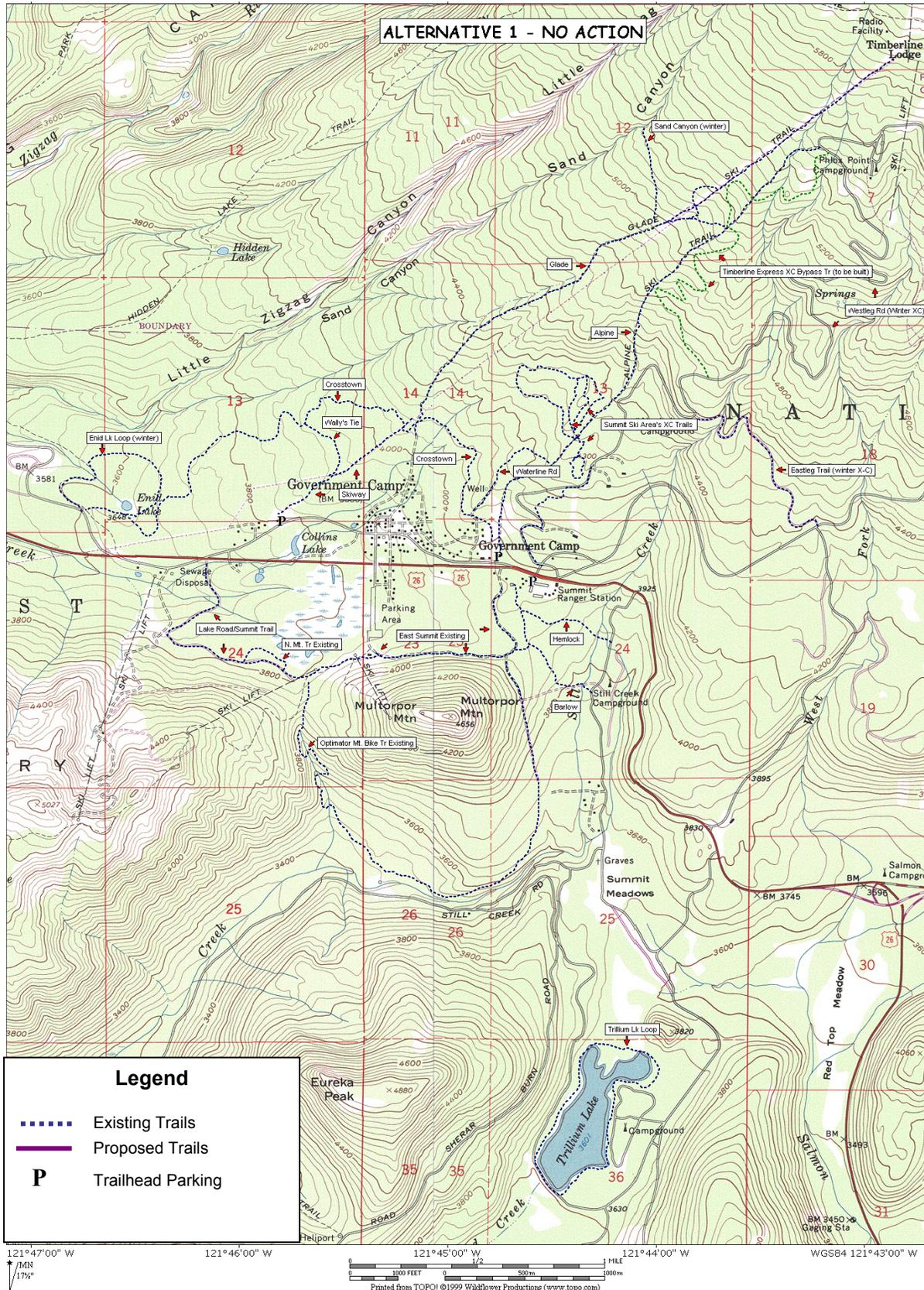
2.2 - Alternatives Analyzed in Detail

Three alternatives are studied in this document: the No Action Alternative, the Proposed Action Alternative, and the Multorpor Mt. Alternative. No alternatives were considered or developed, but dropped from further study by the Interdisciplinary Team.

2.3 - Alternative 1 - No Action Alternative

The No Action Alternative is required by NEPA, and also serves as a benchmark against which the action alternatives can be compared. This alternative would construct no trails, trailhead parking areas, signing, or other facilities. The existing network of system and user trails in the area would continue to exist assuming current management levels. Figure II-1 below shows a Map of the existing trails, and trailhead parking.

Figure II-1. Map of Alternative 1 – No Action



2.4 - Alternative 2 - Proposed Action

The Proposed Action was developed around the purpose and needs outlined in Chapter I. Table II-1 on the following page, and the narrative that follows, provide more information on the projects included in the Proposed Action. Figure II-2 shows a map of the proposed trails, and trailhead parking. Appendix G of this document contains Design Narratives for each of the new trail segments proposed in this alternative including grades, equipment to be used and other details.

2.4.1 - Existing Trail Upgrades

- Upgrade four trail bridges on Crosstown and two trail bridges on Summit Ski Area's Nordic trail loop that would tie into the proposed new Camp Creek Trail.
- Upgrade short spur between Mazamas Sno-park and Forest Service housing compound
- Fix drainage problems on Hemlock and Barlow Trails.
- Restore drainage structures along Glade and Alpine Trails
- Construct a fence or barrier and/or signing along the Lake Road where it approaches the Multorpor Lodge in a location and design that is mutually agreeable to both Ski Bowl and the Forest Service to define and maintain for the future, a non-fee "common corridor" for hike/bike/Nordic ski use and reduce conflicts with other users. This common corridor would have no special fees or restrictions in this section that would differ from the rest of the trail system.
- Upgrade user trail from Lige Road around Waterline Road gate to Crosstown.
- Adjust Eastleg Trail approach to Timberline Road for better sight distance and access to Snowbunny and Yellowjacket.

2.4.2 - Trailhead Parking

- Surface approximately 500 linear feet of roadside parking area along Lake Road
- Surface approximately 250 feet of roadside parking along Government Camp Loop Road near Thunderhead Lodge

2.4.3 - Trailhead and Trail Signing

- Trail system has a consistent, and highly visible design for trailheads, signing along trail, and destination signing along Hwy 26 and other roads adjacent to the trail system.

Table II-1: Alternative 2 – Proposed Action New Trail Construction

Trail Segment	Trail Name	Miles	Designed Use	Difficulty	Design Notes (See Appendix G for full Design Narratives)
2.19	West Summit Fen	0.6	Bike/Ski/Hike	Easier to More Difficult	< 8% grade, 20 ft clearing, 24 inch tread. Approx. 3 water crossings.
2.22	Multorpor Mt.	0.7	Hike	More Difficult to Most Difficult	18" tread, No water crossings
2.28	East Summit Trail Extension	0.1	Bike/Ski/Hike	Easier to More Difficult	< 8% grade, 20 ft clearing, 24 inch tread. No water crossings.
2.6	Barlow Tie	0.1	Bike/Ski/Hike	Easier to More Difficult	< 8% grade, 20 ft clearing, 24 inch tread. No water crossings.
2.3	Crosstown Thunderhead Tie	0.5	Bike/Ski/Hike	Easier to More Difficult	< 8% grade, 20 ft clearing, 24 inch tread. No water crossings.
2.2	West Blossom Connector	0.3	Bike/Ski/Hike	Easier to More Difficult	< 8% grade, 20 ft clearing, 24 inch tread. Small wet area near south end of trail.
2.4	Camp Creek Trail	1.0	Bike/Ski/Hike	Easier to More Difficult	< 8% grade, 20 ft clearing, 24 inch tread. Approx. 3 water crossings.
2.26	Timberline to Town	5.5	Bike/Hike	More Difficult to Most Difficult	
2.23	Trillium Bike	0.8	Bike/Hike	Easier to More Difficult	18 inch tread. One stream crossing
	TOTAL MILEAGE	9.6			

2.4.4 - Project Design Criteria

The design criteria identified below would be included in the site plans and construction plans, as appropriate. All design criteria would be approved by the Forest Service prior to authorization for construction.

2.4.4.1 - Sensitive Plant Design Criteria –

The following design criteria would be implemented as part of Alternative 2 to ensure sensitive plant species are protected.

1. Trail Segment 2.19, West Summit Fen Trail

The trail would be placed at least 50' away from the known population of the Sensitive moss, *Schistostega pennata*. A botanist trained in the identification of this species would work with those identifying the final trail location, so as to avoid any additional populations for this species by no less than 50'. In addition, the trail design would not alter the wetland hydrology.

2. Trail Segment 2.4, Camp Creek Trail

The trail would be placed at least 50' away from the known population of the Sensitive moss, *Rhizomnium nudum*. A botanist trained in the identification of this species would work with those identifying the final trail location, so as to avoid any additional populations for this species by no less than 50'. In addition, the trail design would not alter the riparian hydrologic conditions in any of the four areas where the trail would cross streams because such locations are potential habitat for this species.

3. Trail Segment 2.26, Timberline to Town Trail

The felling of live trees and ground disturbance would be the minimum necessary to meet project objectives to protect host trees and habitat for the Sensitive fungi, *Ramaria aurantiisiccescens*.

2.4.4.2 - Noxious Weed Design Criteria –

Following are the specific design criteria that would be implemented to meet the noxious weed objectives below.

Objective: Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

1. Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict to those periods when spread of seed or propagules are least likely. Prior to project implementation a botanist would survey the proposed staging areas and determine they are weed free. If not weed free, new uninfested project staging areas would be selected.
2. Clean equipment before entering National Forest System lands, including undercarriages, radiators, wheels, and tires. This practice does not apply to service vehicles traveling

frequently in and out of the project area that would remain on the roadway. Seeds and plant parts need to be collected when practical and incinerated. Remove mud, dirt, and plant parts from project equipment before moving it into a project area.

3. If trail projects are not implemented within 3 years of weed survey dates (summer 2004), weed surveys would be redone and the weed risk analysis with recommendations would be updated prior to project implementation.

Objective: Prevent the introduction and spread of weeds caused by moving infested sand, gravel, borrow, and fill material in Forest Service, contractor and cooperator operations.

4. Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources for eradication, and strip and stockpile contaminated material before any use of pit material.
5. Inspect and document the area where material from treated weed-infested sources is used, annually for at least three years after project completion, to ensure that any weeds transported to the site are promptly detected and controlled.
6. Maintain stockpiled, uninfested material in a weed-free condition.

Objective: In those vegetation types with relatively closed canopies, retain shade to the extent possible to suppress weeds and prevent their establishment and growth.

7. Retain native vegetation in and around project activity to the maximum extent possible consistent with project objectives.

Objective: Avoid creating soil conditions that promote weed germination and establishment.

8. Minimize soil disturbance to the extent practical, consistent with project objectives.

Objective: Where project disturbance creates bare ground, consistent with project objectives, re-establish vegetation to prevent conditions to establish weeds.

9. Revegetate disturbed soil (except travelways on surfaced projects) in a manner that optimizes plant establishment for that specific site.
10. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching as necessary. Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available. Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g. road embankments or landings)
11. Use local seeding guidelines to determine detailed procedures and appropriate mixes. To avoid weed-contamination, have a certified seed laboratory test each lot against the all-

State noxious weed list to Association of Seed Technologists and Analysts (AOSTA) standards, and provide documentation of the seed inspection test. There are plant species not on State and Federal noxious weed lists that the Forest Service would consider non-native invasive weeds. Check State and Federal lists to see if local weeds should be added prior to testing. Seed lots labeled as certified weed free at time of sale may still contain some weed seed contamination. Non-certified seed should be tested before use.

Objective: To prevent new weed infestations and the spread of existing weeds, avoid or remove sources of weed seed and propagules.

12. Encourage backcountry pack and saddle stock users to feed stock only weed-free feed for several days before travel on National Forest System lands.
13. Inspect, brush, and clean animals, especially hooves and legs before entering public land. Inspect and clean tack and equipment.
14. Tie or hold stock in ways that minimize soil disturbance and avoid loss of desirable native vegetation.

Objective: Improve effectiveness of prevention practices through weed awareness and education.

15. Post weed awareness messages and prevention practices referring to preceding objective's messages at project trailheads and/or parking areas.

2.4.4.3 - Spotted Owl Habitat and other Wildlife Project Design Criteria –

1. The Programmatic Biological Opinion for Projects with the Potential to Modify the Habitats of Northern Spotted Owls and/or Bald Eagles or Modify Critical Habitat of the Northern Spotted Owl (USDI 2005) associated with this project included a term and condition that stated for activities within the disruption distance (depending on activity type) of any current or historic spotted owl activity center, a seasonal restriction would be in place between March 1 and July 15th (or later if deemed necessary by an agency wildlife biologist) for all activities associated with habitat modification, including chainsaws and heavy equipment that have the potential to disturb nesting spotted owls and/or their habitat .
2. This restriction would only apply in areas where trails were adjacent (within 65 yards) or go through suitable spotted owl habitat and would include a small amount of trail on the west side of the project area in Sections 13 and 24 (West Blossom Connection, Crosstown Thunderhead, and West Summit Fen. The effects determinations would be reduced if hand methods are used for trail construction during the critical breeding season.
3. For pileated woodpecker and other snag and large woody debris dependent species, locate the trail corridor to avoid falling snags where possible, and leave any large trees

felled on the ground for large woody debris, unless needed for bridge stringers or other structures.

2.4.4.4 - Wetland and Water Quality Project Design Criteria –

1. Best management practices would be implemented that require bank stabilization, and other measures. These are outlined in the Mt. Hood Land and Resource Management Plan. In addition, any work done in-stream, would follow “in water work windows” as necessary for fish habitat protection. Where dredging and filling occurred in wetlands, 404/401 permits requirements would be met. No dredging and filling of wetlands is planned.
2. Special design criteria and associated best management practices would be implemented, that require trails within wetland areas to be constructed on puncheon structure or turnpiked to minimize impacts to the wetlands. Trails would be designed to avoid wet areas when possible and to minimize the amount of overstory vegetation to be cleared in wetland areas.
3. Project-specific Stormwater Pollution Control Plans (SWPCP) would include additional erosion protection (such as two rows silt fence, straw bales and/or more permanent structures such as logs) to be provided between streams and construction areas close to stream channels.
4. In graded areas, topsoil would be carefully removed and stockpiled for placement onto the graded area. During construction, topsoil would be carefully stored using approved erosion and sediment control methods, as described in the construction plan (SWPCP) in order to avoid erosion. Soil would be covered to prevent erosion during inclement weather.
5. As specified in the construction plan (SWPCP), excess soil material from construction would be transported to a suitable upland site, approved by the USFS, so that it is stored outside of stream or ditch corridors, wetlands, and Riparian Reserves.
6. If flooding or weather results in detrimental erosion or sedimentation, operations would stop until the conditions improve.
7. Forest clearing in the proposed trail corridors would be reduced to the extent practical through careful trail layout during construction, the area of soil compaction would be reduced by limiting access by construction equipment and drainage structures for stormwater and erosion control would not divert water into these mapped Landslide Hazard Areas.
8. A Spill Prevention and Response Plan would be developed and included in the SWPCP as part of the construction documents. Petroleum products would not be discharged into drainages or bodies of water. No fuels or construction machinery would be stored within Riparian Reserves.
9. Plant material and topsoil would be salvaged for use in revegetation in Riparian Reserves. Revegetation of disturbed areas of Riparian Reserves would emphasize the objectives of filtration of eroded soil material, stream bank stability and wildlife habitat.

10. Vegetation removal in wetlands and riparian vegetation zones will be conducted by hand/chainsaw. No ground-based heavy equipment would operate in wetlands. Trees may be felled away from wetland areas and removed by heavy equipment operating from uplands, provided that no disturbance to wetland or riparian soils occurs. The shrub layer, where present, would be maintained at a height of 5 feet above ground to provide thermal shading.
11. No access corridors, staging areas, spoils piles, or other construction-related materials would be staged or stored within Riparian Reserves. Whenever feasible, potential impacts to streams would be minimized by bringing construction materials and equipment to the project site during the snowpack.
12. The Revegetation Plan would include stabilization of exposed soils during construction operations, as well as disturbed sites on ski trails and other project sites.
13. All mulch and seed mixes utilized in the area would be free of noxious weeds and other invasive nonnative plant species.

2.4.4.5 - Heritage Resource Project Design Criteria -

1. Heritage resources sites are documented in the confidential analysis files to protect them. Specific design criteria have developed to avoid and protect these sites. The West Summit Fen, Barlow Tie and Trillium Bike trails will be designed and constructed to avoid impacts to recorded historic properties in the vicinity of the proposed trail alignments. Should unanticipated archaeological or historical resources be encountered during construction of the trail system or parking expansion, all ground-disturbing activity in the vicinity of the find would be halted and the SHPO and FS would be promptly notified to assure compliance with relevant state and federal laws and regulations.

Figure II-2A – Map of Alternative 2 – Proposed Action: Trails Around Government Camp

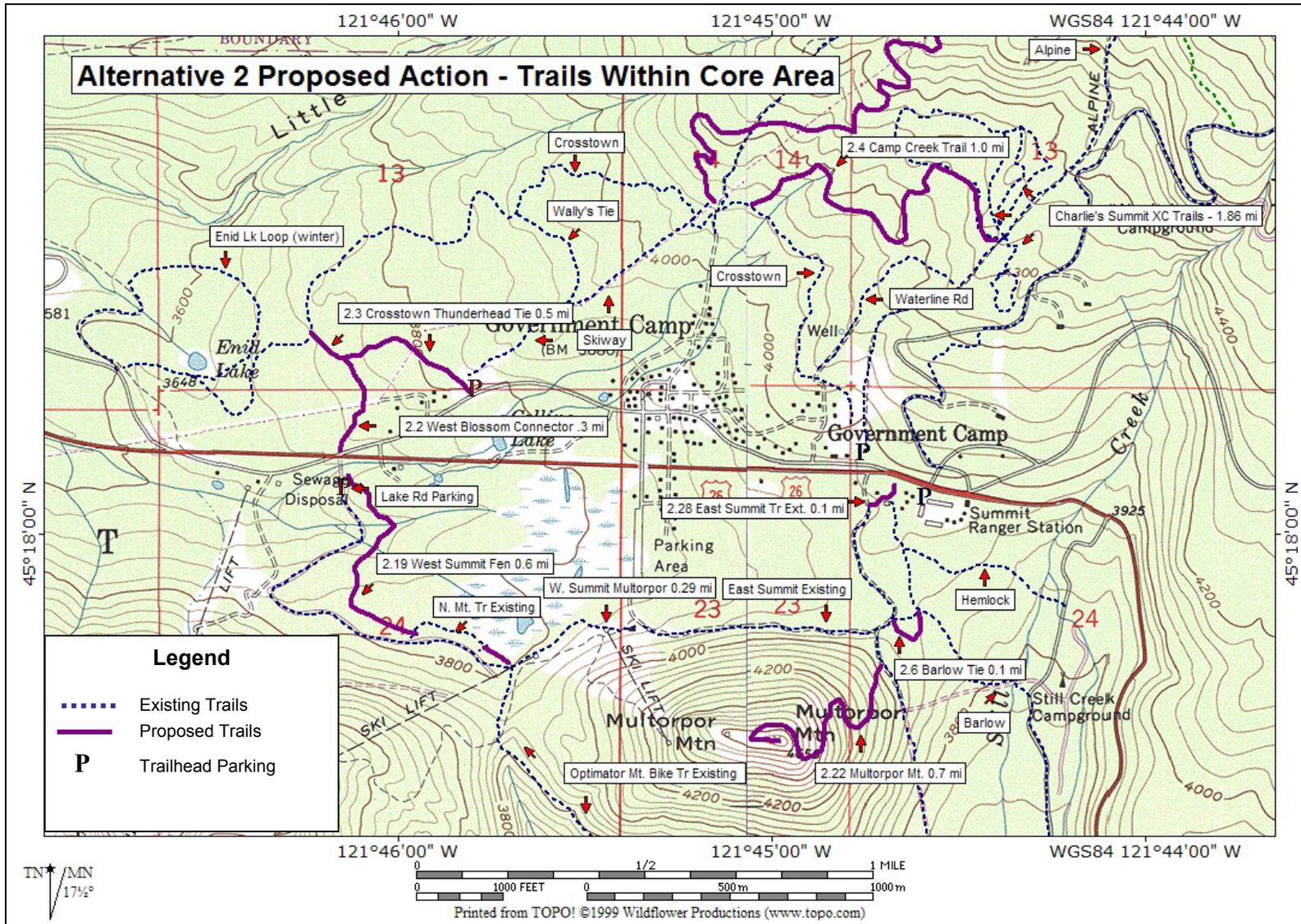


Figure II-2B – Map of Alternative 2 – Proposed Action: Timberline to Town Trail

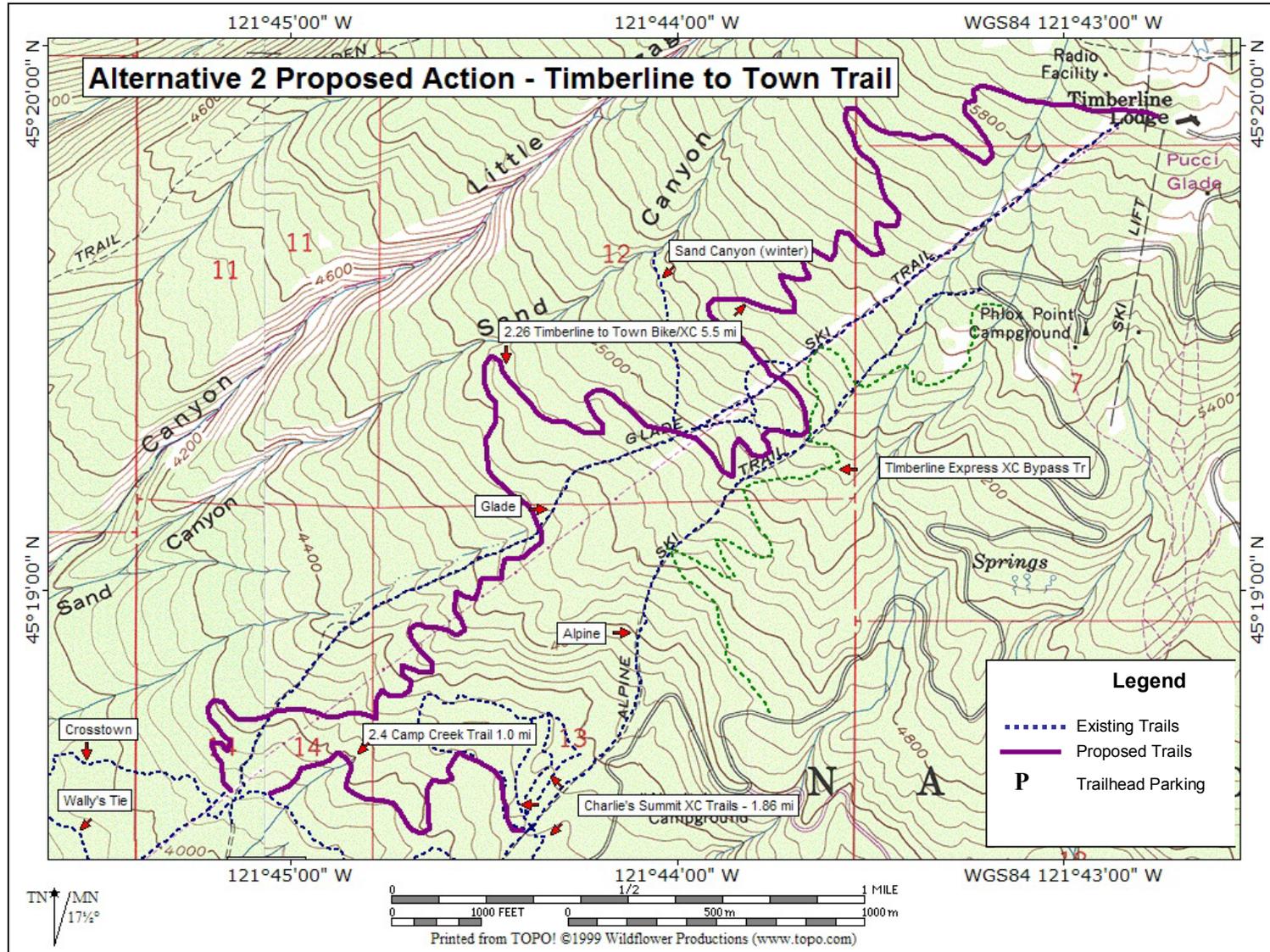
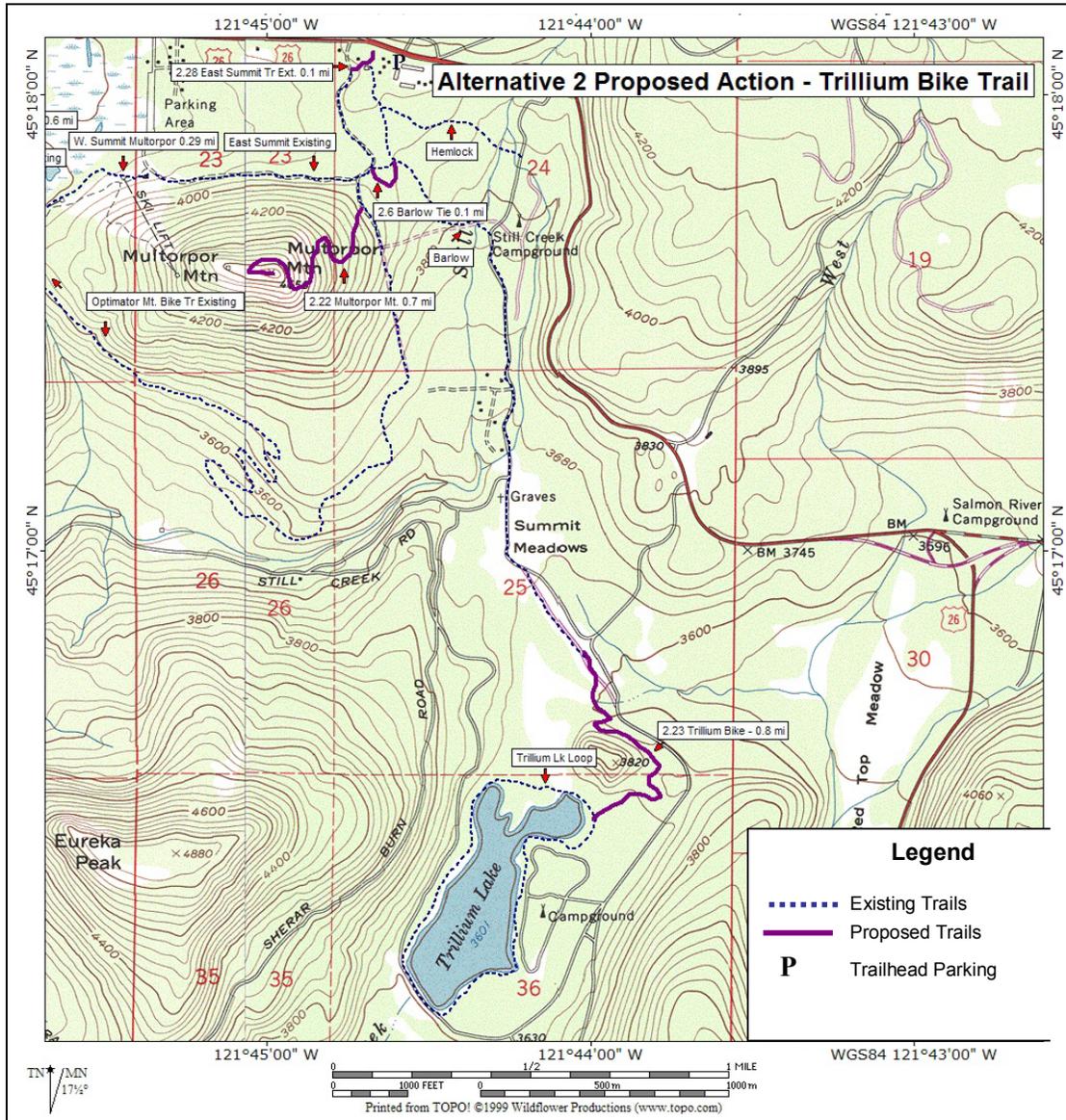


Figure II-2C – Map of Alternative 2 – Proposed Action: Trillium Lake Bike Trail



2.5 - Alternative 3 Multorpor Mountain Alternative

Alternative 3, Multorpor Mountain has all the same objectives, components and project design criteria as Alternative 2 - Proposed Action, except for a proposed winter Nordic ski/snowshoe trail that would go from the base of a lift area at Multorpor Ski Area, and travel around the south side of Multorpor Mountain. This alternative was developed at the request of Ski Bowl Area staff because they felt that the trail would help reduce use through the base area around Multorpor Lodge when it is congested during peak winter days. See Figures I-3 and I-4 for a more detailed map of the congested area. The location of the Multorpor Mountain Trail was based on input from Ski Bowl staff and is shown in Figure II-3. Table 2 below contains more detail on the proposed trail

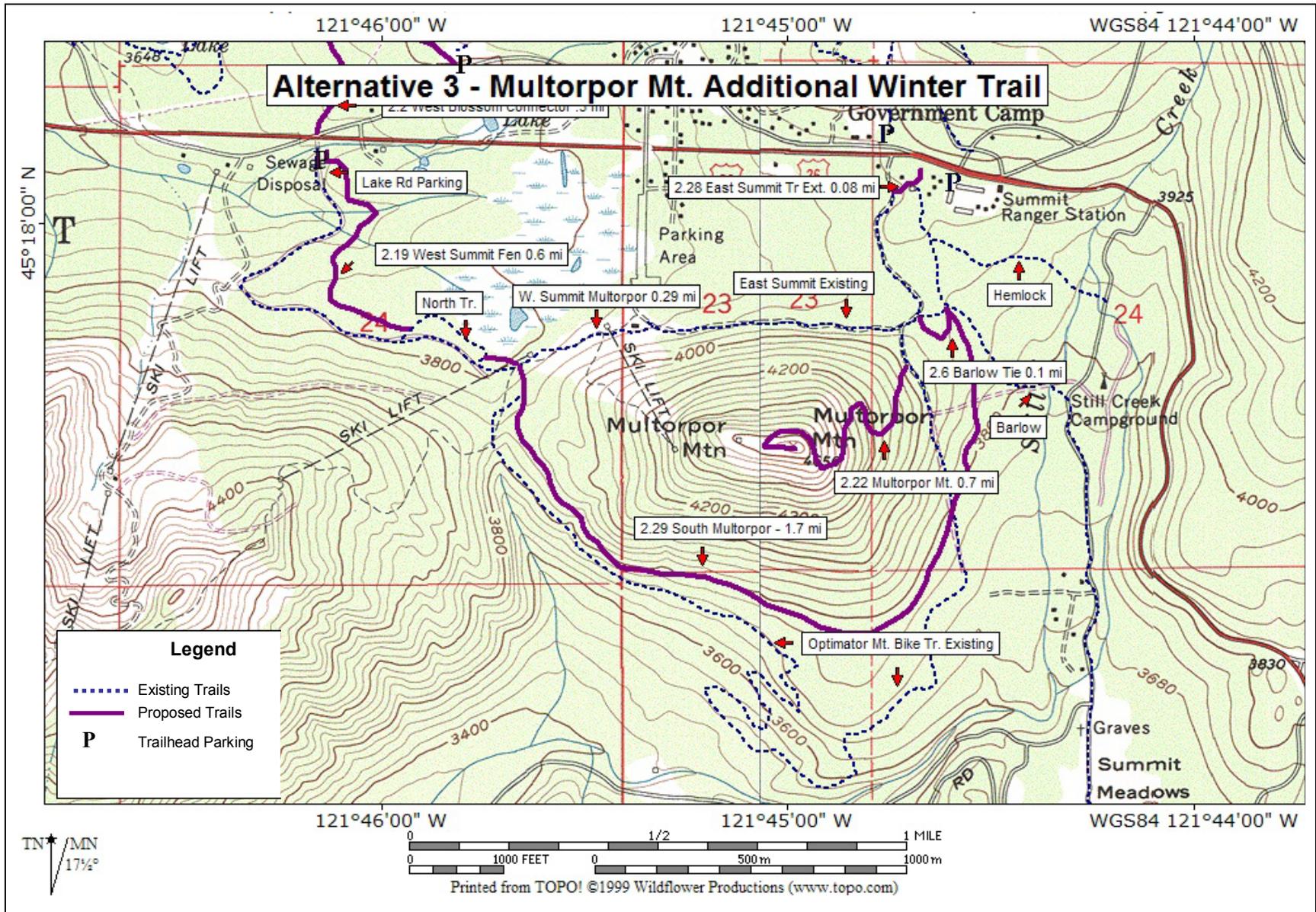
2.5.1 - Existing Trail Upgrades –Trailhead Parking, Trail and Trailhead Signing and Project Design Criteria:

All of these elements are identical to those listed in Alternative #2 – Proposed Action.

Table II-2: Alternative 3 – Multorpor Mt.

Trail Segment	Trail Name	Miles	Designed Use	Difficulty	Design Notes
All trail segments totaling 9.6 miles as described in the Proposed Action – Alternative #2 plus:					
2.29	South Multorpor	1.7	Ski	More Difficult to Most Difficult	20 foot clearing. Excavation required for cut and fill. First 250 feet is 12 to 15% slope. Next 250 feet is 16%. Crosses downhill run, ties in with beginning of Optimator for 150 feet, then travels up to saddle and parallels uphill of Optimator trail across south side of Multorpor Mt.
	TOTAL MILEAGE	11.3			

Figure II-3: Map of Additional Trail in Alternative 3 – Multorpor Mt.



2.6 - Comparison of Alternatives

Table II-3. Comparison of Alternatives

Facility or Improvement Constructed	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3 – Multorpor Mt.
Total Miles Construction	0 miles	9.6 miles	11.3 miles
Hiker only trails	0 miles	0.7 miles	0.7 miles
Hike/Bike trails	0 miles	6.3 miles	6.3 miles
Hike/Bike/Nordic ski trails	0 miles	2.6 miles	2.6 miles
Nordic ski trails only	0 miles	0 miles	1.7 miles
Trailhead Parking	0 ft.	750 ft.	750 ft.
Existing Trail Upgrades	No	Yes	Yes

CHAPTER III. DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1 - Introduction

This chapter forms the scientific and analytic basis for the comparison of the alternatives. The discussion of the environmental effects of implementing the alternatives, including the Proposed Action, explains:

1. Direct and indirect effects and their significance;
2. Conflicts between the alternatives and the objectives of Federal, regional and State and local land use plans, policies and controls for the project area.
3. Environmental effects and cumulative impacts of the alternatives and how they compare to the No Action alternative.
4. Energy and natural or depletable resource requirements and conservation potential of alternatives.
5. Urban quality, historic and cultural resources, and the design of the built environment including reuse and conversation potential of alternatives and mitigation measures.
6. Means to mitigate adverse environmental impacts.

The following sections describe these effects on recreation opportunities, threatened, endangered, and sensitive plants and wildlife, watershed values, fisheries, heritage resources, air quality, scenic resources, potential for noise impacts and other required disclosures.

3.2 – Summary Comparison of Responsive to Purpose and Needs and Impacts by Alternative

Following is a summary table (III-1) describing the responsive of the Alternatives to the Purpose and Needs described in Chapter I, and the effects of implementing the alternatives by resource area. More detail is given by resource in the rest of the chapter.

