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Department
of Agriculture

Forest Service

**Pacific
Northwest
Region**

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# Olallie Lake Watershed Analysis


Mt. Hood National Forest

Cover illustration from U.S.D.A. Forest Service Rec. Guide No.7
Recreation Guide to the Olallie Lakes Area
1935

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# INTRODUCTION

## Overview of Watershed Analysis

Watershed analysis is a procedure used to characterize the human, aquatic, riparian, and terrestrial features; and conditions, processes, and interactions within a watershed. It provides a systematic way to understand and organize ecosystem information. In so doing, watershed analysis enhances our ability to estimate direct, indirect, and cumulative effects of our past management activities and guide the general type, location, and sequence of appropriate future management activities within a watershed.

Watershed analysis is essentially ecosystem analysis at the watershed scale. As one of the principal analyses for implementing the Aquatic Conservation Strategy (ACS) set forth in the Northwest Forest Plan (Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl, USDA, USDI, 1994) it provides the watershed context for fishery protection, restoration, and enhancement efforts. The understanding gained through watershed analysis is critical to sustaining the health and productivity of natural resources. Healthy ecological functions are essential to maintain and create current and future social and economic opportunities.

Federal agencies are conducting watershed analyses on federally managed lands to shift their focus from species and sites to the ecosystems that support them in order to understand the consequences of management actions before implementation. The watershed scale was selected because every watershed is a well defined land area having a set of unique features, a system of recurring processes, and a collection of dependent plants and animals. Because only 2,925 acres of the 32,878 acres in the Olallie Lake Watershed is under Forest Service management, only those lands are being analyzed in this document. The remaining land in the watershed is under the ownership and management of the Confederated Tribes of Warm Springs.

Because only a small portion of the entire watershed is being analyzed in this process, it can be useful to think of it as a landscape scale analysis. Many of the methods and models used in other watersheds analyses to determine cumulative effects are not as applicable in this effort. Both site scale information as well as linkages to the larger landscape are an important context for this landscape scale analysis.

Watershed analysis is not a decision making process. Rather it is a stage setting process. The results of watershed analysis establish the context for subsequent decision making processes, including planning, project development, and regulatory compliance.

The results of watershed analysis can be used to:

- Assist in developing ecologically sustainable programs to produce water, timber, recreation and other commodities.
- Facilitate program and budget development by identifying and setting priorities for social, economic, and ecological needs within and among watersheds.
- Establish a consistent, watershed-wide context for project level National Environmental Policy Act (NEPA) analyses.
- Establish a watershed context for evaluating management activity and project consistency given existing plan objectives.
- Establish a consistent, watershed-wide context for implementing the Endangered Species Act and the Federal Clean Water Act.

# Process and Document Organization

The process that was followed for the Olallie Watershed Analysis is shown in Figure 1-1. The document is organized around the four primary steps in the process: core topic analysis, landscape analysis and design, answers to key questions, and recommendations.
Chapter 2 presents the analysis of core topic areas, as identified in Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis (USDA, USDI 1995). The core topic questions focus the basic analysis of ecological conditions, processes, and interactions at work in the watershed. Current and reference conditions and future trends are examined for each core topic area. The core topics address the major ecological elements that are common to all watersheds. This is the basic analysis that is addressed in every watershed analysis document. Level of detail for each core topic is based on watershed specific issues.

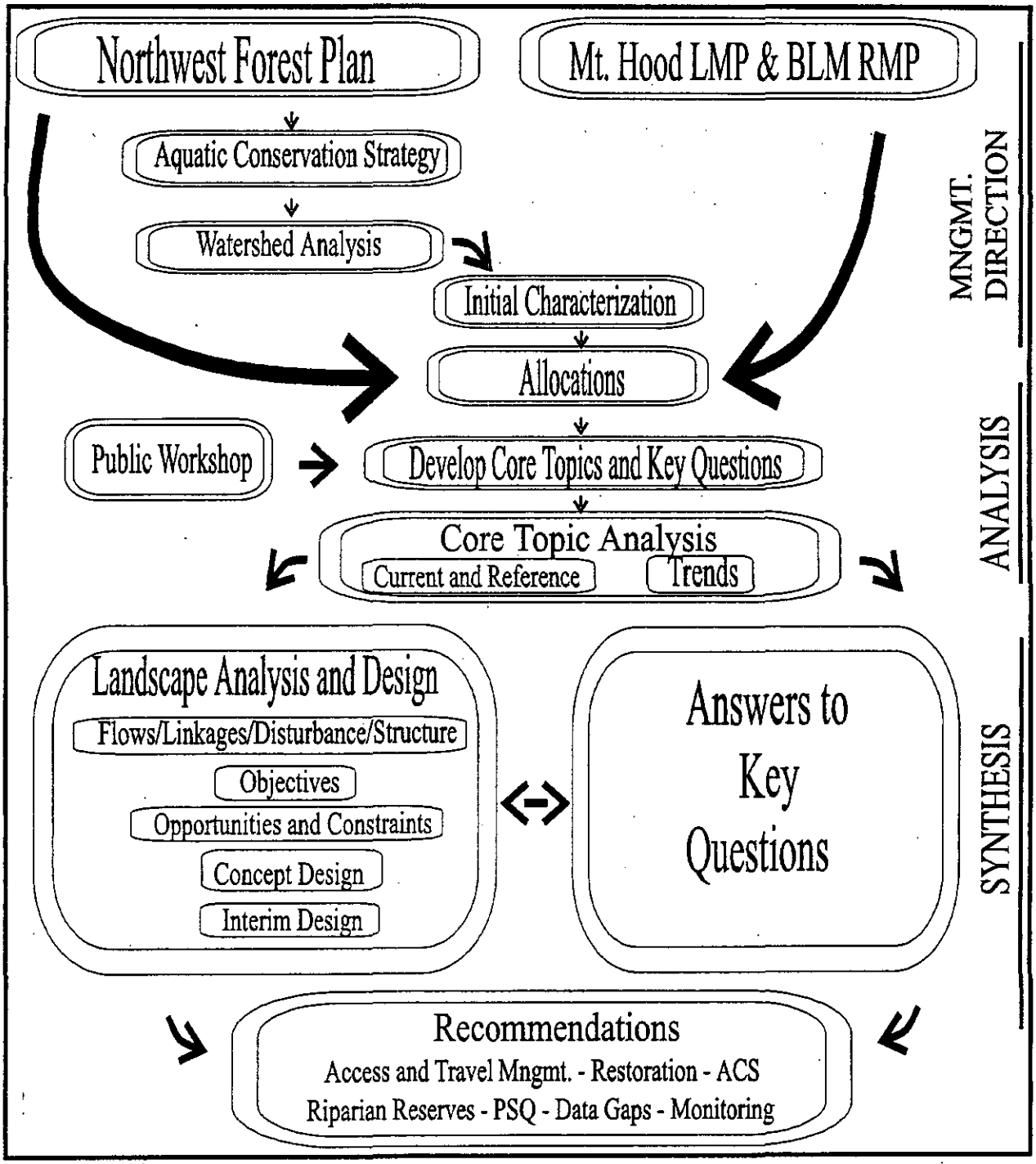
Chapter 3 (Landscape Analysis and Design) and Chapter 4 (Key Questions) synthesize information gained in the core topic analysis and integrate it with management direction from the Northwest Forest Plan and the Mt. Hood National Forest Land and Resource Management Plan (Mt. Hood Forest Plan).

The Landscape Analysis and Design (LAD) process (Diaz and Apostol, 1992) integrates the principles of landscape ecology with forest planning through the conscious design of vegetation patterns and infrastructure based on watershed level desired future conditions as described in the Northwest Forest Plan and the Mt. Hood Forest Plan. The results of watershed analysis are combined with management direction to give a picture of future conditions in the watershed and the ability of the watershed to meet ecological and social objectives.

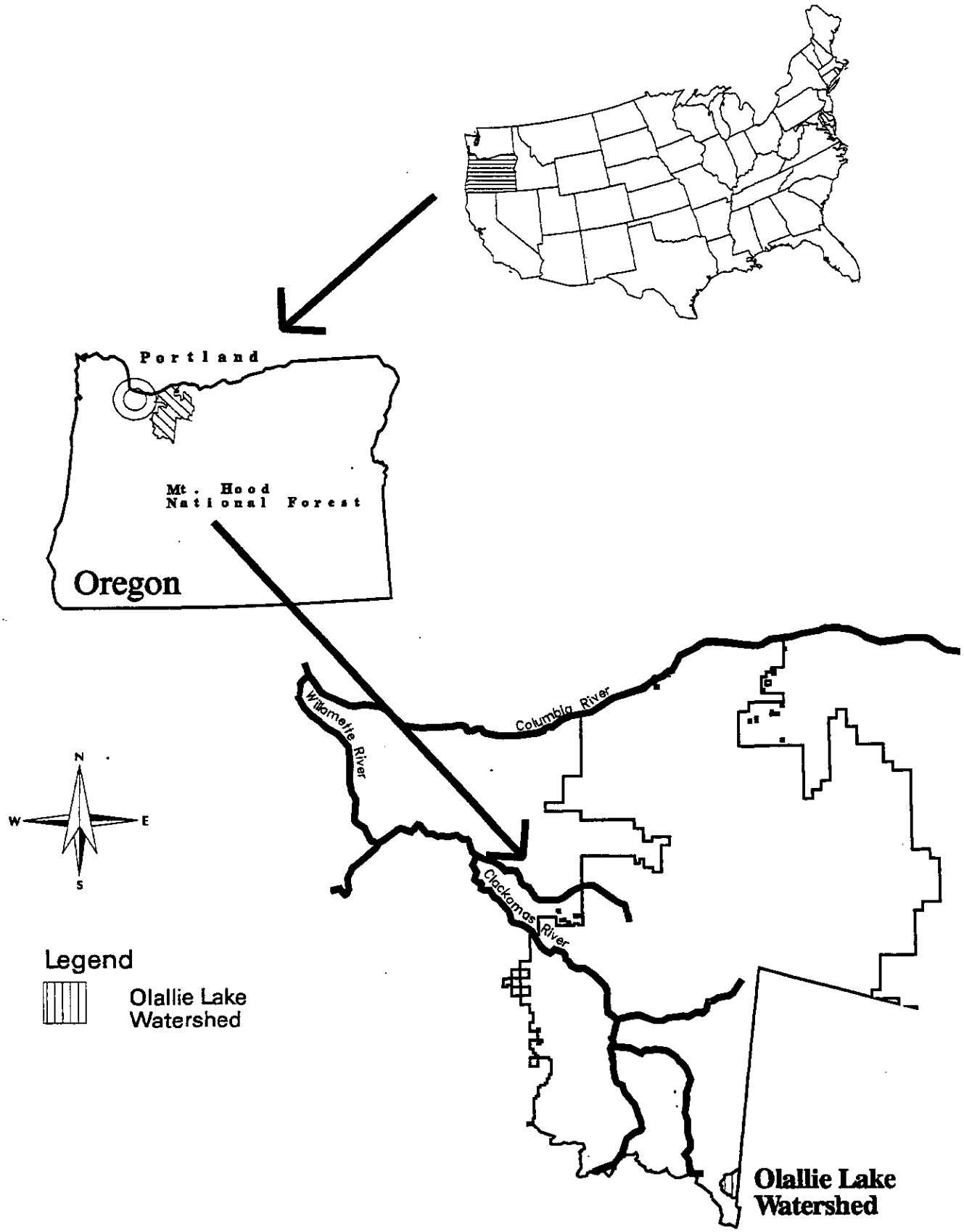
LAD (Chapter 3) gives a graphic depiction of the vegetation patterns conceptually over the long term (Conceptual Design) given current conditions, coupled with management direction. Future projects can be evaluated against the Conceptual Design to see if they help achieve the desired future conditions of the watershed given in the various land management planning documents.

Chapter 4, Key Questions, presents the answers to the Key Questions. These questions were developed around the key issues for the watershed. They are the issues that are of primary concern and are unique to the Olallie watershed. The answers to the Key Questions synthesize and examine interrelationships between the information presented by core topic area in Chapter 2 and LAD (Chapter 3).

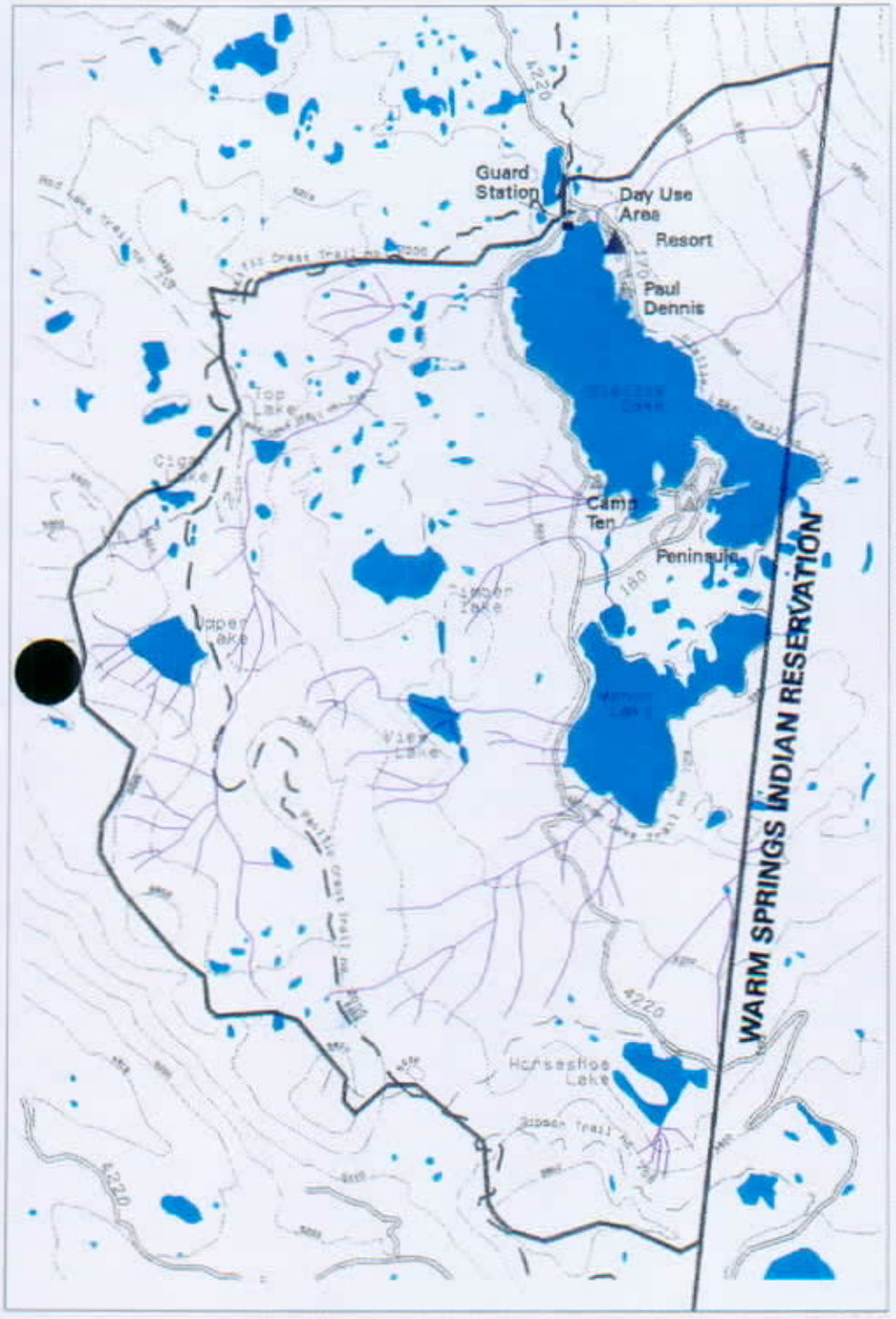
Chapter 5, Recommendations, summarizes recommendations. The recommended Riparian Reserve system, restoration projects, compliance with the Aquatic Conservation Strategy (ACS), data gaps, and monitoring are all presented in this chapter.


Northwest Forest Plan
Mt. Hood LMP & BLM RMP
Aquatic Conservation Strategy
Watershed Analysis
Initial Characterization
Allocations
MNGMT. DIRECTION
Public Workshop
Develop Core Topics and Key Questions
Core Topic Analysis
Current and Reference
Trends
ANALYSIS
Landscape Analysis and Design
Flows/Linkages/Disturbance/Structure
Objectives
Opportunities and Constraints
Concept Design
Interim Design
Answers to Key Questions
SYNTHESIS
Recommendations
Access and Travel Mngmt. - Restoration - ACS
Riparian Reserves - PSQ - Data Gaps - Monitoring

# Figure 1 - Olallie Lake Watershed



# Olallie Lake Watershed (Forest Service)




## Legend

- Trails
- Pacific Crest Trail
- Lakes
- Roads
- Contours 200′ Interval
- Streams
- Developed Campground

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**MAP 1-1**

# INITIAL CHARACTERIZATION

The Olallie Lake Watershed analysis area is a high elevation plateau straddling the crest of the Cascade Mountain range in western Oregon and is a drive of several hours from the Portland Metropolitan area in Clackamas County.(Figure 1-1) Approximately 3,000 of 32,000 acres in the watershed are under Forest Service management administered by the Mt. Hood National Forest. (Clackamas River Ranger Districts) (Map 1-1) The remainder of the watershed is owned by the Confederated Tribes of Warm Springs and is a part of the Deschutes River Basin. The terrain is flat to gently rolling and the watershed is ringed with cindercones although no discernable watershed is evident. Elevations range from 5,998 feet at Double Peaks to 4,936 feet at Olallie Lake and most of the plateau is approximately 5,000 feet in elevation. , In general, landslides are infrequent in this landscape because the ground slopes are gentle, bedrock is resistant rock, and the entire area is above the transient snow zone. The average annual precipitation in the Olallie Lake Watershed analysis area ranges from approximately 105 to 125 inches per year.

The most notable feature in the watershed is presence of lakes. In a region dominated by rivers, creeks, and streams, the presence of over 100 lakes is unique. This unusually high lake density is due to the relatively recent effect of volcanism and glaciation. Lava flows around 20,000 years ago formed a base terrain of subdued relief and some flows created dams that now impound lakes. Scouring from the glacial ice cap also created slight depressions that formed lakes when the ice melted. This type of volcanic landscape typically has a poorly developed surface drainage system and the lakes often have no identifiable inflow or outflow. There are no anadromous fish in these lakes and fish populations are non-native stocks provided the Oregon Department of Fish and Wildlife. The scenery is dominated by a number of volcanic cones including Mt. Jefferson, Si Si Butte, and Olallie Butte which are outside the analysis area.

The high elevation of the analysis area means that the growing season is short and soils tend to be cold, shallow, and low in productivity. The watershed is dominated by mid seral forests of mountain hemlock and lodgepine and has no history of timber harvest. Fire has been the dominant landscape pattern-forming disturbance agent although there have been no large stand replacement fires since Forest Service administration began in 1907. Sites in the Mountain Hemlock Zone tend to support lower numbers of wildlife than those at lower elevation. Habitat for some old-growth dependent species like the Northern spotted owl is limited in the watershed but the lakes along with the wet and dry meadows, provide "focal points' of diversity. Species found in the watershed include amphibians, neo-tropical songbirds, and resident mammals like mink, weasels, and pine martens. Deer and elk herds are also known to be in the analysis area but habitat is limited.

Because of the outstanding scenery, this area is a highly valued recreation destination. Currently there is a private resort, a picnic area, four campgrounds and an extensive network of trails in the analysis area.

The first developed access into the analysis area was via a trail from Government Camp This trail developed into an unimproved road that has become known as the Skyline Road (Road 4220). The Skyline Road is still the only roaded access into the area. It was routed next to the largest of the lakes, Olallie, Monon, and Horseshoe, and all recreation facilities are clustered around these primary lakes.

In the 1930's, the resort and campground development began on the east side of the road. The Olallie Guard Station and the Olallie Resort were constructed at Olallie Lake in the 1930's. The area west of Road 4220 is roadless (approx. 1755 acres) and lies adjacent to Mt. Jefferson Wilderness. This area provides recreationists with unusual opportunities for solitude and back country experiences over numerous recreation trails, including a segment of the Pacific Crest Trail.

Between 1973 and 1979, the Olallie area was studied and evaluated in the Roadless Area Review and Evaluation (RARE I) and (RARE II). The RARE II process recommended portions of Bull of the Woods, Eagle, Mt. Jefferson, and Salmon-Huckleberry for wilderness and proposed Olallie roadless area for further planning. As a result, a Forest level environmental analysis report was developed in 1983 displaying a variety of management alternatives. These alternatives were analyzed within the framework of the Mt. Hood Forest Plan. The chosen alternative retains at least 94% of the unroaded character of the area by allocation of the Olallie area to a Special Interest Area (SIA) A-4. (Map 1-2)

# MANAGEMENT DIRECTION AND LAND ALLOCATIONS

The Mt. Hood National Forest Land and Resource Management Plan (Mt. Hood Forest Plan) of 1991 as amended by the Northwest Forest Plan of 1994, provides management direction for federal lands within the Olallie Lake Watershed. The Northwest Forest Plan Record of Decision (ROD, page 12) has specific direction about amending existing land management plans for National Forests. The ROD direction supersedes Forest Plan allocations that are in conflict with, or are less restrictive than management direction in the Northwest Forest Plan.

Table 1-1 displays each of the Mt. Hood Forest Plan allocations along with acreage. It is important to note that the A13 Bald Eagle Habitat allocation overlaps with the A 4 allocation and is not subtracted from the total acreage and the acreage figure for the Administratively Withdrawn Area includes the Riparian Reserve acreage.

**Table 1-1. Olallie Lake Watershed Analysis Area Land Allocation Acreage**

| Mt. Hood Forest Plan | Acres | Northwest Forest Plan | Acres |
|---|---|---|---|
| A-4 Special Interest Area | 2,912.5 | Administratively Withdrawn Area | 2,925.0 |
| A-10 Developed Recreation | 12.5 | Riparian Reserves | 1,221.2 |
| A-13 Bald Eagle Habitat Area | | | |

## Mt. Hood Forest Plan

A4: Special Interest Area

*Goal:* Protect and, where appropriate, foster public recreational use and enjoyment of important historic, cultural, and natural aspects of our national heritage. Preserve and provide interpretation of unique geological, biological, and cultural areas for education, scientific, and public enjoyment purposes.

*Selected Standards and Guidelines:*

- Recreational facilities may occur. (A4-002)
- Recreational use should be limited when dispersed use exceeds the capacity of the area. (A4-003)
- No more than 15 percent of an activity area should be in a detrimental soil condition from the combined impact of compaction, puddling, and displacement.

Land use allocation map

- Exposed mineral soil around campsites, trails and key interest areas should not exceed 25% of the activity area.
- All management activities (except recreation facilities) within the Management Area shall meet visual quality objectives of Retention in the foreground and Partial Retention in the middleground and background distance zones as seen from open roads, high recreational use areas, and water bodies within A4 boundaries.
- Nonregulated timber harvest activities necessary to achieve Special Interest Area objectives may be allowed, provided no permanent roads are constructed and prescribed ROS class is maintained. Timber salvage may occur for the protection of special features and to provide for the safety of visitors.
- Timber salvage activities to harvest windthrown timber, fire damaged trees, insect or disease attacked trees, other similar natural tree mortality, or for the protection of special features, or surrounding forest, may occur provided no permanent roads are constructed (A4-021, A4-022).
- The development of common variety minerals (e.g. sand and gravel) shall not occur (A4-029).
- Wildlife and fisheries habitat improvement activities may occur (A4-015)
- Existing off-road vehicle tracks inconsistent with the prescribed ROS class shall be blocked, stabilized and returned to a natural condition.(A4-035)
- Recreational off-road vehicle use shall be prohibited except as noted in items 4 and 5 below (A4-038)
- (4) off-road vehicle uses in powerline rights-of-way should be allowed where consistent with other management direction, e.g. riparian and cultural resource protection (A4-039)
- Over-snow vehicles on Skyline road (Road 42) shall be allowed when at least 2 feet of snow cover is present and when it has been demonstrated that such use will not detract from the special features of the area (A4-040)
- Motorized boat use on lakes shall be prohibited (A4-041)
- Mountain bicycle use shall not be allowed on the Pacific Crest National Scenic Trail (A4-043).
- Pedestrian and equestrian use shall be encouraged (A4-044).
- Prescribed burning may occur (A4-045).

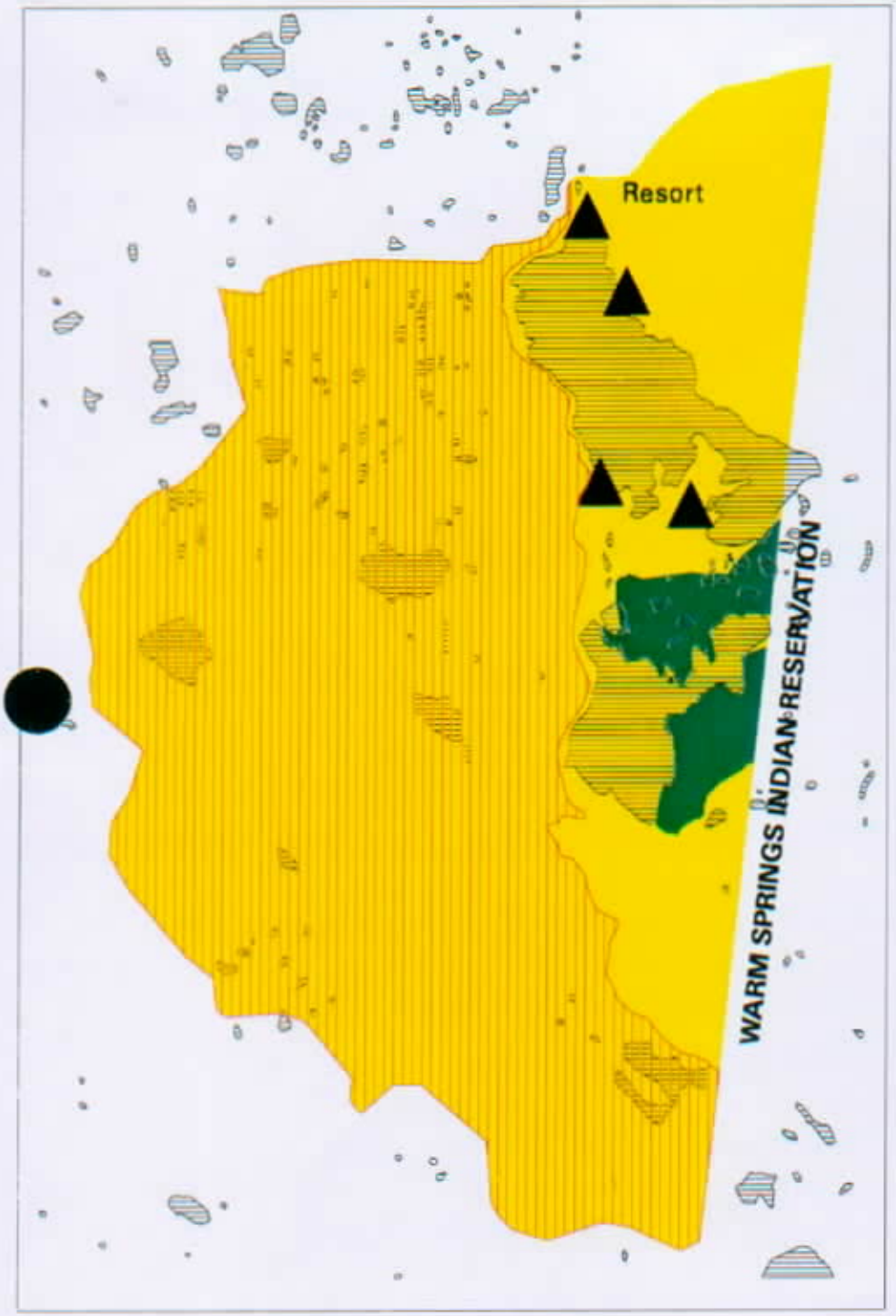
A10: Developed Recreation Sites

*Goal:* Provide a range of high quality outdoor recreational opportunities for concentrated recreational use at readily accessible, appropriately designed developed sites.

*Selected Standards and guidelines:*

- Dispersed recreation opportunities that are complimentary to the developed sites shall be permitted (A10-001)
- All developed sites shall have an approved site plan ( FSM 2333) for construction, reconstruction and maintenance (A10-003).

# Olallie Lake Watershed (Forest Service)




## Land Use Allocations

## Legend

- Bald Eagle Habitat Area Special Interest Area
- Special Interest Area
- Developed Camp Grounds
- Lakes
- Olallie/Mt. Jefferson Unroaded Area

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**MAP 1-2**

- Development, administration, occupancy, and use of sites under special use permits shall conform to Management Area management direction (A10-007)
- management activities within the Management Area shall achieve a visual quality objective (VQO) of Partial Retention as viewed from within A10 boundaries (A10-009).
- A10 sites are often identified as viewer positions for designated viewsheds, therefore prescribed VQOs beyond the A10 boundaries (A10-010)
- Watershed rehabilitation and enhancement activities shall be encouraged (A10-014).
- Vegetation management shall compliment the development and recreational experience level planned for the site, and shall be consistent with the Northwest Region (R6 "Managing Competing and Unwanted Vegetation" FEIS, Vegetation Management Environment Impact Record of Decision (1988) and Mediated Agreement (1989) (A10-017, A10-018).
- Motorized vehicles, except over-snow vehicles, shall be restricted to access roads and parking areas (A10-023).
- Nonmotorized modes of travel, including bicycles, shall be encouraged (A10-024).
- Prevention actions should compliment the development and experience level planned for the site (A10-025).
- Rehabilitation and revegetation work following a fire should compliment the development and experience planned for the site(A10-026).

A13: Bald Eagle Habitat Area

*Goal:* Protect and manage bald eagle nesting and winter communal roost areas in order to meet or exceed recovery levels established in the Pacific Bald Eagle Recovery Plan (1986). A secondary goal is to maintain a mature and overmature stand condition.

*Selected Standards and Guidelines:*

- New developed recreation facilities shall not be constructed (A13-001).
- Development of new trails and facilities shall not be permitted unless determined to have no conflict with nesting eagles. Trail reconstruction, construction, and maintenance should not occur within active bald eagle nesting areas between January 1 and August 15 (A13-002,003)
- Habitat improvement activities which encourage mature forest and/or old growth habitat associated species shall be emphasized (A13-009)
- In eastside-Cascade habitat conditions, at least 8-10 trees per acre greater than 100 feet high and 28-33 trees per acre 50-100 feet high shall be retained or provided (A13-012).
- Large tall trees with large limbs near the top of the crown shall be favored for retention (A13-013).
- Timber harvest and silvicultural treatments may be permitted to achieve bald eagle habitat objectives (A13-018).
- Roads and other access may be restricted between January 1 and August 15 depending

upon bald eagle presence in the area (A13-028).

- All modes of off-trail travel shall be discouraged (A13-032).
- Large snags and snag-topped trees extending into the upper forest canopy should be retained as perch trees (A13-034).
- Prescribed burning may occur to achieve bald eagle habitat objectives (A13-035).
- Wildlife trees shall be maintained to provide habitat sufficient to support at least 90 percent of the maximum biological potential of primary cavity dependent species, e.g. woodpeckers (A13-036).

## NORTHWEST FOREST PLAN

Administratively Withdrawn Area

*Goal:* Administratively Withdrawn Areas are identified in current Forest and District Plans or draft plan preferred alternatives and include recreation and visual areas, back country, and other areas where management emphasis precludes scheduled timber harvest and which are not included in calculations of allowable sale quantity.

*Selected Standards and Guidelines*

- Except for the four specific exceptions listed on page C-3 of these standards and guidelines, Administratively Withdrawn Areas and all other standards and guidelines of the current plans and draft plan preferred alternatives apply where they are more restrictive or provide greater benefits to late-successional and old-growth forest related species than other provisions of these standards and guidelines. (ROD page C-29)

Riparian Reserves

*Goal:* Achieve and maintain riparian and aquatic habitat conditions for the sustained, long-term production of fish, selected wildlife and plant species, and high quality water for the full spectrum of the forest's riparian and aquatic areas. A secondary goal is to provide habitat connection for late-successional species and dispersal habitat for other terrestrial species.

## CONFEDERATED TRIBES OF WARM SPRINGS

The Confederated Tribes of Warm Springs have off-reservation rights through the treaty of 1855, to fishing, hunting, gathering, and grazing. It is the position of the Tribes that treaty rights extend to the habitats upon which trust resources depend. These treaty rights include the way fish and wildlife habitats are affected, by timber management, recreation, water use, grazing, and mining on Mt. Hood National Forest. The Tribes maintain that the government has an obligation to manage habitats in a manner that will not reduce fish, wildlife, and plant populations to the extent that treaty rights and resources are not diminished.

# CORE TOPICS AND KEY QUESTIONS

The primary issues in the Olallie Lake watershed have been divided into two main areas. The first area of issues are those that focus upon the basic analysis of ecological conditions, processes, and interactions at work in the watershed -- the Core Topics. This is the basic analysis that is addressed in all watershed analyses and addresses the major elements and their relationships in the watershed. The second area are those issues that are unique to the Olallie Lake Watershed, those that are key drivers of the system -- the Key Questions.

## Core Topic Questions

### Aquatic

#### Erosion Processes

What erosion processes are dominant within the watershed? Where have they occurred or are they likely to occur?

#### Hydrology

What are the dominant hydrologic characteristics (total discharge, peak flows, minimum flows) and other notable hydrologic features and processes in the watershed?

#### *Stream Channel*

What are the basic stream morphological characteristics and the general sediment transport and deposition processes in the watershed?

#### Water Quality

What beneficial uses dependent on aquatic resources occur in the watershed?

#### Aquatic Species and Habitats

What is the relative abundance and distribution of aquatic species that are important in the watershed? What is the distribution and character of their habitats?

## Terrestrial

### Vegetation

What is the array and landscape pattern of plant communities and seral stages in the watershed? What processes caused these patterns?

### Species and Habitats

What is the relative abundance and distribution of terrestrial species of concern that are important in the watershed? What is the distribution and character of their habitats?

## Social

### Human Uses

What are the major human uses and where do they occur in the watershed?

Current and reference condition, and trends and causal relationships will be examined for each of the core topic areas (Chapter 2).

# Key Questions

These questions were developed around the key issues for the watershed. They are the issues that are of primary concern, unique to the Olallie Lake Watershed. Development of these key questions were based upon previous planning work in the Olallie Lake Scenic Area and a scoping letter sent to the public in February, 1997. These issues were refined and condensed into the Key Questions. The answers to the Key Questions are presented in Chapter 4.

## Issues

- High fire danger due to vegetation density and budworm mortality.
- High fire danger presents risk to wildlife habitat.
- High fire danger presents risk to recreationists and the recreation setting, especially the ingress/egress of users in a fire situation.
- Risk of fire increases with higher recreation use.

- High recreation use impacts on riparian areas and meadows.
- Soils are erodible.
- Stand structure may never achieve late seral structure as described in the Northwest Forest Plan.
- Area has past history of American Indian use.
- What are the opportunities/constraints to current and future recreation development?
- Meadow encroachment by tree species due to fire exclusion.

# Key Questions

1. What management activities could reduce the potential of wildfire impacts to scenic resources, infrastructure, and forest visitors?

2. Can and/or will this area provide for benefits to late successional forest related species? What management options could best ensure adequate habitat structure for species that require these habitat types?

3. What are the effects of human use and management on special habitats, riparian areas, traditional use areas, and the recreational experience? Given these types of effects, what are the opportunities and constraints for future development and management?

# CHAPTER 2
# CURRENT AND REFERENCE CONDITIONS

# AQUATIC

## Current and Reference Condition

### A. Erosion Processes

#### Geology

The upper part of the Olallie watershed is located in the High Cascade Physiographic Province. The watershed landscape has been shaped by two recent geologic processes: volcanism and glaciation.

Seven small volcanic vents have been identified within or along the boundary of the upper watershed. Five of these vents are cinder cones, three of which coalesce just west and southwest of Timber Lake, and two are scoriaceous domes. Olallie Butte, a large composite cone, dominates the northeast part of the watershed. The relative smoothness of its southwest flank testifies to its young age. Lava from these vents and others has flowed out away from its source to build a high-elevation plateau. Volcanism has constructed the base for the Olallie landscape.

This area was covered by glacial ice about 20,000 years ago. The glacial ice formed as an ice cap, with limited movement and minor erosion. The ice cap was centered in the Olallie Lakes area but also spilled down into the upper Clackamas River valley, the upper Warm Springs River valley, and the upper Mill Creek valley. The ice left thin glacial till deposits throughout the upper watershed, with the thickest deposits in the southern half. The freshness of some of the cinder cones suggests that they post-date the most recent period of glaciation.

Previous geologic mapping by Walker and Sherrod (1981) identified five geologic units within the part of the watershed considered in this analysis. From youngest to oldest these units are:

*Surficial Units:*

Glacial Till (Qg): unsorted compact mixture of boulders and rock flour derived from the High Cascade volcanic rocks. Mantles much of the upper watershed, thickest in the southern half.

Cinder Cones (Qcc): approximately conical mounds of vent ejecta, primarily cinders and scoria. Occurs in three areas as five cinder cones: Ruddy Hill, a smaller hill northwest of Ruddy Hill, and three coalescing cones west and southwest of Timber Lake. Other unmapped small cinder cones dot the area. Some cinder cones are younger than the glacial till deposits.

*Bedrock Units:*

Basaltic Andesite Lava Flows (Qba): fresh looking lava flows from nearby vents in the northern half of the watershed. These flows have been dated as less than 700,000 years old and may be much younger.

Scoriaceous Dacite Domes (Qd): two dome-like masses of easily erodible volcanic ejecta. The larger of the two is Double Peaks, the other is Peak 5930, located one mile south-southeast of Double Peaks.

Andesite (Qa): lava flows and flow breccia found along the southern and western boundary of the watershed. This rock is the oldest in the watershed, although it is still less than 2 million years old. This unit underlies the steepest slopes in the watershed which are probably a result of glacial erosion.

**Landform Types**

The landforms are a direct result of the interaction of volcanism and glaciation. Volcanism constructed the base for the Olallie landscape; glaciation applied the finishing touches.

The geologic units can be grouped into three general categories:

Glacial deposits (Qg)
Cinder cones (Qcc), (Qd)
Resistant Rock (Qa), (Qba)

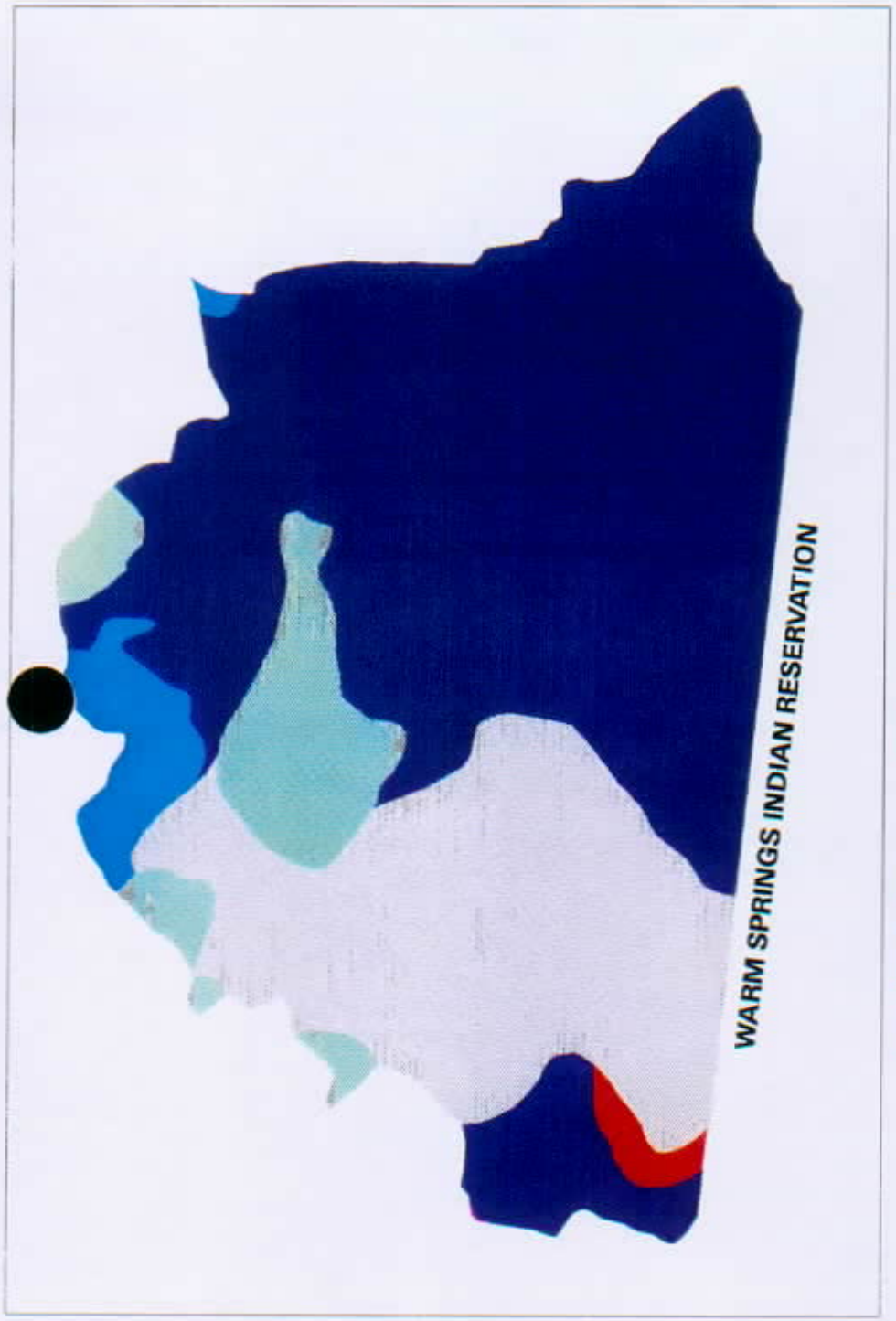
These three categories can be used with two slope classes to create five general landform types, (Map 2-1) which are explained below. Common slope angles are given for each landform type, but in each case, minor inclusions of slopes with higher or lower angles have been made. Very few slopes in this watershed exceed 50%.

Low Angle Till (LAT): Large area of glacial erosion and deposition in the southern half of the watershed. Slopes range form 0% to 30% and are smoother than the slopes in the RRGS landform type.

Glacial Valley Slopes (GVS): The cirque wall above Horseshoe Lake in the southern part of the watershed. This is a result of glacial erosion of some of the oldest bedrock in the watershed. Slopes range from 35% to 60%.

Cinder Cone (CC): Conical mounds of easily erodible cinders or scoriacious rock. Occurs in five areas of the watershed. Slopes range from 15% to 50%.

# Olallie Lake Watershed (Forest Service)




## Landform Types

### Legend

- Cinder Cone
- Glacial Valley Slopes
- Low Angle Till
- Resistant Rock Gentle Slopes
- Resistant Rock Moderate Slopes
- Resistant Rock Steep Slopes

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**MAP 2-1**

Resistant Rock-Gentle Slopes (RRGS): The largest landform unit in this watershed. Primarily comprised of young lava flows in the northern half, but includes some older volcanic rock at the southern tip. Slopes range from 0% to 30%.

Resistant Rock-Moderate Slopes (RRMS): Occurs in three small areas, largest areas are west of Upper Lake and the upper slopes of Olallie Butte. Slopes range from 30% to 50%.

**Landslides**

Landslides are infrequent in this watershed.. Three factors contribute to this condition:

- Ground slopes in the watershed are generally gentle or moderate.
- All of the bedrock geologic units are resistant rock.
- The watershed is entirely above the transient snow zone, so it is spared the rapid snowpack melting that contributes to flooding and landsliding.

The unusually high lake density is due to the combined effects of volcanism and glaciation. The young lava flows formed a base terrain of subdued relief, with some flows creating dams that now impound lakes. Scouring from the glacial ice cap accentuated slight depressions on the recent lava flow surfaces. Some glacial till accumulated in the depressions and sealed up the bottom. When the ice melted a lake formed. In some areas older cinder cones may have been removed by the ice to create depressions which later became lakes.

**Soils**

The majority of the soils in the Olallie area are glacial till soils with compacted till at 20 to 40 inches. They are young soils that are still evolving and have low soil productivity. The coarse textures lead to very permeable soils yet soil moisture storage is limited by the shallow soil profile. On-site septic disposal opportunities are poor, and would be limited by the coarse textured, shallow soils.

Because of the elevation, short growing season, and limited nutrient storage in the soil profile, these soils pose extreme limits to timber production and may be a challenge to revegetate following disturbance. Soil-rock outcrop and soil-talus complexes exist in the southern portion of the watershed analysis area and pose additional limits to site productivity and vegetation potential. Surface erosion hazard in the Olallie area is slight to moderate on slopes less than 30% gradient. Conservation of the soil organic horizon is important in preventing loss of on-site nutrients.

**Sediment Delivery**

Methodology for estimating sediment delivery to streams based upon the Standard Methodology for Conducting Watershed Analysis (Washington Forest Practices Board 1993) were not used in

this analysis. Due to the small size of the analysis area, the relative lack of roads and vegetation disturbance in the landscape, models which demonstrate cumulative effects for an entire watershed were not applicable. Potential sources of sediment delivery in the analysis area are site specific and localized and occur primarily from 5.23 miles of Road 4220, recreation development along Olallie Lake, Monon Lake, Horseshoe Lake, and in dispersed recreation sites and trails along water bodies.

Erosion has been a concern in the high use areas around Olallie Lake, including within the resort permit area. These high use areas have received the most site hardening through soil compaction. Shoreline devegetation along the western shore is caused by dispersed day use in concert with wave action and high water levels. The soils are shallow, have limited moisture storage due to profile, and are relatively infertile. Sites which are compacted and eroded are likely to have persistent revegetation problems. Logs have been placed to define paths between the resort cabins and the Olallie Lake shoreline in an attempt to minimize future damage. Regulations are posted to deep recreation users on roads and trails throughout the developed campground area.

## B. Hydrology

The most conspicuous hydrologic feature in the analysis area are the numerous lakes that lie in basins in the rolling terrain of glacial till and moraines and over 283 acres of the area are water (Map 2-2), (Johnson, et. al., 1985.). This type of volcanic landscape typically has a poorly developed surface drainage system, and the lakes often have no identifiable inflow or outflow. Water to the lakes is supplied by snow melt runoff in seasonal streams, by direct precipitation, and by subsurface seepage through the volcanic terrain. There are no constructed impoundments or dams with the exception of a low barrier constructed by the Oregon Department of Fish and Wildlife (ODFW) at the Mill Creek outlet from Olallie Lake, This barrier was constructed to prevent the migration of non-native stocked fish from Olallie Lake to Long Lake on the Warm Springs Reservation and serves to regulate the water level. Lakes in the analysis area vary in size from Olallie Lake at 188 acres to unnamed ponds less than two acres in size. Federal lands in the watershed serve as a source of exceptionally cold, clean water which flows eastward to Mill Creek, Warm Springs River, and ultimately the Deschutes River.

Streams within this upper portion of the Olallie watershed are typically low-gradient headwaters streams with little floodplain development or channel incision. This is a result of a combination of factors, primarily the relative youth of the geology and the flat to rolling terrain. As a result, the functional streamside riparian zones (zone of interaction between the streams and associated hillslopes) tend to be rather narrow when compared to channels with a greater degree of floodplain development. With a few exceptions, mostly in the western portion of the area, the vegetation within riparian buffers is structurally very similar to hillslope vegetation. There are a few small shrub-forb dominated wetlands associated with the stream that runs north and south alone the west edge of the analysis area. However, near streams an increase in both overall understory vegetative cover, and an increase in abundance of hydrophytic species can be

expected. In addition, the moist environment and potential for deposition of alluvium leads to the likelihood of greater productivity adjacent to streams. Riparian forests enhance streambank stability, buffer water temperatures, and provide habitat for shrub- and large-tree associated species, and species that require moisture (amphibians, for example) to a greater degree than associated uplands. The riparian network of streamsides and lakeshores also provides connectivity of moist forest habitat throughout this portion of the landscape, across to adjacent watersheds, and downwards to lower parts of the Olallie watershed.

The lakeshore riparian zones in this area also tend to be very similar to uplands with regard to vegetation. Shrub cover often increases significantly adjacent to lake edge, and at some lakes small wetlands have developed. Lakeshore riparian zones have all the same functions as those associated with streams. Of particular importance to water quality is the buffering lake edges from erosion, and regulation of surface flows and snowmelt. These functions contribute significantly to the purity of the water in lakes within this area.

Olallie Lake is the most prominent lake in the analysis area (Table 2-1) and receives the highest concentrations of human use. Draining an area of approximately 3.4 square miles, the lake is 188 acres in size and drains eastward into Long Lake and Mill Creek. A low impoundment previously mentioned serves to prevent downstream migration of non-native fish and regulate the water level. Olallie Lake ranges in depth from 43 feet to 10 feet and an average depth of 16.5 feet. Almost one-third of the lake is less than 10 feet deep and the littoral areas have mostly rock bottoms. The rest of the lake has a bottom of mud, rock, and debris.