Table III-1: Summary Comparison of Responsiveness to Purpose and Needs and Impacts by Alternative

Resource	Alternative 1– No Action	Alternative 2 – Proposed Action	Alternative 3 – Multorpor Mt.
Recreation and Purpose and Needs			
<ul style="list-style-type: none"> • Provide contiguous trail system around community to complement community tourism and lodging development 	Trail system remains discontinuous and is not responsive to ongoing development.	Provides continuous trail system around community and accesses key recreation destinations (Timberline, Ski Bowl, Trillium, Summit). Proposed trails, trailhead and signing provide better destination amenities for tourism and lodging developments in the community, making those more attractive for destination lodging.	
<ul style="list-style-type: none"> • Design new trails and upgrade existing to meet established trail design standards for increased safety. 	Safety issues on Alpine, Glade, and Rd 2656 to Trillium remain.	Proposed trails are designed to accommodate intended use with appropriate sight distance, width, grade and surface. Mountain bikes provided with designed trail from Timberline. Hikers/bikers have trail access along busy Rd 2656 to Trillium Lake.	
<ul style="list-style-type: none"> • Design proposed trail work to minimize trail erosion and control runoff. 	Erosion and runoff continue on trails.	Proposed trails are designed to accommodate intended use with appropriate grade, side slopes, drainage structures and erosion control.	
<ul style="list-style-type: none"> • Reduce trailhead parking issues 	Occasional trail user parking conflicts with permittee, business and private property owners.	Proposed trailhead construction as well as destination signing direct trail users to appropriate parking areas that minimize conflicts with permittees, core business area, and private property.	
<ul style="list-style-type: none"> • Locate trail through congested area of Ski Bowl. Reduce winter and summer conflicts where possible 	Existing trail passes thru congested area with no clear guidance.	Trail through congested area is fenced, or signed or both to the satisfaction of the permittee and FS. Signing directs skiers through the heaviest congested area. West Summit Fen gets winter and summer trail users off of most of Summit Trail/Lake Road.	S. Multorpor trail leads skiers up and around Multorpor Mt avoiding most congested area. Some congestion and conflicts with Nordic skiers crossing downhill runs. Some skiers would opt to stay on flat area 1000 feet through congested area to East Summit Trail.

Resource	Alternative 1– No Action	Alternative 2 – Proposed Action	Alternative 3 – Multorpor Mt.
Botany • Threatened and Endangered Plants		No effect	No effect
• Sensitive Plants	No effect	Two mosses and one fungi found in project area. No impact to all sensitive plants, mosses and bryophytes. No practical way to survey for sensitive fungi so presence is presumed if habitat is present. For one fungi found and 18 others, proposed actions “may impact individuals or habitat but not likely to lead to a trend toward federal listing.”	
• Risk of Noxious Weed Introduction	Low risk	Low risk if design criteria incorporated into both alternatives is implemented.	
Wildlife		Finding of “May affect, not likely to adversely affect” for threatened spotted owl and bald eagle. Finding of “may impact, not likely to cause a trend towards federal listing for four species of salamanders, Baird’s shrew, bufflehead, wolverine, fisher and Cascade Lake tightcoil – all sensitive species. No impact to two species of turtles, Horned grebe, and Pacific wing-tailed bat. No habitat present for threatened lynx, or other sensitive species.	
Watershed Values • Trails in Riparian Reserves (mi.) • Clearing (ac.) • Clearing Riparian Reserves (ac) • Trail in Wetlands (ft) • Wetland clearing (ac.) • Excavation (yds ³) • Riparian reserve excavation (yds ³)	0 0 0 0 0 0 0	1.7 19.2 2.9 575 0.2 534 534	1.7 23.6 2.9 575 0.2 1911 534

Resource	Alternative 1– No Action	Alternative 2 – Proposed Action	Alternative 3 – Multorpor Mt.
<ul style="list-style-type: none"> • # Stream Crossings • Fish bearing stream crossings • Sediment Yield (lbs/yr) • Disturbance (ac) 	0 0 0 0	6 2 232 (approx 3 ft ³) 1.91	6 2 232 (approx 3 ft ³) 2.42
Fisheries <ul style="list-style-type: none"> • Direct effects to PETS listed aquatic species 	No effect	No direct effect to PETS listed aquatic species would occur as no work is proposed within stream channels where PETS listed fish or mollusks are present.	
<ul style="list-style-type: none"> • Baseflows 	No effect	Potential increase of 0 to 0.2% considered slight and likely not detectable.	
<ul style="list-style-type: none"> • Stream Temperature 	No effect	No water temperature impacts anticipated associated with stream crossings or trail clearing near stream.	
Heritage Resources	No effect	No Adverse Effect to any historic properties from construction of East Summit Trail Extension, Barlow Tie, Crosstown Thunderhead Tie, West Blossom Connector, and the Camp Creek trails, with Design Criteria implemented. .	
Scenic Resources <ul style="list-style-type: none"> • VQO objectives 	No Effect	Meets visual quality objectives of retention in foreground and partial retention in middle and background.	
Air Quality	No Effect	No impacts to air quality	
Noise	No Effect	Localized and short in duration.	

3.3 - . Recreation

3.3.1 - Recreation Management Direction

The Forest Plan outlines direction for recreation management of the project area. Guiding principles from the Forest Plan for managing Forest recreation related to this project are to:

- Foster coordination among all partners who provide outdoor recreation activities and settings.
- Seek bridging opportunities to tie local and State tourism strategies to the Forest mission.
- Connect and network with community based organizations, programs, agencies and groups which sponsor outdoor recreation activities.
- Construct, rehabilitate, protect or restore facilities to a desired high quality level. Operate and maintain facilities to meet customer expectations.

Most of the project area is within the A11 Winter Recreation Area. The specific objectives for this area are to “provide areas for high quality winter recreation (and associated summer) opportunities including downhill skiing, nordic skiing, snowmobiling, and snowplay within a natural appearing forest environment.” In addition, one of the desired conditions for this allocation is that: “opportunities exist for summer recreation activities such as hiking, mountain bicycling, and horseback riding.”

Specific management standards applicable to the proposed action are:

- Recreation facilities shall be provided for the purposes of winter recreation opportunities such as cross-country and downhill skiing, snowmobiling and snowplay, for health and safety or to mitigate impacts from recreational use. (A11-001)
- The trail system shall be developed and designed to disperse recreational use and provide a range of difficulty levels” (A11-010)

3.3.2 - Affected Environment for Recreation Opportunities

Government Camp Trails Project Area encompasses a range of recreation opportunities, from highly developed ski areas and lodges, to semi-primitive untrailed areas. Ski areas and lodges include Timberline Lodge and Ski Area, Summit Ski Area, Ski-Bowl and Multorpor Ski Areas. All but Summit have both winter and summer recreational activities. There are three National Forest campgrounds in the area: Trillium Lake, Still Creek, and Alpine Campgrounds. There are several summer and winter trails in the project area.

Crosstown Trail and Wally’s Tie were constructed in 1995 as a hike/bike/ski trail. They were not designed for groomers due to limited funds available for construction at that time. They

receive a high amount of use year round and have held up remarkably well to mountain bikes and other uses.

Alpine and Glade Trails were historic downhill runs from Timberline to Government Camp. They are also where utility lines to Timberline have been located. They have had waterbars and other drainage devices installed to reduce the erosion along these trails that generally follow the fall line. They are used in the winter by downhill and telemark skiers and snowboarders. They are used in the summer by the more adventurous mountain bikers. The grade and the drainage devices do not meet mountain bike trail design standards, resulting in safety issues for mountain bike trail access to Timberline Lodge. The trails also have erosion and runoff because water bars are eroded by mountain bikes. Safety issues for bikers and hikers are also present along Forest Road 2656 where there is heavy RV, truck and vehicle traffic between Trillium Lake and Government Camp.

Westleg Road, Still Creek Road, Trillium Lake Road are all Forest roads that are used in the winter by Nordic skiers. They are all popular routes, with the most popular being the groomed Nordic route around Trillium Lake. Regularly groomed Nordic trails are limited on the Mt. Hood National Forest to the Teacup Lake Trail system and the Trillium Lake trails. Both areas are at capacity on peak weekends. Public scooping indicated strong support for additional groomed trails in the Government Camp area. Safety issues for bikers and hikers going between Government Camp and Trillium Lake along Forest Road 2656 where there is heavy RV, truck and vehicle traffic and the road is narrow with curves.

Snowshoeing has increased greatly in the last ten years. There have been some conflicts between Nordic skiers and snowshoers when tracks are obliterated by the latter. This was especially a problem when the track was groomed. Last year the District worked with the groomer at Trillium to set a separate track for snowshoers and walkers and then posted etiquette signs to encourage them to keep off groomed ski tracks. That helped reduce the conflicts and can be used in other areas.

The Barlow and Hemlock trails are access routes between Government Camp and the Still Creek Road that leads to Trillium Lake. The Barlow Trail is historic, used in both summer and winter and has some erosion problems due to its grade. The Hemlock Trail is a winter trail only. Both routes are used by the groomer who grooms the Trillium Lake Basin. Drainage problems along Hemlock have been repaired in recent years.

The Lake Road also known as Summit Trail travels through the Ski Bowl Ski Area and over to Multatorpor. It is used by ski area maintenance vehicles year round. The Summit Trail has long been used by Nordic skiers and that access was preserved as a “common corridor” in the last Master Plan done by Ski Bowl (1975). Mountain bikes were not in use on Mt. Hood when the Ski Bowl Master Plan was done. Since that time, Ski Bowl has added a mountain bike trails within their permit area and included the Lake Road as a fee trail in their operating plan in the summer. Ski Bowl staff have raised concerns about conflicts with ski area visitors in both summer and winter with the public use of the Lake Road. Conflicts include congestion in the winter time with downhill skiers, races, tubing and other winter activities. Conflicts in summer

center around access to the fee mountain bike trail system. More details on this affected environment are contained in the Issues Section.

As mentioned in the purpose and need section, the Government Camp community is actively developing their community as a high quality destination resort with all the recreational amenities that are usually associated with that designation. The trail heads and trails around the community are not well signed. More information about the affected environment for recreation and the needs are identified in Chapter I.

3.3.3 - Environmental Consequences on Recreation Opportunities

3.3.3.1 - Effects of Alternative 1 – No Action on Recreation

Contiguity of Trail System Around Community to Complement Tourism and Lodging Development: There would continue to be a lack of a contiguous trail system around the community and that connects with key recreation destinations such as Trillium Lake, Timberline Lodge, Ski Bowl and Summit Ski Area. The lack of a contiguous trail system and poor trailhead, and trail signing would not achieve the level and quality of recreational amenities desired around the community and by other Forest trail users. Private development of lodging on adjacent private land would continue, however access to recreational opportunities from these developments and portions of Government Camp would be limited and non-contiguous. Groomed Nordic trails would continue to be crowded on peak weekends due to limited supply.

Safety and Design Standards of Trails: The No Action Alternative would maintain existing recreational opportunities in the project area. Safety problems would continue on the Alpine and Glade due to the lack of a designed mountain bike route. Hikers and bikers along Trillium Lake Road 2656 would continue to compete with busy RV and truck traffic on the narrow curved road.

Erosion and Runoff Control on Trails: Erosion and runoff would continue to be an issue on trails that are used by mountain bikes that were never designed for such use, and on existing trails that were under designed or created by users.

Trailhead Parking Conflicts: There are occasional conflicts with trail use parking. Ski Bowl would like to have as much downhill ski parking as possible on peak winter weekends. Businesses in the core business area of town want that parking for business traffic. Private property owners do not want trail users parking near their homes or blocking driveways. Lack of good destination and trailhead signing increases the problem. These occasional conflicts would continue under this alternative.

Trail Conflicts in Congested Area

Use conflicts would continue along the Summit Trail/Lake Road area, and in the vicinity of the Multorpor Lodge. The Ski Bowl permittee filled a large dip in the terrain between the base of the Cascade Chairlift and the Lodge in 2004. This helped mitigate some of the use patterns in the congested area. However, there is still not adequate trail signing or a clear route through the

area. Summit Trail users would continue to wander through and around the snowplay areas, lodge, and kiddie snowmobile area in their effort to reach the East Summit Trail. They cross onto private land in order to avoid the more congested area. Mountain bikers wanting to ride around the community on the trail system could continue to have to buy a permit to go from the Lake Road/Ski Bowl Parking lot to the East Summit Trail.

3.3.3.2 - Effects of Alternative 2 – Proposed Action on Recreation Opportunities

Contiguity of Trail System Around Community to Complement Tourism and Lodging Development: The Proposed Action would create a contiguous system of trails around the community and improve trail access to existing, new and future lodging developments and the core business area. The trail system would have quality destination, trailhead, and trail signing helping trail users find the trails and use them appropriately. The newly expanded trail system would meet the objectives of the community to provide recreational amenities in line with a high quality destination resort community.

Safety and Design Standards of Trails: The proposed trails would be designed to accommodate the intended uses so that safety issues are mitigated. The Alpine and Glade Trail would be closed to mountain bikes due to safety issues and bikers would be rerouted onto the designed route. Hikers and bikers could use the trail along Road 2656 rather than walking along the busy road to and from Trillium Campground.

Erosion and Runoff Control on Trails: Erosion problems on some existing trails would be corrected and new trails would be designed with appropriate grade, location and surface to minimize erosion and control runoff.

Trailhead Parking Conflicts: The additional parking provided along the Lake Road and at Thunderhead, as well as destination and trailhead signing proposed, would help alleviate parking conflicts with ski areas, business areas, and private property owners.

Trail Conflicts in Congested Area:

Winter - The West Summit Fen Trail would keep Nordic trail users off of most of the busy Lake Road. A meeting was held in May, 2005 and attended by the Ski Bowl Permittee, his staff, Zigzag District Ranger and recreation staff, Clackamas County Development Council staff, and the Government Camp Tax Increment Financing Advisory Board chair and vice chair to finalize the winter and summer trail locations and design criteria through the permit area. The group agreed at the meeting that signing for the trail developed as part of the trails construction project and designed and posted with mutual agreement from the permittee, would adequately address their concerns about user conflicts during congested peak use times. In the 2004 season, the Ski Bowl permittee completed filling a large dip in the terrain near the Lodge, mitigating some of the use patterns and potential for conflicts that were previously identified as an issue during planning for the Government Camp Trails Project. The permittee expressed support for the trail and agreed that the loop trail system around the town should be a common corridor open to the public. The trail would come out from the West Summit Fen Trail onto the Lake Road and

skirt the bottom of the Cascade Chair and then skirt the south side of the Lodge connecting with the existing East Summit Trail. This direct route, improved with clear signing and possibly fencing when needed, would provide users a clear route, adequate warnings about congestion, and minimize conflicts where possible.

The summer trail would leave the West Summit Fen Trail, connect to the Lake Road, travel just north of the yurt location to the south of the Lodge, and then connect with the East Summit Trail. The groomed winter trail would be aligned so that the mountain bike trail tread underneath is to the far side of the winter trail cleared corridor. This would help reduce the compaction of snow (caused by grooming) along the mountain bike trail in spring.

3.3.3.3 - Effects of Alternative 3 – Multorpor Mountain Alternative on Recreation Opportunities

Contiguity of Trail System Around Community to Complement Tourism and Lodging Development: Same as Alternative 2

Safety and Design Standards of Trails: Same as Alternative 2

Erosion and Runoff Control on Trails: Same as Alternative 2

Complementing Community Tourism and Lodging Development: Same as Alternative 2

Trailhead Parking Conflicts: Same as Alternative 2

Trail Conflicts in Congested Area: The development of the South Multorpor trail that climbs up and around Multorpor Mountain would add nearly two miles of additional trail opportunities. To the extent that trail users would use the alternate route, it would help reduce the number of people at one time in the congested area. Most of the loop trail around the community is relatively flat and easy. Due to the terrain to get up and away from the ski runs (approximately 500 feet approaching grades of 16%) and around the mountain, and the steep side slopes on much of this trail, it is rated more difficult-most difficult. Directional signing may help guide people to this alternative trail. Due to the more challenging terrain on the alternate route as well as the additional length, some trail users, may choose to cross the approximately 1000 feet of open area towards the Multorpor Lodge and connect with the East Summit Trail. For those that do choose the alternate trail, there is some potential for conflicts and collisions with downhill skiers when climbing up and across the downhill ski runs to tie in with the alternative trail. Once they are past the downhill runs, they would not experience the congestion and crowding at the base of the Lodge. The alternate trail offers a longer, and more challenging and therefore diverse trail experience to trail users. Conflicts in the congested areas at busy periods may still be an issue if trail users choose not to use the alternative trail. These conflicts can be mitigated somewhat by clear signing to direct users to the route with the least conflict.

3.4 - Botany

3.4.1 - Management Direction for PETS Plant Species

This project was evaluated for potential effects the proposed action, and alternatives to the Proposed Action, could have on Proposed, Endangered, Threatened, and Sensitive (PETS) plant species in accordance with The National Environmental Policy Act (42 USC 4321 et seq.) the federal Endangered Species Act (16 USC 1531 et seq.), and the National Forest Management Act (16 USC 1604 et seq.). To comply with the above, the Forest Service has set forth guidance in FSM 2670 that is designed to ensure Forest Service actions (1) do not contribute to the loss of viability of any native or desired non-native species or cause a trend toward federal listing for any species, (2) comply with the requirements of the Endangered Species Act; and (3) provide a process and standard which ensures that PETS species receive full consideration in the decision making process.

To achieve these objectives, all Forest Service projects, programs and activities are reviewed for possible effects on PETS species and the findings documented in the Decision Notice (FSM 2672.4). On the Mt. Hood National Forest there are no federally listed (proposed, endangered, threatened) plant species known to occur, however one federally threatened species (*Howellia aquatilis*) is suspected.

The Region 6 Regional Forester's Sensitive Species List (April, 2004) was used to determine species of vascular plants, fungi, bryophytes and lichens that are documented from or suspected to occur on the Mt. Hood National Forest.

3.4.2 - Affected Environment for PETS Species

The project area has a diversity of habitats including dense conifer forests in mostly silver fir climax zone with some mountain hemlock zone, rock outcrops, streamside riparian areas, and a series of wetlands and meadow complexes including "The Fen" in Government Camp.

Pre-field Analysis: Prior to any site visits, the following pertinent information was reviewed: Aerial photography, Regional Forester's list of Proposed, Endangered, Threatened, and Sensitive (PETS) species (revised April, 2004), Mt. Hood PETS plant database, and the Interagency Species Management System (ISMS) with information on the project area. No PETS species are known to occur within or adjacent to the proposed project area. Based on habitat and range information, (herbarium records, technical manuals, plant atlases, etc.), PETS species that are known or suspected to occur on the Mt. Hood National Forest and have potential habitat within the proposed project area are shown in Appendix A.

Field Surveys: Field surveys were conducted within the project area between September 14 and November 15, 2004. All vascular plant, lichen and moss species with potential habitat within the project area were determined to be "surveyable." With the exception of the perennial conk, *Bridgeoporus nobilissimus*, surveys are not considered practical to detect the presence of PETS fungi species identified as having habitat within the proposed project area (FEIS 2004). It is

assumed that these species are present in the project area where there is suitable habitat. Although there was an incidental find of one Sensitive fungi species within the project area, the surveys were not designed to survey for Sensitive fungi.

All but one of the trails, Multorpor Mountain, was flagged prior to surveys being conducted. For these trails, the entire length was surveyed. For Multorpor Mountain, the existing trail was surveyed as well as an intuitive controlled survey of different habitats within the portion of the mountain where the new trail is proposed. General habitat and Sensitive species found during surveys are noted in Table 3 below.

Table III-2. PETS Species Found by Surveys or Suspected to Occur on the Mt. Hood National Forest and with Potential Habitat Within the Proposed Project Area.

Sensitive Mosses Found in Survey Area

Schistostega pennata
Rhizomnium nudum

Sensitive Fungi Found in Survey Area

Ramaria aurantiisiccescens

Sensitive Species Assumed Present Due to Existence of Potential Habitat in Project Area

Cordyceps capitata
Gomphus kaufmannii
Leucogaster citrinus
Otidea smithii
Phaeocollybia californica
Phaeocollybia olivacea
Phaeocollybia piceae
Phaeocollybia scatesiae
Ramaria aurantiisiccescens
Sowerbyella rhenana

Cortinarius barlowensis
Gyromitra californica
Mycena monticola
Phaeocollybia attenuata
Phaeocollybia dissiliens
Phaeocollybia oregonensis
Phaeocollybia pseudofestiva
Ramaria amaloidea
Ramaria gelatiniaurantia

Table III-3. Habitats or Sensitive Species Found by Trail

Trail segment	Trail Name	Habitats/ Sensitive Species found
2.19	West Summit Fen	Riparian, Conifer forest in silver fir climax zone, wetland. <i>Schistostega pennata</i> found in wetland area.
2.4	Camp Creek Trail	Conifer forest in silver fir climax zone, riparian. <i>Rhizomnium nudum</i> (RHNU) found in riparian area and more RHNU habitat found in other riparian areas.
2.26	Timberline to Town	Conifer forest in Mountain hemlock and silver fir climax zones, crossing riparian areas, <i>Ramaria aurantiisiccescens</i> found.
All other Trails		No Sensitive Species found.

3.4.3 - Environmental Consequences for PETS Species and Conformance with Management Direction

3.4.3.1 - Alternative 1 – No Action Effects on PETS Plant Species

The No Action Alternative would not implement any trail construction projects, trailhead parking or implement existing trail upgrades. Therefore there is a finding of “No Impact” to all proposed threatened, endangered, and sensitive species.

3.4.3.2 - Alternative 2 - Proposed Action and Alternative 3 – Multorpor Mountain Effects on PETS Plant Species

Alternative 2 – Proposed Action would construct 9.6 miles of new trail and Alternative 3 would construct 11.3 miles of new trail. Following are the effects to individual species from these proposed projects. The upgrades to existing trails, trailhead parking and trail signing would have no impact to PETS plant species.

Proposed, Threatened and Endangered Species

Howellia aquatilis is generally confined to palustrine wetlands. No habitat of this type exists within the project area, thus the proposed action would have **NO EFFECT** on this threatened species.

Sensitive Species

Table 4 displays the impact of the proposed action on species that were targeted by the field survey. For the following Sensitive fungi species, presence is assumed, because surveys are not practical and potential habitat is present. In addition, there was an incidental find of *Ramaria aurantiisiccescens* within one of the proposed trails.

Cordyceps capitata is a widespread but locally rare species documented from 38 sites in the western Cascade and Coast Ranges in Washington, Oregon and northern California. Three sites are known from Mt. Hood NF on Zigzag and Clackamas River Districts. The species is parasitic on the fruiting body of *Elaphomyces* spp., a genus of underground-fruiting fungi in the truffle group. *Elaphomyces* are associated with the roots of conifers. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*.

Cortinarius barlowensis is widely distributed, known from 16 sites in the western Cascades, Coast Range and Olympic Mountains of Washington and Oregon. There are three known sites from the Mt. Hood NF on the Zigzag District. Habitat is soil under conifers. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails, within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*.

Gomphus kaufmannii is endemic to western North America and is found in California, Oregon, and Washington states. It is located either along the Pacific coast or in the Cascade-Sierran Range. There are 6 known sites for this species on the Mt. Hood National Forest. Host trees for *G. kaufmannii* include true firs and pines. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails, within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Gyromitra californica is distributed from British Columbia to northern California and east to Colorado, Montana and Nevada. It is known in Washington, Oregon and northern California from 35 sites, one of which is on the Mt. Hood NF, Hood River District. This wood and litter saprobe is found on well-rotted stumps and logs of conifers or in soil with rotted wood. Removal of some potential future downed wood in the form of live trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails, within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Leucogaster citrinus is endemic to the Pacific Northwest, known from western Washington, western Oregon and northern California and known from 45 sites. There are four sites from the Mt. Hood NF, Zigzag District. This truffle species is associated with the roots of conifers. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails, within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Mycena monticola is endemic to the Pacific Northwest where it is known from 153 sites, one of which is on the Mt. Hood National Forest. It is restricted to forests above 3000' in elevation, particularly those with Pinus species. *Mycena monticola* is saprophytic on litter and may form fine root associations with plants. Removal of some vegetation and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of

9.6 miles and Alternative 3 would construct 11.3 miles of trails, within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Otidea smithii is known from 10 scattered sites in the western Washington, Western Oregon and northern California. On the Mt. Hood NF, there is one known location on Clackamas River District. This litter saprobe is found on soil under Douglas-fir, western hemlock and cottonwood. Removal of some vegetation and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails, within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Phaeocollybia attenuata is endemic to the Pacific Northwest from western Washington and western Oregon to northern California where it is known from 131 sites. One site is known from the Mt. Hood NF on Zigzag Ranger District. This mycorrhizal species is found on soil under conifers. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails, within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Phaeocollybia californica is endemic to the Pacific Northwest, known from 34 sites in western Washington, western Oregon, and northern California. No sites are known to occur on the Mt. Hood NF, however, there is a site on the adjacent Columbia River Gorge National Scenic Area. This mycorrhizal species is terrestrial and associated with the roots of Douglas-fir, western hemlock and Pacific silver fir. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails, within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Phaeocollybia dissiliens is endemic to Oregon where it is known from 22 sites. It is not yet known from the Mt. Hood NF but it has been found in the West Cascades on the forest to the immediate south of the Mt. Hood and it is reasonable to assume that habitat may be present. This mycorrhizal species is terrestrial under conifers. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Phaeocollybia olivacea is endemic to the Pacific Northwest, known from 92 sites in western Washington, western Oregon, and northern California. There is one known site on the Mt. Hood NF on Zigzag District. This mycorrhizal species is terrestrial under conifers. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Phaeocollybia oregonensis is endemic to Oregon where it is known from 11 sites, three of which are on the Mt. Hood National Forest, and one is known from the Clackamas River Ranger District. This mycorrhizal species is terrestrial and associated with the roots of Douglas fir, western hemlock and Pacific silver fir. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Phaeocollybia piceae is endemic to the Pacific Northwest, known from 49 sites in western Washington, western Oregon and northern California. There is one known site on the Mt. Hood NF on Zigzag District. This mycorrhizal species is terrestrial and associated with the roots of Douglas-fir, western hemlock and Pacific silver fir. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of

trails within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Phaeocollybia pseudofestiva is endemic to the Pacific Northwest, known from British Columbia south through western Washington, western Oregon to California. There are 36 known sites in Washington, Oregon and California, four of which are on the Mt. Hood NF, Zigzag District. This mycorrhizal species grows on soil under conifers. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Phaeocollybia scatesiae is endemic to western Oregon and northwestern California where it is currently known from 16 sites. Three of these sites are on the Zigzag Ranger District of the Mt. Hood National Forest. This mycorrhizal species is associated with the roots of true firs, Sitka spruce, and huckleberry species, from sea level to 3750' elevation. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Ramaria amaloides is endemic to the Pacific Northwest where one site has been documented on the Mt. Hood National Forest. This mycorrhizal species is terrestrial and associated with the roots of Douglas fir, western hemlock, and true firs. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Ramaria aurantiiscescens is a Pacific Northwest endemic and is known from 29 sites within the range of the northern spotted owl. The 29th site for this mycorrhizal species was found within

this project area and is the first confirmed site from the Mt. Hood NF. It was found within the lower elevation portion of the Timberline to Town trail segment. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails within much larger undisturbed areas with the same potential habitat. Although this species is present within one trail segment and there is a reasonable likelihood this species occurs within other project area trails, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both alternatives 2 and 3 is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Ramaria gelatiniaurantia is another Pacific Northwest endemic species. This mycorrhizal species is currently known from a total of 24 sites, two of which are on the Mt. Hood National Forest. This species fruits in humus or soil and is associated with true firs, Douglas fir, and western hemlock. Removal of some potential host trees and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Sowerbyella rhenana, a litter saprobe, is known from the range of the northern spotted owl. There are currently a total of 69 confirmed sites, 3 of which are on the Mt. Hood NF. This species is terrestrial in older conifer forests. Removal of some vegetation and some soil compaction would occur in connection with trail building and resultant trail usage, both of which could have a small localized negative impact on individuals. Alternative 2 - Proposed Action would build a total of 9.6 miles and Alternative 3 would construct 11.3 miles of trails within much larger undisturbed areas with the same potential habitat. Although there is a reasonable likelihood this species occurs within the project area, there is a low risk to local populations or species viability, and a low likelihood of a trend toward listing caused by the project. Therefore, the impact to this species for both action alternatives is *May Impact Individuals or Habitat but is not likely to lead to a trend toward federal listing*

Sensitive Species found during surveys

Schistostega pennata is a rare moss found in Oregon, Washington, Montana, and from British Columbia through Alaska. In Oregon there are 31 known sites, 15 of which are on the Mt. Hood National Forest. Most Mt. Hood NF sites are located in the silver fir climax zone. Typically this species is found growing on mineral soil over the root wads of downed trees, often with shallow pools of standing water at the base of the root wad. Within the Government Camp trails project areas this species was found on a root wad in the wetlands associated with the proposed West Lake trail. Although a concern for this species is direct impact by trail building activities or

alteration of microclimatic conditions, the project design criteria would adequately protect this species. The trail would not come any closer than 50' to the known site, the wetland hydrology would not be altered as the result of trail building activities, and a botanist would be involved in the final trail location so as to place any newly found sites a minimum of 50' from the trail. No impacts are anticipated from recreationists. The project effect for both action alternatives is *no impact*.

Rhizomnium nudum is also another rare moss and is known from both Washington and Oregon where it is associated with moist or wet sites in the silver fir and mountain hemlock plant climax zones. It is adjacent to a tributary of Camp Creek and the proposed Camp Creek trail within the Government Camp trails project area. Although a concern for this species is direct impact by trail building activities or alteration of microclimatic conditions, the project design criteria would adequately protect this species from impacts. The proposed trail would be placed a minimum of 50' away from the known *R. nudum* site. The riparian hydrology would not be altered from the trail building and a botanist would be involved with trail layout, to assure that any additional sites discovered in the area are also 50' away from the trail. No impacts are anticipated from recreationists. The project effect for both action alternatives is *no impact*.

Table III-4. Findings of Effect of Alternatives on Sensitive Plant Species

Species Name	Common Name	Species Likely Present in Project Area?	Alternative 1 No Action	Alternatives 2 & 3
Vascular Plants				
<i>Aster gormanii</i>	Gorman's aster	No	NI	NI
<i>Botrychium minganense</i>	mingan moonwort	No	NI	NI
<i>Botrychium montanum</i>	Mountain grape-fern	No	NI	NI
<i>Botrychium pinnatum</i>	pinnate moonwort	No	NI	NI
<i>Carex livida</i>	Pale sedge	No	NI	NI
<i>Coptis trifolia</i>	3-leaflet goldthread	No	NI	NI
<i>Corydalis aquae-gelidae</i>	cold water corydalis	No	NI	NI
<i>Diphasiastrum complanatum</i>	Ground cedar	No	NI	NI
<i>Lycopodiella inundata</i>	Bog club-moss	No	NI	NI
<i>Ophioglossum pusillum</i>	Adder's tongue	No	NI	NI
<i>Scheuchzeria palustris</i>	Scheuchzeria	No	NI	NI
<i>Sisyrinchium sarmentosum</i>	Pale blue-eyed grass	No	NI	NI
Bryophytes				
<i>Rhizomnium nudum</i>	Moss	Yes	NI	NI
<i>Schistostega pennata</i>	Green goblin moss	Yes	NI	NI
<i>Scouleria marginata</i>	Moss	No	NI	NI
<i>Tetraphis geniculata</i>	Bent-awn moss	Yes	NI	NI
Lichens				
<i>Chaenotheca subroscida</i>	pin lichen	No	NI	NI
<i>Hypogymnia duplicata</i>	Ticker-tape lichen	No	NI	NI
<i>Leptogium burnetiae</i> var. <i>hirsutum</i>	jellyskin lichen	No	NI	NI
<i>Lobaria linita</i>	lungwort	No	NI	NI
<i>Nephroma occultum</i>	Cryptic kidney lichen	No	NI	NI
<i>Pannaria rubiginosa</i>	brown-eyed shingle lichen	No	NI	NI
<i>Peltigera neckeri</i>	black saddle lichen	No	NI	NI
<i>Peltigera pacifica</i>	fringed pelt lichen	No	NI	NI
Fungi				
<i>Bridgeoporus nobilissimus</i>	Noble polypore	No	NI	NI
<i>Cordyceps capitata</i>	earthtongue	Yes	NI	MIH
<i>Cortinarius barlowensis</i>	mushroom	Yes	NI	MIH
<i>Gomphus kaufmannii</i>	Mushroom	Yes	NI	MIH
<i>Gyromitra californica</i>	mushroom	Yes	NI	MIH
<i>Leucogaster citrinus</i>	truffle	Yes	NI	MIH
<i>Mycena monticola</i>	Mushroom	Yes	NI	MIH
<i>Otidea smithii</i>	cup fungi	Yes	NI	MIH
<i>Phaeocollybia attenuata</i>	mushroom	Yes	NI	MIH
<i>Phaeocollybia californica</i>	mushroom	Yes	NI	MIH
<i>Phaeocollybia dissiliens</i>	Mushroom	Yes	NI	MIH

Species Name	Common Name	Species Likely Present in Project Area?	Alternative 1 No Action	Alternatives 2 & 3
<i>Phaeocollybia olivacea</i>	mushroom	Yes	NI	MIIH
<i>Phaeocollybia oregonensis</i>	Mushroom	Yes	NI	MIIH
<i>Phaeocollybia piceae</i>	mushroom	Yes	NI	MIIH
<i>Phaeocollybia pseudofestiva</i>	mushroom	Yes	NI	MIIH
<i>Phaeocollybia scatesiae</i>	Mushroom	Yes	NI	MIIH
<i>Ramaria amaloides</i>	Coral mushroom	Yes	NI	MIIH
<i>Ramaria aurantiiscescens</i>	Coral mushroom	Yes	NI	MIIH
<i>Ramaria gelatinaurantia</i>	Coral mushroom	Yes	NI	MIIH
<i>Sowerbyella rhenana</i>	Cup fungi	Yes	NI	MIIH

MIIH = May Impact Individuals or Habitat but not likely to lead to a trend toward federal listing.
 NI = A project or activity would have No environmental impacts on habitat, individuals, a population, or a species.

3.4.4 - Management Direction for Invasive Weed Species

Management actions proposed in the alternatives were also evaluated for their potential to increase noxious or invasive weeds in the project area. Invasive Plants are any plant species not native to a particular ecosystem that are likely to cause environmental harm, or harm to human health. They include, but are not limited to, the Oregon Department of Agriculture (ODA) Noxious Weed list. Invasive Plants may disrupt natural ecosystems by displacing native species and reducing natural diversity through the replacement of native communities with invasive monotypic weed stands. They reduce productivity of forest systems by displacing desirable species and capturing and utilizing valuable resources (Oregon Weed Control Program 2002). The Invasive Weeds Report in Appendix A contains a complete listing of both ODA Noxious Weeds (Table A) and the Supplemental List of Invasive Plants for Zigzag and Clackamas River Ranger Districts (Table B).

In addition to the above-mentioned lists, it should be noted that new invasive plant species are continually being introduced and are spreading to new areas. These new invaders may not always be included on the present lists. However, if they are not native to the particular ecosystem and are likely to cause environmental harm, or harm to human health, they should be added to the supplemental list and evaluated for this report.