**Table 2-1. *Named Lakes in the Olallie Lake Watershed Analysis Area***

| Name | Elevation | Acreage | Depth in feet |
|---|---|---|---|
| Cigar | 5,100 | 5 | 8 |
| Horseshoe | 5,400 | 14 | 17 |
| Monon | 5,000 | 91 | 39 |
| Olallie | 4,900 | 188 | 43 |
| Timber | 5,300 | 10 | 18 |
| Top | 5,000 | 3 | 6 |
| Upper | 5,150 | 8 | 14 |
| View | 5,250 | 7 | 10 |

Olallie Lake is the heart of recreation use in the analysis area. The lake is used for camping, hiking, fishing, picnicking, and boating. In addition, there is one privately owned resort with overnight accommodations and a small store. Approximately one-third of the northeast shoreline is developed with additional recreation developments along the west shore and the narrow peninsula that juts into the lake. Swimming and motorized boating are not allowed at the lake because of water quality concerns.

# Olallie Lake Watershed (Forest Service)


Riparian Reserves

Legend

Riparian Reserves

Streams and Lakes

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**MAP 2-2**

Water quality is of particular importance in this lake because it is the only on-site source of drinking water for Olallie Resort and one campground under the Resort's management. No other local source of drinking water is provided in the analysis area. Despite shoreline development and recreation use, the water quality is good and is monitored by the resort to meet state standards. Mineral concentrations are very low and concentrations of major ion, alkalinity, and conductivity are among the lowest observed anywhere in the state. The low mineral content is perhaps due to the fact that snow and rain rather than inflowing streams are the principle water source. Concentrations of chlorophyl and phosphorus are also exceptionally low and the water is transparent even at its deepest point. The lake is ultraoligotrophic and populations of phytoplanktons are very low. Although the lake is shallow, macrophytic growth is not supported on the rocky bottom.

Monon Lake is approximately one half mile south of Olallie Lake and is the next largest lake in the analysis area at 91 acres. Like Olallie Lake, it is fed primarily by rain and snowmelt with only occasional inflow from two seasonal creeks. It drains an area of approximately 1.3 square miles. Unlike Olallie, it is undeveloped except for Road 4220 which follows the western shore and a trail around the shoreline. There is an unimproved boat launch and limited parking at the trailhead. A minor amount of dispersed camping occurs at two campsites.

The lake consists of three interconnected basins. The largest is a shallow basin making up most of the lake. A smaller but much deeper basin joins it at the northeast end of the lake with and an isolated small basin connected to the main lake at the northwest end of the lake. Monon Lake is also ultraoligotrophic with very low concentration of all major ions and phosphorus. Alkalinity and conductivity are also among the lowest of any Oregon lakes.

Little information exists about the other lakes, named and unnamed, in the analysis area. Horseshoe Lake is only 14 acres in size but is a popular recreation site because of its location on Road 4220. A small campground and trailhead are located at the lake. All other lakes in the area are accessed exclusively by trail and receive backcountry use only.

## C. Aquatic Species and Habitats

There are no records of native fish in the Olallie Lake analysis area but many lakes are stocked for recreational fishing. As early as 1935, the Oregon State Game Commission stocked many of the lakes with Eastern brook trout, cutthroat trout, and rainbow trout. Today, ODFW releases trout into a number of lakes in the analysis area. Olallie and Horseshoe lakes are stocked with catchable (legal sized) rainbow trout and Olallie Lake is also stocked with excess rainbow trout brood. The other lakes are stocked with fingerling trout. Olallie and Monon lakes are generally stocked with trout annually while other lakes receive fish on alternate years. ODFW discontinued trout releases in Cigar Lake in 1982 because of repeated episodes of total winter fish kill (mortality from oxygen depletion during winters with prolonged ice cover). This trout stocking

program provides fishing opportunities for recreation visitors although use data does not exist. The backcountry lakes provide a more primitive angling experience. Current stocking information for lakes in the analysis area is in Table 2-2.

**Table 2-2. Fish Stocking Information in the Olallie Lake Watershed analysis area.**

| Year | Lake | Species | Size | Number |
|---|---|---|---|---|
| 1996 | Horseshoe | Rainbow | Catchable | 2,015 |
| 1995 | Horseshoe | Brook | Fingerling | 1,518 |
| 1996 | Monon | Brook | Fingerling | 7,130 |
| 1996 | Olallie | Rainbow | Catchable | 10,499 |
| 1996 | Olallie | Rainbow | Brood | 254 |
| 1995 | Timber | Brook | Fingerling | 990 |
| 1995 | Upper | Brook | Fingerling | 990 |
| 1995 | View | Brook | Fingerling | 990 |

# TERRESTRIAL

## Current and Reference Condition

### A. Vegetation

All of the upper portion of the Olallie Lake watershed is located within the Mountain Hemlock zone for plant associations on a high plateau of the Cascade crest. This is a vegetative transitional zone between the wetter westside and the drier eastside climatic patterns. Three major plant associations are found on the Forest Service managed portion of the watershed: TSME/VAME/XETE CMS216 (mountain hemlock/big huckleberry/beargrass), TSME/VASC CMS114 (mountain hemlock/grouse huckleberry) and TSME/VASC CMS114 (mountain hemlock/Cascade azalea). The majority of the watershed lies to the east on the Warm Springs Indian Reservation, where Mill Creek crosses approximately six different vegetative zones. Moving from the hot, arid lowlands to the cool, moist uplands they include: Dry Juniper Non-Pumice; Moist Juniper Non-Pumice; Shrub Grassland; Ponderosa Pine Grassland; Mixed Conifer; True Fir-Hemlock and High Cascade Zone. Many different plant associations are found in these zones.

The analysis area is made up of higher elevational sites where the growing season is short and soils are usually colder, which is typical of mountain hemlock plant associations. The soil tends to be shallow and low in productivity. In many areas, trees are growing in dense stands where competition keeps the diameters small. There is a heavy component of lodgepole pine (*Pinus contorta*) found here.

#### Landscape Structure

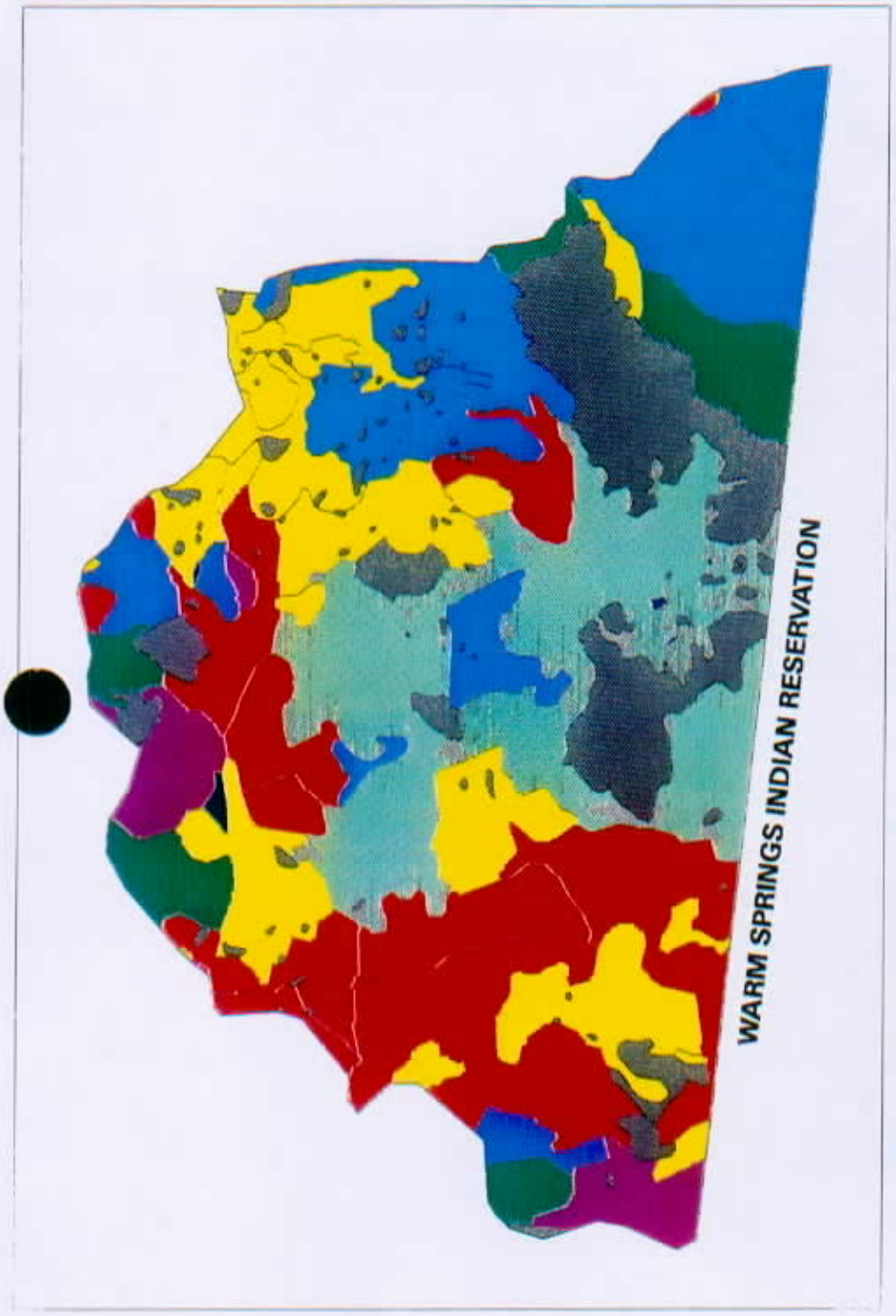
Map 2-3 is a landscape structure map which displays the current condition of the Olallie Lake Watershed analysis area. The structural elements of the Olallie Lake landscape are divided into four categories:

- Matrix (landscape ecology definition)
- Immature forest patches
- Meadows
- Non-vegetated patches

The "matrix", based on the criteria of relative area, connectedness, and control over landscape dynamics (Forman and Godron 1986, Diaz and Apostol 1992) is defined as mature forest and is the predominate structure type in the analysis area. The matrix is composed of:

- closed large conifer
- closed small saw

# Olallie Lake Watershed (Forest Service)




Landscape Structure

Legend

- Closed Large Conifer
- Closed Small Saw
- Closed Variable
- Meadow
- Non Vegetated
- Open Small Conifer
- Open Sap Pole
- Open Variable Stand

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**MAP 2-3**

- closed variable
- open small conifer
- open variable stand

Both the closed variable and the open variable stands are included within the matrix but neither stand type has achieved the dominant size class.

The immature forest patch type includes the open sap pole stands. The open sap pole stands are rocky patches with 30% or less conifer coverage and are not expected to become part of the matrix over time.

The meadow and non-vegetated patches identified within the analysis area are considered "special habitats". There are two small meadows less than 7 acres in size in the federal portion of the Olallie Lake Watershed. The non-vegetated patches include both the lakes and the talus slopes. These areas contribute to species and habitat diversity within the watershed for animals, vascular plants, lichens, mosses, and fungi.

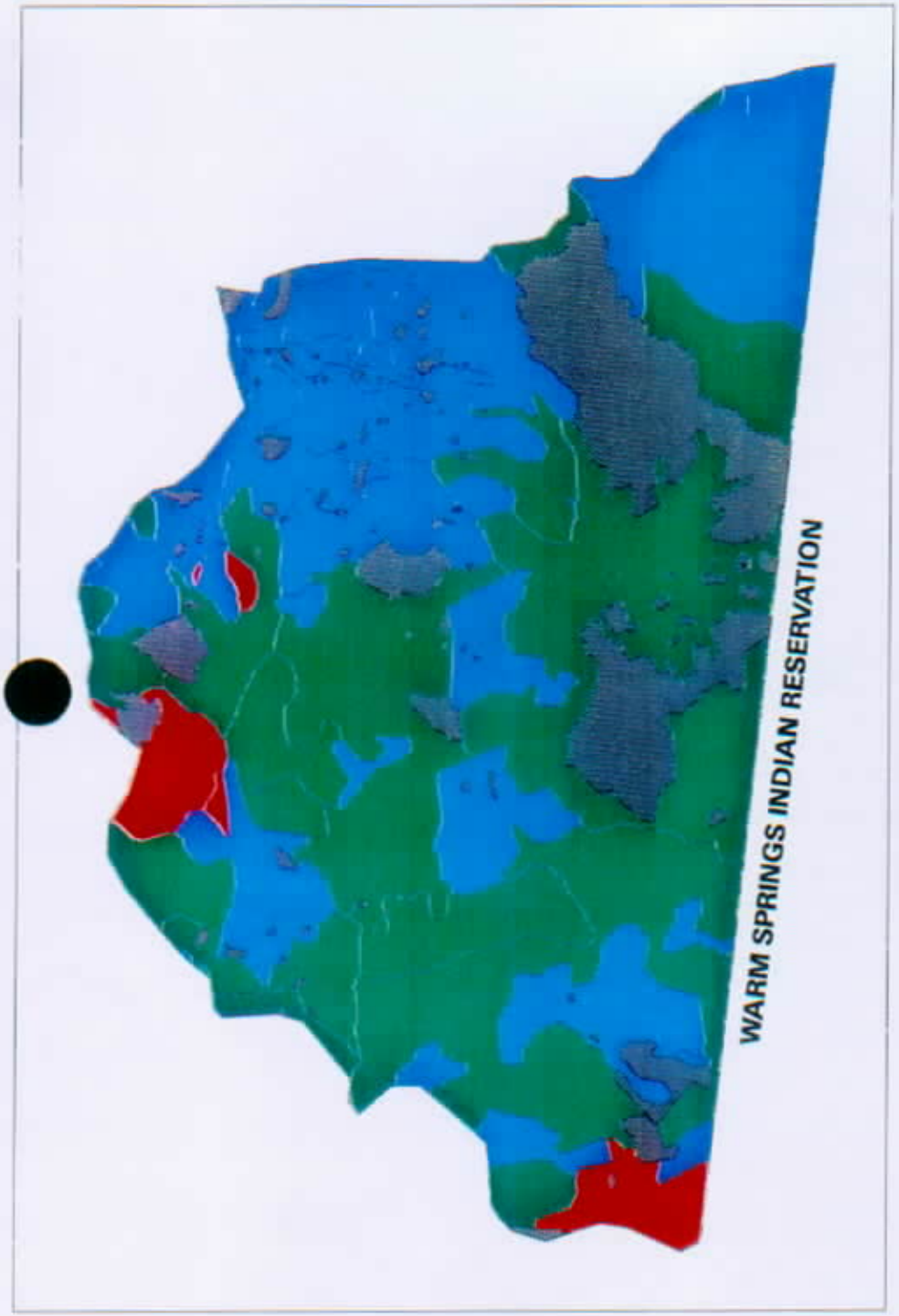
**Seral Stages**

Seral stages within the watershed can be grouped into three broad development stages: early, mid, and late.(Map 2-4) These stages vary by both species composition and structure of the vegetation. Seral stage is an important variable within the watershed, because it affects a variety of ecosystem functions. These may include, but are not limited to habitat type, wildlife species and movement, nutrient cycling, hydraulic function, production and potential for snags and coarse wood debris, and disturbance processes (fire, insects, windthrow, etc.). Seral stages also influence the scenic character of the watershed. For this analysis, seral stage determination incorporated both stand structure as well as age composition for this high elevation elevational area. The following seral stage definitions are utilized by this watershed analysis:

- Early: Includes stands in grass/forb/shrub stage, seedlings and open sapling/pole stands with < 30% canopy closure.
- Mid: Includes closed sapling/pole stands and all open and closed small conifer with 30% canopy closure.
- Late: Includes both Small-Late seral stands and Large-Late seral stands.
    - Small-Late: Includes closed, older, small (16"-20"DBH) conifer stands with >30% canopy closure.
    - Large -Late: Includes large (>21" DBH) conifer stands that have at least 30% or more canopy closure.

The 16" DBH was used for a minimum diameter because of the elevation and higher composition of true firs found in this area. This diameter parameter meets the Region 6 definition of old growth in the true fir zone. In the True Fir/Mtn.Hemlock zone, however, it is expected that many of these stands will remain in a smaller size class even when they are 150-200 years old. and will

# Olallie Lake Watershed (Forest Service)




Seral Stages - Current

Legend

- Early
- Late
- Mid
- Non Veg

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MAP 2-4

not achieve the "classic" definition of late seral structure found in the low elevation Western Hemlock zone.

Early seral stages account for about 4% of the forested land. Another 35% is identified as mid seral. The biggest block, 47%, is small and large late seral while the remaining 14% of the land base is classified as non-vegetation, which includes lakes, rocky areas and talus slopes.

**Disturbance Regimes *Contributing* To Vegetative Patterns**

Several disturbance agents are responsible for the present vegetative pattern. Although fire is the predominant type of disturbance, insects, diseases and wind have also played minor roles in shaping patterns. There is no record of timber harvesting in this area. Considering that there has been relatively little human disturbance within this area in the past century, the present pattern and array and landscape patterns could be assumed to be natural.

*Fire*

Fires, over the past two or three centuries, have created the amoeba-like pattern that we see on the landscape today. Fire, historically, was the dominant landscape pattern-forming disturbance in the Olallie Lake watershed. No stand replacement fires have occurred within the watershed on National Forest land in recent history. While some years have experienced significant fire ignitions, none of these starts resulted in a fire greater than 1-3 acres. It is speculated that a combination of factors may be responsible for the lack of reoccurrence of a large stand replacement fire. These factors may include:

- Faster response times via a more developed road system .
- Increased quantity of suppression forces such as engines and crews.
- Increased development of suppression tools and techniques.
- Fuel loads may have not developed to the point that would sustain large, stand replacement fires.
- Essential climatic elements such as wind, low humidity and high temperatures may not have been "lined up".

The Mt. Hood National Forest has been divided into eleven fire ecology groups based upon vegetation, fire frequency, and behavior (Evers, et. al, 1994). This portion of the watershed is classified as- Fire Group Seven: Cool Associations Often Dominated by Lodgepole Pine. Generally, lodgepole pine comprises over 50% of the overstory where fire serves to perpetuate the dominance of this species in these stands. Without periodic disturbance, mountain hemlock or Pacific silver fir would eventually replace the lodgepole pine which does not regenerate well in duff or shade. Once the pine is established, conditions do not favor rapid fire spread or uniform burning except under extreme burning conditions.

Large, stand replacing fires probably burn every 100-300 years. Occasional low to moderate

intensity fires may thin stands or otherwise rejuvenate it without doing serious damage to large areas of the overstory. Fuel buildup tends to start about age 60-80 due to natural thinning, snow breakage, and disease. Eventually a fire will start, escape initial attack and become large. This area lies within the zone of highest lightning occurrence in the region. In addition, Fire Group 7 experiences the combination of prolonged drought and high winds on about a 30-year basis.

*Insects*

Normal insect populations fluctuate up and down, depending upon various factors such as weather, predators, etc. For some insect species, successional stand development can create habitat conducive for a population buildup. This is true in areas where significant quantities of lodgepole pine exists with respect to mountain pine beetle (*Dendroctonus ponderosae*). Specific events occasionally allow a particular species to increase populations dramatically. This has been the case with Douglas-fir bark beetle (*Dendroctonus pseudotsuga*) and the spruce budworm (*Choristoneura fumiferana*). However, insect populations are presently at endemic levels.

Mountain Pine Beetle: This beetle usually attacks older, weakened lodgepole pine and ponderosa pine (ponderosa pine is not found in this watershed) trees that have slowed in vigor or have been subjected to extended periods of stress. Normally, beetles go through their life cycle(s) and then move on to other hosts. Trees of relative vigor are able to pitch out and resist invasion, however, when the trees are placed under prolonged stress or the insect populations are able to build up in significant numbers, even healthy trees may be successfully attacked. Stands with significant numbers of lodgepole pine trees may increase their susceptibility to successful infestation by mountain pine beetles under extended drought conditions, low vigor and dense stand conditions. This is especially true when a number of these conditions are present for extended periods of time.

Once beetles have gone through their life cycle and the young leave the brood tree, they can travel several miles in search of weakened and susceptible trees. As stand susceptibility to the beetle increases due to stocking density, drought and other stress agents, the effectiveness of natural control decreases and epidemic outbreaks my occur. Once epidemic infestations take place, the stage may be set for large, stand replacement fires. A large outbreak usually last for three to five years, depending upon the size of the susceptible stand and actions taken to reduce it's vulnerability.

In the Olallie Lake watershed, mountain pine beetle populations have been mostly endemic with a few small spikes in population levels.

Douglas-fir Bark Beetle: This beetle usually attacks freshly downed or damaged Douglas-fir trees. The trees may have fallen or been damaged by wind, snow or ice loading, harvesting or other mechanical agent. Normally, beetles go through their life cycle(s) and then move elsewhere. This process goes relatively unnoticed by the casual observer. Then, when a major event creates large quantities of potential hosts, populations can increase dramatically. Once the population elevates to a critical level, the insects may begin attacking live trees that are under stress in the surrounding

area. Large outbreaks usually last for three to five years until the population decreases to endemic levels, unless events occur that created additional host sources.

Spruce Budworm: This insect has been the primary defoliation agent for large acreage on the eastside of the Mt. Hood National Forest. Aerial mapping has identified spruce budworm defoliation within the area since about 1986. It is believed that defoliation by this insect was present before this time, however, aerial records only go back to 1986. These insects also prefer weakened and stressed trees. Primary stress agents have been drought in conjunction with dense and stagnated stands, such as are found in this area.

Pacific Silver Fir Bark Beetle (*Scolytus ventralis*): These insects attack the "true fir" species when trees cone under stress. They also tend to occur in conjunction with the Douglas-fir bark beetle after blowdown events.

*Natural Controls*: Insectivorous birds, bats, ants and fires exert natural control over forest insects and some diseases. Bark beetles are preyed upon by birds that employ a chipping or excavating foraging method in and under the bark of trees (woodpeckers). Budworms are eaten by a variety of forage gleaners, especially chickadees. Certain species of ants have recently been discovered to prey significantly on budworms and other larval stages of insects. Populations of these predators rise with the increase of insect activities.

In certain situations, fire has played a role as a control agent. Periodic, low intensity fire can function as a thinning mechanism which can keep stand density from reaching levels where inter-tree competition begins to exert enough pressure to reduce growth and vigor, increasing stress and susceptibility to mortality by insects. In the past decades, increased efficiency and effectiveness of fire suppression has resulted in virtually eliminating fire as a thinning agent within the watershed.

*Diseases*

Several varieties of dwarf mistletoe (*Arcethobium americanum, A. tsugense, A. douglasii*) can be found within this area. Mountain hemlock has the greatest amount of infection. White pine blister rust (*Cronartium ribicola*) has infected a large percentage of the western white pine (*Pinus monticola*) component of the upper watershed. Individual trees exhibit some degree of rust resistance, however, most of the white pines show evidence of infection by the pole or small log size.

Root disease evidence is found throughout the area also. Primary agents are laminated root rot (*Phellinus weirii*) and shoestring root rot (*Armillaria mellea*). These rots tend to be found in scattered pockets. Levels of root diseases are not at a threshold of concern at this time but disease centers can enlarge up to one foot per year in radius. It should be noted that the impacts of an insect/diseases complex working together can greatly magnify the extent of damage of either individual agent on its own.

*Humans*

Another disturbance agent may be humans. There are those who have put out the "natural" fires that may have become stand replacement in size. The other side of the coin may include Native Americans who set fire to the vegetation for various purposes.

This portion of the watershed has had minimal disturbance, either natural or human caused, since the beginning of recorded history for the area. The only documented human disturbances include the construction of two roads, the "resort" and a few campgrounds and some dispersed camping sites. Another possible disturbance includes fire suppression which may, or may not, have had and impact on current vegetative patterns and structure; this point is open to conjecture. As a result, all of the components of the ecosystem seem to be in a stable, natural and fully functional state. However, evidence points towards the trend that the vegetation in this part of the watershed is towards maturity or over-maturity, even to the point of decadency and may be ripe for a natural disturbance such as fire. When comparing current structural conditions to the range of natural conditions (Figures 2-1 and 2-2), it can be seen that late seral component of the forest is outside of its natural range. There is also a much larger proportion of mid seral stands. This is due primarily to the present and past stand density, the resulting size of the trees and stand structure, not the age and arrangement of the conifers.