Development of weed prevention practices is supported by Forest Service noxious weed policy and strategy. Forest Service policy is to prevent the introduction and establishment of noxious weed infestations. This policy directs the Forest Service to: (1) determine the factors that favor establishment and spread of noxious weeds, (2) analyze weed risks in resource management projects, and (3) design management practices to reduce these risks. The Forest Service Noxious Weed Strategy identifies development of practices for prevention and mitigation during ground-disturbing activities as a long-term emphasis item. The February 1999 Executive Order

13112 on Invasive Species requires Federal agencies to use relevant programs and authorities to prevent the introduction of invasive species and not authorize or carry out actions that are likely to cause the introduction or spread of invasive species unless the agency has determined, and made public, documentation that shows that the benefits of such actions clearly outweigh the potential harm. All feasible and prudent measures to minimize risk of harm would need to be taken in conjunction with the actions. An additional authority for coordinated efforts to prevent and control the spread of Invasive Plants in Region 6 is the 1988 *Final EIS for Managing Competing and Unwanted Vegetation*.

The Forest Service, as part of the NEPA document, must analyze and discuss the need for measures to prevent the establishment or spread of invasive plants based upon a survey of project areas proposed for ground disturbance. These may include locations of proposed temporary roads and new specified roads, reconstruction of existing roads, and likely transportation routes, to establish the presence or absence of Invasive Plants, and to identify equipment cleaning and other potential requirements. Weed risks must be analyzed in the planning stage to identify the likelihood of weeds spreading to the project area and determining the consequence of weed establishment in the project area. A finding of risk is the basis for identifying the appropriate weed prevention practices from the Guide, which are likely to be effective in a particular project situation.

The excerpts from the Forest Service Guide to Noxious Weed Prevention Practices, USDA July 2001 (GUIDE) below provide a comprehensive directory of weed prevention practices for use in planning and wildland resource management activities and operations. The Guide supports implementation of Executive Order 13112. Federal agencies are expected to follow the direction in this order. In addition, Best Management Practices, or other credible methods may be used in establishing equipment cleaning needs and requirements.

3.4.5 - Affected Environment for Invasive Weeds

Risk Ranking:- The Factors and Vectors considered in determining the risk level for the introduction or spread of noxious weeds are:

Factors

- A. Known noxious weeds in close proximity to project that may foreseeably invade project.
- B. Project operation within noxious weed population.
- C. Any of vectors 1-8 in project area.

Vectors

- 1. Heavy equipment (implied ground disturbance including compaction or loss of soil "A" horizon.)
- 2. Importing soil/cinders/gravel/straw or hay mulch.
- 3. ORVs or ATVs.
- 4. Grazing.
- 5. Pack animals (short term disturbance).
- 6. Plant restoration.
- 7. Recreationists (hikers, mountain bikers, etc...).

8. Forest Service or other project vehicles.

High, moderate, or low risk rankings are possible. For the high ranking the project must contain either a combination of factors A+C or B+C above. The moderate ranking contains any of vectors #1-5 in the project area. The low ranking contains any of vectors #6-8 in the project area or known weeds within or adjacent to the project area, without vector presence.

Table III-5. Weed Risk Ranking Results Without Project Design Criteria

Factors	Vectors	Risk Ranking for Alternative 1	Risk Ranking for Alternatives 2 and 3
A	1, 2, 3 (Bicycles), 5, 7	Low	High

Table III-6 Weeds Currently Existing Adjacent to or Within the Project Area

Species Name	Common Name	Areas where present
<i>Centaurea maculosa</i>	Spotted knapweed	Hwy 26 shoulders, Timberline lodge
<i>Centaurea diffusa</i>	Diffuse knapweed	Hwy 26 shoulders

3.4.6 - Recommended Design Criteria Incorporated into Design Narratives of Action Alternatives for Prevention of the Introduction and Spread of Invasive Plants

The measures designed to prevent the introduction and spread of invasive plants are listed in Chapter II under the description of the Proposed Action.

3.4.7 - Environmental Consequences and Conformance to Management Direction for Invasive Weeds – All Alternatives

This project has a low risk ranking for alternative 1 and a high risk ranking for alternatives 2 and 3 without incorporating the recommended design criteria above. However, with the implementation of the following design criteria, the risk ranking is low for alternatives 2 and 3.

3.5 - Wildlife

3.5.1 - Management Direction for Wildlife

Biologists performed field surveys to document the occurrence of special status wildlife resources, including species federally listed as threatened or endangered under the ESA, species proposed for listing under the Endangered Species Act (ESA), US Forest Service (USFS) sensitive species, former Survey and Manage species, and management indicator species for the MHNH.

Forest management activities that may alter the habitat for Threatened, Endangered, Sensitive or Proposed (T,E,S&P) species are required to undergo review in a Biological Evaluation (FSM 2671.44 and FSM 2670.32) as part of the National Environmental Policy Act process. The Biological Evaluation process (FSM 2672.43) is intended to document that proposed management actions would not jeopardize the continued existence or cause adverse modification of habitat for listed or proposed species, or (for sensitive species) lead towards the likelihood of Federal listing

The Biological Evaluation is a 4-step process as follows:

- Step 1) **Pre-field review** to determine if habitat for the species is present
- Step 2) **Field reconnaissance** to determine if the species is present
- Step 3) **Risk assessment/Analysis of Effects** for species by alternative. Risk assessment is based on evaluation of impacts to habitat (even if the habitat is not known to be occupied), individuals (risk from disturbance, actual physical harm to an individual or direct loss of habitat in known occupied territories), and population (based on available regional information).
- Step 4) A **biological investigation** if the risk assessment reveals a trend towards federal listing (sensitive species only) or **consultation** with the USFWS if a may effect call is made for T, E, or P species under the preferred alternative.

Each TESP species associated with the proposed project area is evaluated based on these steps. Evaluation of impacts on a given species may be complete at the end of Step #1 (e.g. if no habitat is present, the risk is automatically determined to be none) or may extend through Step #4. If field reconnaissance is not undertaken and habitat is available, species occurrence is assumed.

The USFWS may modify a project based upon consultation. In addition, the Forest Service provides for modification to any project based on a contract provision that is included in all project contracts. This provision provides for the protection of any threatened or endangered species and their habitat, located after a sale has been sold.

Differing levels of field reconnaissance are required under Step #2 that dictate the level of survey and the intensity of survey required. More information on these requirements is found in the Wildlife Biological Evaluation found in the Appendices.

Executive Summary of Biological Evaluation

The 4-step Biological Evaluation process for those TESP (threatened, Endangered, Sensitive, Proposed) animal species that are documented or suspected to occur within the Mt Hood National Forest and considered in the Government Camp Trails EA (Environmental Assessment) is summarized below.

Table III-7 Summary of Four Step Biological Evaluation Process

Species (T=Threatened, E= Endangered, S=Sensitive, P = Proposed)	Step #1 Pre-field	Step #2 Field Recon.	Step #3 Preferred Alt. Effects / Impacts Call	Step #4 Biological Investigation or Consultation
	Suitable habitat present?	Potential of Species Presence		
Northern Spotted Owl (T)	Yes	Low	MA-NLAA	Consultation Required
Northern Bald Eagle (T)	Yes	Moderate	MA-NLAA	Consultation Required
Canada Lynx (T)	No			
Oregon Slender Salamander (S)	Yes	Moderate	MII-NLFL	None Required
Larch Mountain Salamander (S)	Yes	Low	MII-NLFL	None Required
Cope's Giant Salamander (S)	Yes	Low	MII-NLFL	None Required
Cascade Torrent Salamander (S)	Yes	Low	MII-NLFL	None Required
Oregon Spotted Frog (S)	No			
Painted Turtle (S)	Yes	Low	NI	None Required
Northwestern Pond Turtle (S)	Yes	Low	NI	None Required
Horned Grebe (S)	Yes	Low	NI	None Required
Bufflehead (S)	Yes	Low	MII-NLFL	None Required
Harlequin Duck (S)	No			
American Peregrine Falcon (S)	No			
Gray Flycatcher (sensitive)	No			
Baird's Shrew (S)	Yes	Low	MII-NLFL	None Required
Pacific Fringe-tailed Bat (S)	Yes	Low	NI	None Required
California Wolverine (S)	Yes	Low	MII-NLFL	None Required
Pacific Fisher (S)	Yes	Low	MII-NLFL	None Required
Crater Lake Tightcoil (S)	Yes	Low	MII-NLFL	None Required
Dalles Sideband (S)	No			
<i>Puget Oregonian</i> (S)	No			
<i>Columbia Oregonian</i> (S)	No			

EFFECTS / GOVERNMENT CAMP TRAILS CALL:

"NI" denotes a No Impact

"MII-NLFL" denotes a May Impact Individuals but not likely to cause a trend to federal listing or loss of viability

"LFL" denotes likely to cause a trend to federal listing or loss of viability

"NE" denotes a No Effect

"MA-NLAA" denotes a May Affect, Not Likely to Adversely Affect

"MA-LAA" denotes a May Affect, Likely to Adversely Affect

3.5.2 - General Affected Environment for Wildlife

This trails project is located within the Zigzag Ranger District of the Mt. Hood National Forest. The trails occur within two watersheds: Zigzag River and Salmon River watersheds. The proposed action (Alternative 2) is to construct or improve 0.7 miles of hiker only trails, 6.3 miles of hike/bike trails, and 2.6 miles of hike, bike/nordic ski trail (9.6 miles of trail). On areas proposed for trail construction there would be some individual tree removal and soil disturbance to create a useable path or the intended use. Hazard trees-- trees that because of lean, disease, or decay could fall on people using the trail would be removed. Down logs would have sections cut out or moved to facilitate ease of movement. Chainsaws and earth moving equipment would create some noise levels above ambient.

3.5.3 - Species Specific Affected Environment, Environmental Consequences And Conformance to Management Direction

Below are the affected environment, environmental consequences, and conformance to management direction for each of the wildlife species analyzed.

3.5.3.1 - Northern Spotted Owl (*Strix occidentalis caurina* – threatened)

Habitat:

Old growth coniferous forest is the preferred nesting, roosting and foraging habitat of spotted owls in Oregon. Old growth habitat components that are typical for spotted owls are: Multilayered canopies, closed canopies, large diameter trees, abundance of dead or defective standing trees, and abundance of dead and down woody material. The following describes spotted owl habitat as defined in the Programmatic Biological Assessment for Projects with the Potential to Modify the Habitats of Northern Spotted Owls and/or Bald Eagles or Modify Critical Habitat of the Northern Spotted Owl --Willamette Province - FY 2005-2006

Suitable habitat for the **northern spotted owl** consists of habitat used by owls for nesting, roosting *and* foraging (NRF). Generally this habitat is 80 years of age or older, multi-storied and has sufficient snags and down wood to provide opportunities for nesting, roosting and foraging. The canopy closure generally exceeds 60 percent. The unit wildlife biologist makes site-specific determinations and delineations of suitable habitat.

Dispersal habitat for the **northern spotted owl** generally consists of mid-seral stage stands between 40 and 80 years of age with canopy closures of 40 percent or greater and an average dbh of 11". Spotted owls use dispersal habitat to move between blocks of suitable habitat; juveniles use it to disperse from natal territories. Dispersal habitat may have roosting and foraging components, enabling spotted owls to survive, but lack structure suitable for nesting. The unit wildlife biologist makes site-specific determinations and delineations of dispersal habitat.

Critical Habitat Units: Designation of critical habitat serves to identify lands that are considered essential for the conservation and recovery of listed species. The functional value of critical habitat is to preserve options for the species eventual recovery. The Service's primary objective in designating critical habitat was to identify existing spotted owl habitat and highlight specific areas where management considerations or protections should be given highest priority. Critical Habitat Units (CHUs) were distributed in a manner that would facilitate demographic interchange.

Since the designation of spotted owl critical habitat in 1992, the Northwest Forest Plan (USDA & USDI 1994a) was developed as a conservation strategy for all late-successional forest species, including the spotted owl. Like critical habitat, the Northwest Forest Plan was based upon the work of the Interagency Science Committee, but incorporated recommendations from the spotted owl recovery team, and was strengthened to address the needs of other late-successional forest-associated species.

Pre-field Review:

Habitat available within the project area

Yes. Approximately 75 percent of the project falls within dispersal habitat for spotted owls, five percent or less is in potential suitable habitat (although there are no historic known sites located within the project area) and 20 percent or more of the area is non-habitat. The lack of historic known sites within two miles of this area is a result of poor quality habitat for spotted owls possibly due to the higher elevation and high amount of snowfall that would make finding prey more difficult during the winter. The lack of historic nest sites in the project vicinity may also indicate that the habitat in the area is not optimal for spotted owl nesting.

Field Reconnaissance:

A level A survey was conducted within the project area in addition to some daytime calling during field reconnaissance. There is a low potential for species presence based on current field reconnaissance and based on historic data.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No action)

No effects to the owl would be predicted with this alternative. The habitat would continue to function as spotted owl suitable or dispersal habitat for the short term. The predicted long-term effects to the currently suitable stands would be that they would remain suitable habitat for a long time.

Alternative 2 (Proposed Action) & 3 (Multorpor Mountain)

General Considerations:

The proposed action would not occur within an LSR or Critical Habitat. The proposed trails would go through a very small amount of suitable spotted owl habitat. The largest impact to spotted owl habitat would be trails that go through dispersal habitat. This habitat would be affected in a minor way by trail construction. The impact of noise and disturbance would be

minor to nonexistent do to the very small of suitable habitat in the project area. Implementation of this project would have no impact to the functional interim connectivity cells.

Historic Owl Activity Centers:

The Programmatic Biological Opinion for Projects with the Potential to Modify the Habitats of Northern Spotted Owls and/or Bald Eagles or Modify Critical Habitat of the Northern Spotted Owl (USDI 2003) associated with this project included a term and condition that stated for activities within the disruption zone (depending on activity) of any current or historic spotted owl activity center, a seasonal restriction would be in place between March 1 and July 15th (or later if deemed necessary by an agency wildlife biologist) for all activities associated with habitat modification that disturb nesting spotted owls and/or their habitat.

There are no trails within 2 miles of a known spotted owl activity center. All trail construction activities, involving chainsaws associated with these trails would have the seasonal restriction in place for any operation that would have the potential to disturb the northern spotted owl. This includes any trail within 65 yards of suitable spotted owl habitat.

Effects to NRF and Dispersal Habitat on a Local and Watershed Scale

The proposed action would have an effect on dispersal habitat as well as NRF (nesting, roosting, and foraging) habitat. The proposed action would degrade both suitable and dispersal habitat in the project area. The Government Camp Trails Environmental Assessment occurs within Zigzag River and Salmon River Watersheds and contains dispersal habitat (11/40 rule - average 11 inch DBH with an average canopy cover of 40%) within approximately 90 of its area. Three sections of trail totaling less than one mile of trail go through suitable spotted owl habitat (*West Blossom Connection, Cross Town Thunderhead, and West Summit Fen*).

The proposed action would have very little effect on the quality of the dispersal habitat in the two watersheds. Although the dispersal habitat characteristics of the units would be reduced in quality, they would still function as dispersal habitat for the owl. No loss of dispersal habitat would occur. This reduction in quality in dispersal habitat is considered minimal at the watershed scale. The resultant effects to spotted owls and the population within the watershed is predicted to be negligible.

NRF or suitable habitat is considered to be the limiting factor for spotted owls. The proposed action would degrade a small amount of spotted owl NRF (nesting, roosting, and foraging) habitat within these watersheds. The two trails on the west end of the project area are the only two trails that travel through a small amount of suitable spotted owl habitat. The individual tree removal or moderate thinning required to creating trails would not significantly alter the NRF habitat. In effect, this trails project would not reduce the percentage of NRF habitat within these watersheds. There are no known spotted owl nests within the Government Camp Trails project area. Therefore, in the context of the local and watershed scale, the proposed action is determined to may affect, but not adversely affect the northern spotted owl and its habitat.

Effects to Critical Habitat

This project occurs near Critical Habitat Unit OR-1. No trail construction is planned through critical habitat. There is **no affect** to northern spotted owl critical habitat.

Effects to spotted owl on a province scale (Willamette Province)

The USFWS issued an opinion on the effects of the Government Camp Trails commercial thinning project as well as many other projects within the document titled “Willamette Province Fiscal Year 2005-2006 Habitat Modification Biological Opinion for Listed Species.” The conclusion they reached is the following: “After reviewing the current status of the bald eagle and spotted owl, including critical habitat, the environmental baseline for both species, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the FY 2005-2006 Habitat Modification Projects in the Willamette Province are not likely to jeopardize the continued existence of the bald eagle or spotted owl and is not likely to destroy or adversely modify designated critical habitat for the spotted owl” (USDI 2005).

Effects to spotted owl on the entire range of the species (Washington, Oregon, and California)

The Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Project Documents within the Range of the Northern Spotted Owl established a system of land allocations and a rate of timber harvest (probable sale quantity) that is considered to be consistent with maintaining viability for the northern spotted owl across its range (USDA 1994). The Government Camp Trails Environmental Assessment meets all the Standards and Guidelines set forth within this decision document.

Cumulative Effects

The current condition of the habitat for spotted owls within the Zigzag River and Salmon River watersheds take into consideration recently created or soon to be created trails.

The landscape pattern of vegetation has also been affected by historic and recent recreation and urbanization activities as well as wildfire thus moderately impacting the habitat for spotted owls. Some ecologically important features of landscape pattern are: amount of edge habitat, degree of fragmentation of late-successional forest, and amount of interior forest. As fragmentation of a landscape pattern increases, the amount of interior forest habitat decreases and the amount of edge habitat increases. As fragmentation increases, the amount of interior forest habitat decreases, impacting organisms that prefer large patches of interior habitat, such as the spotted owl in its western cascades range (USDA 1996). Mostly because of past fires, Zigzag River and Salmon River watersheds are very young stands watersheds within a moderately modified sub-basin.

A combination of the loss of suitable habitat due to fire and increase in fragmentation has moderately reduced the amount of suitable habitat for spotted owls currently present within this watershed. Currently, there are no foreseeable future actions other than the projects previously mentioned on Forest Service lands within the watersheds that are predicted to adversely impact spotted owl habitat. There will continue to be management activity within these watersheds that have the potential to adversely impact spotted owl individuals due to disturbance. These types of projects would continue to be consulted on with the United States Fish and Wildlife Service.

Effects Determination

The effect determination for Government Camp Trails Project is, “**may affect, but is not likely to adversely affect**, the spotted owl or its habitat. But the effect would be minor to non-existent for the project area due to the low amount of suitable habitat the trails would impact and the small magnitude of the habitat alteration. The Government Camp Trails Project would have little effect on of suitable habitat. The current proposal would not further add to the fragmentation of late-seral stands within these watersheds. The effects determination for disturbance related issues determined at the time of the biological assessment is, “may affect, but is not likely to adversely affect,” but the effect determination would be reduced to “**no affect**” due to implementation of seasonal restrictions for chainsaws and heavy equipment within 65 yards of small stands of suitable habitat. The seasonal restriction would be from March 1 through July 15th in areas of suitable habitat. This seasonal restriction is only necessary for the small amount of trail on the west side of the project area in Sections 13 and 24 (West Blossom Connection, Cross Town Thunderhead, and West Summit Fen).

Alternative 3

Effects same as in alternative 2 & 3 except that it would add 2.1 miles of trail in dispersal-only habitat. The effects determination would still be “**may affect, but is not likely to adversely affect**” to the northern spotted owl or and/or its habitat and “**no affect**” from disturbance with this alternative. The effects call determinations have the same contingency on the seasonal restrictions and the effects call for disturbance can be considered no affect if the seasonal restriction applies to the dispersal habitat within 65 yards of the habitat and the suitable habitat.

Project Design Criteria – Seasonal Restrictions:

The Programmatic Biological Opinion for Projects with the Potential to Modify the Habitats of Northern Spotted Owls and/or Bald Eagles or Modify Critical Habitat of the Northern Spotted Owl (USDI 2005) associated with this project included a term and condition that stated for activities within the disruption distance (depending on activity type) of any current or historic spotted owl activity center, a seasonal restriction would be in place between March 1 and July 15th (or later if deemed necessary by an agency wildlife biologist) for all activities associated with habitat modification that have the potential to disturb nesting spotted owls and/or their habitat. This restriction would only apply in areas where trails were adjacent (within 65 yards) or go through suitable spotted owl habitat. The effects determinations would be reduced if hand methods are used for trail construction during the critical breeding season. This design criteria has been incorporated into both Alternative #2 - Proposed Action and Alternative #3.

Communication with U.S. Fish and Wildlife Service:

The northern spotted owl is listed as threatened throughout its range under the endangered species act (55 CFR 26114) on June 22, 1990. Any action that would result in a beneficial effect or could result in an adverse impact to the spotted owl would result in a may effect determination and would require consultation with the U.S. Fish and Wildlife Service.

Consultation with the U.S. Fish and Wildlife Service was initiated on the Government Camp Trails project in December of 2004 through the document titled “The Willamette Province Fiscal Year 2005-2006 Habitat Modification Biological Assessment for Listed Species.” The Fish and Wildlife Service issued the Biological Opinion in March 2005. The conclusion

reached in this Biological Opinion for the Government Camp Trails project as well as all others included in the document is as follows: “After reviewing the current status of the bald eagle and spotted owl, including critical habitat, the environmental baseline for both species, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the FY 2005-2006 Habitat Modification Projects in the Willamette Province are not likely to jeopardize the continued existence of the bald eagle or spotted owl and is not likely to destroy or adversely modify designated critical habitat for the spotted owl” (USDI, 2005). A letter has been sent to the U.S. Fish and Wildlife Service amending the Biological Assessment to reflect effects determinations based on better information on project alternatives.

3.5.3.2 - Northern Bald Eagle (*Haliaeetus leucocephalus* – threatened)

Habitat:

The bald eagle is a permanent resident in Oregon. Their nests are usually located in multi-storied stands with old-growth components, and are near water bodies that support an adequate food supply. Nests, which usually consist of a bulky platform of sticks, are usually located in the super-canopy of trees, or even on a cliff. Nest sites are usually within ¼ mile of water in the Cascades.

Adequate forage sources are possibly the most critical component of bald eagle breeding and wintering habitat. Fish, waterfowl, rabbits, and various types of carrion comprise the most common food sources for eagles in the Pacific Recovery Plan area. Wintering bald eagles perch on a variety of substrates, proximity to a food source being the most important factor influencing perch selection. Eagles tend to use the highest perch sites available that provides a good view of the surrounding area. Communal roosts are invariably near a rich food source and in forest stands that are multi-storied and have at least a remnant old growth component.

Pre-field Review:

Habitat available within the project area

Yes, but marginal. The area around Trillium Lake has the potential to be utilized as nesting, roosting, or perching habitat for the bald eagle.

Field Reconnaissance:

A level A survey was conducted. There is a low potential for this species to inhabit the project area. Birds are observed occasionally on the District, especially in late summer through late winter. Due to low numbers and sporadic use, no communal roost areas are known for the District. There has been consistent use by adults in two areas of the Zigzag Ranger District and nesting approximately 5.5 miles from the trail project area.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No Action)

No effect to the bald eagle or its habitat would occur with implementation of this alternative. The one unit within this project area would continue to provide poor quality habitat for the species.

Alternative 2 (Proposed Action), & 3

Effects to Habitat

Bald eagles usually nest within ¼ mile of a water body in the Cascades. There is one Government Camp Trails project trail with potential nesting and roosting habitat that is tied into a trail at Trillium Lake. This habitat could conceivably serve as nesting trees for bald eagles. The rest of the units within the Government Camp Trails Project are either beyond ¼ mile of a water body or do not have the structural characteristics to serve as potential nesting/roosting/perching habitat for the bald eagle.

However, the likelihood is low that this unit would be utilized as nesting/roosting/perching habitat for the following reasons: 1) The area is highly utilized for recreation throughout the nesting season. 2) There are no recent records to indicate the area adjacent Trillium Lake has produced sightings of Bald Eagles.

Effects to Individuals

It is unlikely that individuals of a bald eagle population would be affected by the proposed action. In the rare instance that a bald eagle would be present in this unit during project implementation, they would have the ability to quickly move to adjacent acceptable habitat.

Effects to Population

None expected since no effects to individuals and minor effects to habitat occurring with project implementation.

Cumulative Effects

None predicted. There are no other projects (except for the occasional hazard tree removal) within the Oak Grove watershed that have the potential to affect potential nest/roost/perch trees.

Effects Determination

The effect determination for Government Camp Trails Project for both Alternative 2 & 3 is, “**May affect, but is not likely to adversely affect,**” the Bald Eagle or its habitat due to the low amount of suitable habitat near the trails and the small magnitude of the habitat alteration.

Communication with U.S. Fish and Wildlife Service

The northern bald eagle is listed as threatened throughout its range under the endangered species act (55 CFR 26114) on June 22, 1990. Any action that would result in a beneficial effect or could result in an adverse impact to the bald eagle would result in a may effect determination and would require consultation with the U.S. Fish and Wildlife Service.

Consultation with the U.S. Fish and Wildlife Service was initiated on the Government Camp Trails project in December of 2004 through the document titled “The Willamette Province

Fiscal Year 2005-2006 Habitat Modification Biological Assessment for Listed Species.” The Fish and Wildlife Service issued the Biological Opinion in March 2005. The conclusion reached in this Biological Opinion for the Government Camp Trails project as well as all others included in the document is that the proposed projects within the Biological Assessment may affect, but are not likely to adversely affect the bald eagle.

3.5.3.3 - Canada Lynx (*Lynx Canadensis* – threatened)

Habitat:

In the Pacific Northwest, lynx are associated with high elevation, boreal forests that typify northern latitudes. They are found primarily above 1220m (4000 ft.) in Washington. Although scarce in Oregon, lynx range and habitat in Oregon and Washington is unclear. High quality lynx habitat is comprised of a mosaic of early successional forests with high prey densities (especially snowshoe hare) for foraging and of late-successional forests with an accumulation of down logs used for denning, thermal and security cover. Intermediate successional stages are used mainly for travel and landscape connectivity but may also provide foraging opportunities.

Pre-field Review:

Habitat available within the project area

No. In a letter dated August 2 of 2001 (USDA 2001) and updated on December 3 of 2003 (USDA 2003), the Mt. Hood National Forest has made a determination, based on the best available scientific and commercial data, that the Canada lynx and its habitat are currently not present on the Forest. This letter follows the March 2004 Record of Decision: To Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines (USDI Bureau of Land Management, USDA Forest Service 2004) and is consistent with the Lynx Conservation Assessment and Strategy (Ruediger 2000) as specified in this Record of Decision.

The Lynx Nationwide Survey protocol was implemented and resulted in no lynx being located on the Mt. Hood National Forest. Forest-wide winter tracking surveys have been conducted during the winters of 1994-1995, 1995-1996, 2000-2001, 2001-2002, 2002-2003, 2003-2004. No lynx were detected during these surveys.

No further analysis needed due to lack of habitat.

3.5.3.4 - Larch Mountain Salamander (*Plethodon larseli* – Sensitive)

Habitat:

Habitat is mainly restricted to the talus slopes of the Columbia River Gorge, although the species is now known to occur at several locations in the Cascade Mountains of Washington. This salamander can be found near the surface under rocks during wet weather, but it retreats to considerable depths in the talus during cold and dry weather. Individuals can occur far from

streams and seepages and seem to be less common in perpetually wet talus than in talus that varies from wet to dry with seasonal rainfall.

Pre-field Review:

Habitat available within the project area

The Government Camp Trails project occurs within the identified Larch Mountain salamander distribution range as defined in the Northwest Forest Plan. Some of the trails do occur within or directly adjacent to talus slopes. Two field reconnaissances, one in the spring and one in the fall did not locate any individuals in the project area. The only larch mountain salamanders ever found on the Mt. Hood National Forest have occurred at Larch Mountain despite numerous survey efforts for this species.

Field Reconnaissance:

Level A and low intensity B surveys were conducted. No individuals were found. There is a low potential for this species to inhabit the project area.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No Action)

No short-term or long-term effects to the Larch Mountain salamander would be predicted with this alternative. The forested stands would continue to function as potential Oregon Slender salamander habitat.

Alternative 2 (Proposed Action) & 3

Effects to Habitat

The Larch Mountain salamander prefers moist environments and tends to avoid large openings areas. This alternative would not significantly alter the trees per acre and would retain existing logs that are currently in these stands. It is likely there would also be additional down woody debris generated by the creating the trails. The microclimate would likely change within the trail prism as a result of the individual tree removal, but probably not to the degree that would make the units unsuitable for the Larch Mountain salamander. Thus, this proposed action would degrade but not remove potential Larch Mountain salamander habitat from the area.

Effects to Individuals

Although limited surveys for this species have been completed in the Government Camp Trails project area, there appears to be potential habitat for the Larch Mountain salamander within the project area stands. For this reason, species presence is assumed in these areas. There is also the potential that any individuals currently residing in these units would be able to survive and reproduce in the units after project implementation. The proposed trail construction has the potential to extirpate individuals that are present in the trail prism. The loss of individuals may occur indirectly through the degradation of the habitat but could also occur directly by the presence of man and machine in the units.

Effects to Population

Although detrimental effects could occur to individuals of the population, adverse effects are not expected to the population as a whole. The Hood River and Barlow Ranger Districts on the Mt. Hood National Forest have recently conducted extensive surveys for the Larch Mountain Salamander but have found no populations or individuals outside of the Larch Mountain vicinity. In addition, although the range of the species is small, there is abundant potential habitat for the species in protected lands on the Mt. Hood, the Columbia River National Scenic Area and the Gifford Pinchot National Forest. Predominantly these protected lands are Wilderness areas, Congressional Reserves, Late-Successional Reserves and National Scenic Area lands.

Cumulative Effects

The current condition of the habitat for the Larch Mountain salamander within the Zigzag River and Salmon River watersheds take into consideration recently harvested or soon to be harvested projects or projects that would remove or have removed suitable habitat from the area. There are very few projects in the vicinity of the project that would impact Larch Mountain salamanders that could potentially occur. The loss of mature moist forested stands due to historic fires and the possible expansion of the Timberline Ski Lifts could have minor impacts on potential habitat for this species.

The Government Camp Trails project adds to the effects of the above by degrading an additional 9.6 lineal miles of potential habitat. Currently, there are no foreseeable future actions other than the impacts previously mentioned on Forest Service lands within the watersheds that are predicted to impact the Larch Mountain salamander or its habitat.

Effects Determination

The effects determination for the Government Camp Trails project is, “**May Impact Individuals but not likely to cause a trend to federal listing**”, for Larch Mountain Salamander or its habitat due to the low amount of suitable habitat near the trails and the small magnitude of the habitat alteration.

3.5.3.5 - Oregon Slender Salamander (*Batrachoseps wrighti*) - (Sensitive)

Habitat:

The only amphibian endemic to Oregon, this species is found predominantly on the west slope of the Cascade Range from the Columbia River south to southern Lane County. Sites have been found in Lane, Linn, Clackamas, and Multnomah counties as well as a few sites on the eastern slopes of the Cascades in Hood River and Wasco counties. Sites are generally scarce, occurring in scattered and often widely separated colonies, but sometimes locally common. It is known to occur at only a few dozen localities.

The Oregon Slender salamander is found in moist woods consisting of Douglas fir, maple, hemlock, and red cedar. It is most common in mature Douglas-fir forests and appears to be dependent on mature and old growth stands. Individuals are found under rocks, wood, or bark and wood chips at the base of stumps as well as under the bark and moss of logs. They are also

found in rotting logs, in holes and crevices in the ground, and in termite burrows. Nests that have been located were found under bark and in rotten logs.

Pre-field Review:

Habitat available within the project area

All the older stands have potential Oregon Slender salamander habitat.

Field Reconnaissance:

A level A and low intensity level B surveys were conducted. No individuals were found. There is a low potential for this species to inhabit the project area.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No Action)

No short-term or long-term effects to the Oregon Slender salamander would be predicted with this alternative. The forested stands would continue to function as potential Oregon Slender salamander habitat. The predicted long-term effects to the stands currently providing potential habitat for the Oregon Slender Salamander would be that they would remain suitable habitat for a long time.

Alternative 2 (Proposed Action) & 3

Effects to Habitat

Approximately 9.6 (Alternative 2) to 11.3 miles (Alternative 3) of trail would be created in the project area. The Oregon slender salamander prefers down logs and bark and may not be present at the elevation of the project. This alternative would retain existing logs that are currently in these stands. It is likely there would also be additional down woody debris generated by the trail construction. The microclimate would likely change slightly along the trail corridor as a result of creating the pathway but probably not to the degree that would make the units unsuitable for the Oregon Slender salamander. Thus, this proposed action would degrade but not remove approximately 9-11 lineal miles of potential Oregon Slender salamander habitat from the area.

Effects to Individuals

Although limited surveys for this species have been completed in the Government Camp Trails project area, there appears to be potential habitat for the Oregon Slender salamander within older stands. For this reason, species presence is assumed in these areas. Several of these stands with potential habitat are adjacent to more suitable habitat that individuals could migrate into after project implementation. There is also the potential that any individuals currently residing in these units would be able to survive and reproduce in the units after project implementation. The proposed trail construction has the potential to extirpate individuals that are present in the trail prism. The loss of individuals would not likely occur indirectly through the degradation of the habitat but could occur directly by the presence of man and machine in the units.

Effects to Population

Although detrimental effects could occur to individuals of the population, adverse effects are not expected to the population as a whole. The Hood River and Barlow Ranger Districts on the Mt. Hood National Forest have recently found approximately 300 individuals of this species while conducting surveys for the Larch Mountain Salamander. In addition, although the range of the species is small, there is abundant potential habitat for the species in protected lands on the Mt. Hood and Willamette National Forest as well as the Columbia Gorge National Scenic Area. Predominantly these protected lands are Wilderness areas, Congressional Reserves, Late-Successional Reserves and National Scenic Area lands.

Cumulative Effects

The current condition of the habitat for the Oregon slender salamander within the Zigzag River and Salmon River watersheds take into consideration recent projects that would remove or have removed suitable habitat from the area. These projects include the Timberline ski lift expansion project, fuels reduction project and historic fires in the watershed. The loss of mature moist forested stands due to past fires has substantially reduced the amount of suitable habitat for the Oregon slender salamander currently present within these watersheds.

The Government Camp Trails project adds to the effects of the above by degrading an additional 9-11 lineal miles of suitable habitat. Currently, there are no foreseeable future actions other than the ski lift expansion and fuels reduction projects previously mentioned on Forest Service lands within the watersheds that are predicted to impact the Oregon slender salamander or its habitat.

Effects Determination: The effects determination for the Government Camp Trails project is, “**May Impact Individuals but not likely to cause a trend to federal listing**”, for Oregon Slender Salamander or its habitat due to the low amount of suitable habitat near the trails and the small magnitude of the habitat alteration.

3.5.3.6 - Cope’s Giant Salamander and Cascade Torrent Salamander (*Dicamptodon copei* - Sensitive) and (*Rhyacotriton cascadae* – Sensitive)

Habitat:

Cope’s Giant Salamander: Cope’s Giant salamander prefers streams and seepages in moist coniferous forests. They limit their occurrence to waters with temperatures in the 8 to 14 degrees Celsius range. They also inhabit cold clear mountain lakes and ponds. They occur in suitable areas from sea level up to 1,350 meters elevation. The Cope's salamander breed and rear its young within the cracks and crevices of the rocky substrates within the stream course. They sometimes leave streams on wet rainy nights but remain on wet rocks and vegetation near the stream. This salamander is most frequently found on pieces of wood in streams, under logs, bark, rocks or other objects near streams.

Cope's giant salamander has the potential to be negatively affected by increased sedimentation resulting from project activities adjacent to or intersecting streams and water sources. Sediment deposition within the substrate could impair preferred habitat characteristics. Also, sedimentation of streams can lead to asphyxiation of embryos and larvae as well as a degradation of over-wintering habitat that may result in local extinctions.