**Figure 2-1. Early Seral Stage**

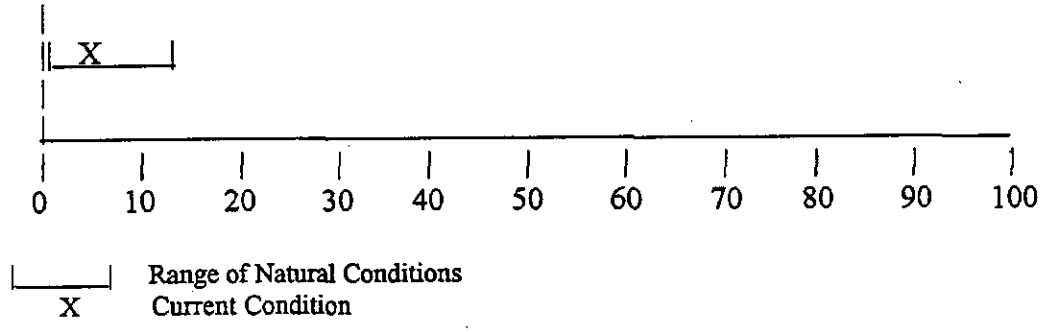
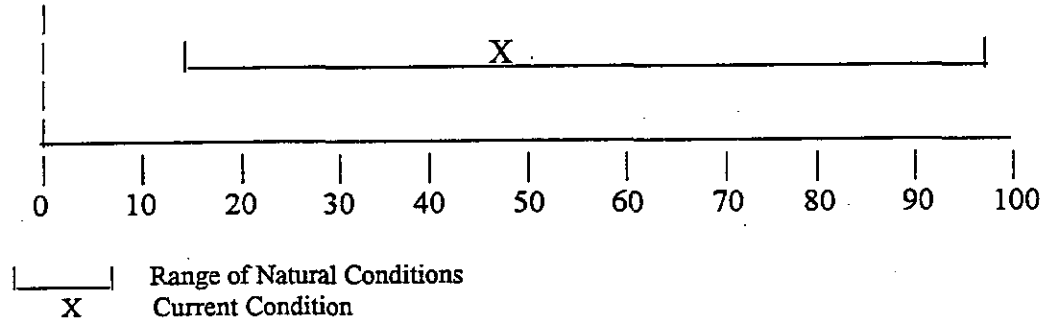



**Figure 2-2. Late Seral Stage**



## B. Fire/Fuels Management

Fire has been an important disturbance factor throughout the Pacific Northwest forests for thousands of years, as evidenced by pollen and charcoal deposits from early forests, fire scars on trees, analysis of stand age classes, and early settler and explorer accounts. Fire is not a uniform process in time or space on the landscape.

### Fire History

Fire, wind, and insects have been the major disturbance regimes affecting ecological values within the Mt. Hood National Forest and can be documented as far back as 750 years ago.

In 1911, Olallie Lakes area was part of the Summit Ranger District of the Oregon National Forest. The Oregon National Forest was renamed the Mt. Hood National Forest in 1926. Historical fire data extracted from the Mt. Hood Fire Atlas indicates that between 1908 and 1917, there were 46 fires on the Summit Ranger District (none of which were within the Olallie Watershed analysis area). Between 1917 and 1930 there were 11 fires within the analysis area: 1-1920 (Class "C" lightning caused [10 to 99 acres]), 8 - 1926 (Class "A" abandoned campfires [1/4 acre or less]) all around Olallie Lake, 1 - 1927 (Class "A" smoking caused [1/4 acre or less]), 1 - 1929 (Class "A" lightning caused [1/4 acre or less]).

### Current Fire Documentation

Historical fire occurrence records for the Mt. Hood National Forest consist of documented fires for the periods of 1908-1930 in the Mt. Hood N.F. Fire Atlas and fire lookout panoramic photos from 1933.

Starting in 1960, the National Forest began keeping fire records for statistical wildfires. A statistical wildfire is a fire that burns uncontrolled in vegetative or associated flammable material and either requires suppression action to protect natural resources or values associated with natural resources, or is destructive to natural resources. These records can be found at the Forest Headquarters on a personal computer (PC) data base. Currently these records are not available due to the Headquarters office relocation. As soon as these records are available they will be added to the data base for this watershed analysis.

### Natural Fire Rotation

Fire frequency is calculated by using the Natural Fire Rotation (NFR) method. From the age class data and assumptions about reconstruction of past fire events, the area of individual past fire events is determined as a proportion of the total watershed area for a given period of time. For example, if the area considered covers 50,000 acres, the time period of consideration is the last 500 years, and within the last 500 years an accumulative total of 100,000 acres has burned within the area of consideration (some areas may have burned 1, 2, or 3 times and others may not have

burned), the NFR calculation would be: 100,000/50,000 = 2.0. 500/2.0 = 250 yrs. In other words, every 250 years, an accumulative total area burned within the area of consideration would be 50,000 acres. The NFR for the Olallie Watershed Analysis area appears to be between 100 and 300 years.

**Fire Regimes**

The frequency, intensity, and extent of fires differ considerably across the Pacific Northwest. These differences can be categorized by the concept of the fire regime. Fire regimes can be grouped into three broad categories of *high*, *moderate*, or *low* severity as defined by frequency, intensity, and environmental gradients of temperature and moisture. The fire regime for the Olallie watershed characteristically resembles a high severity fire regime.

High severity fire regimes are characterized by infrequent crown or severe surface fires that usually result in high mortality (stand replacement) type fires. These fires typically result in total mortality of the trees in the stand and moderate to high loss of the litter/duff layer. Unlike moderate fire severity regimes, the landscape will generally be dominated by a lack of residual (remnant) trees which ultimately will develop into an even aged stand of reproduction. These fires are generally associated with drought years, east wind weather events with lower humidity, and an ignition source such as lightning. Fires are often of short duration (days to weeks) but of high intensity and severity. Fire frequencies range from 100 - 300+ year intervals.

Moderate severity fire regimes are more difficult to characterize. Individual fires often show a wide range of effects, from some mortality to the intermediate and overstory vegetation with light to moderate loss to the litter/duff layer; to light underburns with no loss to the intermediate vegetation and/or light loss to the litter/duff layer. Fires occur in areas with typically long summer dry periods and will last weeks to months. Periods of intense fire behavior are mixed with periods of moderate and low intensity fire behavior. In moderate severity fire regimes, one or more residual age classes will be present at most places on the landscape. High severity patches may occur, but generally most places on the landscape are only thinned which provides open growing space for new regeneration to establish. The resultant landscape will resemble a patchy mosaic of uneven aged timber and age classes. Fire frequencies generally range from 25 to 100 years.

Low severity fire regime characteristics may be found in moderate, and to some extent, high fire regimes. However, for the most part, low severity fire regimes are characteristic of higher elevation, drier forest types east of the Cascade mountains. Low severity fire regimes are characterized by frequent (intervals less that 25 years), low intensity, light underburn type fires with little or no mortality to the overstory vegetation and with little or no litter/duff layer loss.

Since the early 1900s, the Forest Service has had an aggressive fire suppression policy which virtually excluded fire from the ecosystem. Within the last few years, we have just begun to realize the management implications and impacts of our fire exclusionary policy. Without fire acting as an agent of decomposition, duff and litter accumulates, tree density increases, and fuel

continuity, both vertically and horizontally, becomes more uniform. Fires that occur in such fuels are more intense and more difficult to control, even as fire control technology improves. This effect is most pronounced in low, and to some extent, moderate severity fire regimes.

**Fire Groups**

In 1994, a group of fire specialists jointly developed a draft report entitled *Fire Ecology of the Mid-Columbia* (Evers et al., 1994) which summarizes the most current available fire ecology and management information that applies to the Mt. Hood National Forest. The developed fire groups correspond to plant associations and species response to fire, as well as the roles these species take during succession.

Each Fire Group includes specific information concerning the following:

- Plant association that comprises the fire group, including ecoclass and elevation range (if available).
- Vegetation overstory and understory type, including climax and seral species.
- Forest fuels (kind and amount of dead and down woody material) likely to be present.
- Role of fire in the pre-settlement era in shaping the vegetation composition.
- Forest succession of ecological groups as influenced by fire regimes.
- Fire management considerations (suggestions) that resource managers may consider for incorporation into land management objectives for a particular site.

These fire groups are used to describe and predict the influence fire will have on an ecosystem. In some cases, the existing conditions within the watershed do not correspond entirely with the generic descriptions in the study, therefore, some discretion must be used when applying the fire groups.

The Olallie Lake watershed falls generally within Fire Group 7. Fire Group 7 occurs on higher elevation plateaus subject to frost. Vegetation with this fire group consists primarily of lodgepole pine (50%+) with additional species of western white pine, subalpine fir, noble fir, Douglas-fir, western hemlock, and Pacific silver fir. Huckleberries and beargrass dominate the understory vegetation, although trace amounts of other species which are typical of cold, moist conditions can be found. Sites around Olallie Lake occur in areas with fluctuating water tables, such that soils are saturated in the spring and very dry by fall.

Fire serves to perpetuate the dominance of lodgepole in these stands. Without periodic disturbance, mountain hemlock or Pacific silver fir would eventually replace the lodgepole pine. Once the lodgepole pine stand is established, conditions do not favor rapid fire spread or uniform burning except under extreme burning conditions. Large stand replacing fires probably burn every 100-300 years. Occasional low to moderate intensity fires may thin the stands or otherwise rejuvenate it without doing serious damage to large areas of the overstory. Fuel buildup tends to start about age 60 to 80 due to natural thinning, snow breakage, and insect/disease.

Following a stand replacing fire, shrubs and forbs dominate for a short period of time. Lodgepole seedlings quickly establish and overtop the undergrowth. Fire might burn when the lodgepole stand reaches the pole or stem exclusion stage. Because pole sized lodgepole contains some serrotinous cones, periodic fire at this stage can create a fire maintained lodgepole pine stand that lacks other conifer species. Once the canopy becomes broken and other conifer species dominate the understory, a low to moderate intensity fire would further reduce the overstory and remove the other species in the understory. Over a very long period of time without fire, a climax forest of mountain hemlock or Pacific silver fir would develop. Low to moderate fires would perpetuate the climax stand conditions while a high intensity fire would replace the stand.

Wildfire risk rises during periods of prolonged drought and during extreme burning conditions. Fires at such times can crown and become very large if the lodgepole stands are "ready" to burn. High recreation use, a large build-up of dead/down and standing dead material and generally poor access add to fire management concerns.

Fuels management prescriptions should try to maintain as much duff as possible and some of the larger downed logs. Prescribed burning or other fuel removal techniques can reduce wildfire hazard in areas of high recreation use, primarily in older stands with heavy fuel loading. Low to moderate intensity fires may create a mosaic of understory conditions that provides more scenic diversity.

**Ecological Effects of Wildfire**

Wildfire has been and will continue to be the most influential factor affecting ecosystem development. Virtually all ecosystem resources are affected either directly or indirectly by fire. Wildfire changes forest ecosystems and interacts with geomorphic processes, climate, and land form in a variety of ways to alter the landscape and temporarily increase the potential for erosion by exposing readily erodible material and in some cases, increasing hydrologic energy available to move it.

Wildfire has a more indirect effect on wildlife, affecting habitat more than individuals. The major effect of wildfire is on animal habitat (food, cover, and water), and may have different effects over time on an individual species, with immediate beneficial or detrimental effects and later offsetting effects.

There are direct effects from wildfire on water quality through short term and long term temperature increases by removing overstory vegetation and increasing stream turbidity by removing the protective litter/duff layer which increases soil erosion.

Combustion of biomass is one of the most common of all environmental chemical reactions, and it's products are virtually ubiquitous in air. Although it is known that a few hundred substances are formed, liberated, or modified during combustion of vegetation, little information exists about the quantities of these substances. Ninety percent of the total mass emitted from wildland fires is

water and carbon dioxide. Particulate matter is the major cause of reduced visibility. Based on past wildfire experience, any wildfire exceeding several hundred acres in size and under an east wind influence could have major air quality impacts to Portland and the metropolitan area airsheds. The impacts would continue until the fire is extinguished or the east wind subsides.

Fires are an inherent part of the disturbance and recovery patterns to which native species have adapted. In significantly altered ecosystems, natural disturbance processes may no longer be operating within historical ranges of variability. Their effects may be as foreign to the functioning of the ecosystem as are human activities.

**Fire Suppression/Wood Residue Management**

Olallie Lake Scenic Area is classified as A4 (special interest) in the Mt. Hood National Forest Land Management Plan (LMP). Fire suppression and wood residue management direction varies by land allocation. General fire suppression objectives for National Forest lands in order of priority are: protection of life, property, and natural resources. Specific fire suppression and wood residue management direction can be found in the Mt. Hood National Forest Land Management plan under Forestwide Standards and Guidelines.

All wildfires within the Olallie Lake watershed will receive the "appropriate suppression response" as identified in the *Mt. Hood Appropriate Suppression Response (ASR) Guide.* The ASR guide bases suppression action on expected suppression costs, public safety, and resource values at risk. Each ignition which is declared a wildfire requires a timely suppression response with appropriate forces. Appropriate suppression response to a wildfire may range from direct attack and control, to more indirect methods of confinement and containment.

Control strategy utilizes the most cost efficient suppression action to extinguish the fire with the least loss of natural resources or values. Confinement strategy would be used to limit fire spread within a predetermined area mainly through the use of natural or preconstructed barriers or environmental conditions. Contain strategy would be to surround a fire, and any of it's spot fires, with control lines as needed, which can reasonably be expected to check the fire's spread under prevailing predicted conditions.

**Fire Risk and Hazard**

Risk and hazard are important terms to understand in the context of wildfire prevention. Fire occurs when flammable materials are exposed to an intense heat source coincidental with conductive weather and fuels conditions. A wildfire loss reduction can be implemented by one of two strategies: eliminate or reduce the sources of ignition (risk management), or remove or modify the fuel to reduce its flammability and/or intensity with which it burns (hazard management). Risk and hazard management, in order to be cost effective, must be commensurate with resource values at risk of being lost.

Risk is the agent that causes wildfires; i.e., lightning, campfires, smoking, etc. It is virtually impossible to eliminate all risk, therefore, some level of risk must always be accepted. The acceptable level of risk should be determined by the existing level of fuel hazard and values to be protected. Although little can be done to reduce the risk of ignition by lightning, human risk can be reduced by limiting entry to an area. This can be accomplished by completely closing an area to the general public on a year-round basis (as in the case of a municipal watershed), or limiting public entry to National Forest lands during periods of extreme fire danger.

Where the values at risk are high and the risk cannot be sufficiently reduced, then an alternative may be to reduce the fuel hazard. Hazard is a rating assigned to a fuel complex that reflects its susceptibility to ignition, the fire behavior and severity it would support, and/or the suppression difficulty it represents. Hazard reduction can be planned to decrease wildfire incidence and severity, ameliorate rate of spread and/or intensity, and make extinguishment easier and less costly.

**Current Fire Protection Infrastructure**

*National Fire Management Analysis System*

In 1993, the Mt. Hood National Forest completed their portion of a national initial attack fire suppression response study termed NFMAS (National Fire Management Analysis System). The study divided the Mt. Hood forest into initial attack zones and through integration of production rates for initial attack resources, values of resources at risk of being lost to wildfire, historical fire occurrence rate, and cost of initial attack resources, the best mix of initial attack resources that could economically be deployed was developed. The one drawback to the study was that the only resources that had a value assigned to it for calculating loss to wildfire was the timber resource. The loss of water quality, wildlife habitat, Late Successional Reserves (old growth), etc., was not figured into the loss tables for the NFMAS study.

The fire protection infrastructure for the Clackamas River Ranger Districts consists of detection, water sources, helispots (one at Peninsula Campground), prevention signs and patrols. District/zone resources available for detection and initial attack suppression in the Olallie Lakes area are: Patrol 508 (4X4 pickup with a 100 gallon removable tank), Engine 501 (1,000 gallon engine), Watertender 504 (3,000 gallon nurse tender), and Sisi Lookout (currently under construction but should be available in late 1997). Also available for additional support on the district is Patrol 509 (4X2 pickup with a 100 gallon removable tank), and Patrol 507 (type 6, 4X4 model 45 engine with a 200 gallon tank). In the event of an emergency, the Forest has access to fixed wing or rotor wing aerial detection flights should extra fire detection patrols be necessary.

Airtankers are available for retardant support from Redmond Air Center with additional support from Troutdale Air Tanker Base. In addition, the Zigzag Interagency Hot Crew (IHC) is available at the Zigzag Ranger District at Zigzag, Oregon. We also have a 20 person fire cache stationed at Ripplebrook Ranger station, a 20 person fire cache stationed at Estacada Ranger

station, and a 100 person fire cache of equipment stationed at the Troutdale Air Tanker Base for support needs. Additional Mt. Hood National Forest resources available for initial attack support are identified in the Mt. Hood National Forest Appropriate Suppression Response (ASR) guide.

*Automated Weather Stations*

Throughout the continental United States, there is a system of approximately 4,800 automated weather stations. These weather stations monitor weather for the National Weather Service and the Federal Aviation Administration. There are two types of automated weather stations; Remote Automated Weather Stations (RAWS ) and site specific micro-Remote Environmental Monitoring Systems (REMS). RAWS stations are established long term fixed weather stations located at permanent sites which are used to collect current and historical weather data. REMS stations are portable weather stations designed to be transported to individual incidents to gather site specific weather data for that incident.

There are 5 RAWS stations on the Mt. Hood, two of the 5 (Redbox and Wanders Peak) are on the Clackamas River Ranger Districts. The representative weather station for the Olallie Lakes area is Wanders Peak. Wanders Peak records and stores weather readings (wind speed and direction, air temperature, precipitation, fuel moisture and temperature, relative humidity, and soil moisture and temperature) once per hour and every 3 hours transmits the data via satellite to a base station at Boise, Idaho. This RAWS data is used to calculate and predict the current and expected fire weather condition. The individual forests throughout the nation can access their respective weather stations (or any other weather station's data in the RAWS system) 24 hours per day. The data from the RAWS stations can be used for prepositioning initial attack forces during critical fire weather events.

**Hazard Fuels Treatment Options**

The resource values (scenic quality, wildlife, recreation resources, campgrounds, Olallie Lake permittee, etc.) at risk of loss from wildfire within the Olallie Lake watershed could be categorized as "high". The opportunity for human and lightning caused ignitions (based on district statistical fire records) is moderate to high. The opportunity for lighting caused ignitions is high. Although little can be done to reduce the occurrence of lightning fires, there are several scenarios that may be implemented to minimize the occurrence of human caused ignitions and/or reduce current and future fire hazards:

- Maintain an aggressive detection and initial attack program to extinguish fires as soon as they are detected.

- Identify areas that have the highest values at risk and remove or break up the continuity of all fine fuels within these areas to minimize ignitions from known sources. One criteria might be to identify areas that currently have fine fuel loading (dead and downed material less than 3 inches in diameter) of 12 tons per acre or more. If a fire was to start in these

areas, there is a high probability that most if not all of the litter/duff layer would be consumed which would most likely result in increased erosion from raindrop splash.

- Reduce or remove fuels in strategically located blocks to augment natural fire barriers. Although fire may still spread into the treated blocks, under worst case conditions, the rate of spread and intensity would be far less than what would be experienced in the untreated blocks.

- Eliminate fuels extending from the ground to the tree crowns (ladder fuels) and/or thin stands to reduce crown density to reduce the probability of crown fires.

- Remove standing dead trees (snags) in the higher lightning prone areas (ridgetops) to reduce the opportunity of ignitions and embers or firebrands that can be readily carried across fire control lines.

- Run another NFMAS study using appropriate value loss data that reflects other resource values at risk besides timber loss.

## C. Plant and Plant-Like Species

### Threatened, Endangered, and Sensitive Plants (TES)

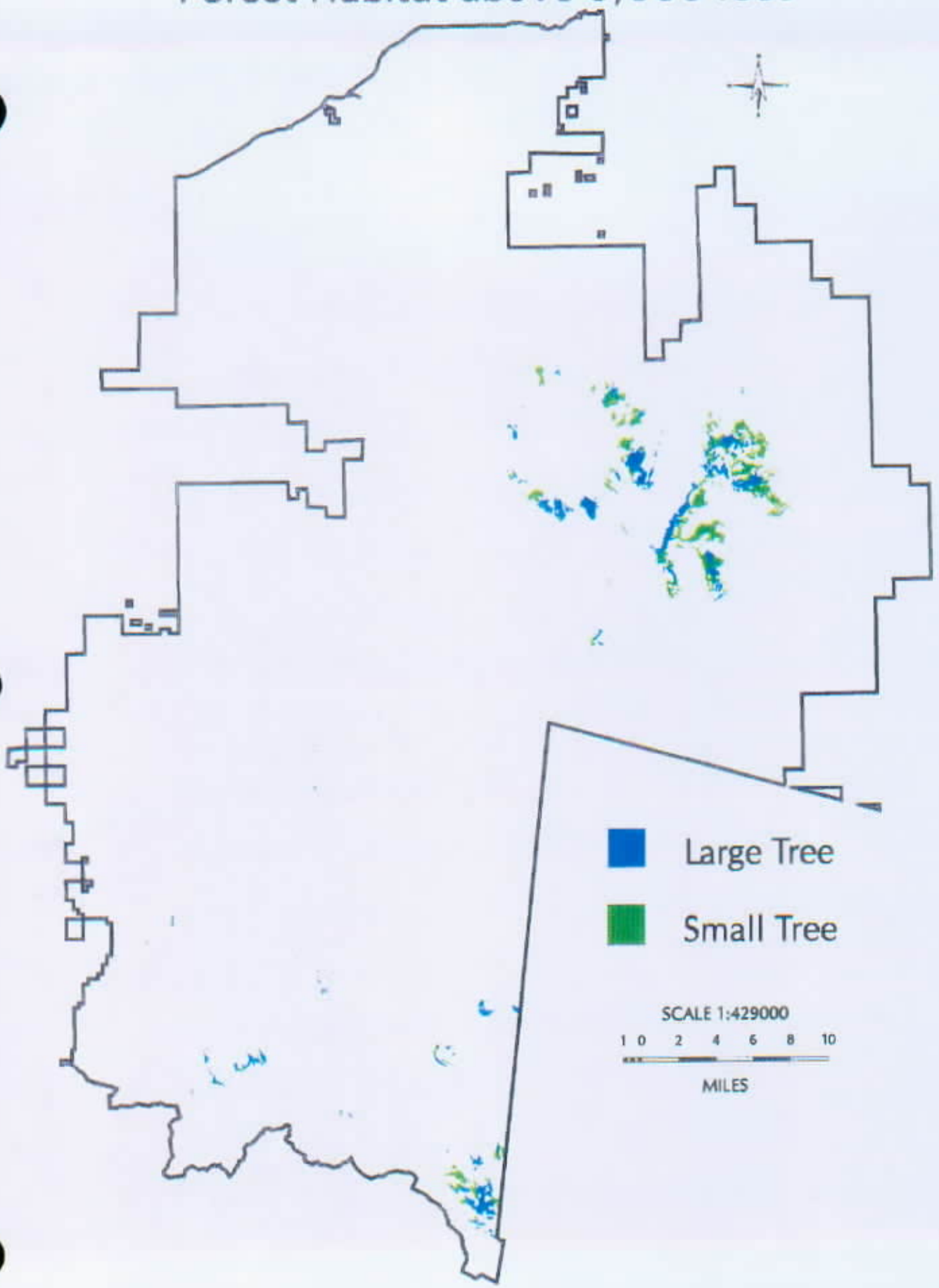
One historic record of a TES plant species (Table 2-3), dating from 1929, exists within the analysis area. It is likely that there is habitat for an additional six TES species (Table 2-4). Due to a lack of inventory work, the flora of the Ollalie Lakes area is poorly known and should be viewed as a data gap.

**Table 2-3. Known TES Plant Species Within the Watershed.**

| Scientific Name | Common Name | Habitat |
|---|---|---|
| *Lycopodium complanatum* | ground cedar | Early seral habitat resulting from stand-replacing fire |

Ground cedar: One historic record of ground cedar within the analysis area is known from a herbarium record at Oregon State University. This speciman was collected from the vicinity of Upper Lake in 1929. There has been no known effort to relocate the site and its status is unknown at this time. The range of ground cedar is circumboreal and the six known sites from Oregon are disjunct from the primary range to the north. On the Mt. Hood National Forest, ground cedar appears to have an affinity for early seral habitat which has resulted from stand-replacing fire. These sites are dominated by shrub and forb species with a sparse tree component. It is therefore assumed that fire is necessary to maintain habitat for this species.

# Forest Habitat above 5,000 feet




**MAP 2-5**

**Table 2-5. Known Survey and Manage Fungi Species in the Analysis Area.**

| Scientific Name | Habitat | Survey Strategy 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| *Alpova alexsmithii* | Mature mt. hemlock and true fir forest at mid to upper mid-elevation | X | | X | |

**Table 2-6. Potential Survey and Manage Fungi Species in the Analysis Area.**

| Scientific Name | Habitat | Survey Strategy 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| *Bondarzewia montana* | Mature true fir forest at relatively high elevation | X | X | X | |
| *Bridgeoporus nobilissimus= Oxyporus nobilissimus* | On large true fir snags, particularly noble fir, at the base to 15 feet up the bole | X | | X | |
| *Choiromyces alveolatus* | Mature mt. hemlock/true fir forest at mid to high-elevation | | | | |
| *Cortinarius wiebeae* | Mature true fir and other conifer forest at relatively high-elevation | X | | X | |
| *Gastroboletus ruber* | Mature mt. hemlock forest at upper mid to high-elevation | X | | X | |
| *Gastroboletus subalpinus* | Lodgepole and whitebark pine forest above 4,500 feet in elevation | X | | X | |
| *Gastroboletus turbinatus* | Mature true fir, Engelmann spruce or hemlock forest at mid to high-elevation | | | X | |
| *Gymnomyces* sp. nova Trappe #5052 | Mature mt. hemlock and Pacific silver fir forest at relatively high-elevation | X | | X | |
| *Hydnotrya* sp. nova Trappe #792 | Old growth mt. hemlock/Pacific silver fir forest at approximately 6,000 feet | X | | X | |
| *Martellia* sp. nova Trappe #1700 | Mature mt. hemlock/true fir forest at upper mid-elevation (5,000 feet) | X | | X | |
| *Martellia* sp. nova Trappe #311 | Mature mt. hemlock/Pacific silver fir forest | X | | X | |
| *Martellia* sp. Nova Trappe #5903 | Mature mt. hemlock/Pacific silver fir forests at approximately 6,000 feet | X | | X | |
| *Nivatogastrium nubigenium* | Xeric sites in mature forest with abundant woody debris at mid to high elevations | | | | |
| *Octavianina* sp. nova Trappe #7502 | Mature mt. hemlock/true fir forests at upper mid-elevation | X | | X | |

| | | | | | |
|---|---|---|---|---|---|
| *Pithya vulgaris* | Saprobe on recently killed true fir twigs above 3,500 feet in elevation | X | | X | |
| *Plectania latahensis* | Saprobe on conifer litter at upper mid to high elevation | X | | X | |
| *Plectania milleri* | Saprobe on conifer duff at high-elevation | X | | X | |
| *Polyzellus multiplex* | Higher elevation Pacific silver fir and mixed conifer forest | X | | X | |
| *Rhizopogon albietis* | Mixed conifer forest at relatively high elevation | | | | X |
| *Rhizopogon atroviolaceus* | Mixed conifer forest at relatively high elevation | | | | X |
| *Rhizopogon brunneininger* | Mature mixed conifer forest at low to relatively high-elevation | X | | X | |
| *Rhizopogon evadens var. subalpinus* | Mt. hemlock/true fir forest at upper mid to high-elevation | X | | X | |
| *Rhizopogon sp. nova Trappe #1692* | Mature mt. hemlock, Douglas-fir, true fir forest at upper mid-elevation | X | | X | |
| *Rhizopogon sp. nova Trappe #1698* | Mature mt. Hemlock, Douglas-fir, true fir forest at upper mid-elevation | X | | X | |
| *Rhizopogon truncatus* | Mixed conifer forest at relatively high elevation | | | | X |
| *Thaxterogaster pingue* | Mature true fir forest at mid to high elevation | | | | X |
| Tricholomopsis fulvescens | No habitat information | X | | X | |

**Table 2-7. Potential Survey and Manage Lichens in the Analysis Area.**

| Scientific Name | Habitat | Survey Strategy 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| *Bryoria subcana* | Cool, moist true fir forest up to 5,400 feet in elevation | X | | X | |
| *Hydrotheria venosa* | On small to medium sized rocks within perennial streams up to 7,000 feet in elevation. | X | | X | |
| *Piliphorus nigricaulis* | On rock in cliff and talus areas adjacent to coniferous forest | X | | X | |

**Table 2-8. Potential Survey and Manage Bryophyte Species in the Analysis Area.**

| Scientific Name | Habitat | Survey Strategy 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| *Marsupella emarginata var. aquatica* | On rock in cold perennial streams at upper mid to high-elevation | X | X | | |
| *Racomitrum aquaticum* | Moist rocks and cliffs along shaded streams | X | | X | |
| *Rhizomnium nudum* | Moist, organic soil in mid to high elevation forest | X | | X | |
| *Tritomaria exsectiformis* | On moist peaty or humic soil up to 5,100 feet in elevation | X | X | | |

**Table 2-9. Potential Survey and Manage Plant Species in the Analysis Area.**

| Scientific Name | Habitat | Survey Strategy 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| *Botrychium montanum* | Riparian forest | X | X | | |
| *Botrychium minganense* | Riparian forest | X | X | | |
| *Coptis trifolia* | Hummocks within boggy areas | X | X | | |

Conduct inventories for survey and manage species within the analysis area to determine its relative importance as refugia for high elevation forest species. Table 2-10 lists the plant species found in the analysis area.

**Table 2-10. [1]Vascular Plant List For the Olallie Lake Analysis Area.**

| Scientific Name | Common Name |
|---|---|
| [2]***Abies amabilis*** | Pacific silver fir |
| ***Abies lasiocarpa*** | subalpine fir |
| ***Abies nobilis*** | noble fir |
| ***Acer circinatum*** | vine maple |
| *Achlys triphylla* | vanilla-leaf |
| *Aconitum columbianum* | monkshood |
| *Agrostis thurberiana* | Thurber's bentgrass |
| ***Alnus sinuata*** | Sitka alder |
| ***Amelanchier alnifolia*** | serviceberry |
| *Anaphalis margaritacea* | pearly-verlasting |
| *Anemone deltoidea* | Columbia windflower |
| *Anemone oregana* | Oregon anemone |
| *Apargidium boreale* | apargidium |
| *Apocynum androsaemifolium* | dogbane |
| *Arceuthobium americanum* | dwarf mistletoe |
| ***Arctostaphylos nevadensis*** | pinemat manzanita |
| *Arnica latifolia* | mountain arnica |
| *Arnica mollis* | hairy arnica |
| *Aster engelmannii* | Engelmann's aster |
| *Aster foliaceus* | leafy aster |
| *Aster occidentalis* | western aster |
| ***Berberis nervosa*** | Oregon-grape |
| *Botrychium multifidum* | leathery grape-fern |
| *Caltha bicolor* | marshmarigold |
| *Carex geyeri* | elk sedge |
| ***Carex lenticularis*** | lentil sedge |
| *Carex leptalea* | bristle-stalked sedge |
| *Carex luzulina* | woodrush sedge |
| *Carex nigricans* | black alpine sedge |

[1] Derived from Ecoplot and incidental survey records.

[2] Bold type designates species which may be useful for habitat restoration.

| | |
|---|---|
| *Carex scopulorum var. bracteosa* | Holm's Rocky Mountain sedge |
| *Carex vesicaria* | inflated sedge |
| *Cassiope mertensiana* | Merten's mountain heather |
| *Castilleja miniata* | scarlet paintbrush |
| *Castilleja suksdorfii* | Suksdorf's paintbrush |
| ***Castanopsis chrysophylla*** | chinquapin |
| *Ceanothus velutinus* | snowbrush ceanothus |
| *Chimaphila umbellata* | pipsissewa |
| *Clintonia uniflora* | queen-cup bead-lilly |
| *Cornus canadensis* | bunchberry |
| ***Deschampsia cespitosa*** | tufted hairgrass |
| *Dicentra formosa* | Dutchman's breeches |
| *Dodecatheon jeffreyi* | Jeffrey's shooting star |
| ***Eleocharis pauciflora*** | few-flowered spike-rush |
| *Epilobium alpinum* | alpine willowweed |
| *Epilobium angustifolium* | fireweed |
| *Equisetum fluviatile* | water horsetail |
| *Equisetum arvense* | field horsetail |
| *Erigeron peregrinus* | subalpine daisy |
| *Festuca idahoensis* | Idaho fescue |
| *Fragaria virginiana* | wild strawberry |
| ***Gaultheria humifusa*** | alpine wintergreen |
| ***Gaultheria ovatifolia*** | slender wintergreen |
| *Gentiana sceptrum* | staff gentian |
| *Goodyera oblongifolia* | rattlesnake plantain |
| *Habenaria dilatata* | white bog-orchid |
| *Hieracium albiflorum* | white-flowered hawkweed |
| *Hypericum anagalloides* | bog St. John's-wort |
| *Hypopitys monotropa* | pinesap |
| *Juncus bufonis* | toad rush |
| ***Juncus effusus*** | soft rush |
| ***Juncus ensifolius*** | dagger-leaf rush |
| ***Juncus regelii*** | Regel's rush |
| ***Kalmia occidentalis*** | western swamp laurel |
| *Leutkea pectinata* | partridgefoot |
| *Ligusticum grayi* | Gray's lovage |
| *Lilium washingtonensis* | Washington lilly |

| | |
|---|---|
| ***Linnaea borealis*** | twinflower |
| *Listera convallarioides* | braod-lipped twayblade |
| *Lomatium martindalei* | Matindale's lomatium |
| ***Lonicera involucrata*** | black twinberry |
| ***Lupinus caudatus*** | tailcup lupine |
| ***Lupinus latifolius*** | broadleaf lupine |
| ***Lupinus polyphyllus*** | broad-leaved lupine |
| *Luzula campestris* | field woodrush |
| *Luzula hitchcockii* | smooth woodrush |
| *Lycopodium clavatum* | elk-moss |
| *Machaeranthera canescens* | hoary aster |
| *Menziesia ferruginea* | fool's huckleberry |
| *Mitella breweri* | Brewer's mitrewort |
| *Muhlenbergia filiformis* | slender muhly |
| *Nothechelone nemorosa* | woodland beard-tongue |
| *Osmorhiza chilensis* | sweet-cicely |
| ***Pachistima myrsinites*** | boxwood |
| *Pedicularis bracteosa* | bracted lousewort |
| *Pedicularis racemosa* | sickle-top lousewort |
| *Penstemon euglaucus* | glaucous penstemon |
| *Phacelia hastata* | silverleaf phacelia |
| *Phyllodoce empetriformis* | red heather |
| ***Physocarpos capitatus*** | ninebark |
| ***Pinus contorta*** | lodgepole pine |
| ***Pinus monticola*** | white pine |
| *Potentilla flabellifolia* | fan-leaf cinquefoil |
| *Pseudotsuga menziesii var. menziesii* | Douglas-fir |
| *Pteridium aquilinum* | brackenfern |
| *Pterospora andromedea* | pinedrops |
| *Pyrola asarifolia* | alpine pyrola |
| *Pyrola picta* | white vein pyrola |
| *Pyrola secunda* | side-bells pyrola |
| *Ranunculus alismaefolius* | water-plantain buttercup |
| *Rhododendron albiflorum* | Cascade azalea |
| ***Rosa gymnocarpa*** | baldhip rose |
| ***Rosa nutkana*** | Nutka rose |
| *Rubus lasiococcus* | dwarf bramble |

| | |
|---|---|
| ***Rubus parviflorus*** | thimbleberry |
| ***Salix phylicifolia*** | tea-leaved willow |
| *Salix scouleriana* | Scouler's willow |
| *Saxifraga mertensiana* | Merten's saxifrage |
| *Saxifraga oregana* | bog saxifrage |
| *Scirpus microcarpus* | small-fruited bullrush |
| *Senecio cymbalarioides* | alpine meadow butterwort |
| *Senecio triangularis* | arrowleaf groundsel |
| *Sisyrinchium douglasii* | grass-widow |
| *Smilacina racemosa* | false Solomon-plume |
| *Smilacina stellata* | starry false Solomon-plume |
| ***Sorbus sitchensis*** | Sitka mountain-ash |
| *Sphagnum sp.* | Sphagnum |
| ***Spiraea densiflora*** | subalpine spiraea |
| ***Spiraea douglasii*** | Douglas spiraea |
| *Spiranthes romanzoffiana* | ladies-tresses |
| ***Symphoricarpos mollis*** | creeping snowberry |
| *Tiarella unifoliata* | cool-wort foam-flower |
| *Tofieldia glutinosa* | tofieldia |
| ***Vaccinium deliciosum*** | blue-leaf huckleberry |
| ***Vaccinium membranaceum*** | big huckleberry |
| ***Vaccinium occidentale*** | bog huckleberry |
| ***Vaccinium ovalifolium*** | oval-leaf huckleberry |
| ***Vaccinium scoparium*** | grouse whortleberry |
| *Valeriana sitchensis* | Sitka valerian |
| *Vancouveria hexandra* | inside-out flower |
| *Viola glabella* | stream violet |
| *Viola orbiculata* | round-leaved violet |
| *Viola palustris* | bog violet |
| *Viola sempervirens* | evergreen violet |
| *Xerophyllum tenax* | beargrass |

## Noxious Weeds

There is no noxious weed information for the analysis area. Potential sources of infestation are associated with recreation activity. Sources of infestation include vehicles, hay for pack and saddle stock, animal manure and boats. Disturbed sites are prone to the establishment of weed species and in the analysis area are almost totally associated with recreation activity.

## D. Wildlife Species and Habitat

### Amphibians

Streams, lakes, and riparian areas offer the most likely habitat for amphibian species inhabiting this area. Species known to occur within the boundary include, but are not limited to, Cascade frog (*Rana cascadae)*, Pacific treefrog (*Hyla regilla)*, Roughskin newt (*Taricha granulosa)*,Northwestern salamander (*Ambystoma gracile)*, and Pacific giant salamander (*Dicomptodon tenebrosus*). Although no documented sightings have been recorded, it is possible that other amphibian species exist within the analysis area as water quality and temperatures are favorable.

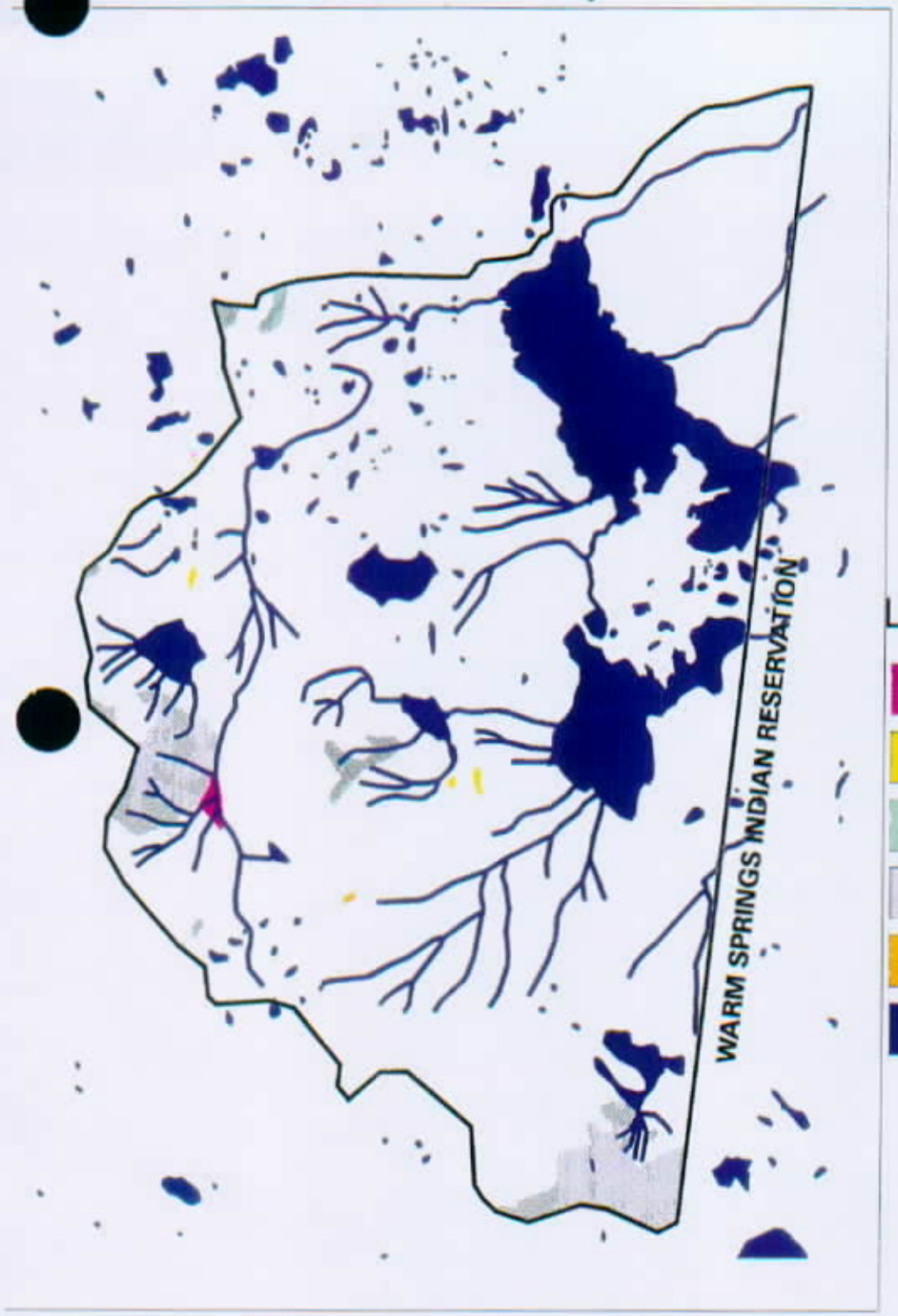
### Special Habitats

Special habitats are those which provide a unique niche for species associated with them. These species may not be dependent on these habitats but use them as primary breeding and/or non-breeding habitat. Special habitats found within the watershed include, but are not limited to, wet meadows, dry meadows, lakes, rock/talus slope and buildings (Map 2.6). No bridges, caves, cliffs, or mines occur in the area. Table 2-11 illustrates the types and acreages of special habitat found within the Olallie Lake Analysis Area.

Lakes are the dominant special habitat in the area, occupying approximately 382 acres. These lakes, along with the wet and dry meadows, provide "focal points" of diversity in the analysis area-habitat provided for both a greater array and more unusual species than are found in the surrounding landscape. Amphibians, mammals, birds, reptiles, insects, and various flora can be found in and around the lakes.

Mapped rock and/or talus slopes occupy approximately 143 acres within the watershed. This habitat type provides nesting, roosting, hiding, and foraging opportunities for a variety of small mammals, birds, and amphibians. Predators, such as cougar (*Felis concolor*), bobcat (*Lynx rufus*), and hawks utilize these areas for foraging while others may den in the cave-like openings between the rocks.

# Olallie Lake Watershed (Forest Service)




## Special Habitats

### Legend

- Dry Meadow
- Wet Meadow
- Rocky
- Rock with Conifers
- Talus
- Streams and Lakes

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Map 2-6

**Table 2-11. Special Habitats in Olallie Lake Analysis Area**

| Special Habitat | Acres/Structures |
|---|---|
| Wet Meadow | 3.20 ac |
| Dry Meadow | 4.50 ac |
| Lakes | 381.90 ac |
| Rocky land with <10% conifer coverage | 17.60 ac |
| Rocky land with 10-30% conifer coverage | 116.00 ac |
| Talus | .40 ac |
| Talus with conifer | 8.80 ac |
| Buildings | approximately 20 structures |

**Threatened, Endangered, and Sensitive (Animal) Species (TE&S)**

Table 2-12 displays information on TE&S (animal ) species of concern on the Clackamas River Ranger Districts. Of those species, two are known to occur within the Olallie Lake analysis area. These species are the Northern bald eagle (*Haliaeetus leucocephalus*) and the Harlequin duck (*Histrionicus histrionicus).* See district biologist or analysis file for locations. Habitat exists for other TE&S species however confirmation of their presence is unknown..

Known presence of other TE&S species and/or high potential habitat located just outside (within 2 miles) of the analysis boundary should be noted. These species include: Sandhill crane (*Grus canadensis),* Peregrine falcon (*Falco peregrinus),* and Northern spotted owl *(Strix occidentalis).* Discussion of these species follows text on known inhabitors. See district biologist or analysis file for locations.

**Table 2-12. Threatened, Endangered, and Sensitive Species**

| Species | Status By Agency | | | Habitat in Olallie? | Known occurrence in Olallie? |
|---|---|---|---|---|---|
| | USFWS | State (Oregon) | USFS | | |
| Spotted owl | Threatened | Threatened | Threatened | Dispersal | No |
| Bald eagle | Threatened | Threatened | Threatened | Yes | Yes |
| Peregrine falcon | Endangered | Endangered | Endangered | P | No |
| Harlequin duck | ---- | Sensitive | Sensitive | Yes | Yes |
| Sandhill crane | ---- | Sensitive | Sensitive | No** | No** |
| Townsend's big-eared bat | Former C2 | Sensitive | Sensitive | No | No |
| Wolverine | Former C2 | Threatened | Sensitive | P | No |
| White-footed vole | Former C2 | Sensitive | Sensitive | No | No |
| Red-legged frog | Former C2 | Sensitive | Sensitive | Yes | No |
| Western pond turtle | ---- | Sensitive | Sensitive | No | No |
| Painted turtle | ---- | Sensitive | Sensitive | No | No |
| Cope's giant salamander | ---- | Sensitive | Sensitive | No | No |
| Larch mountain salamander* | ---- | Sensitive | Sensitive | No | No |

USFWS = United States Fish & Wildlife Service
USFS = United States Forest Service
* C3 Survey and Manage Species
** Habitat and/or species occurrence just outside of boundary
P = Potential habitat

*Northern bald eagle*

Nesting habitat is found in all forest types bordering coastal, lake, or river areas. Nest trees are usually large, open branching trees and are dominant on the landscape. In Oregon, bald eagles generally select forested stands with dense, high basal areas in locations with minimal logging or other human disturbance (Anthony and Isaacs, 1989). Nest are normally located within a half mile of water. The Olallie Lake Analysis Area contains two A-13 (Bald Eagle Habitat Area) Forest Plan land allocations (Map 1-3). The goal of these allocations as stated in the Forest Plan is to "protect and manage nesting and winter communal roosting areas to meet or exceed levels established in the Pacific Bald Eagle Recovery Plan (U.S. Department of Agriculture, 1990, Four-201). 1986)." A secondary goal is to "maintain a mature and/or overmature stand condition." Table 2-13 summarizes the results of a 1993 study performed in the Olallie Lakes area by Richard Frenzel, Ph.D.

**Table 2-13. Results of Olallie Lakes Bald Eagle Study. Frenzel, 1993.**

| Habitat Characteristic | Rating | Comments |
|---|---|---|
| Overall nesting quality | Poor - Marginal | based on critical factors of prey availability and suitable nesting habitat |
| Overall roosting quality | Poor | lack of abundant food source available to attract and hold wintering eagles |
| Suitable nest trees | Poor - Marginal | -few prominent trees<br>-small spindly crowns unsuitable for nest platforms |
| Suitable perch trees | Marginal - Fair | -most areas not well protected<br>-few irregular shaped crowns<br>-Olallie Lake has decent numbers of snags and perch trees around campground |
| Access to reliable prey base | Marginal - Fair | -frozen waters limits prey base<br>-late spring thaw availability too low for nesting birds |
| Freedom from disturbance | Fair - Good | -no recent logging<br>-foot access limited to a few trails<br>-summer recreational use is high |

*Harlequin Duck*

A diving duck that inhabits turbulent mountain streams in coniferous forests (mixed conifer, white fir, lodgepole pine and subalpine fir); in winter, they prefer rocky intertidal areas along the Oregon coast. They feed on crustacean, molluscs, insects, and fish. Nesting takes place on the ground adjacent to streams or in cavities of trees or cliffs (National Geographic Society, 1983; Peterson, 1961; USDA Forest Service, PNW Region, 1985).

One sighting of two Harelquin ducks (gender unknown) has been documented in the Olallie Lake analysis area. The ducks were observed on a lake and although that habitat is questionable, the source was extremely reliable (the district biologist).

*Wolverine*

One high potential denning site is located within the analysis boundary although several exist in the surrounding area (see district biologist for locations). High potential sites were identified by modifying criteria outlined by Copeland (S.Hall, personal communication, 1996.). Following are

the characteristics used to create the Mt. Hood Potential Denning Habitat Map:

- At least 4000 feet elevation
- North to northeast aspect
- Soil Resource Inventory (SRI) codes 5,6,7,9,12, and 14 (see analysis file for descriptions)
- Landsat Vegetation Mapping Project (ISAT) codes 2 (rock, talus, sparsely vegetated) and 3 (snow, ice, glaciers)
- Concave slope features

*Sandhill Crane*

Small groups and single pairs may be found in the cascades, inhabiting wetland complexes which provide for security, nesting, and foraging. Nests are usually located on or very near standing water and are constructed of vegetation left over from the previous growing season.

Three meadows, Cornpatch, Olallie, and Windy, just outside of the analysis area, have confirmed sandhill crane use. See district biologist or analysis file for locations.

*Peregrine Falcon*

Peregrines nest on sheer cliffs ranging in height from 75 to 2,000 feet elevation. Eyries are normally within ¼ mile of a riparian area and appear as a small scrape on a ledge . Small caves with easy aerial access and visibility to surrounding forage areas are also used.

Two potential sites, Double Peaks and Ruddy Hill, are located on the western boundary of the Olallie Lake analysis area. These sites were identified on aerial photos and have not been surveyed for peregrines.