Cascade Torrent Salamander: The range of this species is from the coastal mountains on the Olympic Peninsula in Washington south to Mendocino County, California. It also has a known population in the Cascade Mountains of southern Washington and northern Oregon, with a local disjunct population in the southern Oregon Cascades.

The torrent salamander is most abundant in rocks bathed in a constant flow of cold water, but also occurs in cool rocky streams, lakes, and seeps. Individuals from this species require microclimatic and microhabitat conditions generally found only in older forests.

The diet of this salamander consists of aquatic and semi-aquatic invertebrates, including amphipods, springtails, fly larvae, worms, snails, and spiders. They search for prey under rocks and other objects in streams. Adults occasionally are found under surface objects a few meters from water after heavy rains, but they are the most aquatic of our metamorphosed salamanders and should be expected only in saturated stream-side talus and in streams. Experiments have shown that this species are among the most sensitive of all terrestrial northwestern salamanders to loss of body water and will die quickly in a desiccating environment.

The Cascade Torrent salamander has the potential to be negatively affected by increased sedimentation resulting from project activities adjacent to or intersecting streams and water sources. Sediment deposition within the substrate could impair preferred habitat characteristics. Also, sedimentation of streams can lead to asphyxiation of embryos and larvae as well as a degradation of over wintering habitat that may result in local extinctions.

Pre-field Review:

Habitat available within the project area

A few areas within the Government Camp Trails project include perennial or intermittent streams, wet areas, or seeps.

Cope's Giant Salamander: This species' range is predominantly west of the Cascade Range. Potential habitat for this species does exist within the Zigzag River and Salmon River Watershed. Although the species is not known to exist in the watershed, a portion of the planning area appears to have all the habitat characteristics essential to the species.

Additional Comments: The Cope's Giant Salamander is difficult to identify and can be easily confused with the Pacific Giant Salamander (*Dicamptodon tenebrosus*). Although numerous sightings have been reported from streams on the Zigzag Ranger District, none have been positively confirmed in the project area.

Cascade Torrent Salamander: Potential habitat for this species does exist within the project area. A portion of the project area appears to have all the habitat characteristics essential to the species.

Field Reconnaissance:

A level A survey was conducted based on a low potential for species occurrence. Field surveys have not been accomplished.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No Action)

No effects to the Cope's giant salamander or Cascade torrent salamander would occur with implementation of this alternative. The streams and wet areas within the stands would continue to provide potential habitat for the species for possibly far into the future.

Alternative 2 (Proposed Action), & 3

Effects to Habitat and Individuals

There are several streams and wet areas occurring within or adjacent to the Government Camp Trails project area. The potential for increased sedimentation to these water sources would be minimized by installation of waterbars on the trail. The water bars would provide an effective barrier to any sediment being transported by surface erosion or runoff. Although there is the potential that small micro-climate changes would occur with implementation of this project, the change is not predicted to be substantial enough to affect habitation of the areas by Cope's Giant Salamander and Cascade torrent salamander.

Cumulative Effects

Minimal cumulative effects are predicted to occur with the proposed action. The small increase in sediment caused by soil exposed by the trail would be mitigated by the installation of water bars on the trail. There would be some increase in sediment but it is expected to be small and would travel a short distance within the stream. The current condition of the habitat for the Cope's giant salamander or Cascade torrent salamander within the Zigzag River and Salmon River watersheds take into consideration recent projects that would remove or have removed suitable habitat from the area. These projects include the Timberline ski lift expansion project, fuels reduction project and historic fires in the watershed.

The Government Camp Trails project adds to the effects of the above by exposing soil on an additional 9-11 lineal miles of habitat. Most of this sedimentation would be absorbed by the surrounding vegetation. Some sediment would be added to the stream systems where the trail crosses the stream or then the trail closely parallels the stream. Currently, there are no foreseeable future actions other than the ski lift expansion and fuels reduction projects previously mentioned on Forest Service lands within the watersheds that are predicted to impact the Cope's giant salamander or Cascade torrent salamander or their habitat.

Effects Determination

The effects determination for the Government Camp Trails project is, "**May Impact Individuals but not likely to cause a trend to federal listing**", for Cope's Giant and Cascade Torrent Salamanders or their habitat due to the low amount of suitable habitat near the trails and the small magnitude of the habitat alteration.

3.5.3.7 - Oregon Spotted Frog (*Rana pretiosa*) – Sensitive

Oregon Spotted Frog: The range of this species is from Northern British Columbia and coastal southern Alaska south to the Rocky Mountains of Idaho, Montana, and Utah. Populations are also present in both the interior and coastal mountains of the Pacific Northwest.

The Oregon Spotted Frog is a highly aquatic species that is rarely found far from permanent water. This species frequents waters and associated vegetated shorelines of ponds, springs, marshes, and slow-flowing streams and appears to prefer waters with a bottom layer of dead and decaying vegetation. They are found in aquatic sites in a variety of vegetation types, from grasslands to forests. Individuals may disperse into adjacent non-aquatic areas during wet weather.

The Oregon Spotted frog has the potential to be negatively affected by increased sedimentation resulting from project activities adjacent to or intersecting streams and water sources. Sediment deposition within the substrate could impair preferred habitat characteristics. Also, sedimentation of streams can lead to asphyxiation of embryos and larvae as well as a degradation of over wintering habitat that may result in local extinctions.

Oregon Spotted Frog: This species is highly aquatic and needs a permanent water source to survive. Potential habitat for this species does not exist within the Government Camp Trails Project area.

3.5.3.8 - American Peregrine Falcon & Gray Flycatcher (*Falco peregrinus anatum* – Sensitive) and (*Empidonax wrightii* – Sensitive)

Habitat:

Peregrine Falcon: The most critical habitat components for Peregrine Falcons are suitable nest sites, usually cliffs, and overlooking fairly open areas with an ample food supply. They nest along seacoasts, near marshes, and even in cities, but are not well suited to life in interior forests. They usually nest or roost near a marsh, lake, or coast where water birds are plentiful.

Gray Flycatcher: The Gray Flycatcher is a bird of the arid interior West. It prefers relatively treeless areas with tall sagebrush, bitterbrush, or mountain mahogany communities. It also occupies these communities within open forests of ponderosa or lodgepole pine. It also lives in juniper woodland with a sagebrush understory.

Pre-field Review:

Habitat available within the project area

Peregrine Falcon: None. There are no suitable cliffs within or adjacent to the project area.

Gray Flycatcher: None. There is no habitat for this species on the Zigzag Ranger District

No further analysis needed due to lack of habitat.

3.5.3.9 - Northern Painted Turtle, Western Pond Turtle, Horned Grebe, & Bufflehead

(Chrysemys picta -Sensitive), (Clemmys marmorata marmorata- Sensitive), (Podiceps auritus – Sensitive), (Bucephala albeola – Sensitive)

Habitat:

Painted Turtle: An aquatic turtle that frequents ponds, marshes, small lakes, ditches and streams where the water is quiet or sluggish and the bottom is sandy or muddy, and there is considerable vegetation. Mudbanks, logs, partially submerged branches and rocks are preferred for sunning.

Western Pond Turtle: The western pond turtle inhabits ponds, marshes, and the slow-moving portions of creeks and rivers that have rocky or muddy bottoms. Partially submerged logs, vegetation mats, mudbanks, rocks and tree branches provide areas for sunning. Western pond turtles have been found to occur from sea level up to around 2000 feet. During the winter months these turtles usually hibernate in bottom mud.

Horned Grebe: The Horned Grebe breeds throughout most of Alaska and Canada and, locally, just south of the Canadian border. It also breeds in northern Eurasia. Its habitat consists of areas with much open water surrounded with emergent vegetation.

Bufflehead: The Bufflehead is a northern species that breeds from Alaska across Canada, and south to Oregon, northern California, and Wisconsin. This species nests near mountain lakes surrounded by open woodlands containing snags. In many areas, the preferred nest trees are aspen, but it will also nest in ponderosa pine or Douglas-fir.

Pre-field Review:

Habitat available within the project area

Painted turtle and Western Pond turtle: The trail project enters the Trillium Lake area and therefore there is potential habitat. There are no known sightings of these species on the Mt. Hood National Forest. The Region 6 Regional Forester's Sensitive Species list only has them as suspected to occur on the Mt. Hood National Forest.

Horned Grebe and Bufflehead: The trail project enters the Trillium Lake area and therefore there is potential habitat. These species both occur on the Mt. Hood National Forest as winter residents and as migrants. No breeding has been observed or documented for this species on the Mt. Hood National Forest.

Field Reconnaissance:

A low intensity level B survey was conducted based on a low potential for species occurrence. No observations were made of any of the four species at Trillium lake during the breeding season. There are minimal opportunities for the horned grebe or bufflehead to utilize Trillium Lake during the winter since this lake freezes over. It is the professional opinion of the Forest Wildlife biologist that none of these species occur in the project area as residents. There is the potential for bufflehead and horned grebes to occur at Trillium Lake during migration. The lack of sightings of the turtles indicates that the turtles do not use Trillium Lake and will not be considered as species being potentially present in the project area.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No Action)

No effects to the Painted turtle, Western Pond turtle, Horned Grebe and Bufflehead would occur with implementation of this alternative. The lake would continue to provide potential habitat for the species for possibly far into the future.

Alternative 2 (Proposed Action), & 3

Effects to Habitat and Individuals

There is a very small potential for disturbance and loss of potential bufflehead nest trees from the trail in the vicinity of Trillium Lake. There would be no affect to the turtles or horned grebe from the trails project.

Cumulative Effects

Minimal cumulative effects are predicted to occur with the proposed action. An increase in use of Trillium Lake could cause more disturbance of waterfowl (horned grebe and bufflehead) by encouraging more use of the area if or when these species are present.

Currently, there are no foreseeable future actions within the watersheds that are predicted to impact the Painted turtle, Western Pond turtle, Horned Grebe, and Bufflehead or their habitat.

Effects Determination

The effects determination for the Government Camp Trails project is, “**May Impact Individuals but not likely to cause a trend to federal listing**”, for Bufflehead or its habitat due to the low amount if suitable habitat near the trails and the small magnitude of the habitat alteration but potential loss of potential nest trees near Trillium Lake.

The effects determination for the Government Camp Trails project is, “**No Impact**“, for horned grebe, painted and western pond turtle, or its habitat due to the low amount if suitable habitat near the trails, lack of breeding individuals within the project boundary, and the small magnitude of the habitat alteration.

3.5.3.10 - Harlequin Duck (*Histrionicus histrionicus*) - (Sensitive)

Habitat:

Harlequin Duck: This species occurs from Iceland and Greenland west to eastern Canada. It is absent from the central part of North America, and the “western” population ranges from eastern Siberia east through Alaska and south to the Sierra Nevada of California and the mountains of southwestern Colorado. In the Northwestern United States, the Harlequin duck breeds along relatively low-gradient, slower-flowing reaches of mountain streams in forested areas.

Pre-field Review:

Harlequin Duck: None. There is no habitat for this species on the Zigzag Ranger District

No further analysis needed due to lack of habitat.

3.5.3.11 - Wolverine (*Gulo gulo* – Sensitive)

Habitat:

Populations in the Cascade Mountains are small and scattered. Wolverines are usually found in high temperate coniferous forests, from mid-elevation (around 4000 feet) to moderately high elevation (above timberline), depending on the season. Common tree species are subalpine fir and lodgepole pine. They prefer to feed along rivers and streams and in wet meadows. The den is usually in a rock crevice, cave, or beneath a talus slope. Territories may encompass 10 to 80 square miles. Wolverines are believed to prefer areas of minimal people presence and high levels of solitude and seclusion. They are usually associated with wilderness, chiefly because they are so vulnerable to the activities of humans.

Pre-field Review:

Habitat available within the project area:

Wolverines have no real habitat preference but instead appear to seek high elevations for denning and solitude. Wolverines are dependant on carrion for a large part of their diet and key in on big game populations rather than on specific habitats. Historic sightings of wolverines both verified and unverified are within a few miles of the project area. Snow Bunny Snow Park had one verified track sighting in 1990. However, the proposed project area occurs in areas that lack solitude and seclusion qualities due to the open road densities, management activities, businesses, homes, and recreational opportunities in the area. It is unlikely but possible that a wolverine would be present in the project area.

Recent field surveys in the project area have not been accomplished. The last time broad based surveys were conducted over the watershed was during the winter of 1993-1994 and 1994-1995. Some survey efforts have been ongoing to the east at the Badger Creek Wilderness and on the east and north sides of Mt. Hood but at this point in time there have been no verifiable sightings of wolverine or sign of presence.

Field Reconnaissance:

A level A survey was conducted based on a low potential for detecting species occurrence. No observations were made of wolverine or their tracks during field reconnaissance. The lack of sightings of this species is not a reliable indicator of species presence or absence. The home

range of wolverines is documented to be in the hundreds of miles. Therefore any wolverine that is present in the Cascades of Oregon may potentially travel or forage in the project area.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No Action)

No effects to the Wolverine would occur with implementation of this alternative. The existing human use of this area would continue to limit opportunities for wolverines to utilize the area. However, the area would continue to provide potential habitat for the species for possibly far into the future.

Alternative 2 (Proposed Action), & 3 (Multorpor Mountain)

Effects to Habitat and Individuals

There is a potential for disturbance and loss of utilization of some of the potential wolverine habitat by implementing either of these two alternatives. Increasing human presence in currently unutilized areas could degrade the habitat for this species, if the species in fact, still exists on the Mt. Hood National Forest.

Cumulative Effects

The primary cumulative effect predicted for this species is to increase both the number of visitors to this area and expand the area of human impact in the proposed action area. An increase in human use in this area could cause wolverines to avoid utilizing the area. That is assuming that the current level of use has not already had that impact.

Currently, there are two foreseeable future actions within the watersheds that are predicted to impact wolverines and their habitat. The Timberline Lift Express project and Government Camp Fuels Treatment Project would both increase human activity in the area and would add to the effect of disturbance ongoing in the area. Because there is already a high amount of human activity in the area from ski areas, businesses, a major highway, recreational uses and homes the effect of this project is considered to be a minimal addition.

Effects Determination

The effects determination for the Government Camp Trails project is, “**May Impact Individuals but not likely to cause a trend to federal listing or loss of viability**”, for wolverine or its habitat due to the low amount of suitable habitat near the trails and due to high amount of human presence already within the project boundary.

3.5.3.12 - Baird’s Shrew (*Sorex bairdii permiliensis* – Sensitive)

Habitat:

This species is endemic to Oregon. Its range is from northwestern Oregon from the Pacific coast east to the Cascades, and from the Columbia River south to Benton and Lane Counties.

Little published information exists that assigns with certainty habitat characteristics to the Baird's Shrew. In 1986 two specimens were collected in an open Douglas-fir forested area with numerous rotting logs in Polk County. The habitat of the Baird's shrew can be described as moist coniferous forests with a shrubby understory. Individuals of the species tend to forage near logs and rocks.

Pre-field Review:

Habitat available within the project area

As stated above little is known about this species. The location and habitat characteristics of the forested areas of the Government Camp Trails project does seem to fit with what little is known about the species.

Field Reconnaissance:

A level A survey was conducted. There is a low potential for this species to inhabit the project area.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No Action)

No short-term effects to the Baird's shrew would be predicted with this alternative. The forested stands would continue to function as potential Baird's shrew habitat for the short term. Considering long-term effects, there is the potential that most of the units that are currently young managed plantations would eventually acquire enough of down wood component to become potential habitat for the Baird's shrew. The predicted long-term effects to the currently suitable stands would be that they would remain suitable habitat for a long time.

Alternative 2 (Proposed Action) & 3

Effects to Habitat

This alternative would retain existing logs that are currently in these stands. It is likely there would also be additional down woody debris generated by the trails project. The microclimate would possibly change within the immediate trail prism. Enough is not known about the species to determine whether this microclimate change and alteration of tree density would impact the habitation of the unit by the species. It is predicted that this proposed action would degrade but not remove potential Baird shrew habitat from the area.

Effects to Individuals

Although no surveys for this species have been completed in the Government Camp Trails project area, there appears to be potential habitat for the Baird shrew within the older forested stands. For this reason, species presence is assumed in these areas. Several of these stands with potential habitat are adjacent to more suitable habitat that individuals could migrate into after project implementation. There is also the potential that any individuals currently residing in

these units would be able to survive and reproduce in the units after project implementation. The proposed trails project also has the potential to extirpate individuals that are present in the trail prism. The loss of individuals would likely occur indirectly through the degradation of the habitat but could also occur directly by the presence of man and machine in the units.

Effects to Population

Although detrimental effects could occur to individuals of the population, adverse effects are not expected to the population as a whole. In addition, there is abundant potential habitat for the species in protected lands on the Mt. Hood. Predominantly these protected lands are Wilderness areas, Congressional Reserves, Late-Successional Reserves and National Scenic Area lands.

Cumulative Effects

The current condition of the habitat for the Baird's shrew within the Zigzag River and Salmon River watersheds take into consideration proposed projects that would remove or have removed suitable habitat from the area. These projects include the following: Timberline Ski Lift Express and Government Camp Fuels Reduction Project. There could be some loss of moist forested stands and down logs that would subsequently reduce the amount of suitable habitat for the Baird's shrew currently present within these watersheds.

The Government Camp Trails project adds to the effects of the above by degrading an 9-11 lineal miles of suitable habitat. Currently, there are no foreseeable future actions other than the projects previously mentioned on Forest Service lands within the watersheds that are predicted to impact the Baird's shrew or its habitat.

Effects Determination

The effects determination for the Government Camp Trails project is, "**May Impact Individuals but not likely to cause a trend to federal listing**", for Baird's Shrew or its habitat due to the low amount of suitable habitat near the trails and the small magnitude of the habitat alteration.

3.5.3.13 - Pacific Fringe-tailed Bat (*Myotis thysanodes vespertinus*) -(Sensitive)

Habitat:

Little to nothing is known about this subspecies of the Fringed Myotis (*Myotis thysanodes*). There appears to be only one source of information for the Pacific Fringe-tailed bat. The distribution of this species is in California, Oregon, and Washington. No habitat data could be found on the Pacific Fringe-tailed bat so habitat information and the following analysis are based on what is known for the Fringed Myotis.

Although the Fringed Myotis is found in a wide variety of habitats throughout its range, it seems to prefer forested or riparian areas. Most Oregon records are west of the Cascade Mountains. Its nursery colonies and roost sites are established in caves, mines, and buildings. The species is thought to forage by picking up food items from shrubs or the ground. It consumes beetles, moths, harvestmen, crickets, craneflies, and spiders.

Pre-field Review:

Habitat available within the project area

There are no breeding or roosting sites available within the project area. There is the potential for the project area to contain foraging habitat, although foraging usually occurs near the species' breeding and roosting sites. Species would only occur in area during dispersal or possibly foraging. This species is considered suspected on the Mt. Hood National Forest. No verified records have been documented for this species on the Forest.

Field Reconnaissance:

A level A survey was conducted. There is a low potential for this species to inhabit the project area.

Analysis of Effects/Cumulative Effects:

Effects Determination – All Alternatives

The effects determination for the Government Camp Trails project is “**No Impact**” in any alternative due to lack of nesting or roosting habitat. In the event that individuals were dispersing or foraging through the area, they would likely be able to quickly disperse from the area during project implementation. Foraging habitat is not limiting and if individuals happened to be displaced, they could easily find other areas to forage within nearby.

3.5.3.14 - Fisher (*Martes pennanti* – Sensitive)

Note: The species analyzed here is the Fisher (*Martes pennanti*) and not the Pacific fisher (*Martes Pennanti pacifica*). It is assumed that the species meant to be on the Region 6 Regional Forester's Sensitive Species List is *Martes Pennanti* since the USFWS concluded that it is unlikely that there are any valid subspecies of *M. pennanti*.

Habitat:

In the northwest part of its range, the fisher occupies a “wide variety of densely forested habitats at low to mid-elevations. The fisher is a moderate- to wide-ranging species and is considered rare in Oregon. West of the Cascade Range, all records for the species were for sites at elevations of 100-1,800 meters (328 – 5906 feet) and were located in the Subalpine fire, western hemlock, and Sitka spruce zones. The species tends to frequent riparian corridors. They are known to occasionally use cut-over areas, but this is not their optimal habitat.

Research has shown that the habitat for fishers would be enhanced by minimizing forest fragmentation, both in the remaining old-growth and in second-growth forests; maintaining a high degree of forest-floor structural diversity in intensively managed plantations; preserving large snags and live trees with dead tops; maintaining continuous canopies in riparian zones; and protecting wetland habitat.

Pre-field Review:

Habitat available within project area

The older forested stands have the structural characteristics of fisher habitat. Although these watersheds have been fragmented through past management, there remains enough unfragmented stands of old-growth and second-growth forests, including some of the stands proposed for treatment, that potential low quality habitat exists for the fisher. Fishers were reduced to extremely low numbers in Oregon as recently as 1950. There was a transplant of fishers into south central Oregon and those populations remain viable. No recent verifiable records exist for fishers on the Mt. Hood. A few track sightings were recorded as potentially being fisher but these are unreliable due to the size overlap with American Marten. It is speculated that fishers have been extirpated from the Mt. Hood.

Field Reconnaissance:

A level A survey was conducted. There is a low potential for this species to inhabit the project area.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No action)

No short-term effects to the fisher would be predicted with this alternative. The older forested stands would continue to function as potential low quality fisher habitat for the short-term. The predicted long-term effects to the currently suitable stands would be that they would remain suitable habitat for a long time.

Alternative 2 (Proposed Action) & 3

Effects to Habitat

This alternative would not impact stand structure enough to alter fisher habitat. These alternatives would retain existing logs that are currently in these stands. It is likely there would also be additional down woody debris generated by the project. The microclimate would change within the trail prism, but possibly not to the degree that would make the units unsuitable for the fisher. Thus, this proposed action would degrade but not remove fisher habitat from the area. It is not expected that trail construction would increase fragmentation of suitable habitat for the species.

Effects to Individuals

Although no surveys for this species have been completed in the Government Camp Trails project area, there appears to be potential low quality habitat for the fisher within the older forested stands. For this reason, species presence is assumed in these areas. There is the slight possibility that a fisher traveling through the area could be impacted by the disturbance associated with implementation of this project. This includes the disturbance created by the 9-11 lineal miles of trail construction. However, these stands with potential habitat are adjacent to more suitable habitat that individuals could easily migrate into during project implementation. The proposed trails project does not have the potential to extirpate individuals that are present in or adjacent to the units. Fishers are not believed to be highly sensitive to human activity. Any fishers currently utilizing the watershed could easily change their travel habitat to avoid the management activity.

Effects to Population

Effects are not expected to the population since there would be no adverse effects to any individuals.

Cumulative Effects

Past activities has to a substantial extent caused the fragmentation of habitat within the affected watersheds as well as the forest. This has reduced essential habitat characteristics associated with the fisher. Currently the majority of these watersheds are providing low quality habitat for the fisher. Continued forest openings could further reduce habitat quality for the fisher within these areas.

Effects Determination

The effects determination for the Government Camp Trails project is, “**May Impact Individuals but not likely to cause a trend to federal listing**”, for Fisher or its habitat due to the low amount of suitable habitat near the trails and the small magnitude of the habitat alteration.

3.5.3.15 - Crater Lake Tightcoil (*Pristiloma arcticum crateris*)- (sensitive)

Habitat:

Habitat is found above 610 meters elevation in moist conifer forests and among mosses and other vegetation near wetlands, springs, seeps, and riparian areas. This species may be found on logs, among sedges, attached to decaying leaf surfaces, in litter, or inside other shells (USDI, Bureau of Land Management, 1999).

Pre-field Review:

Habitat available within project area

Pristiloma arcticum crateris has been found rarely on the Mt. Hood Nation Forest in the past. The habitat in the project area fits the habitat where this species has been found to occur. The project area does have mosses, wetlands, springs and seeps.

Field Reconnaissance:

A Level A survey was done and it was determined that habitat for this species was present in the project area. During field reconnaissance of the project area a low intensity Level B surveys were done in the spring and fall for mollusk and salamanders. No specimens were discovered during the low intensity surveys.

Habitat for this species is present in the project area and therefore presence is assumed.

Analysis of Effects/Cumulative Effects:

Alternative 1 (No action)

No short-term effects to the *P. arcticum crateris* would be predicted with this alternative. The suitable habitat would continue to function as habitat for the short-term. The predicted long-term effects to the currently suitable stands would be that they would remain suitable habitat for a long time.

Alternative 2 (Proposed Action) & 3

Effects to Habitat

It is anticipated that some habitat areas for this species would be disturbed by the construction of a trail through the habitat. Some trails may go through some portion or in rare cases all of the home range for this small species. In some rare cases the amount of opening created by the trail could change the microclimate to the point that the habitat in that small area is no longer suitable.

During trail construction some additional habitat for *P. arcticum crateris* would be created by falling trees and creating more down logs. Down logs is a major component of habitat for this species because of their moisture holding capacity. Therefore there would be some loss and some increase in habitat.

Effects to Individuals

It is anticipated that some individuals may be removed from the population due to trail construction activities. The footprint of the trails themselves is small in terms of ecological scale and therefore the resulting loss of individuals is anticipated to be small relative to the overall population of these mollusks.

Effects to Population

Although there is anticipated that there is potentially some loss of individuals these mollusk are widely scattered over the landscape from Klamath County, Oregon to the Mt. Hood. *P. arcticum crateris* occurs throughout the Oregon Cascades in widely scattered populations. The effect of this project would be extremely local and should not severely impact the population.

Cumulative Effects

The current condition of the habitat for the *P. arcticum crateris* within the Zigzag River and Salmon River watersheds take into consideration proposed projects that would remove or have removed suitable habitat from the area. These projects include the following: Timberline Ski Lift Express and Government Camp Fuels Reduction Project. There could be some loss of moist forested stands and down logs that would subsequently reduce the amount of suitable habitat for the *P. arcticum crateris* currently present within these watersheds.

The Government Camp Trails project adds to the effects of the above by degrading an 9-11 lineal miles of suitable habitat. Currently, there are no foreseeable future actions other than the projects previously mentioned on Forest Service lands within the watersheds that are predicted to impact the *P. arcticum crateris* or its habitat.

Effects Determination

The effects determination for the Government Camp Trails project is, “**May Impact Individuals but not likely to cause a trend to federal listing**”, for *Pristiloma articum crateris* or its habitat due to small magnitude of the habitat alteration and large amount of unaltered potential habitat in the area.

3.5.3.16 - Dalles Sideband, Puget Oregonian, and Columbia Oregonian (*Monadenia fidelis minor*, *Cryptomastix devia*, and *Cryptomastix hendersoni*)- -(Sensitive)

Habitat:

Monadenia fidelis minor- Dalles Sideband : This species is usually found in springs and seeps in steppe or dry forest plant communities more associated with the eastside of the Mt. Hood National Forest (USDI, Bureau of Land Management, 1999).

Cryptomastix devia- Puget Oregonian: This species is found in low to mid elevations. The project is above the elevation that this species is usually found (USDI, Bureau of Land Management, 1999).

Cryptomastix hendersoni- Columbia Oregonian: This species is found in low to mid elevations. The project is above the elevation that this species is usually found (USDI, Bureau of Land Management, 1999).

Pre-field Review:

Habitat available within the project area

Monadenia fidelis minor- Dalles Sideband: None. There is not enough dry forest types in the project area.

Cryptomastix devia- Puget Oregonian: None: The elevation of the project area is higher than this species is normally found.

Cryptomastix hendersoni- Columbia Oregonian: None. The elevation of the project area is higher than this species is normally found.

No further analysis needed due to lack of habitat.

3.5.4 - Management Indicator Species

3.5.4.1 - Management Direction –

Four wildlife species are listed as MHNH management indicator species that may occur within the Project Area. The MHNH Land and Resource Management Plans (USDA, 1990a) 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 individual Forest Plans and replaced the land allocations for pileated woodpecker and American marten with Northwest Forest Plan land allocations. 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 Project Area, and type of occurrence are listed in Table III-7B

3.5.3 – Affected Environment for Management Indicator Species

Table III-7b Mt. Hood National Forest Management Indicator Species Potential Occurring within Project Area

Species	Habitat Association	Potential for Using Project Area
Pileated woodpecker (<i>Dryocopus pileatus</i>)	Late Seral and mature forest; may feed in younger forests particularly those containing remnant patches of mature or late Seral trees (Marshall et al. 1996).	Known to occur in Project Area. Pileated woodpecker excavations observed in Project Area.
American marten (<i>Martes americana</i>)	Dense coniferous forests, subalpine forests, areas above timberline (Maser 1998).	Known to occur in Project area.
Black-tailed deer (<i>Odocoileus hemionus</i>)	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 Project area
Elk (<i>Cervus elaphus</i>)	Combination of forest and other habitats; edge habitats; seclusion from human disturbance important for calving (Thomas and Toweill 1982)	Known to occur in Project area

Neotropical Migratory Birds

Neotropical migratory birds have been defined as those species that regularly breed in continental North America and winter south of the Tropic of Cancer, typically in Central and South America and the Caribbean. Widespread declines in populations of many neotropical migrants have intensified interest in avian conservation and resulted in policy direction to evaluate the impact of proposed activities on the nesting habitats of these species.

The North American Breeding Bird Survey Program found that 75 percent of forest dwelling migrants in eastern North America declined in population during the 1980's (Robbins et al., 1989). Potential causes of these declines are numerous and diverse, and may involve corridors and stopover sites, or a combination of these factors (Sherry and Holmes, 1992). Related to these potential causes is the problem of nest parasitism by the brown-headed cowbird, populations of which have expanded significantly in the last few decades due primarily to human-induced changes in the landscape (Ehrlich et al., 1988).

Occurrence in the Project Area: Neotropical migrants occur in a wide variety of habitat types including early and late-Seral forests (Finch and Stangel, 1992). However, in the relatively arid western United States, densities of neotropical migrants are highest in riparian areas, with

coniferous forests being the second-most used habitat by this assemblage of species (Saab and Rich, 1997). They are known to utilize the Government Camp Trails Project Area.

3.5.4 – Effects and Conformance to Management Direction

Alternative 1 – No Action

The No Action Alternative would have no impact to management indicator species or migratory bird species as no trails would be constructed.

Alternatives 2 Proposed Action and Alternative 3 – Multorpor Mountain

Impacts for both action alternatives would result from construction and/or use and maintenance of the proposed trails and would be either temporary or permanent in duration. Impacts may consist of the physical loss of habitat, or wildlife may be disturbed by construction activities or ongoing use of trails. In addition, these impacts may be direct or indirect. Direct impacts have immediate effects where they occur, while indirect impacts have delayed effects at or some distance from their origin. Permanent impacts (e.g. more than 5 years) occur when a previously undisturbed area is modified during construction and maintained in a modified state for recreational use. The relatively narrow canopy openings and selective removal of trees for trail corridors and trail construction, would not be considered a permanent effect to wildlife habitat, as it consists of the selective removal of individual trees and is not expected to result in significant alteration of habitat.

Temporary impacts are associated with noise and human presence. Temporary construction impacts would result from trail equipment constructing the trails and levels of human activity around the construction site. These types of activities would occur only during the construction phase and would not be long term.

Direct impacts would be associated with the physical actions of trail construction and trail use and annual trail maintenance. Direct impacts would include some clearing of vegetation for trails, increased human activity, and potential disruption of denning and nesting sites. Indirect impacts may include limited clearing which results in reduced shading of wetlands and creation of edge zone that results in changes to microhabitats and erosion from cleared trails that affect water quality in nearby streams. .

Pileated Woodpecker –

The pileated woodpecker is expected to occur within the Project Area based on signs observed during field surveys. Their habitat is comprised of forests containing snags and downed logs. Long-term impacts to pileated woodpeckers would include some degradation of their habitat where proposed trail corridors open up the canopy. . Snags that are felled and left in place would lose value as nesting habitat but they would retain value as foraging habitat and contribute to large woody material in the area. The Project Design Criteria include locating the trail to minimize the need for falling snags and leaving any removed on site to serve as foraging

habitat. Nesting could be directly impacted by construction if nest trees are removed or nearby construction causes enough noise and disturbance to result in nest abandonment.

Martens

Construction activities such as noise and increased human presence would cause temporary disturbance and displacement of American martens utilizing the Project Area. Habitat removal would be minimal. Mountain hemlock parkland was included in the forested habitat available for this species, as American martens have been observed in that habitat within the Project Area. Because clearing limits on the trails would mimic natural openings, there would be no decrease in the amount of denning, foraging, and travel habitat available for this species. Design Criteria would require that some most large trees felled for ski trails be left on site to provide additional down wood habitat for wildlife.

Use and maintenance of the trail system is not expected to cause significant disturbance to local martens as the martens in this area appear to be accustomed to the greater activity level around Timberline Lodge to the north and Government Camp to the south.

Black-tailed Deer

Black-tailed deer habitat would be moderately altered by the conversion of cover habitat as trees are cleared for Nordic trail corridors. These changes would occur under all Action Alternatives. Potential direct impacts to this species would include loss or conversion of cover habitat, an increase in foraging habitat, and disturbance due to construction and increased human activity. Due to the limited width of the ski trails, and the small reduction in canopy closure in the trail corridors, that would almost mimic natural openings, this impact would be limited in scope.

Temporary impacts would include displacement of deer during construction and temporary loss of foraging habitat. Disturbance would occur as a result of the increased noise and activity associated with construction. Deer are highly mobile and capable of moving away from disturbances, except during the fawning season when the mobility of does is limited by newborn fawns. The fawning season generally occurs between mid-May and mid-June. Periodic disturbance from summer use and trail maintenance activities would potentially lead to temporary displacement of deer from the area. Increases in winter recreation would not impact black-tailed deer since the Project Area is not within winter range for this species.

Elk

Elk are expected to utilize the Government Camp Trails Project Area as summer range based on the availability of potentially suitable summer foraging habitat within the area. Calving within the Project Area may occur but is unlikely in the higher elevations except in low snow years. Winter range for elk within the Project Area is lacking.

Construction activities would temporarily affect elk in the vicinity. Disturbance is likely to occur as a result of construction activities such as the use of heavy equipment, increased human activity, and increased noise. Since elk are highly mobile, they are capable of moving away from localized disturbances. Continued disturbance over an extended period of time, however, can cause elk to alter their behavior, including displacing elk from otherwise suitable foraging

habitat available in the Project Area. Potential impacts may occur during low snow years when there is a higher likelihood that elk might utilize the Project Area as part of their calving grounds. Since low snow years occur intermittently, elk calving in the area is expected to occur infrequently. Elk are expected to continue utilizing the Project Area, although use areas may be altered as a result of construction activities. Additional impacts are expected to occur due to ongoing periodic disturbance from recreational use of the area and summer maintenance activities. Again, these impacts would be temporary in nature and are not expected to significantly affect elk use of the area. Elk are not expected to utilize the Project Area during the winter months therefore grooming Nordic trail operations would not have any direct or indirect effects.

Neotropical Migratory Birds

Limited removal of forested habitat in the Project Area would result in a small decrease in the amount of nesting habitat available for neotropical migratory birds. Potential direct impacts to these species may occur as a result of clearing and construction activities during the nesting season, potentially resulting in nest mortality. There would likely be loss of nesting and foraging habitat for some neotrops and a gain of nesting and foraging for other neotrops, depending on the species and its preferences.

3.6 - Watershed Resources

3.6.1 - Management Direction

For ease of analysis a hydrologic planning area was identified for this project. The hydrologic analysis area (HAA) extends from the uppermost extent of any stream where it is intersected by project activities to the bottom of the micro watershed associated project activities. For this project the hydrologic analysis area is 5481 acres.

There are 4 land allocations in the HAA that address water resources. These allocations are detailed in Table III-

Table III-8 – Land Allocations related to Watershed Resources

Allocation	Acres	Management Direction
Special Emphasis Watershed	765	Maintain or improve watershed, riparian, and aquatic habitat conditions and water quality for municipal uses and/or long term fish production.
Wild and Scenic River	70	Protect and enhance the resource values for which a river was designated into the Wild and Scenic Rivers System
Riparian Reserve	1758	Riparian resources receive primary emphasis and special standard and guidelines apply
Key Site Riparian	226	Maintain or enhance habitat and hydrologic conditions of selected riparian areas, notable for their exceptional diversity, high natural quality and key role in providing for the continued production of riparian dependent resource values.

In addition to the land allocations listed above the Salmon River Fifth Field Watershed is a Tier 1 Key Watershed under the Northwest Forest Plan. There are 975 acres of the HAA in the Key Watershed. The objective of the Key Watershed is to contribute directly to conservation of at-risk anadromous salmonids and resident fish species. The emphasis within Key Watersheds is to reduce existing system and non-system road mileage and receive priority for restoration.

The hydrologic planning area contains 488 acres of the 582 acre Government Camp Drinking Water Protection Area (DWPA). Although the boundary of the Government Camp DWPA has been identified, a Drinking Water Protection Plan has not been developed, and therefore, no management guidelines or protection standards have been established (USDA, 2005).

3.6.2 - Affected Environment

3.6.2.1 - Climate

The planning area receives approximately 68-114 inches of precipitation annually in the form of rain and snow based on data from PRISM model developed by the Oregon Climate Service. There are two SNOTEL (Snow Telemetry) sites in or adjacent to the project area. The Mt. Hood Test Site is at the lower end of the Timberline Ski area at 5400 feet elevation. The Mud Ridge Site is about 1 mile south of Trillium Lake at 3800 feet elevation.

Data from the Mt Hood Test Site from 1981 through 2004 is summarized in Table III-

Table III-9 – Mt Hood Test Site Climate Summary

	Total Precipitation (inches)	Snowpack measured as inches of Snow Water Equivalent	% of Total Precipitation contained in the Snowpack
Average	106.6	67.1	63
Minimum	68.4	37.9	39
Maximum	152.6	102.4	81

Data from the Mud Ridge Site from 1979 through 2004 is summarized in Table III-10

Table III-10 –Mud Creek Climate Summary

	Total Precipitation (inches)	Snowpack measured as inches of Snow Water Equivalent	% of Total Precipitation contained in the Snowpack
Average	66.44	28.08	42
Minimum	45.20	6.80	10
Maximum	95.10	45.10	66

3.6.2.2 - Surface Water Resources

The hydrologic project incorporates two Fifth Field Watersheds (Zigzag and Salmon River) and five Sixth Field Watersheds (Still Creek, Camp Creek, Little Zigzag Canyon, Mud Creek, and West and East Fork Salmon River).

There are 19.0 miles of perennial streams of which 10.4 are classified as fish bearing with resident rainbow and cutthroat trout. Major streams in the project area include Still Creek (4.9 miles), Camp Creek (1.7 miles), and Trillium Lake Tributaries (0.9 miles).

3.6.2.3 - Geomorphology

The underlying geology within and adjacent to the Project Area is described as a large pyroclastic-flow (volcanic-flow) and debris flow deposits in the report entitled, "Preliminary Geologic Map of the Mount Hood 30-Minute by 60-Minute Quadrangle, Northern Cascade Range, Oregon" (U.S. Geological Survey, 1995). These highly permeable pyroclastic and debris flow deposits covered older volcanic deposits to create the smooth fan that is currently discernable between Zigzag Canyon and White River Canyon. The thickness of this debris fan is largely undocumented, however a test well located just south of Timberline Lodge revealed a measured thickness of 120 feet (USFS, 1992). The dominant materials found within this layer include poorly sorted pebbles, cobbles, and boulders in a reddish-gray sandy matrix (U.S. Geological Survey, 1995). It is likely that the young age and high permeability of these deposits are the dominant factors responsible for the limited stream development above Timberline Lodge and the large amount of shallow groundwater flow. Finally, it is thought that the older volcanic deposits found under the permeable pyroclastic and debris flow materials have low permeability and act to concentrate groundwater flow and create groundwater springs at specific elevations where bedrock is exposed (DeRoo, Pers. Comm., July, 2004).

The headwaters of Still creek emerge out of a set of perennial and ephemeral wetland seeps originating at about the 5000' elevation on the south side of Mt Hood. Fed by snowmelt surface runoff and groundwater flow emanating from the Palmer Snowfield, these numerous wetland seeps join together at the 4800' elevation level and form the mainstem channel of Still Creek (USDA, 2005)

Thick pyroclastic flow and debris flow deposits from approximately 1,500 years ago comprise the surface material in the project area. These permeable deposits filled in over the older topographic surface (including stream channels) and created the present smooth fan on the southwest side of Mt. Hood (U.S. Geological Survey, 1995). The age and permeability of this material explains the limited stream development above Timberline Lodge; the buried topography (including stream channels) probably helps to concentrate groundwater flow in certain areas and partially explains why springs are located where they are (DeRoo, Pers. Comm., July, 2004).

The topography of the land around these seeps and wetlands is very steep (30 to 50 percent slope), and because of the steep slopes, these tributary streams all are moderately to highly incised and have distinct stream morphology with limited floodplain development. The perennial reach of the mainstem of Still Creek in the vicinity of the project area is classified as a Rosgen A4a+ channel type. The A4 stream types typically have a high sediment supply which is combined with high energy streamflow to produce very high bedload sediment transport rates. The A4 stream types are generally unstable, with very steep rejuvenated banks that contribute large quantities of sediment. A4a+ stream types are usually located in slump/earthflow landforms and are often associated with debris avalanches and debris torrent erosional processes. (Rosgen 1996).

Similar to Still Creek Camp Creek is in the area affected by pyroclastic flow and debris flow deposits from approximately 1,500 years ago. Camp Creek and its associated tributaries

originate from a series of seeps and springs in the 4000' to 4300' elevation band. As with Still Creek it is assumed that the location of the current seeps and springs that form the headwaters of Camp Creek are associated with topography that was buried 1500 years ago.

Based on stream gradient (greater than 4%) and substrate (sand and gravel) Camp Creek above Government Camp is classified as a Rosgen A4 stream type. The A4 stream types typically have a high sediment supply which is combined with high energy streamflow to produce very high bedload sediment transport rates. The A4 stream types are generally unstable, with very steep rejuvenated banks that contribute large quantities of sediment (Rosgen 1996).

Camp Creek downstream of Multorpor Fen in the Ski Bowl Ski Area was classified as a Rosgen B3 channel type during the 1994 Camp Creek Stream Survey (USDA 1994). This channel type is moderately entrenched with channel gradients of 2-4%. The channel bed morphology is dominated by cobble materials and characterized by a series of rapids with irregular spaced scour pools. The channel materials are composed primarily of cobble with a few boulders, lesser amounts of gravel and sand. The bed and bank materials are stable and contribute only small quantities of sediment during runoff events.

3.6.2.4 - Flow Regime

With the lowest elevation in the hydrologic planning area at 3650 and the highest elevation area at 6000 feet about 50% of the annual precipitation is contained in the snowpack based on data from adjacent SNOTEL sites. Based on the amount of precipitation associated with the snowpack a snowmelt dominated hydrograph would be expected for this area. Figure 1 details the mean daily values for the Salmon River stream gage at 3445 feet which has a period of record of 67 years and measures a watershed area of 8 square miles. This gage is approximately 1 mile east of Trillium lake and at approximately the same elevation as the low end of the hydrologic analysis area. Figure III-1 clearly details the influence of the melting snowpack (starting in early April and peaking in late May) on the annual hydrograph. Baseflows at this site generally occur from mid July through mid November.

Figure III-1 – Daily Mean Streamflows Salmon River at 3445 feet

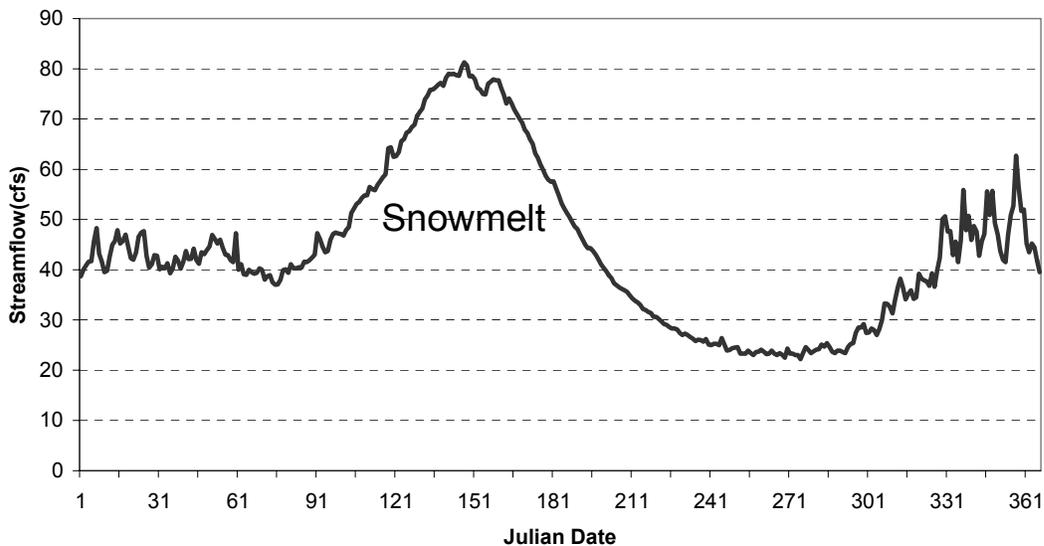
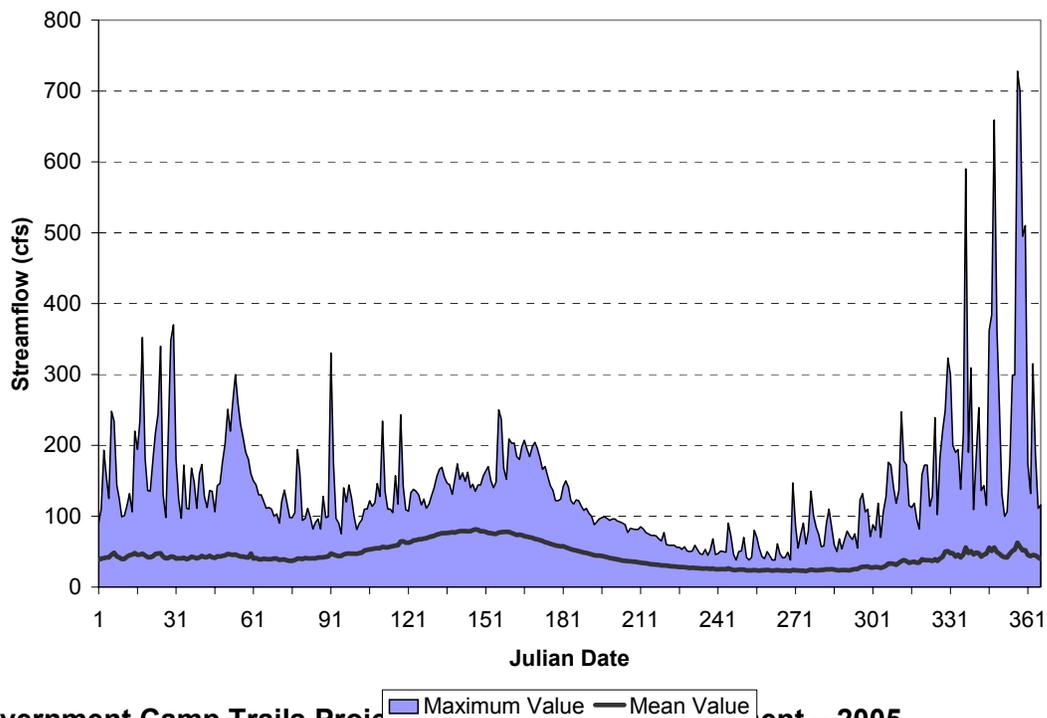


Figure III-2 details the maximum daily streamflows for the 67 years of record for the Salmon River gage at 3445 feet. This figure details that the maximum streamflows occur from late November to early March. As detailed by Figure III-2 the peak streamflow events are of short duration and peak and fall rapidly indicating that peak streamflows are associated with runoff from rapid snowmelt and rainfall during rain on snow events.

Figure III-2 - Peak Streamflows Salmon River at 3445 Feet



Current streamflow data from Still Creek in the vicinity of Still Creek Campground indicates Still Creek differs from the Salmon River, as it is fed primarily by groundwater rather than direct run-off from the snowfield. Seepage from the upper snow fields travels through the near surface geology and expresses itself in the springs that provide the source of perennial flow (USDA, 2005)

Still Creek flow regime is “buffered” by the constant influx of groundwater. Pulses of surface runoff during rain events occur primarily when the ground surface becomes saturated and the ephemeral reaches of Still Creek carry water (USDA, 2005).

Within the hydrologic planning area there are water rights for approximately 15.8 cfs for various uses that are detailed in Table III-11

Table III-11 – Water Rights in the Hydrologic Analysis Area

Use Type	Total Water Rights (cfs)
Domestic	3.6
Fire Protection	0.1
Fish Culture	7.0
Other	5.1
Total	15.8

As a quick comparison the hydrologic planning area is approximately 8.6 square miles and the gaged area from the Salmon River Gage at 3445 feet is 8.0 miles so with the close proximity and similar areas it would seem appropriate to use the streamflow at the Salmon River gage as an approximation of the total streamflow from the hydrologic planning area. With mean base streamflows (assuming that existing water rights for Salmon River above the gage have been removed) at the Salmon River Gage around 25 cfs and existing water rights for 15.8 cfs in the hydrologic planning area it would appear approximately 60% of the baseflows are allocated.

3.6.2.5 - Water Quality

Currently a Total Maximum Daily Load (TMDL) is being established for stream temperature in the Sandy Basin. The federal Clean Water Act requires DEQ to develop a plan with goals and pollution control targets for improving water quality in the watersheds where water quality standards are not met. DEQ is doing this by establishing TMDLs for each pollutant entering the water. In this case, heat is considered a pollutant because it raises water temperature. A TMDL describes the amount (load) of each pollutant a waterway can receive while maintaining compliance with water quality standards. An important step in the TMDL process is determining how much stream heating results from natural sources and how much heat comes from human activities.

Oregon requires that a water temperature management plan (TMP) be developed and implemented by sources that contribute to stream heating. The TMP will identify the technologies, best management practices, and/or measures and approaches to be implemented by each source to limit stream heating. Stream heating and sedimentation from forestry activities

would be controlled through implementation of measures in the state Forest Practices Act on private lands, the Western Oregon State Forests Management Plan in state forests, and federal Northwest Forest Plan on federal forestlands.

Within the hydrologic planning area there are two National Pollution Discharge Elimination System (NPDES) permits. Both permits are for activities that discharge into Camp Creek. H and P Development has a permit for Industrial Stormwater discharge associated with the Collins Lake Condominium Project and the Government Camp Sanitary District has a permit for Domestic Wastewater Treatment Facilities.

3.6.2.6 - Sediment

The Watershed Analysis for the Zigzag Watershed (USDA, 1995) identifies moderate problems with turbidity and sediment associated with highway sanding and road surface erosion in both Still Creek and Camp Creek.

The 1996 Still Creek Stream Survey (USDA, 1996) details problems with sedimentation in the past near Still Creek Campground and in the upper portion of the Key Site Riparian area. These observations were validated with pebble counts from that survey that detail surface fines (material less than 6 mm) at 70% and 44% respectively in these reaches (the Mt Hood LRMP Standard is less than 20% surface fines).

The 1994 Stream Survey of Camp Creek (USDA, 1994) details high accumulations of silt and sand occurred throughout the stream with the highest accumulations observed adjacent to Camp Creek Campground (RM 1.7) and adjacent to Mirror lake Trailhead (RM 5.8). High accumulations of silt were also noted in areas adjacent to summer homes, bridge crossings, road landings, stream segments running along Highway 26, and the Ski Bowl recreation site. It should be noted that sedimentation was observed even in areas where bank erosion was not evident.

Furthermore, the stream survey states:

- Sedimentation could be attributed to heavy road sanding on Highway 26 as well as bank erosion. It was not possible to distinguish between sediment originating from road sanding or eroding stream banks.
- Another possible contributor to excess sediment levels may be the extensive use of Ski Bowl ski area and trails by mountain bikers in the summer months. High accumulations of sediment were noted in the stream adjacent to this recreation area.
- A concern relating to the condition of fish habitat in Camp Creek is the presence of high accumulations of silt and sandy substrate in the channel which may be decreasing the availability of ideal spawning gravels for both anadromous and resident populations.

3.6.2.7 - Water Temperature

Camp Creek and Still Creek are identified by the Oregon Department of Environmental Quality as core cold water habitat for salmonids with a water temperature standard of the seven-day-average maximum temperature may not exceed 16.0 degrees Celsius (60.8 degrees Fahrenheit).

In the Watershed Analysis for the Zigzag Watershed (USDA, 1995) neither Camp Creek nor Still Creek were identified with stream temperature problems. This was validated by temperatures taken during stream surveys.

In Still Creek temperatures taken during the 1998 survey (USDA, 1998) from July 6th to August 31st varied from a maximum of 15^oC at river mile 2.4, 2.7, and 3.3 to a minimum of 4^oC from river mile 14.0 to the end of the survey at river mile 14.4. Within the hydrologic analysis area (starting at approximately river mile 11.0) water temperatures varied from 4^oC upstream of river mile 14.0 to 9^oC at river mile 11.0.

Temperatures taken during the 1994 Camp Creek Stream Survey (USDA, 1994) from July 12th to August 22nd indicated a maximum of 12^oC in the vicinity of river mile 0.5 to a minimum of 8^oC in the area of Yokum Falls.

3.6.2.8 - Groundwater Resources

There are approximately 324 acres of wetlands within the hydrologic analysis area based on the mapping from the National Wetlands Inventory (U.S. Fish and Wildlife Service 1998). **Table III-12** details acres by broad wetland classification.

Table III-12 – Wetlands in the Hydrologic Analysis Area

Wetland Type	Acres
Scrub Shrub	114
Forested	110
Emergent	47
Lake- Unconsolidated Bottom	40
Unclassified	6
Unconsolidated Bottom	5
Aquatic Bed	2
TOTAL	324

The wetlands are concentrated in three broad areas: headwaters of Trillium Lake, Multorpor Fen, and headwaters of Camp Creek. The 40 acre lake detailed in **Table III-12** is Trillium Lake.

3.6.3 - Environmental Consequences and Conformance to Management Direction

Table III-13 – Summary of Activities and Impacts for Action Alternatives

Activity or Impact	Alt. 2	Alt. 3
Miles of Trail	9.6	11.3
Miles of Trail in Riparian Reserves	1.7	1.7
Acres of Clearing	19.2	23.6
Acres of Clearing in Riparian Reserves	2.9	2.9
Feet of Trail in Wetlands	575	575
Acres of Clearing in Wetlands	0.2	0.2
Cubic Yards of Excavation	534	1911
Cubic Yards of Excavation in Riparian Reserves	534	534
Number of Stream Crossing	6	6
Stream Crossings on Fish Bearing Streams	2	2
Sediment Yield WEPP Model (pounds/year delivered to streams)	232	232
Sediment Yield Cumulative Effects Model used in Watershed Analysis (tons/year delivered to streams)	17.1	17.1
Acres of disturbance (bare soil)	1.91	2.42

3.6.3.1 - Summary of Trail Construction

As detailed in **Table –III-14** the majority of the trail construction (92%) would be in the Zigzag Watershed.

Table III-14 Trail Construction by Subwatershed

Watershed	Subwatershed	Alt. 2 – Miles of Construction	% of Total	Alt. 3 – Miles of Construction	% of Total
Zigzag	Still Creek	0.9	9	2.5	22
Zigzag	Camp Creek	3.1	33	3.2	29
Zigzag	Little Zigzag Canyon	4.9	51	4.9	43
Salmon	Mud Creek	0.2	3	0.2	2
Salmon	West & East Fork Salmon River	0.4	5	0.4	4
	TOTAL	9.6	100	11.3	100

3.6.3.2 - Summary of Trail Construction in Riparian Reserves

When trail construction within the Riparian Reserves is examined the majority of the construction is within the Camp Creek Subwatershed of the Zigzag Watershed.

Table III-15 - Trail Construction in Riparian Reserves by Subwatershed

Watershed	Subwatershed	Alt. 2 – Miles of Construction	% of Total	Alt. 3 – Miles of Construction	% of Total
Zigzag	Camp Creek	1.3	76	1.3	76
Salmon	Mud Creek	0	2	0	2
Salmon	West & East Fork Salmon River	0.3	21	0.3	21
	TOTAL	1.7		1.7	

3.6.3.3 - Summary of Trail Construction in Wetlands

There are 575 feet of trail construction planned in wetlands (as defined by the National Wetlands Inventory) with the majority of construction in the Camp Creek subwatershed. Both Alternative 2 and 3 have the same amount of construction in wetlands.

Table III-16 – Trail Construction in Wetlands

Watershed	Subwatershed	Wetland Type	Feet of Construction	Percent of Total Construction
Zigzag	Camp Creek	Forested	417	73
Salmon	West & East Fork Salmon River	Forested	132	23
Salmon	West & East Fork Salmon River	Scrub Shrub	25	4
Total			575	100

There are 6 stream crossings associated with the project and 5 of these crossings are in the Camp Creek Subwatershed.

3.6.4 - Hydrological Effects of Alternatives

3.6.4.1 - Direct and Indirect Effects of Alternative 1 –

Under the no action alternative there would be trail construction. Changes from the current condition are not anticipated to peak or base streamflow timing, duration, or magnitude, or water quality parameters of temperature and in-channel fine sediment

3.6.4.2 - Direct and Indirect Effects of Alternatives 2 – Proposed Action and Alternative 3 – Multorpor Mountain

Peak Streamflows – Alternatives 2 and 3

Based on the processes that affect peak streamflows and the associated methodologies for analysis, effects are analyzed at the subwatershed and fifth-field watershed scale during a cumulative effects analysis. See the Aggregated Recovery Percent model discussion.

Base Streamflows – Alternatives 2 and 3

There are no direct effects anticipated to base streamflows because there are no water uses, impoundments or diversions associated with this project. Base streamflows can be influenced by the amount of disturbance to forest cover in a watershed so the potential effects of this project will be assessed in a base streamflow cumulative effects analysis

Temperature and Suspended Sediment – Alternatives 2 and 3

For Alternative 2, 9.6 miles of trail would be constructed, 19.2 acres of vegetation would be cut and cleared, 534 cubic yards of material would be excavated, and 6 bridges would be constructed.

For Alternative 3, 11.3 miles of trail would be constructed, 23.6 acres of vegetation would be cut and cleared, 1911 cubic yards of material would be excavated, and 6 bridges would be constructed.

Both Still Creek and Camp Creek within the hydrologic analysis area meet the water quality standard for temperature (seven-day-average maximum temperature may not exceed 16.0 degrees Celsius), but do not meet the Mt Hood Forest Plan standard for in-channel fine sediment (Spawning habitat (e.g. pool tailouts and glides) shall maintain less than 20 percent fine sediments (particles less than 6.0 millimeters in diameter) on an area weighted average. Mt Hood LRMP FW-097).

Designed into each alternative are soil and water protection measures or best management practices (BMPs) with the express purpose of limiting erosion and associated sediment yield to the streams and/or protecting vegetation that is providing stream shade. Through implementation of site specific BMPs this project is in compliance with the Clean Water Act. The BMPs are identified in Chapter 2.

It is the responsibility of the Forest Service as a Federal land management agency through implementation of the Clean Water Act (CWA), to protect and restore the quality of public waters under their jurisdiction. Protecting water quality is addressed in several sections of the CWA including sections 303, 313, and 319. BMPs are used to meet water quality standards (or water quality goals and objectives) under Section 319.

Current statewide Water Quality Standards state:

Pursuant to Memoranda of Agreement with the U.S. Forest Service and the Bureau of Land Management, water quality standards are expected to be met through the development and

implementation of water quality restoration plans, best management, practices and aquatic conservation strategies. Where a Federal Agency is a Designated Management Agency by the Department, implementation of these plans, practices and strategies is deemed compliance with this Division.

Stream Temperature – Alternatives 2 and 3

Stream temperatures can be affected by management activities that remove stream shade, alter channel structure, or alter the flow regime. This analysis will focus on changes in stream shade because there are no changes to channel structure or flow regime anticipated from the action alternatives.

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.

In the Oregon Coast Range and western Cascade Mountains riparian buffers of 100 feet or more have been reported to provide as much shade as undisturbed late successional/old-growth forests (Steinblums 1977).

In the Camp Creek Subwatershed activities within 100 feet of perennial streams under Alternatives 2 and 3 include 5 stream crossings that would remove approximately 100 feet of stream shade, and approximately 750 feet of trail construction between 75 and 100 feet away from a perennial tributary to Camp Creek.

Three of the stream crossings with bridges are associated with the Camp Creek Trail the streams in this area are narrow (approximately 3 to 4 feet wide wetted perimeter during summer low flows) with a shade layer provided by the shrubs in this area. The stands in this area are dense mid seral stands with 90-100% canopy closure. The streams in this area flow from north to south so the overstory shade would be removed on the east and west side of the stream and not the critical south side where the solar radiation is the strongest. The openings adjacent to the stream are narrow (20 feet) with mature vegetation remaining outside the cleared corridor that would provide stream shade. In addition streams in this area are feed by groundwater with stream temperatures estimated around 5⁰C¹. Based on these factors listed there are no water temperature impacts anticipated associated with these 3 stream crossings.

The construction and clearing of approximately 750 feet of trail associated with the Camp Creek Trail and is 75 to 100 feet away from the stream. As with the bridge crossings the stream in this area is narrow with shrubs providing a layer of shade. The trees and shrubs between the trail clearing and the stream are dense mid seral stands with 90 to 100 percent canopy closure and

¹ According to Golder (2003), Still Creek at elevation 5,000 feet exhibits an average temperature of 3°C. At 3,600 feet, the average temperature is 6.8°C. Since water temperature in streams is cumulative and temperature typically becomes higher downstream, it can be deduced that the stream temperatures within the reaches in the hydrologic analysis area are between 3°C and 6.8°C (Golder, 1998). It is assumed that the groundwater source for both Still Creek and Camp Creek is the same so the stream temperatures would be similar.

would remain intact. Also as with the bridge crossings streams in this area fed by groundwater with temperatures estimated around 5⁰C. Based on these factors there are no impacts anticipated to stream temperature associated with the trail clearing.

There are two bridge crossings on Camp Creek associated with the West Summit Fen Trail. In this area the stream is running east to west and the creek is about 11 feet wide (based on the 1994 stream survey) so the stream is not completely shaded by shrubs. The vegetation in this area is classified as late successional with associated large trees with large canopies. Due to the approach of this trail at the northern most bridge a 40 wide area would be cleared adjacent to the stream on the north side and 20 wide area on the south side. On the southern most bridge 20 feet would be cleared on either side of the bridge. Stream temperature in this area is estimated at about 8⁰C. Due to the limited area that would be cleared and the late successional vegetation in the area it is assumed that there would be little change in the amount of shade provided for Camp Creek so there would be no impacts anticipated to stream temperature.

There is one stream crossing with an associated bridge in the West and East Fork Salmon River Subwatershed on an unnamed tributary to Salmon River. The vegetation in this area is large conifers with approximately 85% canopy closure. The stream in this area is approximately 6 feet wide. This trail is planned for bikes and hikers so there are no plans to cut any overstory vegetation to place the bridge. Based on fact that no overstory vegetation would be cut there are no impacts anticipated to stream shade.

In Channel Fine Sediment – Alternatives 2 and 3

The most important potential adverse impact 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 streambanks and adjacent riparian zone (MacDonald, 1991)

Effectiveness of stream buffers at improving water quality adjacent to logging operations was studied in three watersheds in western Washington and found that 200 foot buffers would be effective to remove sediment in most situations if the buffer were measured from the edge of the floodplain (USDA, 1993).

Activities within 170 feet of streams (the riparian reserves in this area) for both action alternatives include 1.5 miles of trail construction, 2.5 acres of clearing, and 534 cubic yards of excavation. In order to quantify the sediment yield to streams in the area the Water Erosion Prediction Project (WEPP) soil erosion model was used.

The WEPP model (Flanagan and Livingston 1995) is a physically-based soil erosion model that can provide estimates of soil erosion and sediment yield considering the specific soil, climate, ground cover, and topographic conditions. It was developed by an interagency group of scientists including the U.S. Department of Agriculture's Agricultural Research Service (ARS), Forest Service, and Natural Resources Conservation Service; and the U.S. Department of Interior's Bureau of Land Management and Geological Survey.

WEPP simulates the conditions that impact erosion--such as the amount of vegetation canopy, the surface residue, and the soil water content for every day in a multiple-year run. For each day that has a precipitation event, WEPP determines whether the event is rain or snow, and calculates the infiltration and runoff. If there is runoff, WEPP routes the runoff over the surface, calculating erosion or deposition rates for at least 100 points on the hillslope. It then calculates the average sediment yield from the hillslope.

All trail crossings of streams (perennial or intermittent) and areas where excavation of side slopes within 200 feet of a stream (where side slope exceeds 25% and a balanced cut and fill bench 15 wide is constructed) were modeled to determine sediment yield to streams.

Parameters used in WEPP Model Include

- Sandy loam soils with 5% rock cover
- Local climate for the Government Camp area (both precipitation and temperature)
- 63 percent cover for disturbed areas such as cut and fill slopes
- 80% shrub cover for all buffers (undisturbed areas)

The WEPP:Road module for used for all trail crossings of streams and the Disturbed WEPP module was used for cut and fill slopes on areas within 200 feet of a stream.

Table III-17 – WEPP Sediment Yield

Activity	Erosion pounds per year	Yield to Stream pounds per year
Stream crossing stream to first drainage structure (one approach)	26.11	14.88
Stream crossing first to second drainage structure (one approach)	24.14	1.08
Cut and Fill Slope – Camp Creek Trail	1560	0
Cut and Fill Slope – West Summit Fen Trail	1440	40 ¹

¹ This is the average sediment yield based on 50 years of climate. There is only a 6% probability of sediment delivery the first year following disturbance.

Alternative 1 No Action, would have no additional sediment delivered to streams. Based on the sediment yield detailed in **Table III-177** there would be 200 pounds of sediment delivered to Camp Creek per year (5 stream crossings and West Summit Fen cut and fill slope) and 32 pounds per year delivered to the Salmon River (one stream crossing) in Alternatives 2 and 3. For visualization purposes 200 pounds of sediment is equivalent to an area of 3 cubic feet.

3.6.4.3 - Wetland Impacts – All Alternatives

Alternative 1 would have no impacts to wetlands. There are 575 feet of trail construction and 0.2 acres of clearing planning in wetlands under Alternatives 2 and 3. The Mt Hood LRMP gives direction that: Special aquatic habitat (e.g. alcoves, secondary and overflow channels, ponds and wetlands) and associated subsurface aquatic habitat (hyporheic zone) shall be maintained in a natural condition or enhanced in both quality and quantity (FW-104).

Special design criteria and associated best management practices that require trails within wetland areas to be constructed on puncheon structure or turnpiked to minimize impacts to the wetlands would be implemented. Trails would be designed to avoid wet areas when possible and to minimize the amount of overstory vegetation to be cleared in wetland areas.

3.6.4.4 - Cumulative Effects – Base Streamflows – All Alternatives

Methods

The methodology used for this analysis was developed by SE Group for the Timberline Express DEIS. The methodology is detailed in the Appendices for that document in the Stream Flow Technical Report for the Timberline Express Proposal. The text describing the methodology is directly from that document.

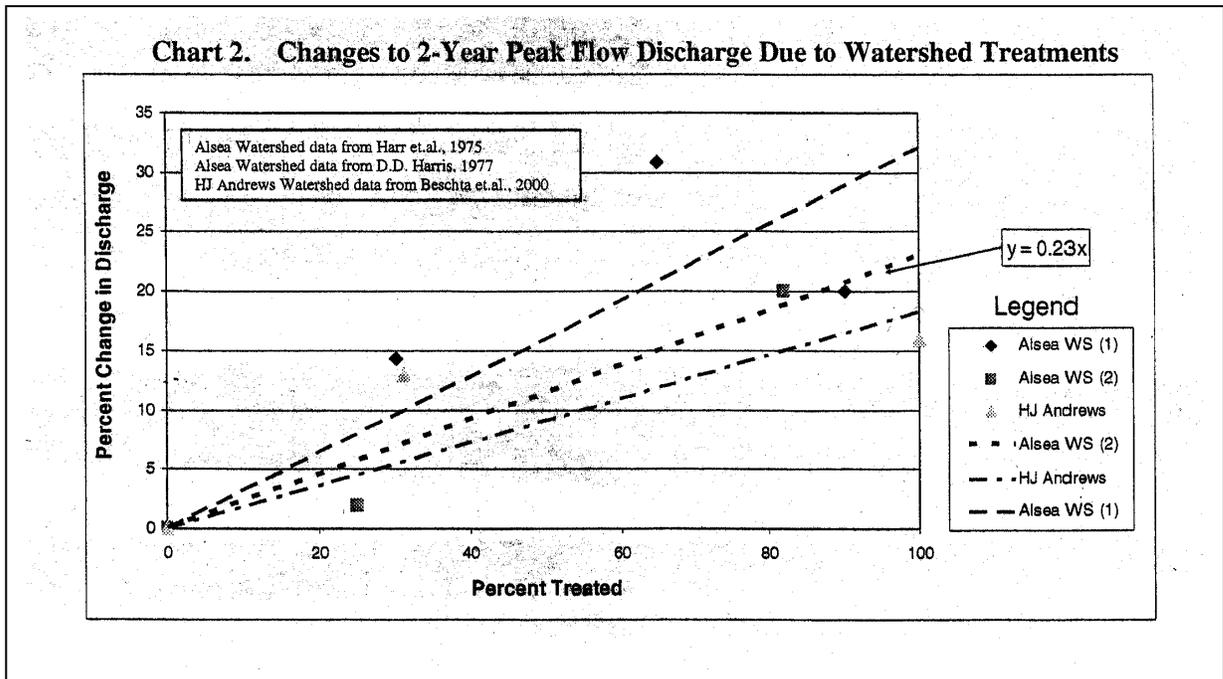
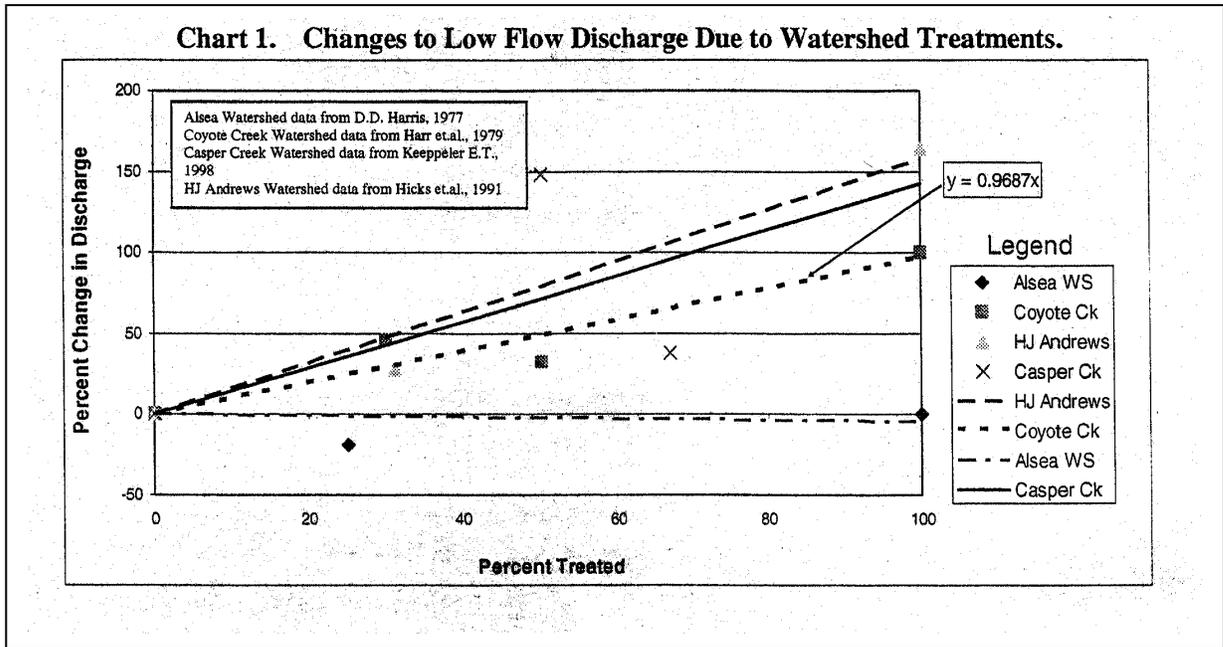
It is well documented that removal of forest cover and creation of new impervious surfaces in a watershed increases available surface and shallow subsurface water, and can alter the flow regime of watershed (Dunne, T. and L. B. Leopold, 1978, Naiman, R.I. and R. E. Bilby, 1998). The dominant type of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

A thorough review of published literature was conducted in order to establish relationships between the size and type of watershed treatments (clear-cutting, road construction, etc.) and the measured effects on various stream flow parameters. Out of the 17 studies that were reviewed, seven were selected to be included in this model because they were conducted locally in Oregon and Northern California and typically involved watersheds with similar characteristics (climate, elevation, slope, etc.) to the two analysis watersheds for this EIS. The selected studies use the paired watershed technique to analyze the affects of watershed treatments, whereby two or more

gauged watersheds that have similar characteristics are monitored for a long period of time (10 to 40 years) before and after watershed treatments are applied to all but one of the watersheds. The stream gage data from the un-affected watershed is compared to the treated watersheds to see if the treatment had any measurable affect on the flow regime.