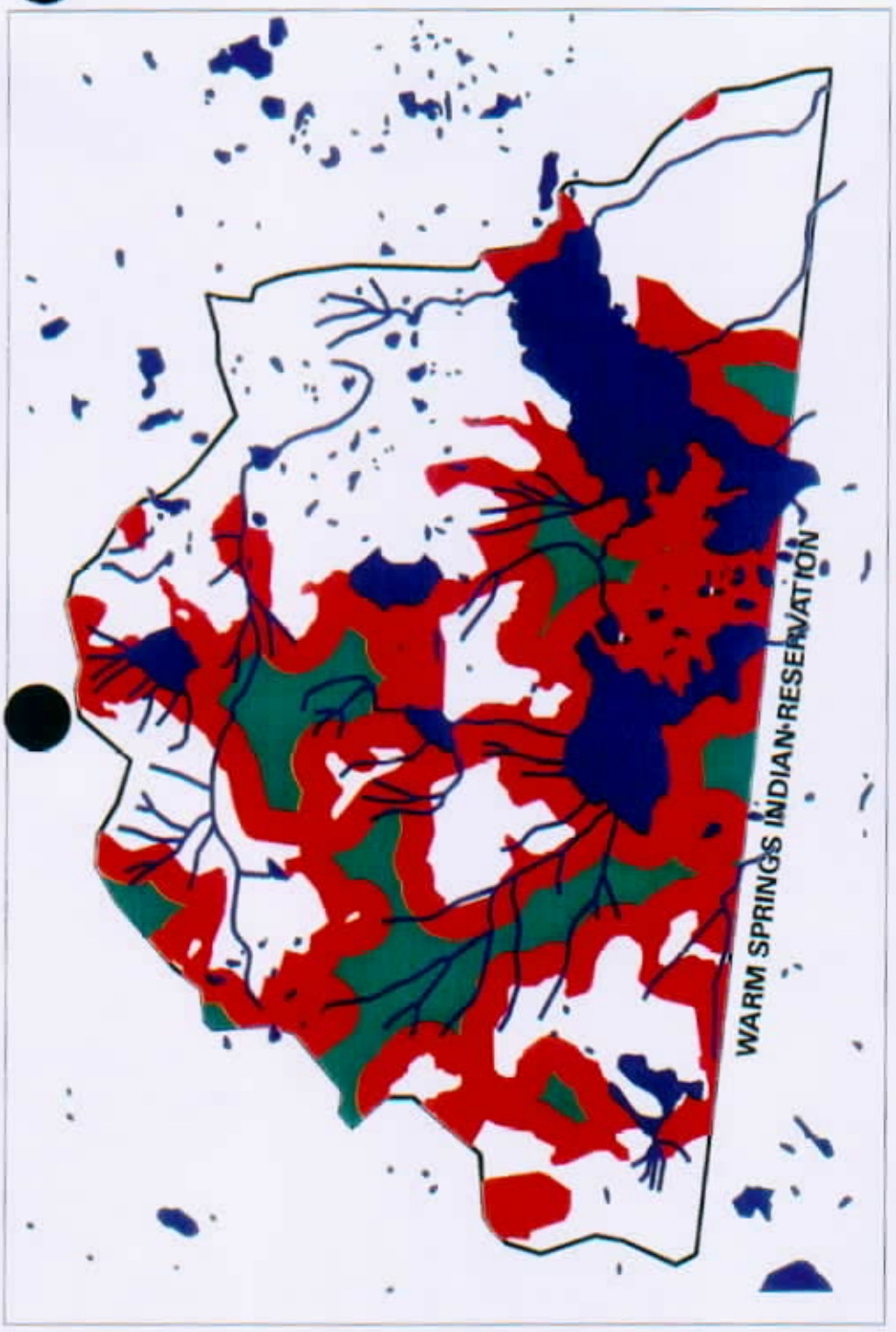
Two additional sites, Potato Butte and Twin Peaks, located just outside of the analysis area boundary, also warrant investigation as potential sites.

No documented sightings have been recorded.

*Northern Spotted Owl*

The northern spotted owl is a federally listed threatened species that is closely associated with late seral forest ecosystems. Nesting occurs in cavities of mature and/or mature trees, roosting normally takes place in dense multi-layered forests, and foraging ranges across many habitat types. The analysis area does not provide typical spotted owl nesting habitat but may provide foraging and dispersal habitat (Map 2-7).

# Olallie Lake Watershed (Forest Service)




## Current Interior Forest

Legend

- Forest Edge
- Interior Forest
- Streams and Lakes

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**MAP 2-7**

Dispersal habitat currently exists in 47% of the analysis area. In the true-fir zone, dispersal habitat is based on stands having trees with 9-21 inch DBH and a canopy closure greater than 40%. If stand treatments (e.g., thinning) are implemented, dispersal would continue to be provided via the Riparian Reserve system. Because the analysis area is at the extreme upper end of the elevational range for nesting spotted owls, the area is not expected to provide spotted owl nesting habitat. Low quality, potential nesting habitat is limited to approximately 10% of the analysis area in the northern section of the watershed.

No known spotted owls reside within the boundary of the analysis area. However, one pair (#3999) does exist to the north. This pair's 1.2 mile "circle" just barely reaches the analysis area boundary. Extensive surveys have not been conducted in the area.

OTHER SPECIES:

The Olallie area supports a wide variety of both avian and terrestrial species. Surveys conducted in the summer of 1993 indicate that several types of woodpeckers, ducks, raptors, and neotropical migrants are common summer residents. Ravens, Clark's nutcrackers, grey jays, and chickadees are among the year round residents which cache food for the winter. Black bear, mink, otter, cougar, coyote, weasel, and pika are some of the mammalian species which make their homes in the Olallie area. In addition, several amphibian species such as Cascade Frog and Tailed Frog have documented sightings in the Olallie Lake analysis area.

**Survey and Manage Animal Species**

Survey and Manage Species, also referred to as C-3 species, are species which require protection through survey and management standards and guidelines as outlined in the Northwest Forest Plans Record of Decision (ROD). Two animal species, one mammal and one amphibian, are of concern in this portion of the analysis. Direction from the ROD requires that each of these species be managed under survey strategy #2, "survey prior to activities and manage sites."

*Red Tree Vole*

The red tree vole (P. longicaudus), a highly specialized tree-dweller, depends on Douglas fir trees for nesting and foraging. Its nests are built 6 to 150 feet off the ground and it feeds on Douglas-fir needles.

Currently no primary, secondary, or marginal habitat exists within the analysis area. Primary habitat consists of stands classified as large conifer (stands with at least 30% canopy closure attributed to trees greater than 21 inches diameter breast height) greater than 300 acres, which occur at less than 3,000 feet elevation, and are in western hemlock or Pacific silver fir vegetation

zones. Secondary habitat, described as stands classified as large conifer between 75 and 300 acres, which occur at less than 3,000 feet elevation, and are in the western hemlock or Pacific silver fir vegetation zones. Marginal habitat, is classified as closed small conifer (stands with at least 60% canopy closure and trees between 8 and 21 inches diameter breast height) greater than 75 acres, which occurs at less than 3,000 feet elevation, and are in the western hemlock or Pacific silver fir vegetation zones (Mellen, 1995).

*Larch Mountain Salamander*

This species (*Plethodon larselli*), also listed as Sensitive by the Forest Service, is associated with steep, wooded, talus slopes where the rocks are of small size and there are relatively large amounts of decaying plant material and small quantities of soil. They have been found in various types of talus areas, including some with little or no moss or other vegetative cover on the rocks. They have also been observed in woody, overgrown areas where talus is not readily visible unless ground surface is disturbed (Personal communication, A. Young, 1996).

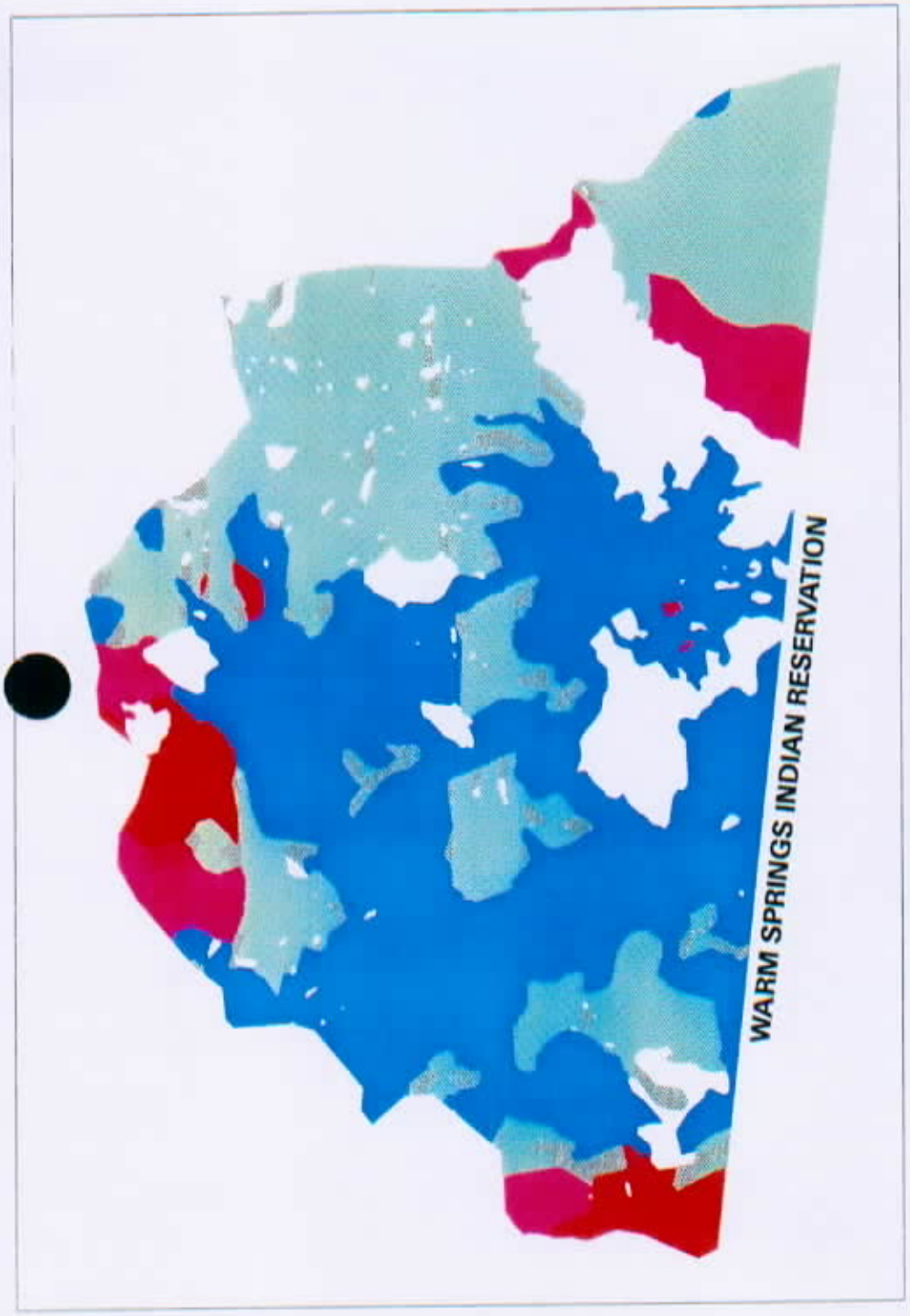
Although the analysis area contains approximately 143 acres of rock/talus habitat, it is not located in the steep, wooded areas preferred by the Larch mountain salamander. In addition, the Olallie Lake Analysis Area is considered to be out of the range of this species (i.e., too far south).

**Deer and Elk**

The Olallie Lake analysis area contains approximately 3000 acres, of which none is Inventoried Deer and Elk Winter Range as designated by the Mt. Hood Forest Plan. Winter range is separated into two categories, "normal" and "severe". Normal winter range generally falls below 2,800 feet elevation while severe winter range falls below 2300 feet elevation; the approximate elevational range of the analysis area is 4000 feet elevation to 6000 feet elevation.

Road densities, as well as availability, sizing/spacing, and quality/quantity of forage and cover, all form the overall habitat effectiveness of a given area. Table 2-14 displays the current condition of habitat and availability for the analysis area. The Olallie Lake Analysis Area contains 84% of deer and elk habitat cover types and 4% is in forage habitat. Six percent is in optimal cover which contributes to hiding cover and forage habitat (Map 2-8). It appears that the Olallie area currently lacks major components (forage 4% and optimal 6%) of deer and elk habitat and therefore, may not be meeting the habitat needs for these species. However, field verification should occur to ensure accuracy.

# Olallie Lake Watershed (Forest Service)




## Big Game Habitat Types

### Legend

- FORAGE AREAS
- HIDING COVER
- OPTIMAL COVER
- THERMAL COVER/ OPTIMAL COVER

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**MAP 2-8**

**Table 2-14. Deer and Elk Habitat Availability**
**Cover types and habitat characteristics based on Habitat Effectiveness Model, Wisdom, et. al.**

| Cover Type | Habitat Characteristic(s) | Acres | % |
|---|---|---|---|
| Forage | Grass, Forb, Shrub, Meadow | 118 | 4% |
| Hiding | Hardwood, Closed Sap Pole, Open Sap Pole, Open Small Saw | 1027 | 34% |
| Thermal | Closed Small Saw | 1198 | 40% |
| Optimal | Large Sawtimber, Old Growth | 174 | 6% |

Forage - Palatable vegetation of nutritional value
Hiding - Any vegetation capable of hiding 90% of a standing adult deer at 200 feet or less
Thermal - Stands at least 40 feet tall with at least a 70% canopy closure. Used for thermoregulation.
Optimal - Used for hiding, thermoregulation, avoiding disturbance, and if necessary, foraging.
Forage - Palatable vegetation of nutritional value.

Two known migration routes traverse the Olallie Lake Analysis Area. One route runs east - west, between Olallie and Monon Lakes, and onto the Warm Springs Indian Reservation. A second route, located near the NW corner of the analysis area, runs NW -SE (Map 3-1). Potential calving and fawning grounds, characterized by presence of water, downed logs, hiding cover, and available forage, may be located throughout the watershed but no known sites have been identified. Calving does occur to the east on the Warm Springs Indian Reservation (Personal communication D. Calvin, 1997).

Trends

- Without manipulation of vegetation, stands will continue to provide for marginal (if any) habitat for late successional species
- Decreases in occurrence of late seral associates as habitat is not replaced.

# SOCIAL

## Current and Reference Condition

### A. Heritage Resources

#### Archaeological sites

Sites within the watershed boundary:

- Nine prehistoric sites
- Two historic sites

Sites on the outskirts of the watershed boundary, but important:

- One prehistoric site
- Two historic sites

Little archaeological survey has taken place in this watershed in the past. Currently the known sites appear around the lakes, where it is obvious that people would have congregated. There is reason to believe that there are numerous archaeological sites throughout the watershed because of the abundance of huckleberries, lakes, and meadows and ethnographic data. It is important that a more intensive systematic archaeological survey be conducted in the Olallie Watershed to locate and protect these nonrenewable resources.

#### Ethnographic Study

Oo-lal-lie = huckleberries

The Ethnographic Study of the Mt. Hood National Forest (Archaeological Investigations Northwest, 1995) indicates ten "clusters" of camps and/or resource areas suggestive of regular and/or intensive traditional use that occur totally or partially within the Mt. Hood National Forest boundaries. One of the ten areas is the Olallie Butte-Fish Lake berry area. It is referred to in both ethnographic and historical sources. It straddles the Mt. Hood NF - Warm Springs Reservation boundary.

Documented Traditional Cultural Use Areas in or near the Olallie watershed:

- Olallie Butte
- Breitenbush Lake
- Kuckup Park

Current concerns of The Confederated Tribes of Warm Springs (CTWS) focus on renovation and maintenance of huckleberry picking areas and the freedom to pick berries, collect medicinal plants, and engage in spiritual activities in relative privacy.

**Tribal Government Relations**

The tribes' position is that treaty rights extend to the habitats upon which these trust resources depend. This claim includes the way fish and wildlife habitats are affected, by manner in which the Forest Service manages timber harvest, recreation, water, grazing, and minerals exploitation on National Forests. The CTWS have off-reservation rights to fishing, hunting, gathering, and range.

Little information exists regarding Traditional Use Areas in the portion of the Olallie Lake Watershed managed by the Forest Service. It could be beneficial for both the Tribes and the Forest Service if the Forest Service had a better idea of these locations and resource uses. Management of these areas would be more clearly definable.

**History of the Olallie Area**

Administrative History

- 1907 - area became part of the Cascade Forest Reserve
- 1908 - became part of the Oregon National Forest
- 1927 - the trail into the area was developed into an unimproved road known as the Skyline Road (major travel route)
- 1939 - Olallie resort was constructed
- 1930s - Olallie Guard Station constructed at Olallie Lake (CCC style building eligible for the National Register of Historic Places). During the summer this building serves as an information center, work station, and living quarters for employees
- 1965 - Olallie Scenic Area was created
- 1968 - Skyline Road became the Pacific Crest Trail

The Skyline Trail was established for the sole purpose of being a Forest Service access and administrative trail. This trail was established the same time as the guard station. This trail became open to the public in 1916. The Skyline Trail was relocated to the east when it became a road in 1927. It was moved to it's current location when it became the PCT in 1968.

*Campground History*

- 1918 - Olallie Meadows CG
- 1926 - Camp Ten CG
- 1932 - Paul Dennis CG

- 1934 - Breitenbush Lake CG
- 1934 - Olallie Lake Picnic Area
- 1937 - Lower Lake CG
- 1938 - Horseshoe Lake CG
- 1964 - Peninsula CG

*Confederated Tribes of the Warm Springs History*

- 1855 - reservation created
- 1871 - T.B. Handley surveyed for reservation boundaries. This survey proved to be erroneous and was renamed the Handley-Campbell Line.
- 1887 - Indian outcry brought about a re-survey by John A. McQuinn for the US Government. This became the McQuinn Line. The disputed area between became the McQuinn Strip.
- 1972 - Dispute over the strip was settled, awarding the contested lands to the CTWS.
- 1992 - The disputed land was formally transferred to the CTWS.

Upon comparison of today's use at Olallie it is clear that there has been a continuous recreational use of the area similar in nature over time.

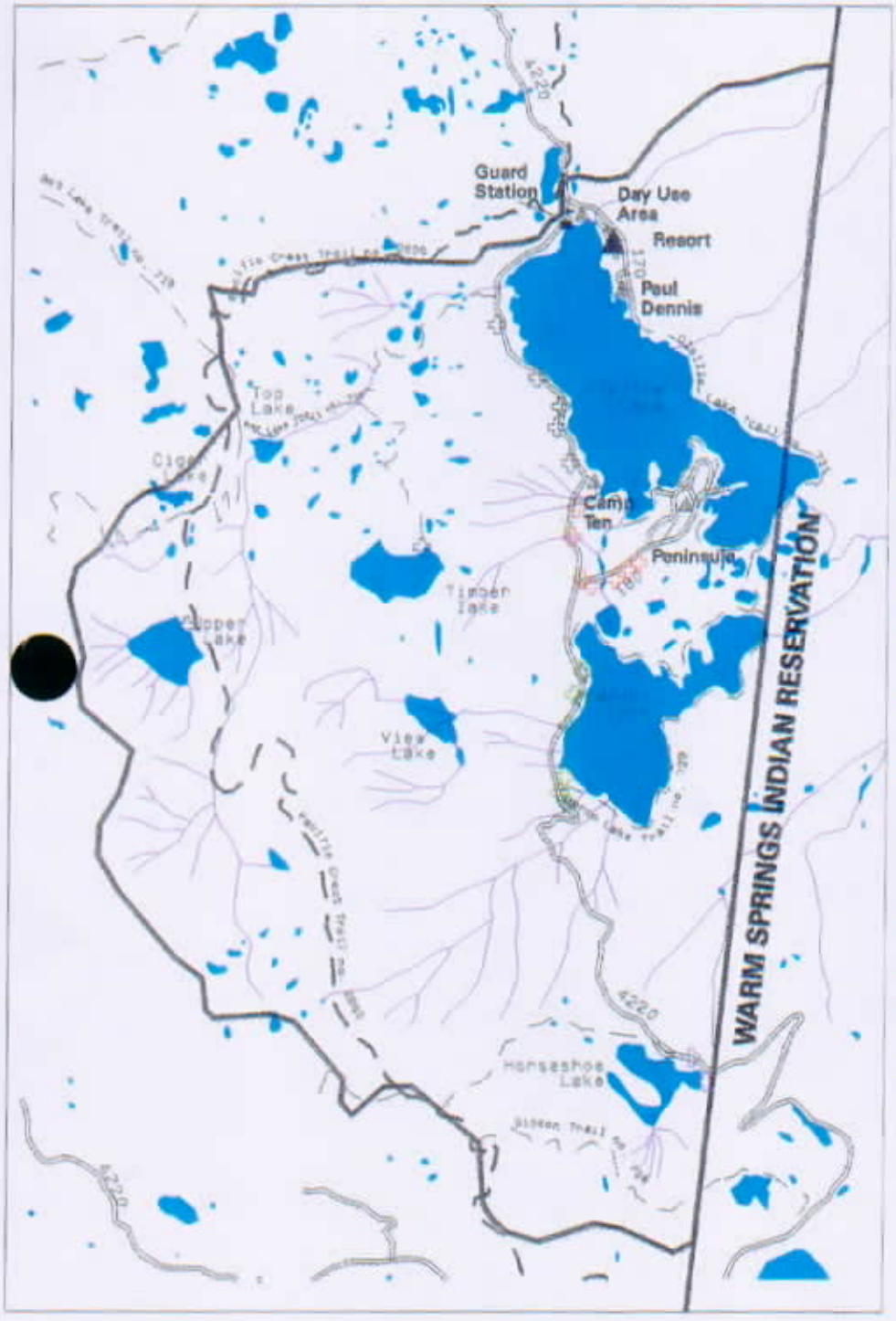
## B. Recreation

The first developed access into the analysis area was via trail from Government Camp. This trail developed into an unimproved road that has become known as the Skyline Road and currently is Forest Service Road #4220. The analysis area has two distinct recreation components separated by this road; backcountry roadless area and developed recreation complex.(Map 2-9) Recreationists have been traditionally drawn to this area because of the unique topography. The area contains numerous lakes, small ponds, meadows and wet areas which are a result of glaciers that once covered the area. The lakes provide visitors with water oriented recreation.

The heavy use season is usually determined by the weather. Winters are cold and wet. Winter weather's heavy snows often start in October and limit access during big game hunting seasons. Snow depths during the winter of 6 - 10 feet are common. Isolated snow drifts on the higher peaks and ridges, or on shaded roads, often do not completely melt away until midsummer.

In the 1930's, the resort and campground development began on the East side of the Skyline Road. Olallie Guard Station was constructed at Olallie Lake in the 1930's in the classic Civilian Conservation Corps (CCC) style. The area West of the road in the analysis area is roadless (approx. 1755 acres) and lies adjacent to the Mt. Jefferson Wilderness. The area provides recreationists with unusual opportunities for solitude and backcountry experiences over numerous recreation trails, including a segment of the Pacific Crest Trail.

# Olallie Lake Watershed
# (Forest Service)




## Recreation

## Legend

- Trails
- Pacific Crest Trail
- Lakes
- Roads
- Streams
- Developed Campground
- Olallie Lake Dispersed Camping Area
- Peninsula Dispersed Camping Area
- Monon Lake Dispersed Camping Area
- Horseshoe Lake Dispersed Camping Area

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**MAP 2-9**

Between 1973 and 1979, the Olallie area was studied and evaluated in the Roadless Area Review and Evaluation (RARE I) and (RARE II). The RARE II process recommended portions of Bull of the Woods, Eagle, Mt. Jefferson, and Salmon-Huckleberry for wilderness and proposed Olallie roadless area for further planning. As a result, a Forest level environmental analysis report was developed in 1983 displaying a variety of management alternatives. These alternatives were analyzed within the framework of the Mt. Hood Forest Plan. The chosen alternative retains at least 94% of the unroaded character of the area by allocation of the Olallie area to a Special Interest Area (SIA) A-4.