Since stream flow conditions can be analyzed in an infinite number of temporal and spatial scales, it is useful to describe changes in flow conditions at a few key recurrence intervals that are of most concern for a specific stream flow study. The concept of recurrence interval is commonly used to describe the statistical probability that a particular flow event would be exceeded in any given year. For the purposes of this analysis, the existing and proposed stream flow conditions were calculated and presented as annual low flow (base flow) and the 2-year peak flow. These specific flow rates were selected for analysis because, according to published literature, these are the flow rates most likely to be affected by land cover changes (Beschta et al., 2000; Burton, 1997; Keppeler, 1998; Hicks et al., 1991). Once the two flow rates were selected, the data contained in the seven selected studies was synthesized for each of the two flow rates for this analysis. The synthesized data was plotted on a X, Y scatter plot and trend lines were fit to the data with the percentage of the watershed treated on the X axis, and the percent change in the specific flow rate on the Y axis (see Charts III-1 and III-2).

Chart III-1 and III-2 Changes to Low Flow and Two Year Peak Flow Discharge



The most representative study for each parameter was chosen based on the characteristics of the watersheds in the study, the location of the trend line relative to the trend lines from other studies, and the fit of the trend line to the data. Once a trend line was selected for each flow rate, an equation was developed to describe the equation so that the percent change in flow rate (discharge) could be calculated under any treatment scenario. The selected trend line is

identified in each table with by an arrow that connects the equation to the trend line (see Charts 1 and 2). Next, the estimated change in flow for the selected return interval (low flow or 2-year peak flow) calculated by determining the percentage of the watershed proposed for treatment and inserting the treatment percentage into the appropriate equation. For the purposes of this analysis, the treated area in the watershed for existing and proposed conditions was determined by calculating the total area of modified herbaceous, modified shrub, and developed land cover using GIS software and dividing that value by the area of the watershed to be analyzed. Using this stream flow model combined with GIS datasets that contain vegetation or generalized land cover information, comparative estimates of potential changes to low flow and 2-year peak flow from historic or proposed treatments can be made.

Results

Using the hydrologically disturbed area from the peak streamflow cumulative effects analysis as detailed in **Table III-18** increases in base streamflows were calculated and are detailed in **Table III-19**.

Table III-18 – Hydrologically Disturbed Area

Area (All lands)	Alt 1	Alt 2	Alt 3
Zigzag 5th Field Watershed	3.0	3.0	3.0
Camp Creek 6th Field Subwatershed	6.4	6.5	6.5
Zigzag Little Zigzag Canyon 6th Field Subwatershed	0.9	1.1	1.1
Still Creek 6th Field Subwatershed	2.2	2.2	2.2

Table III-19 – Changes in Base Streamflow from an Undisturbed Condition

Area (All lands)	Alt 1	Alt 2	Alt 3
Zigzag 5th Field Watershed	2.9	2.9	2.9
Camp Creek 6th Field Subwatershed	6.2	6.3	6.3
Zigzag Little Zigzag Canyon 6th Field Subwatershed	0.9	1.1	1.1
Still Creek 6th Field Subwatershed	2.1	2.1	2.1

Overall baseflows are predicted to increase about 6% in the Camp Creek subwatershed and 3% in the Zigzag subwatershed. Based on baseflow values from the Salmon River gage at 3445 feet this would result in a 0.6 cfs increase in Camp Creek and a 5.5 cfs increase in the Zigzag River. Implementation of the Government Camp TIFF Trails Project would result in a 0.03 cfs increase in base streamflow in the Camp Creek subwatershed.

The increases associated with all activities are slight and are not expected to have an impact to beneficial uses. The increases associated with implementation of the Government Camp TIFF Trails Project are extremely slight and most likely would not be detectable.

3.6.4.5 - Cumulative Effects – Peak Streamflows – All Alternatives

This assessment was completed using the Aggregate Recovery Percent model (ARP). The ARP model was developed for use in the transient snow zone (2400-4800 feet). It provides a methodology for indexing the susceptibility of a watershed to increased peak flows from rain-on-snow events associated with management created openings in the canopy. This method assumes that the greatest likelihood for long-term cumulative effects on forest hydrologic processes is caused by created openings in the canopy (from both timber harvest and from the existence of roads) that impact snow accumulation and snowmelt.

The ARP model was used to assess the proposed management alternative's potential affects on peak streamflows. This methodology was selected because:

- The action alternatives would create openings in the canopy that would affect snow accumulation and melt.
- Mt. Hood Forest Plan Standards and Guides are tied to this methodology.

The ARP model measures the percent of watershed hydrologic recovery based on managed stand age and a recovery curve developed for the Mt. Hood National Forest. This Forest recovery curve is a generalization of the percent of canopy cover and tree diameter expected at different ages of tree harvest plantations. The model assumes that a plantation has fully recovered its snow handling capabilities at 35 years of age. Because it does not predict the increase in peak flows, the ARP model is most useful when utilized in conjunction with information on watershed condition and sensitivity.

For this analysis it was assumed that activities that would reduce canopy closure below 70% in stands greater than 8 inches diameter at breast height (DBH) would have an affect on the ARP values. Harvest activities that did not reduce canopy closure of stands greater than 8 inches DBH below 70% were considered "ARP neutral."

A 35-year recovery curve was used to "grow" a plantation from seedlings to 8 inches DBH and 70% canopy closure.

Landscape areas analyzed included the affected subwatersheds and the fifth field watersheds as specified in the Mt. Hood Forest Plan Standards. For this project the created openings are in the Zigzag Watershed and the Still Creek, Camp Creek, and Zigzag/Little Zigzag Subwatersheds. The ARP values were calculated twice for each land area: for all lands within an area, and for lands available for harvest within an area. Lands available for harvest include Forest Service Lands that are not classified as Wilderness.

In addition to this project other reasonably foreseeable projects included in the assessment are Timberline Express on National Forest lands and Collins Lake Development located on private land.

Table III-20 -- Aggregate Recovery Percent Calculated Using All Lands Zigzag River Watershed Index Year 2005

Area (All lands)	Alt 1	Alt 2	Alt 3
Zigzag 5th Field Watershed	97.0	97.0	97.0
Camp Creek 6th Field Subwatershed	93.6	93.5	93.5
Zigzag Little Zigzag Canyon 6th Field Subwatershed	99.1	98.9	98.9
Still Creek 6th Field Subwatershed	97.8	97.8	97.7

Table III-21 -- Aggregate Recovery Percent Calculated Using Lands Available for Harvest Zigzag Watershed Index Year 2005

Area (Lands Available for Harvest)	Alt 1	Alt 2	Alt 3
Zigzag 5th Field Watershed	96.7	96.7	96.6
Camp Creek 6th Field Subwatershed	95.3	95.2	95.2
Zigzag Little Zigzag Canyon 6th Field Subwatershed	99.1	98.9	98.91
Still Creek 6 th Field Subwatershed	97.8	97.8	97.8

On a Forest-wide basis, ARP values above 65% have been recommended to prevent adverse effects associated with increased peakflows. Much of the available literature that discusses the relationship between harvest/road disturbance and peak flows implies a threshold of concern of 25% -- or ARP value of 75%. (USDA, 1990.)

As detailed by Tables III-20 and III-21, all of the affected watersheds and subwatersheds for all the alternatives are well above either the 65% or 75% threshold of concern.

3.6.4.6 - Assessment of Compliance with Mt. Hood Forest Plan Standards

Applicable Standards - Mt. Hood Forest Plan Standards for Cumulative Watershed Effects

1. Vegetative management activities on National Forest System lands should be dispersed in time and space to minimize cumulative watershed effects. No more than 35 percent of an area available for vegetative manipulation should be in a hydrologically disturbed condition at any one time. (FW-061, FW-062)
 - a. Within the 15 major drainages on the Forest, watershed impact areas shall not exceed 35 percent. (FW-063)
 - b. Watershed impact areas at the subbasin or area analysis level should not exceed 35 percent. (FW-064)

2. Within selected “Special Emphasis Watersheds”, watershed impact areas should not exceed the “thresholds of concern” (TOC) established for those individual watersheds (for this project Still Creek is the associated subwatershed with a TOC of 25%). (FW-065)
3. Cumulative effects analyses of management activities on water quality and stream channel stability (such as watershed impact analyses) shall include all lands in all ownerships within the watershed. (FW-066)
4. Where land ownerships are intermingled, timber harvest scheduling should be coordinated to prevent adverse cumulative effects. (FW-067)

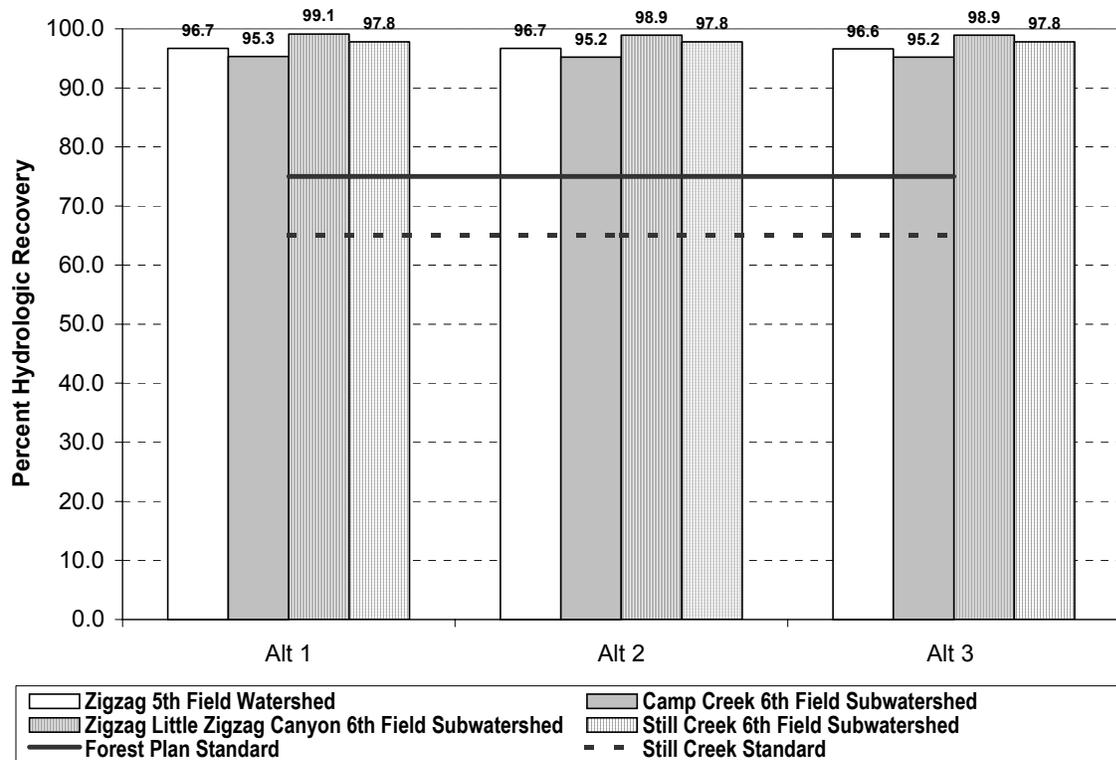
Results of Analysis – All Alternatives

For this analysis activities considered included Timberline Express, Government Camp Activities (i.e. Collins Lake development), and Government Camp TIFF Trails.

Table III-22 -- Watershed Impact Area Zigzag Watershed (Lands Available For Vegetative Manipulation) – Index Year 2005

Area (lands available for harvest)	Alt 1	Alt 2	Alt 3
Zigzag 5th Field Watershed	3.3	3.3	3.4
Camp Creek 6th Field Subwatershed	4.7	4.8	4.8
Zigzag Little Zigzag Canyon 6th Field Subwatershed	0.9	1.1	1.1
Still Creek 6th Field Subwatershed	2.2	2.2	2.2

Figure III-3 – Hydrologic Recovery Zigzag Watershed (Lands Available For Vegetative Manipulation) – Index Year 2005



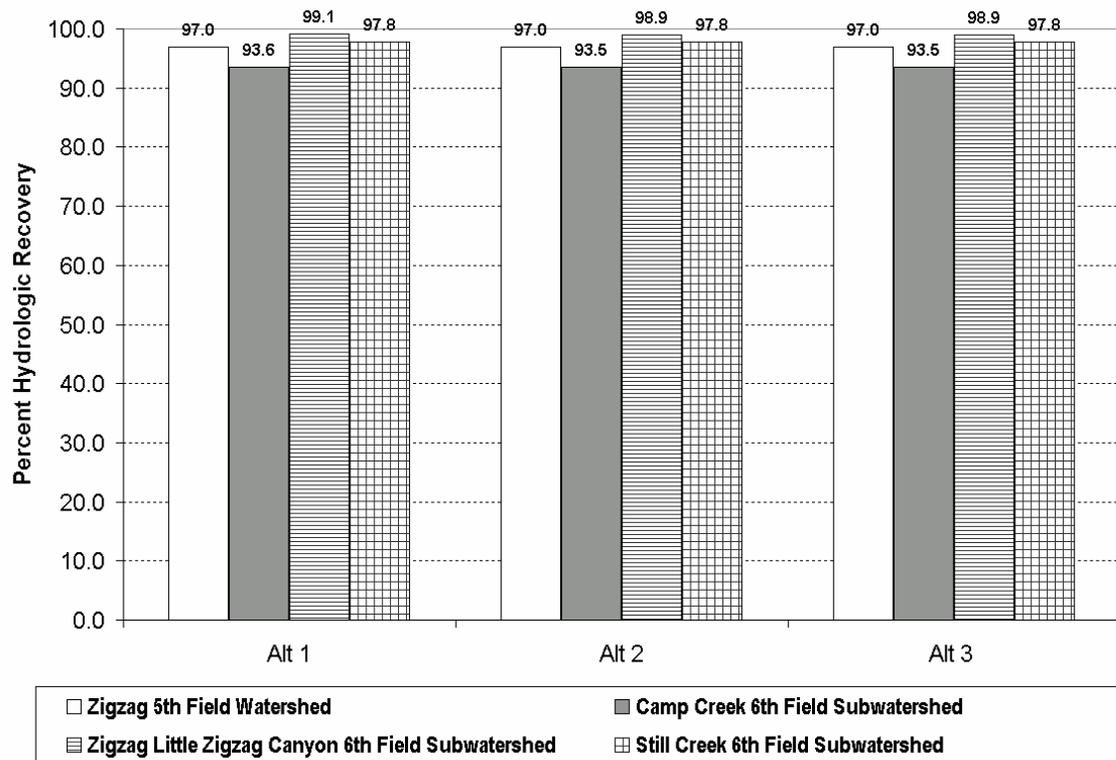
As detailed in **Table III-2** and Figure III-3, all the associated watersheds and subwatersheds for all alternatives are well above the Forest Plan Standards for Watershed Impact Area (no more than 35 percent of an area available for vegetative manipulation should be in a hydrologically disturbed condition at any one time). FW-061, FW-062, FW-063, FW-064.

Still Creek Special Emphasis Watershed is also well above the established threshold of concern for watershed impact area of 25% with values at 2.2%. FW-065

Table III-23 -- Watershed Impact Area (All Lands) Zigzag Watershed – Index Year 2005

Area (All lands)	Alt 1	Alt 2	Alt 3
Zigzag 5th Field Watershed	3.0	3.0	3.0
Camp Creek 6th Field Subwatershed	6.4	6.5	6.5
Zigzag Little Zigzag Canyon 6th Field Subwatershed	0.9	1.1	1.1
Still Creek 6th Field Subwatershed	2.2	2.2	2.2

Figure III-4 – Hydrologic Recovery (All Lands) Zigzag Watershed – Index Year 2005



As detailed in Figure III-4 and **Table III-20**, the watershed impact area for all the associated watersheds and subwatersheds for all alternatives is very low (0.9% to 6.5%). This indicates that the associated watersheds and subwatersheds are not at risk for adverse cumulative affects associated with increased peak streamflows associated with rain on snow events.

In addition to potential increases in peak streamflows channel sensitivity was examined for the associated watersheds and subwatersheds to assess any affects in increased peak streamflows may have on the stream channel. For this analysis the Rosgen Channel types from the most recent stream surveys were used to assess channel sensitivity (Rosgen 1996). The results are presented in **Table III-2**.

Table III-24 Stream Channel Sensitivity

Area	Associated Stream Reach	Sensitivity to Disturbance	Sediment Supply	Streambank Erosion Potential
Camp Creek Subwatershed	Camp Creek @ confluence with Zigzag River	Very High	Very High	Very High
Zigzag River Watershed	Zigzag River @ confluence with Sandy River	Low	Low	Low

Camp Creek at the confluence with the Zigzag River has a very high sensitivity to disturbance, a very high sediment potential, and a very high streambank erosion potential, however, this subwatershed also is 93.5% hydrologically recovered (or 6.5% of the watershed has been impacted by management activities). Even with the high sensitivity to disturbance in this subwatershed very little of the area disturbed so effects associated with bed and bank erosion from increased peak streamflows would not be expected.

Zigzag River at the confluence with the Sandy River has a low sensitivity to disturbance, a low sediment potential, and a low streambank erosion potential. With the associated watersheds and subwatersheds being over 90% hydrologically recovered with respect to increased peak streamflows from rain in snow events and the associated stream channels having a low sensitivity to disturbance the potential for adverse cumulative effects is low. (FW-066).

This conclusion is consistent with the associated Zigzag Watershed Analyses (USDA, 1995) that concluded that peak streamflows for the associated watersheds and subwatersheds are below the threshold of concern for adverse effects from peak streamflows associated with rain on snow events.

3.6.4.7 - Surface Erosion Cumulative Effects Analysis

This Surface Erosion Cumulative Effects Analysis is based on the analysis that was completed for the Zigzag Watershed Analysis (USDA, 1995) and has been modified to assess the affected subwatersheds and associated watershed from this project. Potential increases in sediment yield associated with the implementation of the Government Camp Tiff Trails Project were incorporated.

Natural rates of surface erosion in forested watersheds is measured to be quite low (Swanson, F. and G. Grant, 1982; USEPA-USDA Forest Service, 1980). Surface erosion in the watershed is tied to processes which disturb soil litter and duff cover. The series of high intensity fires (1901, 1908, 1910, 1915, 1933/1934) that burned over large acreage's of the watershed would have generated a sediment pulse each winter following the initial disturbance. Surface erosion would have returned to post fire rates as surface covering vegetation became reestablished.

More recent disturbances to soil cover include roads, timber harvest, site preparation, and recreational uses. These disturbances create chronic, long-term supplies of sediment within the watershed. Methods used to evaluate the altered surface erosion rates within the watershed closely follow those described in the Washington Forest Practices Board Manual: Standard Methodology for Conducting Watershed Analysis (DNR, 1993). In addition to sediment production from surface erosion, sand applications to snow-covered highway surfaces are a chronic source of sediment in the watershed. Actual rates of sand application were taken directly from Oregon Department of Transportation records.

Only those sediment sources with high potential for delivery were considered in this process. Sediment production that was not within the delivery zone to perennial streams was not calculated for this analysis.

For this analysis Camp Creek Subwatershed and the Camp Creek Subwatershed upstream of the Camp Creek in the Laurel Hill area (key depositional reach) were modeled. Even though there were slight amounts of sediment generated in other subwatersheds only Camp Creek is analyzed because of its existing condition and much higher (3 to 8 times higher) predicted sediment production.

Results for All Alternatives

Potential sediment from highway sanding was computed using actual application rates obtained from the Oregon Department of Transportation.

Modeled estimates of sediment transport considered roads within 300 feet horizontal distance of streams within the watershed. While steep slopes along Highway 26 receiving highway sand within 300 feet slope distance may be effective in delivering sand to streams, they were not considered in the estimates.

The highway is within 300 feet (horizontal) of Camp Creek for 1.67 miles, and within 300 feet (slope distance) for an additional mile.

The largest road cut and fill slopes within the watershed are those along Highway 26 adjacent to Camp Creek. Many of these cut and fill slopes are poorly vegetated and/or covered with residual highway sand during the fall and spring.

Table III-25 - Road Related Sediment Contribution

SUB-WATERSHED	TOTAL ROAD MILES	ROAD DENSITY (miles per square mile)	MILES WITHIN 300 FEET OF STREAMS	ESTIMATED ROAD SEDIMENT (Tons/Year)	HIGHWAY SANDING SEDIMENT (Tons/Year)
Camp Creek	20.77	2.14	4.61	285.87	2102.14

3.6.4.8 - Recreation

Recreation activities within the watershed can also contribute to increased potential for surface erosion. Unvegetated ski slopes, campgrounds, and some trails can contribute to surface erosion. While the amount is significantly lower than that from roads and highway sanding, recreation sites are often directly adjacent to water resources. **Table III-26** summarizes the estimated sediment contribution of recreational related sediment.

Table III-26 -- Potential Sediment Contribution from Recreation and Harvest Activities

SUBWATERSHED	SUBWATERSHED ACRES	RECREATION (tons/year)	HARVEST (tons/year)
Camp Creek	6225	8.53	0.00

Table III-27 presents the modeled sediment yield associated with implementation of the Government Camp TIFF Trails Project. Both alternatives 2 and 3 yield the same amount of sediment.

Table III-27 – Potential Sediment Yield from Government Camp TIFF Trails

Alternative	Projected Sediment Yield From New Trails (tons/year)
1	0
2	13.29
3	13.29

It should be noted that the sediment yield in Table III-28 is much higher than that presented in the Environmental Impacts Section of the Environmental Assessment. This is because this model assumes that all trails within 200 feet of streams would contribute sediment to the stream. The site specific modeling completed in the Environmental Impacts Section actually models each trail and cut and fill slope so it is assumed that the site specific modeling is more accurate. However, the associated sediment yield predicted with the cumulative effects modeling is useful for comparison purposes to other sediment sources in the subwatershed.

Table III-28 -- Summary of Estimated Sediment Yield (tons/year)

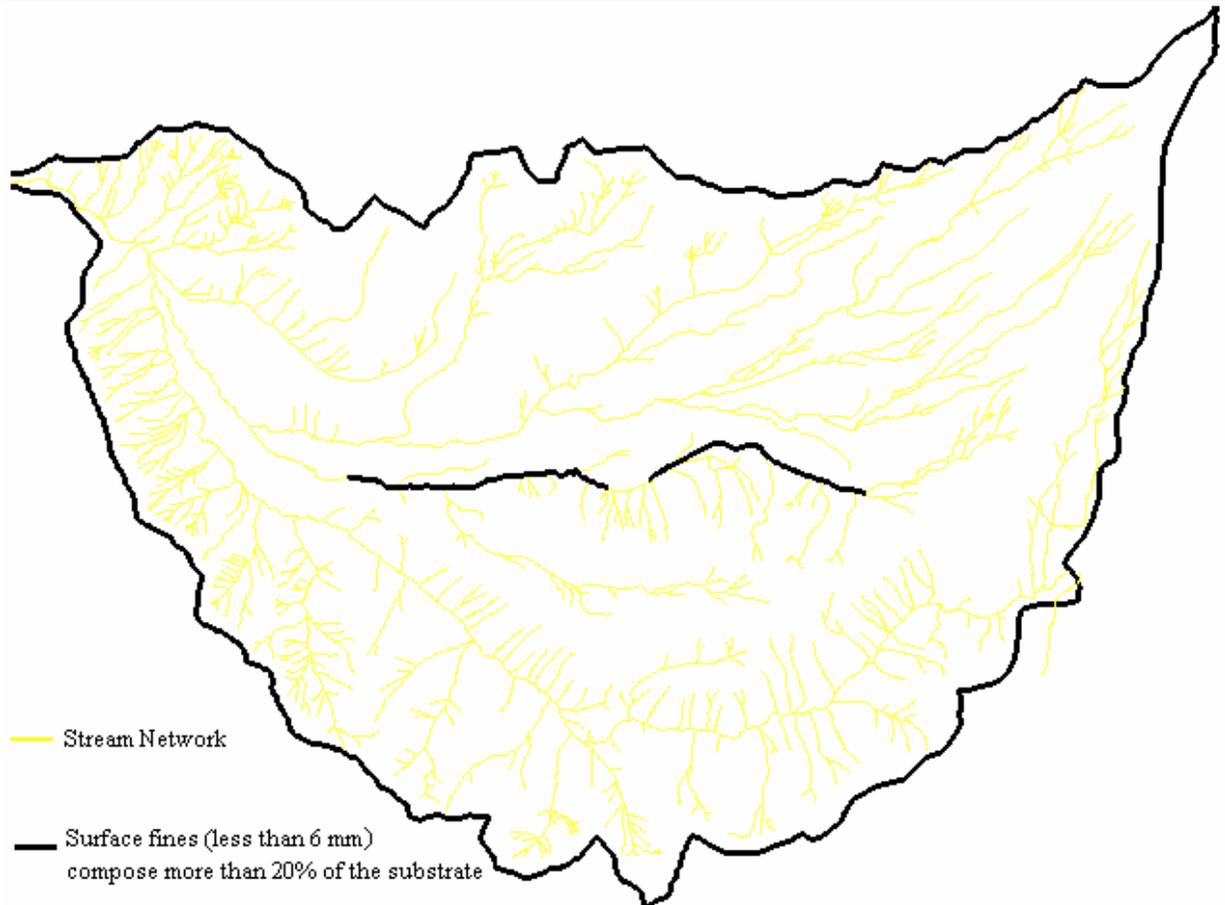
SUBWATERSHED	ROAD SEDIMENT	HIGHWAY SANDING	RECREATION	TIFF TRAILS	TOTAL
Camp Creek	285.87	2102.14	8.53	13.29	2409.84

Implementation of the Government Camp TIFF Trails Project would result in a 0.5% increase in sediment yield at the subwatershed level.

3.6.4.9 - Sediment Deposition

The consideration of sediment production at the subwatershed level can assist in the identification of priorities for mitigation and restoration. In order to assess the potential impact on in-channel habitat, low gradient reaches which provide habitat for aquatic species of concern were identified. As the following map displays, depositional reaches are often associated with stream junctions.

Figure III-6 - Depositional Reaches Where Fine Sediment Levels Exceed Forest Plan Standards



3.6.4.10 - Conclusions Regarding Sediment – All Alternatives

Implementation of the Alternative 1, No Action would not increase sediment yields over existing levels in the subwatersheds. Implementation of the Government Camp TIFF Trails project could increase sediment yield in the subwatershed by 0.5% and at the key depositional reach by 2%. Even though Camp Creek currently exceeds the standards for fine sediment both of these increases are very small and are not expected to affect the beneficial uses in this area.

3.6.4.11 - Government Camp Drinking Water Protection Area (DWPA)

The 1996 Amendments to the federal Safe Drinking Water Act (SDWA) provided funding to the Oregon Department of Environmental Quality (ODEQ) and Oregon Health Division (OHD) to provide drinking water protection assistance to public water systems and communities in Oregon. Although the development of management plans for the protection of public water systems would remain voluntary in Oregon, the 1996 SDWA Amendments mandated that state agencies conduct Source Water Assessments (SWA) for public water systems. The SWAs were to be completed by January, 2003. The SWA process involved three steps: 1.) Delineation of the DWPA; 2.) inventory of potential sources of contamination; and 3.) determination of the

susceptibility to contamination. Following the mandated SWA, the voluntary Protection Phase includes the development of a Drinking Water Protection Plan. The Government Camp DWPA has been delineated by ODEQ, and the remaining SWA tasks have been completed.

A Drinking Water Protection Plan has not been developed, as a result, no standards or land use restrictions have been developed for the DWPA. The Government Camp DWPA totals approximately 582 acres and overlaps a portion of the Government Camp Trails Project Area as well as a portion of the existing Timberline Ski Area Special Use Permit Area.

Effects to Drinking Water Protection Area

Based on analysis and coordination with the Timberline Express EIS conducted in 2005, it was concluded that proposed trails and vegetation clearing needed to construct those trails was not considered a potential contaminate source to the Drinking Water Protection Area (2005 memos Jefferey J.Fredericks, DHS OHPS Drinking Water Program).

3.7 - Fisheries

3.7.1 - Affected Environment and Management Direction

The Government Camp Trails Project Area lies within two 5th field watersheds, the Zigzag River and the Salmon River. All of the proposed trails except a $\frac{3}{4}$ mile hike/bike summer trail adjacent to Forest Road 2656 are within the Zigzag River watershed. The $\frac{3}{4}$ mile trail is proposed to access Trillium Lake within the Salmon River Watershed south of Summit Meadows.

The Salmon River watershed is designated as a Tier 1 Key Watershed under the Northwest Forest Plan because it contains crucial refugia for at-risk fish species. The remainder of the proposed trails is located within the Zigzag River watershed. Both the Salmon River and Zigzag River watersheds support populations of winter steelhead, coho salmon, Chinook salmon, and resident cutthroat trout, Redband trout, and rainbow trout.

Alternative 2 has 0.9 miles of trail proposed within the Still Creek drainage (Zigzag Watershed) and Alternative 3 has 2.5 miles of trail proposed in Still Creek drainage. In both alternatives, these trails are located more than $\frac{1}{4}$ mile from Still Creek and its tributaries.

Alternative 2 has 3.1 miles and Alternative 3 has 3.2 miles of trail construction proposed in the upper reaches of the Camp Creek drainage (Zigzag Watershed). The upper Camp Creek drainage emerges out of out of a large wetland complex just south of Hwy 26 through Government Camp, known as “The Fen”, another wetland/small lake complex known as Collins Lake just north of Hwy 26, and from a series of perennial and intermittent streams located on the forested slopes above Government Camp.

Most of the trails are located between 3600 feet and 4300 feet in elevation. The two exceptions are the last part of the Multorpor Mountain Hiking Trail proposed to reach the summit of Multorpor Mountain at 4656 feet, and the Timberline to Town hike/bike trail that starts at 4100 feet and climbs to 6000 feet to Timberline Lodge. The Timberline to Town trail has 4.9 miles of proposed construction in the Little Zigzag drainage. Both the Multorpor and Timberline to Town Trails have no perennial stream crossings.

For purposes of this EA, and for ease of analysis, the action area has been defined as a hydrologic analysis area (HAA) that extends from the uppermost extent of any stream that is intersected by trail construction to the bottom of the microwatershed associated with trail construction. For this project, the hydrologic planning area is 5481 acres. See Watershed Values section of the EA for HAA map.

In addition to the land allocations listed above the Salmon River Fifth Field Watershed is a Tier 1 Key Watershed under the Northwest Forest Plan. There are 975 acres of the HAA in the Key Watershed. The objective is to contribute directly to conservation of at-risk anadromous salmonids and resident fish species. The emphasis within Key Watersheds is to reduce existing system and non-system road mileage and receive priority for restoration.

3.7.1.1 - Fish Distribution

Salmon River Watershed

The Salmon River originates from the Palmer Glacier at an elevation of approximately 6000 feet near Timberline Ski Area on the south side of Mt. Hood and is a tributary to the Sandy River. The river is 34.75 miles long, and ranges in elevation from 6000' at the headwaters to 1000' at the mouth. The Salmon River drainage area is 74,240 acres. The unnamed tributary to the Salmon River, which the proposed Airstrip to Trillium Trail project crosses, enters the Salmon River at RM 29.8. The tributary contributes approximately 15% of the flow to the Salmon River at this point, has a 4% gradient at the mouth and is fish accessible (2001 Salmon River Stream Survey). At the intersection of the tributary to the Salmon River, the Salmon River is in a broad, trough-like valley form where the average stream gradient is 1.6%. Remarkably, there are only two culverts on the mainstem Salmon River, at RM 30.35 and at RM 30.7 (the location of the proposed project). All other road and trail crossings have bridges.

A culvert exists upstream of this junction of the tributary and the Salmon River at RM 30.7. In 2004, this culvert was deemed a barrier to upstream fish passage (USFS 2004 Salmon River Fish Passage Project *Fisheries Biological Evaluation*). The stream channel immediately upstream from the existing culvert on Highway 35 cuts through soft, sandy substrate of glacial fines that appear to be deposited in an alluvial-fan-like formation.

Riparian vegetation in the bankfull and floodprone area near the project site is dominated by a sedge-grass community with interspersed forbs and shrubs, and coltsfoot is also present. Upslope vegetation is dominated by western hemlock, huckleberry, and dogwood.

The entirety of the Salmon River contains habitat suitable for salmonids. The substrate in the upper reaches is dominated by small cobbles and sand, especially where the river is in the glacial area of Mt. Hood. The Salmon River is relatively well-shaded with adequate amounts of large woody debris to provide channel stability, pool formation, and high flow refuge for fish. Although water temperatures in the lower reaches do not meet Mt. Hood National Forest plan, Region 6 Desired Future Conditions or NOAA Fisheries standards, the temperatures in the upper reaches, especially upstream of Highway 35, are likely cooler due to lack of human impacts and are suitable for salmonids.

Coastal cutthroat trout (*Oncorhynchus clarki*), Redband trout, and brook trout (*Salvelinus fontinalis*) are the only fish species known to reside in the Salmon River in this location as anadromous species are limited to below Final Falls at RM 14. Brook trout are non-native and occur in the Salmon River, probably as a result of stocking in Trillium Lake. Brook trout are known to occur downstream of the Highway 35 culvert, however, their presence upstream of the culvert is unknown.

The Survey and Manage aquatic mollusks Columbia duskysnail *Lyogyrus* n. sp. 1 may reside in this area of the Salmon River. Surveys have not been conducted for this species in the Salmon River at or near the project site. Based on the available information and the fact that the Columbia duskysnail has been found primarily in small seeps, springs and smaller perennial

streams it is suspected that the Columbia dusksnail is present in the Salmon River in this location. Only coastal cutthroat trout will be discussed further in this document.

Zigzag River Watershed

Within the Zigzag River, anadromous fish distribution occurs in the lower reaches of the main drainages; the mainstem Zigzag River, Camp Creek, and Still Creek. Resident fish populations (Redband trout, cutthroat trout, and rainbow trout) are known to occur throughout the watershed. Within Still Creek, the limit of anadromous fish distribution is likely the 75 foot waterfall at RM14.4. Within Camp Creek, the limit of anadromous fish distribution is Yokum Falls at RM 5.75.

Camp Creek

Camp Creek is a fourth order stream with the following flow regime: fourth order from RM 0 to 6.7, third order from RM 6.7 to 7.2. The creek flows from the headwaters at 3680 feet elevation to its confluence with the Zigzag River at 1800 feet elevation over 7.2 miles with an average gradient of 4.6%.

Past survey reports in 1990 and 1991 indicate the presence of coho salmon, Chinook salmon, steelhead, and rainbow trout, sculpin, and Pacific lamprey in Camp Creek. Yokum falls at RM 5.75 is the only barrier to fish passage (USFS 1994) and the upper limit of anadromy is to this falls. Sampling by forest crews confirmed the presence of brook trout and cutthroat trout above the falls at river mile 5.8 in April of 1993 (USFS 1994). Based on captures at trapsites in other streams of the Upper Sandy Basin, Redband trout are suspected to occur in Camp Creek above Yokum Falls.

All of the reaches surveyed in the 1994 stream survey report were below Mt. Hood National Forest Land and Resource Management Plan(LRMP) standards for woody debris densities and pool frequencies.

Still Creek

The Still Creek subwatershed lies south of the Sandy River basin just south of Highway 26 and flows from the headwaters at an elevation of 5000 feet over a distance of 15.2 miles to the mouth at an elevation of 1600 feet. Still Creek is a 4th order stream from RM 0-3.1, 3rd order from RM 3.1-5.3, 2nd order from Rm 5.3-14.7, and 1st order from RM 14.7-15.2.

Still Creek supports populations of steelhead, Chinook, coho, rainbow trout, cutthroat trout, Redband trout, and sculpin. The only barrier to fish passage is a 75 foot falls at RM 14.4 (USFS 1996). The LRMP standard for primary pools was only met in Reach 1. The Project implementation guide (PIG) standard for pools was not met in any of the reaches (USFS 1996).

Still Creek has approximately 13.9 river miles of available anadromous fish habitat upstream of the smolt trap site (USFS, 1998). Still Creek population estimates for coho salmon smolts ranged from a high of 6,697 in 1994 to 987 in 2002. Winter steelhead pre-smolt and smolt

estimates ranged from 6,885 in 1998 to 569 in 2002. Average yearly coho salmon smolt production is 3,275 fish, with approximately 236 smolts per river mile. Average yearly winter steelhead pre-smolt and smolt production above the trap site is 2,619 fish, with approximately 188 fish per river mile (USFS 2004 unpublished data).

Salmonids known to be present in Still Creek include resident coastal rainbow, steelhead, cutthroat, redband, coho, and Chinook salmon.

Surveys conducted within Still Creek in 1978, 1984, and 1992 found presence of coho salmon up to approximately RM 12.15. (USDA, 1992; USDA 1996).

The *Zigzag Watershed Analysis* has documented the existence of LCR steelhead in the 6th field Still Creek sub-watershed (USDA, 1995). A barrier at RM 14.4 prevents steelhead from traveling further upstream. Fall Chinook primarily spawn and rear in the mainstem lower Sandy River Basin near Oxbow Park, over 15 miles downstream of the project area for the proposed trails. Distribution of Spring Chinook in Still Creek is restricted to the lower three miles of Still Creek, over 8 miles downstream from the Project areas. Coho salmon have been documented in Still Creek at Reach 8, (RM 11.4-13 (USFS 1980, 1984). Redband Trout have been found in the Zigzag, Still, and Sandy Watersheds as recently as 2002 and 2003 (Zigzag 2003 Smolt Trap Report). Redband trout are present in Still Creek as evidenced by screw trap captures at RM 0.25. Until genetic identification of these fish can be made, effects determinations can only be based on assumed or suspected presence. Therefore, Redband trout are suspected to within the upper reaches of Still Creek. The *Zigzag Watershed Analysis* does not document the existence of bull trout in the 6th field Still Creek sub-watershed (USDA, 1995b)

3.7.2 - Environmental Consequences and Conformance to Management Direction

Forest management activities that may alter the aquatic habitat or affect individuals or populations of PETS (Proposed, Endangered, Threatened, and Sensitive) fish and aquatic species require a Biological Evaluation to be completed (FSM 2671.44 and FSM 2670.32) as part of the National Environmental Policy Act process to determine their potential effects on sensitive, threatened or endangered species. The Biological Evaluation process (FSM 2672.43) is intended to conduct and document analyses necessary to ensure proposed management actions will not likely jeopardize the continued existence or cause adverse modification of habitat for:

- A. Species listed or proposed to be listed as endangered (E) or threatened (T) by the USDI-Fish and Wildlife Service or National Marine Fisheries Service (NOAA Fisheries).
- B. Species listed as sensitive (S) by USDA-Forest Service Region 6.

Below are the environmental consequences to Fisheries from the Alternatives summarized from the Biological Evaluation in Appendix D of the EA.

Table III-30 -- List of Proposed, Threatened, Endangered, or Sensitive (PETS) Species addressed under this Biological Evaluation

ESU Species/Status	Date of Listing	Suitable Habitat Present	Species Present	Effects of Actions		
				Alternatives		
				1	2	3
<u>Threatened</u>						
Lower Columbia River steelhead <i>(Oncorhynchus mykiss)</i>	3/99	Yes	Yes	NE	NE	NE
Lower Columbia River chinook <i>(Oncorhynchus tshawytscha)</i>	3/99	Yes	No	NE	NE	NE
Columbia River Bull Trout <i>(Salvelinus confluentus)</i>	5/98	Yes	No	NE	NE	NE
<u>Proposed Threatened</u>						
Lower Columbia River/Southwest WA coho <i>(Oncorhynchus kisutch)</i>	07/95	Yes	Yes	NE	NE	NE
<u>Sensitive</u>						
Redband Trout <i>(Oncorhynchus mykiss spp.)</i>	NA	Yes	Yes	NI	NI	NI
Aquatic Mollusk Columbia dusky snail <i>Lyogyrus n. sp. 1</i>	NA	Yes	Yes	NI	NI	NI

Abbreviations/ Acronyms:

- Th Listed as Threatened under the Federal Endangered Species Act
- C Federal Candidate Species
- S Forest Service Region 6 sensitive species
- P Federal Proposed Species
- C3 Aquatic mollusks listed in Table C-3 requiring survey & protection under the NW Forest Plan (1994)
- NI / NE No Impact / No Effect
- MIIH May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species
- NAA Not Adversely Affected
- NLAA May Affect, Not Likely to Adversely Affect

3.7.2.1 - Direct Effects – All Alternatives

No direct effect to PETS listed aquatic species would occur as no work is proposed within stream channels under the No Action or any of the Action Alternative where PETS listed fish or mollusks are present.

3.7.2.2 - Indirect Effects

The effects of implementation of the proposed actions on PETS listed aquatic species are based on local populations of these species known to occur or suspected to occur within the Action Areas.

Indirect impacts to special status species may occur through changes in sedimentation and flow, stream temperature, and/or riparian vegetation. Some of these impacts could be carried downstream and, in combination with natural and existing anthropogenic influences, could have an adverse effect and degrade stream conditions downstream.

The following sections discuss the effects to special status aquatic species, by each Alternative.

Alternative 1

Under the no action alternative there would be trail construction. Changes from the current condition are not anticipated to peak or base streamflow timing, duration, or magnitude, or water quality parameters of temperature and in-channel fine sediment and thus no effects to existing aquatic TES species or wetlands.

Alternatives 2 and 3

Below are brief descriptions of environmental impacts to parameters affecting aquatic TES species habitat (peak streamflows, base streamflows, sedimentation, stream temperatures, and wetland impacts). For a more detailed discussion of the effects of the proposed actions on these parameters, refer to the appropriate sections of this EA.

3.7.2.3 - Peak Streamflows

Based on the processes that affect peak streamflows and the associated methodologies for analysis, effects are analyzed at the subwatershed and fifth-field watershed scale during a cumulative effects analysis

3.7.2.4 - Base Streamflows

There are no direct effects anticipated to base streamflows because there are no water uses, impoundments or diversions associated with this project. Base streamflows can be influenced by the amount of disturbance to forest cover in a watershed so the potential effects of this project will be assessed in a base streamflow cumulative effects analysis. Based on activities

associated with this project baseflows are predicted to increase 0.3cfs. This is an extremely slight increase and most likely would not be detectable.

3.7.2.5 - Stream Temperatures

In the Camp Creek Subwatershed activities within 100 feet of perennial streams under Alternatives 2 and 3 include 5 stream crossings that would remove approximately 100 feet of stream shade, and approximately 750 feet of trail construction between 75 and 100 feet away from a perennial tributary to Camp Creek.

Three of the stream crossings with bridges are associated with the Camp Creek Trail. The streams in this area are narrow (approximately 3 to 4 feet wide wetted perimeter during summer low flows) with a shade layer provided by the shrubs in this area. The stands in this area are dense mid seral stands with 90-100% canopy closure. The streams in this area flow from north to south so the overstory shade would be removed on the east and west side of the stream and not the critical south side where the solar radiation is the strongest.

The openings adjacent to the stream are narrow (20 feet) with mature vegetation remaining outside the cleared corridor that would provide stream shade. In addition streams in this area are fed by groundwater with stream temperatures estimated around 5⁰C². Based on the factors listed there are no water temperature impacts anticipated associated with these 3 stream crossings.

The construction and clearing of approximately 750 feet of trail associated with the Camp Creek Trail is 75 to 100 feet away from the stream. As with the bridge crossings the stream in this area is narrow with shrubs providing a layer of shade. The trees and shrubs between the trail clearing and the stream are dense mid seral stands with 90 to 100 percent canopy closure and would remain intact. Also as with the bridge crossings, streams in this area fed by groundwater with temperatures estimated around 5⁰C. Based on these factors there are no impacts anticipated to stream temperature associated with the trail clearing.

There are two bridge crossings on Camp Creek associated with the West Summit Fen Trail. In this area the stream is running east to west and the creek is about 11 feet wide (based on the 1994 stream survey) so the stream is not completely shaded by shrubs. The vegetation in this area is classified as late successional with associated large trees with large canopies. Due to the approach of this trail at the northern most bridge a 40 feet wide area would be cleared adjacent to the stream on the north side and 20 foot wide area on the south side. On the southern most bridge 20 feet would be cleared on either side of the bridge. Stream temperature in this area is estimated at about 8⁰C. Due to the limited area that is being cleared and the late successional vegetation in the area it is assumed that there would be little change in the amount of shade provided for Camp Creek so there would be no impacts anticipated to stream temperature.

There is one stream crossing with an associated bridge in the West and East Fork Salmon River Subwatershed on an unnamed tributary to Salmon River. The vegetation in this area is large conifers with approximately 85% canopy closure. The stream in this area is approximately 6 feet wide. This trail is planned for bikes and hikers so there are no plans to cut any overstory vegetation to place the bridge. Based on fact that no overstory vegetation would be cut there are no impacts anticipated to stream shade.

3.7.2.6 - WEPP Sediment Yield

Based on the sediment yield models, there would be 200 pounds of sediment delivered to Camp Creek per year (5 stream crossings and West Summit Fen cut and fill slope) and 32 pounds per year delivered to the Salmon River (one stream crossing). For visualization purposes 200 pounds of sediment is equivalent to an area of 3 cubic feet.

3.7.2.7 - Wetland Impacts

There are 575 feet of trail construction and 0.2 acres of clearing planning in wetlands under Alternatives 2 and 3. The Mt Hood Land and Resource Management Plan (LRMP) (USFS 1990) gives direction that: Special aquatic habitat (e.g. alcoves, secondary and overflow channels, ponds and wetlands) and associated subsurface aquatic habitat (hyporheic zone) shall be maintained in a natural condition or enhanced in both quality and quantity (FW-104).

Special design criteria and associated best management practices that require trails within wetland areas to be constructed on puncheon structure or turnpike to minimize impacts to the wetlands would be implemented. Trails would be designed to avoid wet areas when possible and to minimize the amount of overstory vegetation to be cleared in wetland areas.

3.7.2.8 - Individual Trail Impacts – Alternatives 2 and 3

Trail # 2.22 – Multorpor Mt Trail

This trail, located in the Still creek subbasin, is a 0.7 mile hiking trail that branches off the existing East Summit trail and ascends the east side of Multorpor Mountain. There are no stream crossings for this trail and the trail does not traverse through any riparian reserves. No tree/vegetation clearing would occur. Even though trail construction would occur on steep mountain terrain, there is no potential for any created sedimentation to reach stream channels due to relatively small disturbance of the created trail and the distance of over ¼ mile from the Still creek channel. Based on this and expected effects to stream temperatures, flows, and sedimentation discussed above, construction of this trail is expected to have *No Effect/No Impact* on TES listed aquatic species in Still Creek.

Trails # 2.2 and #2.3 - West Blossom Connector/Crosstown Thunderhead TieTrails

This trail complex, located in the Camp Creek subbasin, is a 0.8 mile bike/XC ski/hiking trail located between Government Camp and Enid Lake. There are no stream crossings for this trail.

The south terminus of the trail would end at the Government Camp loop road, within the riparian reserve of the northernmost fork of Camp Creek. Even though a small portion of this trail would occur within a riparian reserve, any potential effects due to clearing would be negated by the presence of the Government Camp loop road which lies between the trail terminus and the Camp Creek fork. Trail clearing near the Loop road has the potential to create sedimentation which could run into the Loop road ditch line. However the ditch would not connect to Camp Creek. Thus, the small amounts of sedimentation that could be generated would be of short duration and is not expected to reach any stream channels. Based on this and expected effects to stream temperatures, flows, and sedimentation discussed above, construction of this trail is expected to have *No Effect/No Impact* on TES listed aquatic species in Camp Creek

Trail # 2.28 - East Summit Trail Extension

This trail, located in the Camp Creek subbasin, is a 0.1 mile bike/XC ski/hiking trail is located south of Hwy 26 where the east end of the Government Camp Loop joins the highway. There are no stream crossings for this trail and the trail does not traverse through any riparian reserves. The nearest stream/water body is over ½ mile away (Multorpor Fen).

The small amounts of sedimentation that could be generated by construction of this trail would be of short duration and would not reach any stream channels. Based on this and expected effects to stream temperatures, flows, and sedimentation discussed above, construction of this trail is expected to have *No Effect/No Impact* on TES listed aquatic species in Camp Creek

Trail # 2.6 - Barlow Tie Trail

This trail, located in the Still Creek subbasin, is a 0.1 mile bike/XC ski/hiking trail below Multorpor Mountain on the northeast side. Located on relatively flat terrain, this trail does not pass through any riparian reserves. Still Creek is located over 1/8 mile away. The small amounts of sedimentation that could be generated by construction of this trail would be of short duration and would not reach any stream channels because of the large distances to any stream channels. Based on this and expected effects to stream temperatures, flows, and sedimentation discussed above, construction of this trail is expected to have *No Effect/No Impact* on TES listed aquatic species in Still Creek.

Trail # 2.26 – Timberline to Town (Gentle Glade) Trail

This 5.5 mile long trail would not pass through any riparian reserves. No stream crossings or wet areas exist in this trail project area. The small amounts of sedimentation that could be generated by construction of this trail would be of short duration and would not reach any stream channels because of the large distances to any stream channels. Construction of this trail is expected to have *No Effect/No Impact* on TES listed aquatic species.

Trail #2.19 - West Summit Fen Trail

This proposed 0.6 mile trail crosses upper Camp Creek in two places, downstream of the Multorpor Fen. Two bridges are needed for the project. .

There are two wet areas that would likely need construction of turnpike (a raised elevated section of trail between curb logs approximately 36" wide. This is located directly south of the south bridge. Distance to stream channel is approximately 50 feet on a 15% slope. Predominant drainage is perpendicular to the creek. Use of a turnpike would prevent erosion and mobilization of sediments.

Another area is located on relatively flat terrain where the trail heads west from the bottom of the Multorpor chair, approximately 125 feet from the Fen. Water does not drain from this area. Use of puncheons or turnpikes would prevent erosion and sedimentation..

1st Stream Crossing:

This tributary contributes approximately 25% of the flow to Camp Creek (USFS 1994). A September 21, 2004 survey found 12' bankful widths with fines and gravels.

2nd Stream crossing:

This tributary contributes approximately 40% of the flow (USFS 1994). Bankful widths are to 10 feet, depths to 2 feet. Aquatic vegetation prevalent, and the old bridge with footer logs in channel creating habitat. Left bank looking upstream shows some bank instability due to existing bridge (ZZRD September 21, 2004 survey). The 29' south bridge is proposed to be in the same location as an existing partially fallen bridge from the old ski race course.

A barrier to anadromous fish passage exists at RM 5.75 (Yocum Falls), approximately 1.25 miles downstream of the crossings (approximately RM 7.2). Stream gradient downstream of the proposed crossing is approximately 3% for the next 0.5 miles to Rm 6.7 with in a Rosgen B3 channel type. From RM 6.7 to 4.8, gradient averages 7% and Rosgen A3 channel type. Below RM 4.8, the creek gradient shallows to 4% from RM 4.5-4.8 in a Rosgen C3b channel type. The closest identified depositional zone is below the steep gradient downstream of RM 6.7 where Yocum Falls is located. However, the upper reaches of Camp Creek below the bridge site (RM 7.2 to 6.7) has likely shallow enough gradients that deposition of sediments may occur, especially during low flow seasons.

Given the relatively small amounts of ground disturbance near the creek, construction planned for the dry season, the full-spanning bridge design (no midstream spans), restriction of disturbance to above the 100year floodplain, disturbance restricted to being well back from the active channel, restriction of equipment away from the creek, the use of sediment fencing and BMP's, and the low-level of disturbance associated with use of hiking/skiing trails, the construction and use of the bridge and trail is expected to result in little sedimentation reaching the creek. If any sedimentation did reach the creek, it would be expected to be small in amounts and short in duration.

Based on this and expected effects to stream temperatures, flows, and sedimentation discussed above, construction of this trail is expected to have *No Effect/No Impact* on TES listed aquatic species in Camp Creek

Trail # 2.4 Camp Creek Trail

This 1 mile trail starts near the Alpine Ski Trail just above the Summit Ski Area. The first quarter mile is located on an old cross country ski trail route developed by Summit Ski Area.

There are 3 stream crossings on this trail. Each crossing would require a bridge between 25 and 29 feet in length. Stream channel types in these areas are Rosgen A4 with bankfull widths to 4' and depths to 1 foot.

One area on the Camp Creek trail has been identified that exceeds 25% and would need grading to allow for use of a winter trail groomer. This section is approximately 250 feet in length and would require excavation for a balanced construction bench. A total of 375 yds of material would be redistributed to create this section of trail. The affected area of disturbed and or filled ground would encompass a little less than ¼ acre (33'x 250' = 8300sf total area).

Given the relatively small amounts of ground disturbance near the creek, construction planned for the dry season, the full-spanning bridge design (no midstream spans), restricting disturbance to above the 100year floodplain and well back from the active channel, restriction of equipment away from the creek, the use of sediment fencing and BMP's, and the low-level of disturbance associated with use of hiking/skiing trails, the construction and use of the bridge and trail is expected to result in little sedimentation reaching the creek. If any sedimentation did reach the creek, it would be expected to be small in amounts and short in duration.

Based on this and expected effects to stream temperatures, flows, and sedimentation discussed above, construction of this trail is expected to have *No Effect/No Impact* on TES listed aquatic species in Camp Creek

Trail # 2.23 – Trillium Bike Trail

This 0.8 mile trail had one creek crossing (the only wet area for this trail) that would need a bridge. The creek (identified as Tributary 80 in the Salmon River Stream Survey (2001) intersects the Salmon River at Red Top Meadows, at RM 29.8 and contributes approximately 15% of the flow to the Salmon River at this point and has an approximately 2% gradient at its mouth (USFS 2001).

The bridge would be 10 feet in length with a 4' wide (30" tread with 9" on each side for curbs) decked bridge with round curbs and 4' above the 100 year floodplain.

Given the relatively small amounts of ground disturbance near the creek, construction planned for the dry season, the full-spanning bridge design (no midstream spans), restricting disturbance to above the 100year floodplain and well back from the active channel, restriction of equipment away from the creek, the use of sediment fencing and BMP's, and the low-level of disturbance associated with use of hiking/skiing trails, the construction and use of the bridge and trail is

expected to result in little sedimentation reaching the creek. If any sedimentation did reach the creek, it would be expected to be small in amounts and short in duration.

Based on this and expected effects to stream temperatures, flows, and sedimentation discussed above, construction of this trail is expected to have *No Effect/No Impact* on TES listed aquatic species in the Salmon River drainage

Additional Individual Trail Impact – Alternative 3

Trail # 2.29 – South Multorpor Trail

This trail would not pass through any riparian reserves. No stream crossings or wet areas exist in this trail project area. The small amounts of sedimentation that could be generated by construction of this trail would be of short duration and would not reach any stream channels because of the large distances to any stream channels (Still Creek is over 1/8 mile away). Construction of this trail is expected to have *No Effect/No Impact* on TES listed aquatic species.

3.7.2.9 - Effects of Existing Trail Upgrades and Trailhead Parking – Alternative 2 & 3

Existing Trail Upgrades

Because the proposed trail upgrades are limited in scope, occur on previously disturbed areas, and BMP's and design criteria would limit or prevent adverse shading effects, loss of large woody debris recruitment, or sedimentation into streams, the proposed existing trail upgrades are expected to have *No Effect/No Impact* on TES listed aquatic species.

Trailhead Parking

The proposed parking lot paving would be located greater than 200 feet from any stream, would occur on an existing road prism, propose no new ground disturbance, and Best Management Practices (BMP's) would be employed. Therefore, the proposed paving of the road prism is expected to have *No Effect/No Impact* on TES listed aquatic species.

3.7.2.10 - Cumulative Effects Sediment Yield – All Alternatives

Alternative 1 – No Action would have no projected increase in sediment yield as no trail projects are proposed. Implementation of the Government Camp TIEF Trails project could increase sediment yield in the subwatershed by 0.5% and at the key depositional reach by 2%. Both of these increases are very small and are not expected to affect the beneficial uses in this area. For a more detailed discussion, see Sediment Yield discussion in EA.

3.7.2.11 - ESA Cumulative Effects – All Alternatives

ESA cumulative effects are those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation [50 CFR section 402.02].

Two future projects, the Collins Lake Development and the Timberline Ski Area expansion (Timberline Express) are reasonably certain to occur in the future. Timberline Express occurs in the Still Creek subwatershed and is not expected to contribute sediments to the Camp Creek subwatershed.

The Collins Lake Development comprises housing development in the upper Camp Creek subwatershed in the vicinity of Government Camp. The developers for this project have been issued a NPDES 1200-C Permit from the State of Oregon Department of Environmental Quality (DEQ) for controlling erosion and sediment and thus sedimentation into Camp Creek is not expected to occur.

3.7.2.12 - ESA Findings – All Alternatives

Under Alternatives 2 and 3, the implementation of this project warrants a "**No Effect**" (NE) determination for Lower Columbia River steelhead, Lower Columbia Chinook, and Lower Columbia River/Southwest WA coho salmon because of low potential for adverse conditions of sedimentation, stream temperature, or flows to occur in areas where these species are known or suspected to occur.

Under Alternatives 2 and 3, the implementation of this project warrants a "**No Effect**" (NE) determination for and Columbia River Bull Trout because these fish are not expected to occur in the Upper Sandy River Basin.

A determination of "**No Impact**" (NI) is warranted for Redband trout and Columbia Dusky Snail under Alternative 2 and 3 because of the low potential for adverse conditions of sedimentation, stream temperature, or flows to occur in areas where these species are known or are suspected to occur.

3.8 - Heritage Resources

3.8.1 - Management Direction

Regulations protecting heritage resources include: NEPA; Antiquities Act of 1906; Section 106 of the National Historic Preservation Act (NHPA), as amended, which established the National Register of Historic Places (NRHP); Archaeological and Historic Preservation Act of 1974; Archaeological Resources Protection Act of 1979; American Indian Religious Freedom Act of 1978; Native American Graves Protection and Repatriation Act of 1990; Uniform Regulations for the Protection of Archaeological Resources (36 CFR Part 296); and Executive Order 13007 (1996).3.9.2

The National Register of Historic Places (NRHP) is the nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the

National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archaeological resources. The National Register is administered by the US Department of the Interior, National Park Service. Eligible properties include both properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP listing criteria (36 CFR 60.4). A review of the NRHP was conducted to determine if any historic properties are listed for the proposed project area. The results of the NRHP review indicated that there is one historic property, the Barlow Road, listed in the NRHP for the project area vicinity.

3.8.2 - Affected Environment

This section summarizes information heritage resources collected in this project planning effort as well as other adjacent and overlapping past planning processes.

Relatively little is known about the **prehistory** of Mt. Hood specifically. Occasional use of the southern Washington Cascades may date to 12,000-11,000 years B.P. (Hollenbeck and Carter, 1986). After about 5,000 years B.P., cultures west of the Cascades exploited a broad range of marine resources, including shellfish, marine mammals, and freshwater and marine fish. A wide variety of ground and chipped stone and bone artifacts made of both local and imported materials are found in sites dating to the last 2,500 years, indicating complex and diversified technologies. Semi-subterranean pothouses east of the Cascades and cedar plank houses west of the Cascades are well represented after 3,500 to 3,000 B.P., evidence of a large, semi-sedentary regional population (Ames and Maschner, 1999; Blukis Onat, 1987; Fladmark, 1982; Galm et al., 1985).

Increased occupation of upland and montane areas dates to ca. 4,500/4,000 B.P. and may be associated with higher regional population size and establishment of a logistical land use system emphasizing intensive exploitation of certain highly productive or predictable resources (e.g., Burtchard, 1998; Schalk, 1988). Sites from the past 2,500 to 3,000 years in the Cascades are found in a wide variety of upland settings. Sites from both east and west slopes of the Cascades show a general continuity in distribution and contents, which may reflect, in part, closer intergroup connections via trade, travel, and kinship ties.

In the **Ethno historic period** prior to the treaties of the 1850s, the Mt. Hood area was at the territorial boundary of several different American Indian peoples. The Molalla occupied the Cascades south from Mt. Hood into southern Oregon (Zenk and Rigsby, 1998). Wasco territory was centered on the Columbia River but extended south to Mt. Hood; and Tenino territory occupied the east from Mt. Hood to the John Day River (Suphan, 1974). Tribal boundaries shifted somewhat over time, some groups expanding into new territory while others retreated. Use areas on Mt. Hood overlapped to some degree.

During the ethno historic period, volcanic peaks in the Cascades held important religious and mythological significance. They represented mythological beings or powers and also were home to spirits of the dead, animals, and mythological creatures. People seeking spiritual power typically went into the mountains alone, although certain places were avoided because they belonged to specific spirits (Reese et al., 1991:6).

People also traveled to the mountains in groups to obtain resources that were either more available there or superior to those at lower elevations. The most important resource was huckleberries (*Vaccinium* spp.), and the south slope of Mount Hood was an important huckleberry-gathering area. Warm Springs, Molalla, and some Umatilla who were related to Warm Springs people, would camp at good huckleberry grounds on the mountain for up to a month in the late summer, collecting and drying berries (French et al., 1995). Popular huckleberry grounds on the south side of Mt. Hood were around Government Camp and Summit Meadows; others were at Buzzard Point, High Rock, Zigzag Mtn., Fir Tree, Multopor, Swim, and Devil's Half-Acre (French et al., 1995:50).

Whitebark pine nuts were collected in the timberline area of Mt. Hood, and several other kinds of berries and medicinal plants were also gathered in the mountains. Cedar bark, bear grass, willow, and other plant materials were used to make baskets and other items. Cedar bark was stripped to obtain material for clothing, baskets and other items, and planks were removed from standing trees for boxes and building material. Cambium, pitch, roots, bark and wood of other species were also used for food, medicines, construction materials, and fuel. Culturally modified pines, spruce, hemlock, Douglas fir, and several other species have been identified in the Northwest.

Deer was the primary animal sought in the mountains, and men often hunted deer while camped at huckleberry grounds with their families during the late summer. Other animals, including elk, bear, and beaver, were also hunted in the mountain forests and meadows. Hunting as well as medicinal plant gathering took place on the higher slopes on the southwest side of Mt. Hood (French et al., 1995:68). Salmon was also an important resource, but was obtained primarily in lower elevation reaches of the Sandy and White rivers.

Known ethnographic locations on the MHNF have been compiled by French et al. (1995:64-66). A Warm Springs woman interviewed in 1991 mentioned having collected pine nuts where Timberline Lodge was later built, and another woman collected them where one of the Timberline chairlifts is located (French et al., 1995:52). Historically, the Salmon River Watershed has been used by American Indians as a major huckleberry picking area, particularly in the Sherar Burn, Mud Creek, and High Rock areas (FS, 1995). The area was also used seasonally for fishing and hunting.

In the 1850s, the U.S. Government signed treaties with a number of Indian tribes in Oregon Territory. Most tribal lands were ceded to the U.S. government and several reservations established onto which the tribes were to be relocated. The Confederated Tribes of the Warm Springs Reservation of Oregon was established by the Treaty of June 25, 1855 (12 Stat. 963, ratified March 8, 1859) under Oregon Superintendent of Indian Affairs Joel Palmer. The signatories included representatives of the Tenino (Tenino proper, Tyigh, Wyam and Dockspuse) and Wasco (Kigaltwalla, Dog River, and Dalles bands). Later, a group of Northern Paiutes moved to the Warm Springs Reservation after their release from U.S. Army custody in 1884 (Ruby and Brown, 1992). The treaty of 1855 retained the Warm Springs Tribes' traditional fishing and hunting rights; however, a second, highly disputed treaty ratified in 1865 ceded most of their off-reservation subsistence rights (Beckham, 1998:152). In 1973, the Warm Springs

Tribes were awarded monetary compensation for loss of their lands resulting from the 1855 treaty.

The Northern Molalla's lands in the northeastern Willamette Valley, where most of their villages were located, were ceded in another 1855 treaty. That treaty also provided for a reservation, although no permanent reservation was ever established. Some Molalla moved to the Grand Ronde and Klamath reservations and were absorbed into those tribes, while others remained off reservation without federal recognition.

The earliest recorded **historic period** use of the area was the 1845 exploring expedition of Joel Palmer and Samuel Barlow for a wagon route across the Cascades (Palmer, 1966; Thurlkill, 1976). The first recorded ascent of Mt. Hood, by Palmer, Barlow, and one other person, took place in 1845, and by the 1880s climbing at Mt. Hood had begun in earnest. Initially, the most popular route to the summit was on the northeast side of the mountain. On the south side, climbers traveled from Government Camp to base camps at the timberline, the most popular of which was Camp Blossom. A wagon road from Government Camp to the vicinity of Camp Blossom is shown on the earliest Forest Service maps (1907 to 1927) and may have been built as early as ca. 1888 (Grauer, 1975). A trail generally paralleling the road to its east and originating at Summit House (east of Government Camp on SR 26) is also shown on early USFS maps connecting with the summit route above Camp Blossom (USDA Forest Service, 1907, 1916). It appears to be the same trail later known as the Alpine Ski Trail (USDA Forest Service, 1936) and as Trail 660 on the current USFS version of the USGS topographic map (USDA Forest Service, n.d.). Both the Barlow Road and Oak Grove wagon roads were used by pioneers on their way to the Willamette Valley.

The Oregon National Forest was established in 1908 and superseded by the Mt. Hood National Forest in 1924. In 1915, the Forest Service erected a fire lookout on the summit of Mt. Hood and the following year built Timberline Cabin near Camp Blossom. The cabin was intended to serve as a Forest Service operations base at timberline, and was also used as a shelter from bad weather by climbers and skiers (Grauer, 1975).

The Mt. Hood Recreation Area was established in 1926. Once the Mt. Hood Loop Highway (US Route 26) was opened to winter use in 1926, the south side of the mountain became the primary focus of winter recreation (Bryant et al., 1978:115). Trails were constructed, upgraded, or converted to recreational use. The wagon road from Government Camp to Camp Blossom was reclassified as a trail after a new automobile route, the West Leg Road, was built in 1929-1930 (Reese et al., 1991:13). The Oregon Skyline Trail appears on Forest maps starting in 1907 (USDA Forest Service, 1961). The Timberline Trail was built by the Civilian Conservation Corps (CCC) in 1933-1935 as a loop trail Mt. Hood. The portion in the vicinity of the project area shares now an alignment with the Pacific Crest National Scenic Trail (PCT). The East-West Way (or Trail) is shown on trail maps from 1939 and 1947 and described in a 1937 trail study, connecting the County Line and Timberline trails and crossing West Leg Road in the vicinity of the Alpine Forest Camp (USDA Forest Service, 1937, 1939, 1947). It does not appear on the 1961 trail map.

To provide easier access to the alpine meadows and snow fields for skiing, climbing, hiking, camping, sightseeing, and berry picking, the Forest Service proposed a one-way loop road from Government Camp to the timberline area in the late 1920s. The west half of this loop, the West Leg Road, was built by the Forest Service in 1930 and opened in 1931. The road originally ended at Phlox Point, a short distance below timberline, in order to reduce the anticipated impacts of increased visitors to the fragile mountain meadows. After a site for Timberline Lodge was chosen in 1936, the West Leg Road was extended upslope to the lodge site. The East Leg Road and the Tie Road, which connected the two legs lower on the mountain, were built by the CCC between 1934 and 1937. The Works Progress Administration (WPA) began construction of Timberline Lodge in 1936. President Franklin D. Roosevelt dedicated the lodge in September, 1937, and it opened to the public in February, 1938. In 1939, the *Magic Mile* chairlift became the second chairlift ever built, and the longest in the United States (Reese et al., 1991:13). The existing Silcox Hut was the original upper terminal for the *Magic Mile* chairlift.

When the United States entered World War II, the ski area and Timberline Lodge were closed for the war's duration. The lodge re-opened in December, 1945 and additional facilities were built, including buildings, rope tows, and the *Skyway to Timberline* tramway. The tramway, which operated between 1951 and 1956, ran from Government Camp to Timberline Lodge. Its use was discontinued after road improvements and inefficiencies of the aerial bus technology made the tram obsolete. The tram towers were removed in 1962 and the upper portion of the tramway is now the Glade ski trail.

During the late 1940s, the East Leg Road was widened and relocated to accommodate two-way automobile traffic. It became the Timberline Highway, the main route to Timberline Lodge and the Timberline ski area. The West Leg Road remained open, but automobile traffic was greatly reduced, as it was used primarily for access to the Nanitch Lodge, Phlox Point Cabin, and other facilities previously built near the road.