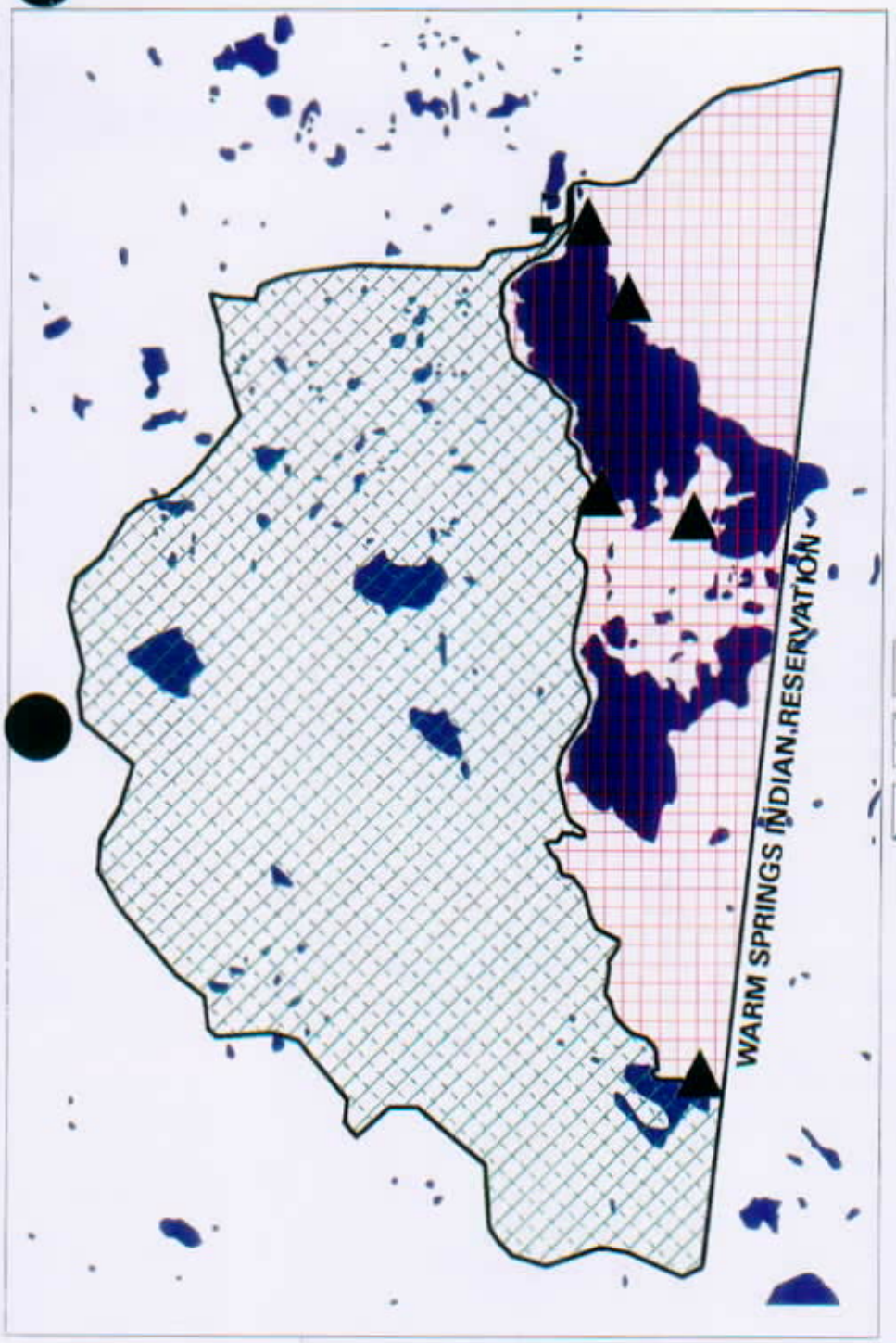
The 1983/84 analysis report identified that the current condition of the Olallie area indicated Recreation Opportunity Spectrum (ROS) classifications ranging from Semi-Primitive Non Motorized (SPNM), Semi-Primitive Motorized (SPM), to Roaded Natural (RN). To protect the naturalness of the Olallie roadless area, the ROS classification chosen in the Mt. Hood Forest Plan selected alternative for the entire Olallie Special Interest Area (SIA) was SPNM and SPM. (Map 2-10) Developed sites within this SIA were given an additional allocation of A10 Developed Recreation. ROS classification for each developed recreation site is to be delegated with an approved site plan that addresses SIA spectrum direction.

This ROS is a recreation planning and management framework which recognizes the continuum of recreation opportunities based on the activities, setting and experiences visitors desire. It is formulated by a variety of factors, or setting indicators including:

- Access
- Remoteness
- Social encounters
- Visitor management
- Facilities and management
- Visitor impacts
- Naturalness

Each of the setting indicators assists in describing the existing condition. The range of desired future conditions is developed by considering the setting factors in combination with management objectives. For the purpose of this analysis, each setting indicator of the ROS is discussed as an individual topic.

# Olallie Lake Watershed (Forest Service)




## Recreation Opportunity Spectrum

### Legend

- Semi-Primitive Motorized
- Semi-primitive Non-moterized
- Developed Campground

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**MAP 2-10**

**Access**

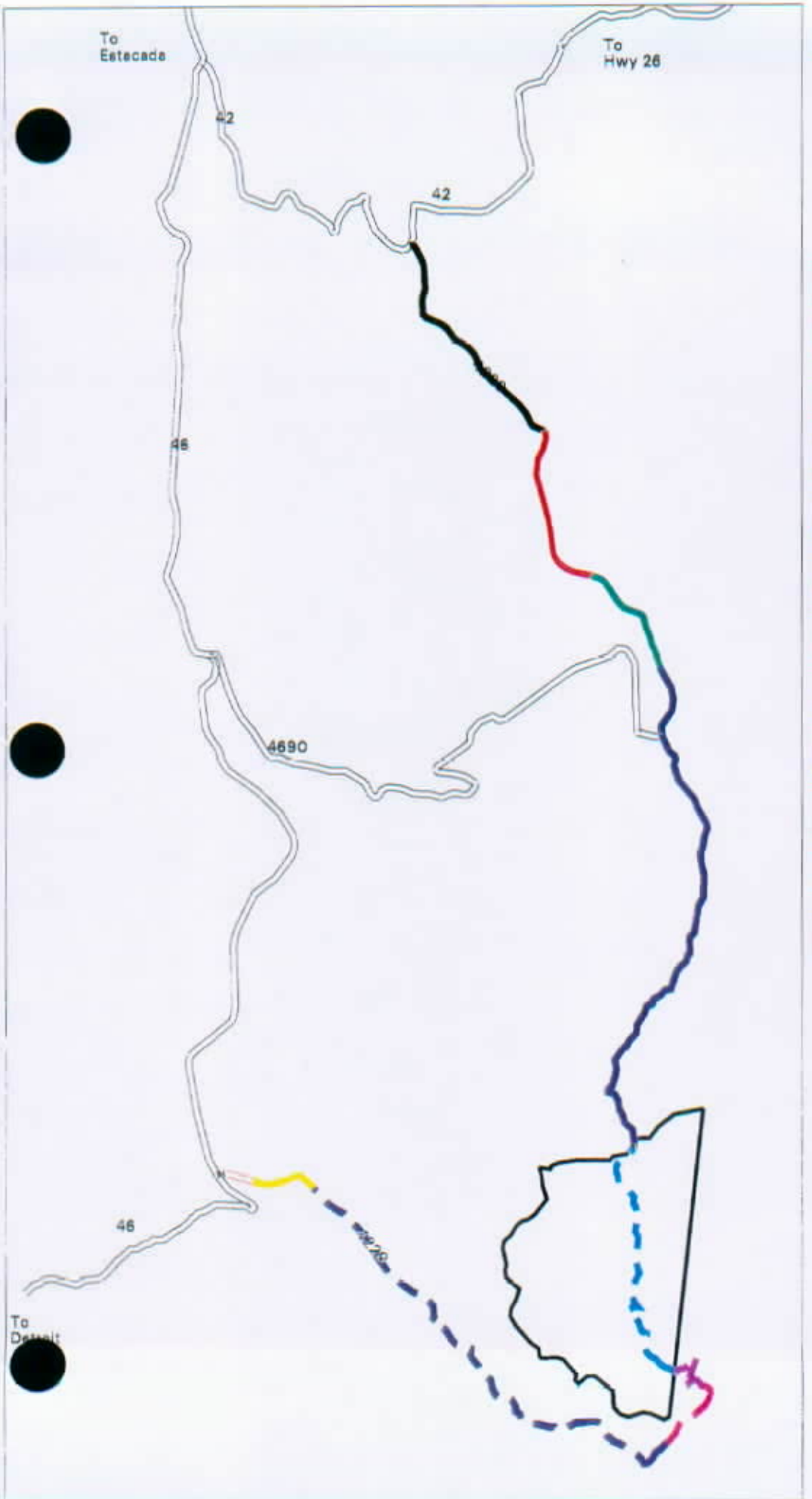
This element includes type and mode of travel. Highly developed access generally reduces the opportunities for solitude, risk, and challenge.
Access is provided to the Olallie Lake Scenic Area via road and trail. Access is often difficult and at times impassable through the section of Forest Service Road 4220 adjacent to Olallie Lake. This is due to heavy random parking along the roadway on holidays and weekends with pleasant weather conditions. There are also approximately 15 miles of trail in the analysis area including the Pacific Crest Trail.

*Roads*

The primary access road to the Olallie area is via Forest Service Road 4600, FS Rd 4690 and FS Rd 4220.(Map 2-11) The secondary access is provided via Forest Service Road 4200 and FS Rd 4220. A southern route from the Detroit area is via Forest Service Road 4600 and FS Rd 4220 or via FS Rd 4600 from the South to the primary access FS Rd 4690 and FS Rd 4220.

The primary access is via FS 4600, a maintenance level four, arterial double lane paved surface, Access and Travel Management System Road. Forest Road 4690 consists of 3.42 miles of paved surface, 2.82 miles of surface treatment and 1.9 miles of aggregate surfacing. The entire length of the road is maintenance level three, single lane with turn outs and an Access and Travel Management (ATM) System Road. Forest Road 4220 segment four and five (Map 2-10), from the Clackamas/Marion County Line to the McQuinn Line, is an objective maintenance level three, native surfaced single lane, Access and Travel Management System Road. This maintenance level cannot be accomplished at this time due to present primitive physical features of the travel way. Reconstruction would be needed to maintain the roadway at level three standards.

The secondary route is via Forest Service Road 42, which consists of basically three sections: double lane, paved surface maintenance level four; single lane with turn outs and paved surface maintenance level three; and single lane with turn outs and aggregate surface. The single lane aggregate section is under a timber sale contract to be paved to a single lane with turn outs standards. The timber sale was sold in fiscal year 1996. Forest Service Road 4220, segment one, is 2.72 miles of single lane with turn outs, paved level three maintenance. Segment two is 2.20 miles of double lane surface treatment, level three maintenance. Segment three is 0.95 miles of true native surface, single lane, level three maintenance. Segment four and five are essential links of both primary and secondary routes. Segments three through five would require reconstruction mentioned above to receive level three maintenance. The southern route is by Forest Service Road 46 to Forest Service Road 4220. Segment eleven is maintenance level three, single lane pavement. Segments ten and nine are maintenance level two, aggregate surface, single lane. Segment eight is a level two, native surface single lane road with two wooden bridges. Segments seven and six are within the McQuinn Strip and are under the Bureau of Indian Affairs jurisdiction. Both segments seven and six have had little or no maintenance in the last decade and are nearly impassible to all except a high clearance four wheel drive vehicle skillfully driven.




# Olallie Lake Watershed

## Access Routes to Olallie Lake

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5
- Section 6
- Section 7
- Section 8
- Section 9
- Section 10
- Section 11
- Main Routes into Olal i

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**MAP 2-11**

This route provides a loop access into the Olallie Scenic Area. With the continuation of no maintenance on segments six and seven of Forest Service Road 4220, this route will eventually become a non-loop road.

Trends

Forest Service Road 4220 serves as the only road access for recreation, administration, and emergency fire evacuation. As recreation use of the area increases, so does the risk of human-caused fire occurrence. This coupled with areas of heavy fuel loading from limited vegetation management could increase the risk of wildfire in the area. With the high fire risk and limited access, public safety concerns are growing. Additional fire prevention presence to address these concerns would be required. The primitive condition of the road could be a problem for fire evacuation. The current soft closure by no maintenance of Forest Service Road 4220 on Warm Springs land will eventually make this road a non-loop road. This closure through no maintenance could have direct impact on the maintenance and reconstruction required on the primary and secondary route from the North. Funding for this type of roading for recreational use has been declining every year. Because this is a scenic area, no timber sales are planned that would supplement funding for road improvement.

The Mt. Hood National Forest Management Plan states that "Dispersed recreational opportunities in a "roaded natural" setting will more than double during the next 50 years". This could be higher in the analysis area due to the close proximity to the expanding Portland-Vancouver metropolitan area. The Olallie analysis area is also within two to three hours driving time of Southern Oregon population centers such as Salem, Eugene and Bend. With Olallie Lake's central location and easy access from population centers combined with current and growing demand for activity settings around water, more vehicles can be expected on the primary, secondary and southern routes to the analysis area.

*Trails*

A network of trails interlace across the Olallie area (Table 2-15). A variety of development/maintenance levels may be found in the area. The destinations of most trails are lakes, peaks, or other trails. They are located in a variety of settings, including roaded natural, semi-primitive motorized, or semi-primitive non-motorized.

**Table 2-15. Trails in the Olallie Lake Area.**

| Number | Name | Description |
|---|---|---|
| 708 | Gibson Lake | Gibson Lake to Pacific Crest Trail. Open to hikers and mountain bikes. |
| 712 | Horseshoe Saddle | Gibson Lake to Pacific Crest Trail. Open to hikers and mountain bikes. |
| 704 | Ruddy Hill | Trail runs through geological area. Connects to Pacific Crest Trail. Open to hikers and horses. |
| 719 | Red Lake | West access to Olallie Scenic Area. Open to hikers, horses and mountain bikes. Maintenance Level I. |
| 725 | Top Lake | Connector to the Pacific Crest Trail. Open to hikers and horses. |
| 729 | Monon Lake | Trail travels around Monon Lake to trail #731 around Olallie Lake. Open to hikers. |
| 731 | Olallie Lake | Trail loops around lake. Open to hikers. |
| 732 | Monollie | Connector trail between Olallie, #731 and Monon, #729. Open to hikers. |
| 733 | Timber Lake | Trail travels in mature forest where there is excellent fishing. Open to hikers, horses, and mountain bikes. |
| 735 | Double Peaks | Steep trail with outstanding view of Jefferson basin. Open to hikers. |
| 2000.13 | Pacific Crest Trail (PCT) | This portion of the PCT accesses numerous lakes and unique features. Open to hikers and horses. |

To date, the PCT is the only trail used as an access route to Olallie Lake Scenic Area. The remainder of the trails are used for access within the area. The connection between the proposed Urban Link Trail and the PCT is to be accomplished by using the Red Lake Trail located in this watershed analysis area. When completed the Urban Link trail will provide a vital link through the Mt. Hood National Forest and become part of the trail system that connects downtown Portland to the PCT.

Due to budget reductions which limits maintenance of Forest Service trails to a higher standard, Trail #735 - Double Peaks, Trail #714 Ruddy Hill, and Trail #708 - Gibson Lake are scheduled to be dropped from the Clackamas Ranger District list of maintained trails.

Hikers currently comprise the large majority of all trail use in the analysis area.. Equestrians and mountain bikers comprise the balance of the trail use. Equestrians, hikers (including people with disabilities), and mountain bikers are the probable travelers on the proposed Urban Link Trail. Forest Service Road 4220 is commonly used as an equestrian and pedestrian travel way. The road is used as an access to the resort, lakes, and system trails. Most trails have minimal signing and little to no established trailhead. A fairly high degree of self-reliance is required in many places to locate the road/trail crossing, and then to find a safe place to park one's car.

Trends

The Olallie roadless area is the main "alternative" area for the Mt. Jefferson Wilderness. The roadless area provides opportunities for semi-primitive dispersed recreational experiences. This area provides an opportunity to reduce the number of people using Wilderness, by dispersing people into the unroaded area.
There has been a 12% increase in the number of visits to the Mt. Jefferson Wilderness since 1991.The combination of easy access and close proximity to major population centers has resulted in high day and overnight use. Easy access to popular locations has lead to intensive use that poses unique challenges to wilderness management. Intensive use has subsequently resulted in resource and social impacts that have impeded the attainment of wilderness management objectives.

The trend is leaning toward more regulated and restricted measures at highly concentrated and impacted areas in order to meet the intent of wilderness management policies and direction. Although restrictions are resorted to as last level measures, the sheer numbers of visitors and the anticipated growth of use prompt these types of actions. As restrictions such as limited entry are implemented, increasing demand may affect other "alternative" areas as a result of potential displacement of visitors.

**Remoteness**

Remoteness refers to the extent to which individuals perceive themselves removed from the sights and sounds of human activity.

The developed recreation sites, including the Olallie Lake Resort and the associated uses around Olallie Lake, generally consolidate the highest density use in analysis area. Use is increasing yearly on the Pacific Crest Trail. Remoteness criteria (i.e., distance from roads and motorized trails, size, evidence of humans), for Semi-Primitive Non-Motorized (SPNM), Semi-Primitive Motorized (SPM) and Roaded Natural (RN) are achievable in the watershed. To reach SPNM and SPM areas requires entrance into the roadless area.

Trends

Interest in outfitting and guiding special use permits is increasing for the Olallie roadless area. Issuance of this type of organized recreation could bring larger groups of people and animals (horses and llamas) into the area thus increasing stress on the perception of remoteness.

The recent purchase of Olallie Resort by a developer has increased the demand for commercially feasible resort operations which includes a proposal for the upgrade of facilities and associated activities to draw additional recreationists to the area. Sites and sounds of commercial development would accompany this activity.

Decreasing Forest Service budgets for trail maintenance is reducing and limiting the amount of maintenance work on remote trails.

**Social Encounters**

This factor refers to the number and type of other recreationists met along travel ways, or camped within sight or sound of others. This setting indicator measures the extent to which an area provides experiences such as solitude or the opportunity for social interaction.

Social encounters are most acute in the hub around Olallie Lake. Social encounters will be more intense on weekends and holidays throughout the summer season. Recreation use extends into the Fall in the Olallie area, but is practically non-existent in the Winter and Spring due to snow inhibiting vehicle access. Snowmobile use is increasing adjacent to the Olallie roadless area. Social encounter criteria for Rural, Roaded Natural, Semi-primitive non motorized,, and Semi-primitive motorized are achievable in the analysis area. The encounters around the resort and lake area are most responsible for the Rural and Roaded Natural classifications. Frequency of contact with others is moderate to high in developed sites, on roads and developed area trails. In the roadless area back country trails, semi-primitive settings occur with low to moderate contact frequency of 6 to 15 parties encountered per day on trails and 6 or less visible at dispersed campsites. On main line trails such as the Pacific Crest Trail use has increased to meet a Roaded Natural classification where frequency of contact can be moderate to high.

Trends

The Statewide Comprehensive Outdoor Recreation Plan (SCORP) includes a broad overview and analysis of the organization and function of the outdoor recreation system in Oregon. Olallie analysis area is part of Region 7 in this study. Dispersed activities in the Olallie area such as bicycle on road day trip, day hiking on trails, non-motor boating on lakes, recreation vehicle camping, and nature study/wildlife observations are high growth activities. As mentioned previously, the close proximity to population centers to the North and South indicate an increase in recreationists using this site.

**Visitor Management**

Visitor management includes the degree to which visitors are regulated and controlled (via physical barriers or regulations - such as permits), as well as the level of information and services provided for visitor enjoyment.

Regimentation controls are numerous in the developed component of the analysis area East of Forest Service Road 4220. Camping is prohibited between Forest Service Road 4220 and Olallie Lake, and is posted as such. Swimming and motors are prohibited in Olallie Lake, as it is still the primary water source for the recreation sites in the area. Horses are prohibited in all campgrounds in the analysis area. Erosion has been a concern in the high use areas around Olallie Lake, including within the resort permit area. Logs have been placed to define paths between resort cabins and the Olallie Lake shoreline. Regulations are posted to keep recreationists on roads and trail ways throughout the developed campground area. Other general forest regulations are posted at the Olallie Guard Station and Forest Service personnel are present during the summer season. An amphitheater is located at Peninsula Campground and general forest information and informative programs are advertised and presented on a regular basis.

Managerial criteria in the developed component area are best represented in the ROS classification of Roaded Natural and Rural classifications. On-site regimentation and controls are noticeable, but harmonize with the natural environment and in some cases the manmade environment.

Subtle regimentation controls are present in the roadless component of the analysis area West of Forest Service Road 4220 which meet classification of Semi-Primitive. Trail and trail destination distance is posted. General information is posted on occasional information boards. Mountain bikes are prohibited on the Pacific Crest Trail (PCT).

The Olallie Lake Guard Station is the primary location to receive information through postings and the recreation and fire guards stationed at this site. Interpretive programs are offered at the amphitheater in Peninsula Campground on most Saturday evenings. Bulletin boards provide general regulation information.

Trends

The Forest Service trend nationally is moving towards concessionaire campgrounds due to decreasing Forest Service maintenance and monitoring budgets for recreation. A reservation system is a part of management in most concessionaire campgrounds.

**Facilities and Site Management**

This indicator refers to the level of site development.

Many of the facilities in Olallie are rustic. Dimensioned materials are widely used in the developed component West of Forest Service Road 4420. An universally accessible fishing dock is located on Olallie Lake at Peninsula Campground. It is constructed of dimensioned materials. There are three universally accessible campsites available in Peninsula Campground. Four developed campgrounds are located in the analysis area and one picnic area. Developed site plans have not been updated in recent years. While facility improvements and replacements are being made, there is typically a large maintenance backlog. There is no potable water available in any of the Forest Service sites.

The Olallie Lake Resort and Paul Dennis Campground, under special use permit administered by Clackamas River Ranger District, is in similar condition to the Forest Service campgrounds. A new master plan for upgrading the resort and adding improvements has been submitted to the District for approval.

Upgrades, including filters and a chlorinator, have been added to the current water system for the resort and Paul Dennis Campground to meet Oregon State standards. Water is provided by the resort to the Forest Service Guard Station at no cost. Restrooms are located at each of the campgrounds and at the day use area. They are compatible with ROS classification of Road Natural/Roaded Modified. Trash dumpsters generally fill up on Sunday's and holidays. Often overflowing dumpsters attract bears in the area. The Historic Guard Station by Olallie Lake is an active administrative site in the summer months.

Current capacity for the resort, developed recreation sites, and dispersed campsites can be evaluated based upon design capacity for each unit in a campground, number of picnic tables in the day use site, accommodation for overnight use at the resort, and number of dispersed sites in the analysis area. Table 2-16 illustrates types and relative proportions of recreation activities in developed recreation sites during June through September. Use statistics for the resort during the same use period are found in Table 2-17. Both the size and the design capacity of each developed recreation facility is found in Table 2-18.

**Table 2-16. Numbers of occasions of use for recreation activities in developed recreation sites during June - September. Occasions are recorded by activity and number of persons doing that activity.**

| Campgrounds and Day Use Areas | General Day Camping | Trailer Camping | Vehicle Camping | Tent Camping | Picnicking | Cold Water Fishing | Hiking and Walking | Talks and Programs | Canoeing | Boat Launching | Other Watercraft |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Camp Ten | 1,000 | 1000 | 40 | 1,190 | 20 | 1,200 | 300 | | | | |
| Peninsula | 2,000 | 1,100 | 850 | 4,000 | 150 | 2,000 | | 650 | 150 | 500 | 150 |
| *Paul Dennis* | 1,500 | 320 | 400 | 2,000 | 20 | 2,000 | 1,200 | | 200 | | 350 |
| Olallie Picnic | | | | | 400 | | | | | | |
| Horseshoe Lake | 200 | 30 | 30 | 590 | 20 | | | | | | |
| Totals | 4700 | 2450 | 1320 | 7780 | 610 | 5200 | 1500 | 650 | 350 | 500 | 500 |

**Table 2-17. Numbers of occasions of use for recreation activities in the Olallie Lake Resort during June - September.**

| Resort and Store | Resort and Commercial Public Service[1] | Resort Lodging[2] | Other Watercraft | Canoeing |
|---|---|---|---|---|
| Olallie Lake Resort | 8,330 | 3,273 | 1,990 | 118 |

1. Resort and Commercial Public Service: All *nonspecific* daytime activities and general leisure at hotels, lodges, resorts, and other public service sites (i.e., stores, restaurants, filling stations, etc.)
2. Resort Lodging: Overnight use of hotels, lodges motels, cabins, etc.

**Table 2-18. Size and design capacity of developed recreation sites.**

| Developed Recreation Facilities | Size in Acres | PAOTS[1] (Capacity) |
|---|---|---|
| Paul Dennis | 6 | 75 |
| Peninsula | 5 | 190 |
| Camp Ten | .5 | 50 |
| Olallie Lake Picnic | .5 | 25 |
| Horseshoe Lake | .5 | 20 |
| Olallie Lake Resort | 14.9 | 200 |
| Total | 27.4 | 560 |

1. Persons at One Time (PAOT'S) for each campground, resort and picnic area are listed below. PAOT's are figured by multiplying each site in a campground and picnic area by 5.

Based upon the method for quantifying PAOTs (Persons At One Time), the number of people at one time using dispersed sites in the analysis area is the number of dispersed sites multiplied by 5. (Number of dispersed sites) 18 x 5 (assumed capacity) = 90 (PAOTs)Traditional appropriated funding for campground operation and maintenance is declining. Budget reductions may inhibit maintaining facilities to the levels of use they receive. The Forest Service is looking to the private sector to manage public campgrounds in order to keep campgrounds open. Campground, trail and other facility construction and reconstruction have been funded through the Capitol Investment Program which also is facing cutbacks. Recreation managers will need to look at alternative ways of funding recreation development in the future. Potentially, user fees may be implemented on National Forests in the future as a means to support recreation use on federal forests.