The Government Camp Trails Project Area was used by a number of Native American peoples for hunting, gathering, and spiritual purposes during the ethno historic and early historic period. It is unclear what, if any, treaty rights exist involving use of the area. The Tribes have expressed concerns on other Forest projects about fisheries and wetlands, huckleberry production, and maintaining tribal access to usual and accustomed areas, including winter season.

Methodology

The Zigzag District Archaeologist conducted a cultural resources literature search and pedestrian archaeological survey of East Summit Trail Extension, the Barlow Tie, the Crosstown Thunderhead Tie, the West Blossom Connector, and the Camp Creek trails. Past surveys that overlap the project area were also reviewed. Site reports for known historic properties were updated and newly discovered properties were recorded. The effects that construction of these trails could potentially have on these historic properties were assessed and the Oregon State Historic Preservation Office was consulted with as is required by Section 106 of the National Historic Preservation Act. The finding for the trails that were surveyed was that no historic properties would be adversely affected.

Field surveys for the West Summit Fen and the Trillium Bike trails have been completed and preliminary findings of effect have been made. Consultation is continuing with the Oregon State Historic Preservation Office (SHPO).

Archaeological field surveys for the Timberline to Town, the Multorpor Mtn., and the South Multorpor trails are scheduled for the summer of 2005. Surveys and SHPO concurrence would occur before trail design and contract preparation were completed.

3.8.3 - Environmental Consequences

No Action Alternative

Because there are no actions proposed in this alternative, there would be no effect to archaeological resources in this alternative.

Alternative 2 Proposed Action and Alternative 3 Multorpor Mountain

The Analysis of the proposed projects had the following findings for environmental consequences for the proposed action

Table III-31 – Findings on Historic Properties for Action Alternatives

Trail #	Trail Project Name	Finding of Effect	SHPO Response
Alternative 2 – Proposed Action and Alternative 3 Multorpor Mt.			
2.28	East Summit Trail Extension	No Historic Properties Affected	Concur
2.6	Barlow Tie	No Historic Properties Affected	Conditional Concurrence based on implementing design criteria
2.3	Crosstown Thunderhead Tie	No Adverse Effect	Concur
2.2	West Blossom Connector	No Adverse Effect	Concur
2.19	West Summit Fen	No Historic Properties Affected	Concurrence pending
2.4	Camp Creek Trail	No Historic Properties Affected	Not Applicable
2.23	Trillium Bike	Historic Properties Avoided	Concur
	Existing Trail Upgrades	Little or No Potential to Affect	Not Applicable
	Lake Road Parking	No Historic Properties Affected	Concurrence pending
2.26	Timberline to Town	Not surveyed. May not be implemented until survey is completed and SHPO concurrence is obtained.	
Alternative 3 Multorpor Mt.			
2.22	Multorpor Mt.	Not surveyed. May not be implemented until survey is completed and SHPO concurrence is obtained.	

The project is referred to as a “non-undertaking” in the **Effects on American Indian Rights and AIRFS (American Indian Religious Freedom Act)** section under **Additional Required Disclosure**. This project is an “undertaking” under the National Historic Preservation Act and us under the auspices of the 2004 Programmatic Agreement.

3.8.3.1 - Project Design Criteria to Protect Heritage Resources

Heritage resources sites are documented in the confidential analysis files to protect them. Specific design criteria have developed to avoid and protect these sites. The West Summit Fen, Barlow Tie and Trillium Bike trails will be designed and constructed to avoid impacts to recorded historic properties in the vicinity of the proposed trail alignments. Should unanticipated archaeological or historical resources be encountered during construction of the trail system or parking expansion, all ground-disturbing activity in the vicinity of the find would be halted and the SHPO and FS would be promptly notified to assure compliance with relevant state and federal laws and regulations.

3.9 - Air Quality

3.9.1 - Affected Environment and Management Direction

The LRMP forest-wide standards for Air Quality that apply to the proposed project are the following:

- A. Management Activities shall comply with all applicable air quality laws and regulations, including the Clean Air Act (1977 and any updates or revisions) and its associated Oregon State Implementation Plan. FW-040
 1. Management Activities shall comply with the Oregon State Smoke Management Plan.
 2. Federal, State and local regulations for facilities management shall be applied.
 3. Appropriate State performance requirements on emitting facilities for permitted activities that could affect air quality, e.g. mineral, oil, gas or other developments, shall be incorporated.
- B. Planning
 1. Forest management activities that could permanently degrade air quality shall consider the cumulative effect of Forest and non-Forest activities through the application of the Clean Air Act (1977) and where applicable, the Prevention of Significant Deterioration regulations (contained in the Clean Air Act).
 2. Major Federal actions shall consider air pollution impacts.

- C. Forest resources in non-Class I airsheds shall be protected from the effects of air pollution based on the guidelines for Class II airsheds (Clean Air Act 1977).
- D. Air quality related values within Class I airsheds, e.g. portions of the Mt. Hood Wilderness and all of the Mt. Jefferson Wilderness on the Mt. Hood National Forest, shall be protected from the effects of air pollution.

The “National Strategic Plan for Air Resource Management” (FS, 1994) provides strategies to protect FS lands from air pollution, to manage FS emissions, and to protect visibility in Class I Wilderness Areas.

The Mt. Hood Wilderness is designated as a Class I Area under the Clean Air Act amendments of 1977. National wilderness areas, national parks, and national wildlife refuges in existence at the time the amendment was passed are classified as Class I. All other areas are designated as Class II. (The Salmon-Huckleberry Wilderness is not designated as Class I.)

The FS maintains an air quality station on Mt. Hood to monitor ozone and particulates (FS, 2003a). DEQ also maintains an air quality monitoring site at the top of the Mt. Hood Ski Bowl chairlift on Multoppor Mountain, near the middle of the project area. The purpose of the two stations is to monitor visibility in the Mt. Hood Wilderness’ Class I airshed.

The DEQ site’s nephelometer takes air samples and measures their scattering coefficients, which is observed visibility. Measurements are recorded seasonally July 1 through September 15 between 9:00 a.m. and 9:00 p.m. DEQ has not adopted any air quality standards for visibility/light scattering. Impairment is categorized into “perceptible,” “moderate,” and “heavy.” In general, visibility is good, with most impairment in the “perceptible” category. In the nine years of available data (1994 through 2002), the Mt. Hood Wilderness visibility typically has been better than at Crater Lake National Park and comparable to the central Cascades area—the two other visibility impairment monitoring sites in Oregon (DEQ, 2002

3.9.2 - Environmental Consequences and Conformance to Management Direction

Alternative 1

There are no expected effects to air quality from the No Action alternative (Alternative 1).

Alternative 2 and 3

There are no expected effects to air quality from Alternative 2 and Alternative 3. Trail construction activities may involve mechanized equipment, but not at a level that would be visible or have an effect to air quality. Any trees removed for clearing would likely be lopped and scattered instead of piled and burned

3.10 - Scenic Resources

3.10.1 - Affected Environment and Management Direction

The key viewpoints within the project area are Timberline Lodge, Trillium Lake, and Highway 26. The LRMP and the Final Environmental Impact Statement (FEIS) for the LRMP provide the primary direction for management of scenic resources in the project area. The plan designates most of the project area and surrounding landscape as B2 Scenic Viewshed and A11 Winter Recreation. Key viewpoints include the Timberline Lodge Viewshed with the viewer position being the lodge and the background extending to approximately twelve miles (FS, 1990). Trillium Lake viewshed as seen from the dam is also a key viewpoint. Proposed trail construction actions in the alternative must meet the Visual Quality Objectives (VQO's) outlined in the LRMP. VQO's objectives are to meet "retention" objectives within the foreground area (0.5 miles) of key viewpoints, and "partial retention" objectives within middle ground and back ground (0.5 to 5 miles and beyond) of key viewpoints. Trailhead parking must meet partial retention in all visual zones.

The retention objectives for visual quality ensure that the project area has:

- Natural appearing forest landscape, with little evidence of human alteration; and that
- Dominant visual impression is mostly continuous tree canopies, with diversity in occasional natural appearing openings
- Mosaic of species and age classes add texture and color contrast in natural patterns
- Management activities repeat form, line, color and texture common to the characteristic landscape

Landscape Setting

Recreational activities abound in the project area with trails, ski areas, roads, rivers, lakes, and campgrounds. US 26 and OR 35 serve as the major access corridors to the area; numerous FS roads provide a well-used network throughout the project vicinity. The project area accesses Trillium Lake, which receives significant, year-round recreation. Historically, the project area has been used by American Indians as a huckleberry picking area, and is still used by recreation users for berry picking.

The project is in an area of high visual quality importance, dominated with mature Douglas-fir forest and mountain hemlock at the higher elevations. Snow-capped peaks of Mt. Hood, Mt. Jefferson, and ridgelines in the Cascade Range augment the area's scenic quality. Timber harvest activities have resulted in an unnatural patchwork pattern in several areas and create strong visual contrast when viewed from Timberline Lodge. Trillium Lake, also viewed from Timberline Lodge, creates a distinct, natural appearing contrast amid the surrounding forested landscape. Climatic conditions vary dramatically and affect the visual environment. The vicinity receives a significant amount of rain and snow annually. Fog and low clouds are common and block views beyond the foreground. During exceptionally clear winter weather, snow glare may affect the views in the foreground and exacerbate contrast in the middle and background.

3.10.2 - Environmental Consequences and Conformance to Management Direction

Alternative 1 – No Action

This alternative would have no effect on visual quality objectives since no clearing or construction is proposed.

Alternative 2 and 3

The clearing width for the proposed trails is approximately 20 feet wide. Effects of the trail construction were analyzed by evaluating the existing Crosstown Trail and by 3D analysis on the computer. When viewed at an oblique angle (looking down from Timberline Lodge or up from Trillium Lake or the Highway) these clearings are indistinguishable from the natural forest landscapes form, line and texture. Trail construction in both of the action alternatives would meet the visual quality objectives of retention in the foreground and partial retention in the background. Trailhead parking proposed in both alternatives would meet the objective of partial retention.

3.11 - Noise

3.11.1 - Affected Environment and Management Direction

The Mt. Hood Land and Resource Management Plan does not have standards that address noise. There are numerous homes and lodging and other businesses around the community.

3.11.2 - Environmental Consequences and Conformance to Management Direction

Alternative 1 – No Action

There would be no noise associated with this alternative as there are no proposed construction activities.

Alternatives 2 and 3

There are no trails directly adjacent to private homes. The West Summit Fen Trail is probably the closest trail to a private residence. However that residence is along Highway 26. There are no expected prolonged noise effects to the project area from any of the alternatives. Construction activities would have localized noise and be short in duration. This localized noise is likely not any louder than adjacent highway noise.

3.12 - Adjacent Wilderness and Unroaded Character

The Government Camp Trails Project Area lies south of the Mt. Hood Wilderness. The Project Area surrounds the community of Government Camp and is surrounded by commercial ski areas on three sides. The Mt. Hood Wilderness has crowding issues on summer weekends with 85% of the users being day hikers. Opportunities for solitude in the Mt. Hood Wilderness are much better during the shoulder seasons and weekdays.

Construction and marketing of the trails proposed in Alternative 2 and 3 could help disperse weekend wilderness use in the Mt. Hood Wilderness outside of wilderness. Solitude and primitive recreation opportunities within the Mt. Hood Wilderness could be improved, to the extent that hikers choose the Government Camp trails rather than the wilderness trails.

Portions of the Government Camp Project Area near Sand Canyon are within an area that was identified and inventoried in 1979 in RARE II (Roadless Area Review and Evaluation) and called the "Mt. Hood Additions". At that time, those areas were allocated to nonwilderness uses. The RARE II areas were again analyzed in the Mt. Hood Forest Plan. The Forest Plan allocated the Sand Canyon area in the Government Camp Trails Project Area to A11- Winter Recreation Area. Chapter I of this EA summarizes the A11 management direction. Both Alternative 2 and Alternative 3 would meet the management direction contained in the Forest Plan for these areas. Most of the Project Area is within sight and/or sound of State Highway 26, adjacent ski areas, Government Camp or other trails. According to the Forest Plan, the opportunity for solitude in the Mt. Hood Additions area is low and opportunities for primitive recreation are moderate.

Construction of the proposed trails within Alternative 2 and 3 would not greatly alter the existing unroaded character of the project area. Grooming equipment on Nordic trails in winter would introduce motorized over snow use periodically in winter to keep the trails groomed.

In July, 2004, Senator Wyden introduced proposed legislation to (among other things) expand the Mt. Hood Wilderness and also designate the south side of Mt. Hood as a "Southside Winter Recreation Area". A portion of the proposed Timberline to Town Trail mountain bike trail is within the 2004 proposed wilderness legislation which would have prohibited mountain bikes. All of the Government Camp Trails Project Area lies within the 2004 proposed "Southside Winter Recreation Area". The text of the proposed legislation included within the Winter Recreation Area "the entire network of cross country trails behind Government Camp that are being developed by the Forest Service and Clackamas County, Oregon." Senator Wyden's proposed wilderness legislation was introduced in Congress but was not acted upon.

The Timberline to Town mountain bike trail was designed to address safety issues on the Glade and Alpine trails which were originally constructed as downhill ski runs. The Timberline to Town trail design needed to have numerous switchbacks to meet grade standards for mountain bikes while covering the drop in terrain down the mountain. The trail design also needed to minimize criss-crossing the Alpine and Glade trails to discourage use of those trails by mountain bikers. The Timberline to Town Trail design also tried to avoid steep canyons and wet areas where possible to address water quality concerns. The trail was designed to avoid the 2004

proposed wilderness mapped area where possible, but the above criteria were overriding considerations in locating the trail. Construction of the Timberline to Town mountain bike trail would not prevent future designation of this area as wilderness. The trail would have to be closed to mountain bikes if the area was designated. No legislation for wilderness designation is pending in Congress at this time.

3.13 - Additional Required Disclosures – All Alternatives

3.13.1 - Effects of Alternatives on Prime Farm Land, Rangeland, and Forest Land

All alternatives would be in keeping with the intent of Secretary of Agriculture Memorandum 1827 for prime land. The project area does not contain any prime farm lands or rangelands. “Prime” forest land does not apply to lands within the National Forest system.

3.13.2 - Energy Requirements of Alternatives

There would be no unusual energy requirements for implementing any of the alternatives.

3.13.3 - Effects on Environmental Justice

Executive Order 12898 of February 11, 1994 as amended by Executive Order 12948, provides that “each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority populations and low income populations.” Environmental Justice “is achieved when everyone, regardless of race, culture, or income, enjoys the same degree of protection from environmental and health hazards and equal access to a healthy environment in which to live, work, and play” (Whorton and Sohocki 1996). The trails constructed as part of this project would be open and available to variable numbers of minorities and low-income populations. The Confederated Tribes of the Warm Springs Reservation have been contacted about the proposed trails project and have not expressed any interest. There are no known areas of religious significance in the project area. The alternatives would all comply with Executive Order 12898 as amended and there would be no disproportionate effects on minority or low-income populations or Indian Tribes as a result of implementing any of the alternatives.

3.13.4 - Effects on Wetlands and Floodplains

Effects on and protection of wetlands and riparian areas are described in Chapter III. No direct impacts to wetland resources would be expected in any of the action alternatives and there would be no filling or excavation of any wetland areas. Floodplains have not been mapped within the project area. Because of stream gradients and topography, the area is not prone to flooding. Proposed trails cross floodplains. Trail bridges are designed to be constructed above the high water mark.

3.13.5 - Compliance with Section 504 of the Vocation Rehabilitation Act and the Americans with Disabilities Act (ADA)

The Forest Service has drafted guidelines for complying with Section 504 and the Americans with Disabilities Act. The current guidance can be found in two draft documents: 1) Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG) and the Forest Service Trail Accessibility Guidelines (FSTAG). Management direction is to comply with these draft guidelines while they are being finalized as manual direction. The FSTAG direction is most pertinent to the proposed project. FSTAG requires that all trails that are designated as “Pedestrian/Hiker” trails be consistent with FSTAG design standards, or that exceptions to those standards, be allowable exceptions under FSTAG and be documented.

The FSTAG document contains an overview of process and decision guide to determine whether or not FSTAG applies to a proposed trail project on National Forest lands. The first decision criteria is whether or not the proposed trails are designated as “Pedestrian/Hiker” trails which defines the intended user on the trail. The Government Camp trails are all designated as either Hiker/Biker/Nordic skiing, Hiker/Biker, or as Hiker only. None of the trails are designated as Pedestrian/Hiker trails as the need is for biking and ski trails. The trail to Multorpor is a relocation of an old fire trail to be a hiker only trail that climbs to the top of Multorpor Mountain for views.

3.13.6 - Effects on Environmental Justice to Women, Minority, and Low Income Populations

Most of the recreational trail use trend studies have focused on visitors’ age, gender, education level, income, occupation, whether they are from an urban or rural area, and their past experience. Many of the trail use studies that have been done are for trails within designated wilderness. No studies were found that focused on trends in minority population’s use of wilderness. Research has shown that in the last 20 years, wilderness use by women has increased. Wilderness users in general have above-average education levels and income. (Watson, Cole and Roggenback 1995) (Roggenbuck and Lucas 1987) (Lucas 1985). Income levels of wilderness visitors, which are typical of most outdoor recreationists, are likely a function of their higher than average education and/or professional occupational status. Variation in income across wilderness areas is high with the average income of the area surrounding the wilderness being an important factor. There is no specific data on income of users likely to be recreating on the proposed trails in the Government Camp Trails Project Area. Those trail users who are staying in some of the newly developed and future planned lodging developments in Government Camp are likely to have higher incomes than the general population..

Minority populations are increasing in the Portland-metro area, in other towns in the surrounding area, and in the west as a whole.

Figure 4.1 Minority Populations in the Portland-Vancouver Metro Area

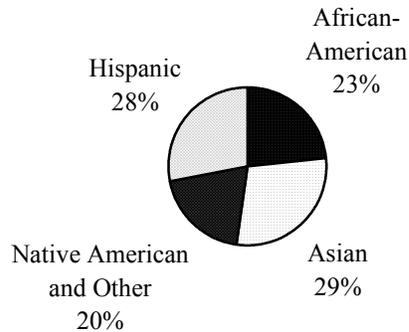


Figure 4.1 shows the percentage of minority populations for the Portland-Vancouver metro area. The percentage within individual counties surrounding the Government Camp area are approximately similar with the exception that a much higher percentage of Hispanics reside in Hood River county and a large Native American population is located on and around the Warm Springs Confederated Tribes Reservation. Anecdotal trend information from recreation staff patrolling the trails indicates an increase in trail users from former Soviet block countries but no discernible trend in visitation by minority populations. Native Americans visit a variety of sites on the south side of Mt. Hood and within the project area for their traditional uses. A variety of minorities visit the project area to pick huckleberries and mushrooms for personal consumption.

Environmental justice is addressed in Executive Order 12898 and ensures that Forest Service programs, policies, and activities affecting human health or the environment do not exclude minorities and low-income groups from participation in, or the benefits of, programs or activities based on race or economic status. None of the alternatives including Alternative 1 - No Action, would disproportionately affect use of the project area and proposed trails by women, minorities, or groups with low income. Alternatives 2 and 3 would provide similar recreational opportunities. Parts of the proposed trail system could be part of the Recreation Enhancement Act and a daily or annual pass required. There could be a fee charged in the winter for Nordic trail grooming. Any fees or passes required would either be the same for everyone, or would incorporate existing fee discounts under Golden Age and Golden Access national passes. Any fees charged, would be the same for everyone and would be relatively inexpensive compared to other recreational activities. The fee would not have a disproportionate effect on individuals with a low income.

3.13.7 - Alternative Effects on Recreational Fisheries

Executive Order 12962 was designed to conserve, restore and enhance aquatic systems to provide for increased recreational fishing opportunities. The order requires federal agencies to:

- Identify and restore recreational fishing opportunities limited by degraded habitat and water quality;
- Provide access and promote awareness of recreational fishing opportunities;
- Stimulate angler participation in conservation and restoration; and
- Evaluate and document effects of federal actions on aquatic systems and recreational fisheries.

The Forest Service is responsible for managing aquatic habitat and recreational fishing associated access and developments. The Oregon Department of Fish and Wildlife is responsible for fish and aquatic populations, including fish stocking programs. Funding for fish stocking has decreased over time and wilderness lakes have not been stocked as often as non-wilderness lakes. Trillium Lake is still stocked often, and is a popular recreation fisheries. There are natural populations of fish and recreational fishing in adjacent streams and lakes.

Alternative #1 – No Action

This alternative would have no effect on recreational fisheries.

Alternative #2 and #3

This alternative would improve hiker/biker access to Trillium Lake, a popular recreation fishing destination from Government Camp. Stream fishing opportunities would likely not change under the action alternatives.

3.13.8 - Effects on American Indian Rights and AIRFS (American Indian Religious Freedom Act)

Access by American Indians to traditional use areas within the Government Camp Trails Project Area would remain unchanged under all alternatives. In accordance with consultation under the 1995 Programmatic Agreement between the Pacific Northwest Region of the Forest Service, the Oregon State Historic Preservation Office, and the Advisory Council on Historic Preservation, this proposed action is a “non-undertaking”.

3.14 - Summary of Adverse Impacts, Which Cannot Be Avoided

Implementation the proposed action (Alternative 2) or Alternative 3 would result in some adverse impacts to the physical and biological environment and the human environment. Many of these impacts can be minimized and/or mitigated, as described previously. The impacts described below represent those that would occur after application of project design criteria. The degree of impact would be proportional to the degree of construction, operation and maintenance actually undertaken.

3.14.1 - Watershed Values

In the short term, the action alternatives would result in unavoidable, minor impacts to the sedimentation and water quality, primarily during the construction period. Construction activities would be expected to increase sedimentation in Camp Creek and its tributaries due to activities such as transport of equipment, excavation and other activities. Activities in closest proximity to the creek, would include construction of bridge crossings and trail approaches.

3.14.2 - Vegetation

Construction of new trail corridors and parking areas, especially Nordic trails with wider clearing limits, would result in unavoidable impacts to vegetation where it is removed to construct the trail tread and create a trail corridor opening wide enough to hold consistent and desirable snow conditions for skiing.

3.14.3 - Fish and Wildlife Habitat

Construction of new improvements in selected areas would have short and long-term effects on fish and wildlife habitat. In the short term, sedimentation effects described above would have unavoidable impacts on fish habitat. Removal of vegetation would reduce available habitat for a variety of wildlife species described in section III.B. Given the nature of the trail corridors, and amount and type of vegetation removed, impacts would be expected to be insignificant.

3.14.4 - Heritage Resources

There will be no adverse impacts to any listed, eligible, or potentially eligible historic properties.

3.15 - Irreversible and Irretrievable Commitments of Resources

Irreversible commitment of resources refers to non-renewable resources, such as cultural resources, or to those factors, which are renewable only over long time spans, such as soil productivity. Irretrievable commitment applies to losses of production, harvest or use of renewable natural resources. For example, the timber production capability of the area is

irretrievably lost while the area is used as a trail corridor. The production lost is irretrievable but the action is not irreversible. Construction of new trail corridors for hiking, biking and skiing and parking for trailheads would result in an irretrievable loss of timber production along those corridors for as long as they are brushed out and maintained as trail corridors or parking areas. In addition, continued use of the trail corridors for recreational purposes, and trailheads for parking would result in a potential loss of wildlife habitat in those corridors when they are in use.

Most of the proposed actions, including trail and trailhead construction, could be reversed through future discontinuation of use and rehabilitation and restoration over time if the trails did not continue to meet the recreation needs of the populations it serves. There would be no irreversible impacts on hydrology, water quality or other watershed values. There could be some irreversible losses of vegetation or wildlife habitat if the ability to grow vegetation in compacted areas were affected to the degree that it could not be reversed over time.

Chapter IV. Listing of Agencies and Persons Consulted

Consultation was conducted with other state and federal agencies pursuant to NEPA and Endangered Species Act (ESA) requirements and Forest protocols. The following groups and persons were consulted:

- U.S. Fish and Wildlife Service
- Members of the Willamette Valley Level 1 Review Team for Fish
- Members of the Willamette Province Interagency Level 1 Review Team for Wildlife
- Representatives of the Confederated Tribes of the Warm Springs
- Oregon State Historic Preservation Office
- Clackamas County, Department of Transportation and Development
- Oregon Department of Transportation

Consultation with the U.S. Fish and Wildlife Service was initiated on the Government Camp Trails project in December of 2004 through the document titled “The Willamette Province Fiscal Year 2005-2006 Habitat Modification Biological Assessment for Listed Species.” The Fish and Wildlife Service issued the Biological Opinion in March 2005. The conclusion reached in this Biological Opinion for the Government Camp Trails project as well as all others included in the document is as follows: “After reviewing the current status of the bald eagle and spotted owl, including critical habitat, the environmental baseline for both species, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the FY 2005-2006 Habitat Modification Projects in the Willamette Province are not likely to jeopardize the continued existence of the bald eagle or spotted owl and is not likely to destroy or adversely modify designated critical habitat for the spotted owl” (USDI, 2005). A letter has been sent to the U.S. Fish and Wildlife Service amending the Biological Assessment to reflect effects determinations based on better information on project alternatives.

Consultation with the Oregon State Historic Preservation Office resulted in concurrence of findings.

Chapter V. List of Preparers

This document was prepared by an interdisciplinary team with assistance from District trail personnel.

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Chapter VI. References

- Alta Transportation Consulting, Clearwater West, KPFF Consulting Engineers.** 2003. Government Camp Trails Master Plan.
- Beschta, R.L., M.R. Pyles, A.E. Skaugset, and C.G. Surfleet.** 2000. Peakflow Responses to Forest Practices in the Western Cascades of Oregon, USA. *Journal of Hydrology*. Vol. 233.
- Burton, T .A.** 1997. Effects of Basin-Scale Timber Harvest on Water Yield and Peak Streamflow. *Journal of the American Water Resources Association*. Vol. 33, No.6.
- Castellano, MA, Efren Cazares, Bryan Fondrick, Tina Dreisbach,**2003. Handbook to Additional Fungal Species of Special Concern in the Northwest Forest Plan, USDA Forest Service, Pacific Northwest Research Station, PNW-GTR-572-2003. Portland, OR.
- Castellano, MA, Jane E. Smith, Thom O'Dell, Efren Cazares, Susan Nugent,** 1999. Handbook to Strategy 1 Fungal Species in the Northwest Forest Plan, USDA Forest Service, Pacific Northwest Research Station, PNW-GTR-476. Portland, OR.
- Castellano, MA, Thom O'Dell.** 1997. Management Recommendations for Survey and Manage Fungi Version 2.0, September 1997. USDA Forest Service.
- Clackamas County, Department of Transportation and Development.** 1989. Government Camp Village Revitalization Plan and Report.
- DeRoo, Tom.** July 26,2004. U. S. Forest Service, Mt. Hood National Forest, Forest Geologist. of geology of the Timberline Study Area and the implications to surface and subsurface hydrology
- DNR.** 1993 Washington Department of Natural resources Watershed Analysis Manual, Version 2.0, October 1993
- Dunne, T. and L. B. Leopold.** 1978. Water in Environmental Planning. W. H. Freeman and Company. New York, NY.
- Flanagan DC, Livingston SJ,** 1995. USDA Water erosion prediction project WEPP user summary. NSERL Report No. 11, USDA-ARS National Soil Erosion Research Laboratory. West Lafayette, Indiana
Forest. U.S. Forest Service, Wenatchee National Forest
- Frederick Jeffrey J.** 2005. Oregon Department of Health Services Drinking Water Section. Email communications on Timberline Express EIS.

Golder Associates. 1998. Timberline Ski Area, Section 401 Certification, Summary Report. Final Draft. Redmond, W A

Golder Associates. 2003. Timberline Ski Area, Annual Report, Water Year 2002. Final Draft. Redmond, W A

Grauer, Jack. 1975. *Mt. Hood: A Complete History*. Jack Grauer, Portland.

Halverson, N.M., C. Topik and R. Van Vickie, 1986. Plant Association and Management Guide for the Western Hemlock Zone. Mt. Hood National Forest. USDA Forest Service, Pacific Northwest Region. R6-ECOL-232A- Portland, OR.

Harr, R.D., A. Levno, and R. Mersereau. 1982. Streamflow Changes After Logging 130-Year-Old Douglas Fir in Two Small Watersheds. *Water Resources Research*. Vol. 18, No.3.

Harr, R.D., R.L. Fredriksen, and J. Rothacher. 1979. Changes in Streamflow Following Timber Harvest in Southwestern Oregon. USDA Forest Service Research Paper PNW -249. Portland, OR.

Harr, R.D., W.C. Harper, J.T. Krygier, and F.S. Hsieh. 1975. Changes in Storm Hydrographs After Road Building and Clear-Cutting in the Oregon Coast Range. *Water Resources Research*. Vol. 11, No.3.

Hicks, B.J., R.L. Beschta, and R.D. Harr. 1991. Long-term Changes in Streamflow following logging in Western Oregon and Associated Fisheries Implications. *Water Resources Bulletin*. Vol. 27, No.2.

Hill, Mary Ann. 2004 and 2005, Personal Communications.

Hollenbeck, J.L., and S.L. Carter. 1986. A Cultural Resources Overview: Wenatchee National

Keppeler, E. T. 1998. The Summer Flow and Water Yield Response to Timber Harvest. USDA Forest Service General Technical Report. Fort Bragg, CA.

Lilleskov, Erik A. and T. Bruns, 2001. Nitrogen and ectomycorrhizal fungal communities: what we know, what we need to know, Dept of Plant and Microbial Biology, U of Cal, Berkeley, CA from the *New Phytologist* 149:154-158

MacDonald, L. H. , A. W. Smart, and R. C. Wissmar. 1991. Monitoring guidelines to evaluate effects of forestry activities on streams in the Pacific Northwest and Alaska

Naiman, R.J. and R.E. Bilby. 1998. *River Ecology and Management: Lessons from the Pacific Coastal Ecoregion*. Springer-Verlag New York, mc. New York, New York.

OTAK. 1999. Government Camp Village Development Incentives Plan

Rosgen, D. 1996. *Applied River Morphology*

Ruediger, Bill, Jim Claar, Steve Gniadek, Bryon Holt, Lyle Lewis, Steve Mighton, Bob Naney, Gary Patton, Tony Rinaldi, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.

Sera Architects. 1999. Destination Government Camp

Steinblums, I. 1977. Streamside bufferstrips: survival, effectiveness, and design. Corvallis, Oregon: Oregon State University. 181 p. M.S. thesis.

Swanson, F.J. and Grant, G. 1982. Rates of Soil Erosion by Surface and Mass Erosion Processes in the Willamette National Forest. USDA Forest Service, unpublished report

Thurkill, Keith. No date. *Cultural Resource Inventory of the Division Timber Sale.* Zigzag Ranger District, Mt. Hood National Forest, Zigzag, Oregon.

Tresder, Kathleen, 2004. A meta-analysis of mycorrhizal responses to nitrogen, phosphorus, and atmospheric CO₂ in field studies by Kathleen K, Dept of Ecology and Evolutionary Biology and Dept. of Earth Systems Science, U of CA, Irvine, CA , New Phytologist

U. S. Geological Survey. 1995. Preliminary Geologic Map of the Mount Hood 3D-Minute by 60- Minute Quadrangle, Northern Cascade Range, Oregon. Open File Report 95-219.

U.S. Departments of Agriculture and Interior. 1994. Supplemental Final Environmental Impact Statement Forest Ecosystem Management Assessment Team Report and Record of Decision on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl.

USDA Forest Service, Washington Office. 1993. *Universal Access to Outdoor Recreation: A Design Guide (Design Guide)*

U.S. FWS (Fish and Wildlife Service). 1998. National Wetlands Inventory (NWI) Metadata. U.S. Fish & Wildlife Service, National Wetlands Inventory. St. Petersburg, FL.

USDA Forest Service and USDI Bureau of Land Management. 2004. Record of Decision 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. Portland, OR.

USDA Forest Service, 1993. Forest ecosystem management; and ecological, economic, and social assessment. Report of the Forest Ecosystem Management Assessment Team, July 1993. Washington, DC: United States Department of Agriculture Forest Service

USDA Forest Service, Mt Hood National Forest October 1990. Final Environmental Impact Statement, Land and Resource Management Plan, Mt. Hood National Forest. Pacific Northwest Region. 491 pgs.

USDA Forest Service, Mt Hood National Forest, 2005. Timberline Express DEIS .US Government Printing Office

USDA Forest Service, Mt Hood National Forest. 1995. Zigzag Watershed Analysis. US Government Printing Office

USDA Forest Service, Mt. Hood National Forest 2001. Lynx Effects Determination. Letter dated August 2, 2001.

USDA Forest Service, Mt. Hood National Forest 2003. Lynx Effects Determination. Letter dated December 3, 2003.

USDA Forest Service, Mt. Hood National Forest, 1980. Stream survey report for Still Creek. Mt. Hood National Forest, Sandy, Oregon.

USDA Forest Service, Mt. Hood National Forest, 1984. Stream survey report for Still Creek. Mt. Hood National Forest, Sandy, Oregon.

USDA Forest Service, Mt. Hood National Forest, 1990. Mt. Hood National Forest Process Paper -- Special Emphasis Watersheds and Cumulative Effects

USDA Forest Service, Mt. Hood National Forest, 1994. Stream survey report for Camp Creek. Mt. Hood National Forest, Sandy, Oregon.

USDA Forest Service, Mt. Hood National Forest, 1996. The 1996 Still Creek Stream Survey Report..

USDA Forest Service, Mt. Hood National Forest, 1998. The 1998 Still Creek Stream Survey Report..

USDA Forest Service, Mt. Hood National Forest,. 1990. Land and Resource Management Plan. Mt. Hood National Forest, Sandy, Oregon.

USDA Forest Service, Mt. Hood National Forest,. 1996. Stream survey report for Still Creek. Mt. Hood National Forest, Sandy, Oregon.

USDA Forest Service, Mt. Hood National Forest,. 2001. Stream survey report for the Salmon River. Mt. Hood National Forest, Sandy, Oregon.

USDA Forest Service, Mt. Hood National Forest,. 2004. Still Creek and Clear Fork smolt trap report, 2004. Zigzag Ranger District, unpublished data, Zigzag, Oregon.

USDA Forest Service, Mt. Hood National Forest, -Forest Service, Pacific Northwest Region. 1996. Upper Sandy Watershed Analysis. Mt. Hood National Forest. 1996.

USDA Forest Service, Pacific Northwest Region, USDI Bureau of Land Management, 1998. North Willamette LSR Assessment, Mt. Hood National Forest & Cascade Resource Area, Salem BLM. Portland, Oregon.

USDA Forest Service, USDI Bureau of Land Management. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Project Documents within the Range of the Northern Spotted Owl; Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest related Species within the Range of the Northern Spotted Owl. Pacific Northwest Region.

USDI, Bureau of Land Management, 1999 (Mt. Hood consolidated version). Field Guide to Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, June 1999 pgs 5,9,37, and 57.

USDI, Fish and Wildlife Service, 2003. Biological Opinion for the Willamette Province Fiscal Year 2005 & 2006 Habitat Modification Biological Assessment for Effects to Listed Species.

USEPA-USDA Forest Service. 1980. An approach to Water Resources Evaluation of Non-point Sources-Silviculture. EPA-IAG-D6-0660. Washington, D.C.

Wright, K.A., K.H. Sendek, R.M. Rice, and R.B. Thomas. 1990. Logging Effects on Streamflow Storm Runoff at Casper Creek in Northwestern California. Water Resources Research. Vol. 26, No.7.