### Visitor Impacts

This factor refers to the impacts of visitor use on the physical and biological resources.

The Olallie Lake Resort permit area and the day use area near Olallie Lake have received the most site hardening and display high concentrations of human impacts. They are in need of redesign and reconstruction to lessen impacts to other resources. Dispersed campsites display human impacts from mild to severe. Where vehicle access is easiest, impacts tend to be most severe. Typical recreation-related impacts include litter, human waste, compacted bare soil in campsites, exposed roots, and damaged vegetation.

Established dispersed sites are located in the developed component of the watershed along Forest Service Road 4220 (Map 2-9). Four distinct groupings occur; 1)Olallie Lake, 2)Peninsula Campground Area, 3)Monon Lake, and 4)Horseshoe Lake area.

1. Dispersed sites adjacent to Olallie Lake receive a high level of recreation-related impacts listed above.

2. At Peninsula Campground the site close to Camp 10 has no available parking. The site adjacent to Rd 4220 at the entrance of the campground obstructs access to Rd 4220. Camping at this point has destroyed vegetation and compacted the soil. The three remaining sites are used as overflow camping from the developed campground.

3. No developed sites exist around Monon Lake. The dispersed sites provide the only camping opportunity. One site is actually parking for the Monon Lake Trail. Two sites are within 20' of the lake. One site is in a meadow. Two sites are located on an abandoned road.

4. One site is located across the road and up the road from Horseshoe Campground. It is on a hill side and receives heavy use. One site is located on an abandoned road and is rarely used.

Trends

Dispersed sites will increase with growing number of recreationists visiting the area. Vegetation will be destroyed and ground compaction will occur at these new sites. Erosion will increase off the trails around the lakes on user created paths.

**Naturalness**

Naturalness refers to the degree of naturalness of the setting related to Visual Quality Objectives (VQO). The setting of the area currently meets the visual quality objectives of retention and partial retention.

The Olallie Lake Watershed analysis area is a high elevation plateau straddling the crest of the Cascade Mountain range. The terrain is flat to gently rolling with no discernible watershed or viewshed boundary. The area is considered a "Class A Distinctive" landscape because it has unique scenic features not found in similar or surrounding landscapes. The Olallie Lakes Scenic Area is distinctive and unique because of the presence of over two hundred lakes in a region dominated by creeks and rivers. Scenic features also include a number of volcanic cones like Mt. Jefferson, Si Si Butte, and Olallie Butte; undisturbed forest cover, open meadows, and historic structures like the Olallie Guard station. Only one road accesses the Scenic Area and the landscape remains predominantly roadless and unlogged. The landscape also includes a number of historic, cultural elements such as old ranger cabins, sign boards, entry signs, a cabin resort, and campground facilities. Road 4220, trails, developed and dispersed campgrounds, the resort

lakeshores, and the lakes are the primary locations in the analysis area from which forest visitors both view and experience the landscape. Viewpoints are stationary at recreation facilities and slow moving along 4220 due to the slow travel speed of the primitive road. The area is dominated visually by a number of volcanic cones including Mt. Jefferson, Si Si Butte, and Olallie Butte which are outside the analysis area. Elevations range from 4000 feet elevation to 6000 feet elevation but the general elevation of the plateau is roughly 5,000'. The buttes rise in elevation from 100' to 2,400' above the plateau and, as with Olallie Butte, can measure as much as 6 miles in diameter at the base of the cone. The scenic quality of the lakes is further enhanced by the vivid reflection of the volcanic cones mirrored in the lakes' surface. Road 4220, the Skyline Road, is the only roaded access into the Scenic Area and was routed next to the largest of the lakes, Olallie, Monon, and Horseshoe, so all recreation facilities are clustered around these primary lakes. Much of the scenery along the road is a foreground view of dense forest stands due to the flat terrain and relatively uniform forest types. There are also unfolding views from the road of lakes, buttes rising above the forest, and buttes rising above and reflected in the lakes.

The foreground scenery also includes alpine meadows with lupine, Indian paintbrush, gentian, penstemon, tiger lily, and other colorful wildflowers in the summer. Huckleberry and heather also add color in the fall. The historic structures and cultural landscape components play a major role in the experience of the Scenic Area by emphasizing the remoteness of the area and the historic self reliance of the user. Persistent snow in the summer also contributes to the remote experiential qualities.

Views from Road 4220 are primarily foreground with the exception of isolated viewpoints or middleground views of the buttes and lakes. The existing views currently meet and/or exceed the Visual Quality Objective (VQO) of retention in the foreground and partial retention in the middleground and background as specified in the Mt. Hood Forest Plan. This means that the foreground vegetation currently is "natural appearing". The forest vegetation can also be uniform in texture and density in some areas and views into the forest stands can be flat and two dimensional. Potential middleground and background views based on topography are currently screened by forest vegetation along the road and trails with the exception of isolated viewpoints. Like the road, most of the view from the trails is of foreground vegetation except where the trail accesses lakes, butte tops, and cliffs.

*A 4/Scenic Area*

The Visual Quality Objectives for the Scenic Area as prescribed in the Mt. Hood Forest Plan are designated as retention in the foreground and partial retention in the middleground. This means that from roads, high use recreation areas and open water bodies, human activities should not be visually evident in the foreground and should be visually subordinate in the middleground. As has been previously noted, views in the scenic area are primarily foreground with the exception of isolated viewpoints or middleground views of the buttes and lakes.

The foreground, middleground, and background scenery meets the visual quality objective (VQO) Retention from the Mt. Hood Forest Plan. Uniform texture and high density of some forest

stands as viewed from the road are can appear flat and two dimensional. Potential changes from fire could affect the scenic quality in the short term although the resulting landscape would still meet the VQO of natural appearing.

*A 10/Developed Campgrounds*

The visual quality objective (VQO) for the developed recreation sites is Partial Retention as viewed from within the recreation sites. The current condition of the vegetation within the campgrounds and day use are currently appears "moderately altered" and is consistent with the Forest Plan standards. Evidence of recreational activity around Olallie Lake is growing and is giving the area a more "urbanized"appearance. This evidence includes tents and campers in lakefront campsites, shoreline devegetation, bumper to bumper parking of cars along Road 4220 , and the continuous stream of vehicles and dust during busy weekends and holidays on Road 4220.

# CHAPTER 3
# LANDSCAPE ANALYSIS AND DESIGN

# LANDSCAPE ANALYSIS and DESIGN

The Landscape Analysis and Design (LAD) process unites forest planning with the principles of landscape ecology and emphasizes the conscious design of vegetation patterns in the landscape based upon management objectives. The premise of the LAD process is that different landscape structures in the watershed can be arranged spatially according to management direction within the parameters of the watershed's physical and biological potential. Information about the LAD process is described in detail in the publication *Forest Landscape Analysis and Design* by Diaz and Apostol, 1992. The goal of using the LAD process in the Olallie Lake Watershed Analysis is to synthesize current management direction from the Northwest Forest Plan and the Mt. Hood Forest Plan, with the site specific analysis and recommendations from the watershed analysis to form a spatial plan of vegetation patterns and forest structures. In addition, the LAD process was used in the watershed analysis as the synthesis step to coalesce individual resource analysis into a landscape scale understanding of the watershed.

The LAD process for the Olallie Lake Watershed analysis area began with a comprehensive review of management direction and land allocations and was followed by an analysis of landscape structure, flow phenomena, linkages to the larger landscape, and disturbance regime. This analysis combined with landscape objectives from the existing management direction were used to create a conceptual landscape design for the watershed. The designs and plans produced during the LAD process graphically display where future management activities could occur in the watershed and serve as a bridge between analysis and site specific project development.

## Landscape Allocations and Design Objectives

Because design is an objective driven process, the establishment of clear landscape objectives for the watershed design is a critical first step of the process. Design objectives for Olallie Lake Watershed analysis area watershed were derived from the Northwest Forest Plan and the Mt. Hood Forest Plan.

The next step in the LAD process involved translating the management objectives into vegetation pattern types. Some management directions and land allocations have clear vegetation pattern objectives such as the enhancement of late seral forest structure in the Bald Eagle habitat area. Other vegetation pattern objectives had to be developed from the management direction based on watershed specific ecological structures and processes. See Chapter 1 *Management Direction,* for a comprehensive review of the land allocations and the most pertinent standards and guidelines from the Mt. Hood Forest Plan. Of particular importance in this watershed was the historic development of the A4 Special Interest Area in the Forest Plan based upon previous roadless area studies, RARE 1 and RARE 2. The provision of semi-primitive recreation opportunities and retention of scenic quality also played an important role in the creation of the design. And the interaction between forest visitors and resource protection in a fire dependent landscape also became a significant driver during the design development.

## Landscape Structure

Landscape Structure is an analysis of the existing vegetation patterns based upon the landscape ecology definitions of matrix and patch. (Forman and Godron 1986). Map 2-3 is a landscape structure map which displays the current condition of the Olallie Lake Watershed analysis area. The structural elements of the Olallie Lake landscape are divided into three categories:

- Matrix (landscape ecology definition)
- Immature forest patches
- Meadows
- Non-vegetated patches

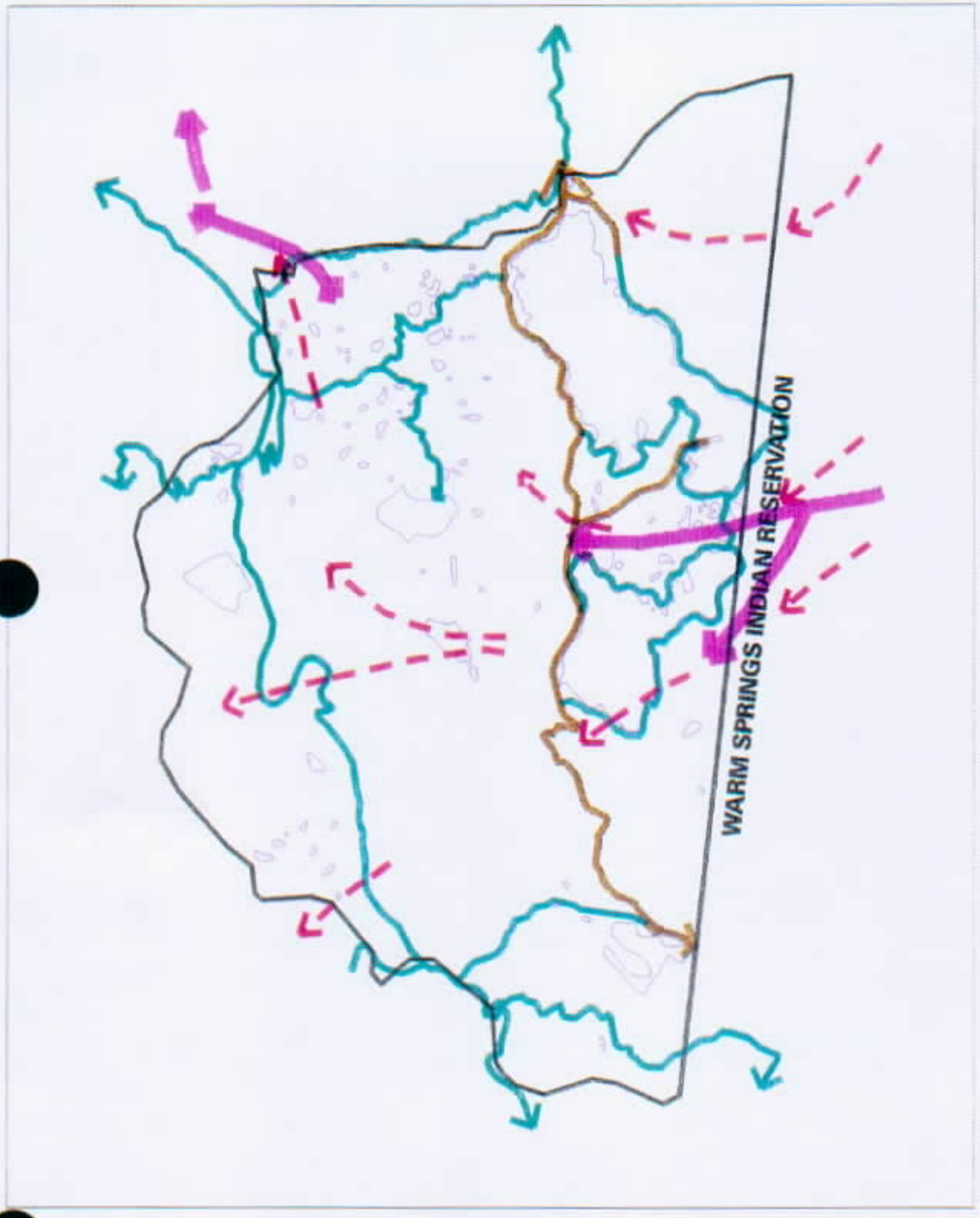
The "matrix", based on the criteria of relative area, connectedness, and control over landscape dynamics (Forman and Godron 1986, Diaz and Apostol 1992) is defined as mature forest and is the predominate structure type in the analysis area. The matrix is composed of closed large conifer, closed small saw, closed variable, open small conifer, and open variable stand. Both the closed variable and the open variable stands are included within the matrix but neither stand type has or is expected to reach a dominant age or size class. The immature forest patch type is comprised of the open sap pole stands. The open sap pole stands are rocky patches with 30% or less conifer coverage and are not expected to become part of the matrix over time. Because of the importance of fire disturbance in the Olallie Lake Watershed, stands within the matrix have also been further sub-divided into open or closed canopy structure based upon their expected relationship with fire disturbance. The large conifer stands are also treated as a separate landscape patch in the LAD process because of their importance in terms of habitat, scenery, and fire behavior.

The meadow and non-vegetated patches identified within the analysis area are considered "special habitats". There are two small meadows less than 7 acres in size in the federal portion of the Olallie Lake Watershed. The non-vegetated patches, lakes, and talus slopes are also divided into separate patches for the purpose of the analysis since each serve different functional roles in the landscape.

### Flows

Landscape flow phenomena are those identified elements which move across the landscape such as humans, animals, plants, water, fire, and air. (Diaz and Apostol) A map of the landscape flows can describe how the individual landscape elements and overall landscape pattern interacts with the individual landscape flows (map 3-1). For the Olallie analysis area, the roads and trails are important landscape components for human access and movement across the landscape. The riparian areas could be as important for terrestrial connectivity as for the flow of water and aquatic species. Two known migration routes for deer and elk traverse the analysis area although it appears that elevation and habitat limits the size of the herds. East wind is also an important

# Olallie Lake Watershed
# (Forest Service)




Flows

Deer and Elk

Road

Trails

Wind

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2640 0 1320

FEET

N

W E

S

MAP 3-

flow phenomena in the watershed because of the role it can play in the spread of fire. Table 3-1 summarizes the relationships between the landscape elements (matrix and patches) and the major flow phenomena in the analysis area. These relationships can convey information about habitat, biotic diversity, and social values. In addition to the mapped flow phenomena, the relationship between fire and the different landscape elements was included in Table 3-1 because of the significant role fire plays in the Olallie Lake landscape.

**Table 3-1. Relationship of Landscape Structure to Flows in the Olallie Lake Watershed Analysis Area**

| | People | Wind | Big Game | Riparian/Terrestrial spp | Fire |
|---|---|---|---|---|---|
| Landscape Elements | | | | | |
| Closed Large Conifer | *enhances scenery<br>*continuous canopy<br>*aesthetics | *alters flow pattern both vertically and horizontally<br>*decreased wind speed at lower level of canopy<br>*blow down<br>*ice breakage | *thermal/optimal<br>*hiding<br>*forage in openings (mammal)<br>*"stepping stone" from one cover to next | *connectivity<br>*forage (including other than big game<br>*shade/thermal<br>*nesting/denning/burrowing | *underburn type |
| Open small conifer<br>Open sap pole<br>Open Variable Stand | forested scenery | minimal impact overall | *hiding<br>*forage | *nesting/burrowing<br>*forage<br>*plants | *mortality in small conifer-<br>*poles survive<br>*"patchy" or thinning type burn-*not very intense |
| meadows | *high scenic diversity views<br>*harvest/gather<br>*nature study (birds/plants) | turbulence | *forage<br>*calving<br>*resting<br>*frolicking | *amphibians nesting/hiding/foraging<br>*birds nesting/hiding/foraging<br>*plants | *replacement type fire<br>*fast moving, less intense fire |
| Water | *recreation magnet<br>*scenery<br>*thirst quencher | *channels wind<br>*turbulence | *water source<br>*cooling source(thermal) | *amphibians<br>*otter, mink, weasel<br>*fish (non-native)<br>*birds<br>*plants | N/A |
| Talus | *exploration<br>*views of/from | *channels wind<br>*turbulence | N/A | *small mammals<br>*birds<br>*plants - specialized habitat | N/A |
| Closed small saw<br>Closed Variable | *forested scenery<br>*"it's there" | *density of stands alters flows | *hiding<br>*thermal (due to density<br>*minimal forage | *birds (songbird types)<br>*small mammals<br>*plants | *Stand replacement<br>*fast moving, intense, hot<br>*crown fire<br>*potential |

## Disturbance Regime

Fire is and has been the primary disturbance agent in the analysis area although disease, insects, and humans have also play a role in shaping the vegetation pattern of the landscape. As previously mentioned, this area has not been fragmented by timber harvest and is relatively unroaded. The existing forest mosaic is a result of historic fire disturbance although no large stand replacement fires have occurred in the analysis area since 1907. Natural fuels cycling, fire suppression, and climatic conditions appear to be the primary determinants of the fire regime. Insects, disease, and wind are also disturbance agents in the landscape and work in concert with fire to create the shifting pattern of vegetation structure across the landscape. Human activity is limited in the analysis area and the effects are primarily from recreation development, fire ignition, introduction of non-native species, and wildlife displacement. The effects of American Indian burning of the landscape are not known at this time.

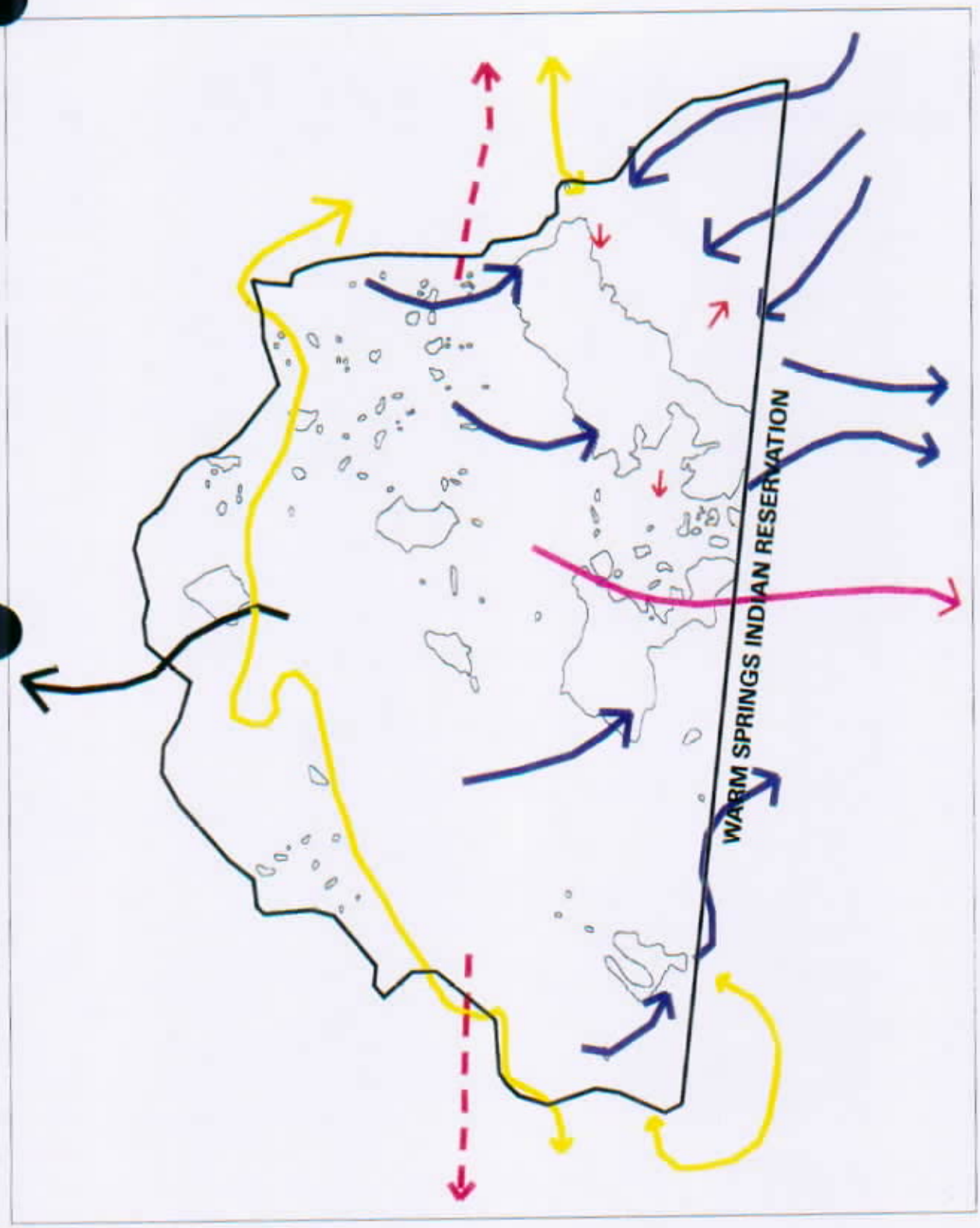
## Landscape Linkages

Linkages describe those flow phenomena which move or connect across watershed boundaries and describe how the analysis area fits into the context of the larger landscape.(Map 3-2) This is especially important because the Olallie Watershed analysis area covers only the area of the watershed that is managed by the Forest Service (2,925 acres). The remaining 29,953 acres of the watershed that is not covered by this analysis document is on land that is owned and managed by the Confederate Tribes of the Warm Springs Indian Nation. In addition, the analysis area is located on a high elevation plateau with no discernable watershed boundary. This means that it shares many unique geologic, biologic, and social characteristics with the surrounding landscape.

Water links the analysis area to the rest of the watershed by serving as a recreation destination, connected terrestrial habitat, a source of cold clean water for the downstream riparian system, and as a potential migration route for non-native fish. Humans access the watershed by both Road 4220 and a trail network which includes the Pacific Crest Trail. And viewpoints within the analysis area provides views to the outstanding scenic features of Mt. Jefferson and Olallie Butte outside the watershed.

For species requiring forest habitat above 5,000 feet, the analysis area can be viewed as an island with a causeway to the south and Mt. Jefferson, surrounded by a sea of low and mid-elevation habitat. Linkages may also exist to the north along the Cascade crest to Mt. Hood, but due to the lower elevations and habitat modification which has occurred is this area, the relationship is not as apparent. The analysis area may therefore serve as an important center of distribution for higher elevation species in the southern portion of the Forest, an important linkage with Mt. Jefferson to the south and a refugia for high elevation species during periods of warmer climate.

# Olallie Lake Watershed (Forest Service)




Linkages


High Elevation Cascade Crest Species

East Side Elevational Species

Human

SCENIC LINKAGE

Water

West Side Elevational Species

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2640 0 1321

FEET

MAP 3-2

## Conceptual Landscape Design

The Conceptual Landscape Design (Map 3-3 and Table 3-2) graphically displays the vegetation patterns desired under the existing management direction found in the Mt. Hood Forest plan. The Conceptual Landscape Design provides information specific to each pattern type, its' management objectives, and recommended activities. Development of the Conceptual Design was based upon the following primary management objectives:

- Retention of a mosaic of forest stand types through natural fire processes.
- Creation of "fire resilient" stands and "defensible spaces" near structures and developed recreation sites.
- Creation of bald eagle habitat.
- Retention and/or creation of large conifer stands in riparian areas for riparian system integrity and habitat diversity.

For the roadless area west of Road 4220 the pattern type of "Fire Mosaic" is based upon the retention of roadless characteristics and natural processes.

The "open conifer" pattern type is based upon the relationship between fire and the large conifer and open small conifer/open sap pole landscape elements (Table 3-1).These stand types are least likely to burn as part of a fast moving, intense, hot, stand replacement fire with crown fire potential. In the developed area east of Road 4220, the design objective of Open Conifer is to create stands in and around the developed recreation area which are more fire resilient.

The "Late Seral" pattern type in the A13 land allocation has the objective of habitat enhancement for bald eagle nesting and roosting by the enhancement or creation of open, large forest structure.

**Table 3-2. Conceptual Design Key**

| Pattern Type | Objective | Includes | Management Direction |
|---|---|---|---|
| Fire Mosaic  | *Retain mosaic of forest stands through natural fire processes. | *Area A<br>*roadless area west of road 4220 | *Prescribed fire |
| Open Conifer  | *Create "fire resilient" stands and "defensible space" near structures and developed recreation sites. | *Area B<br><br>*A10 Developed recreation site land allocations<br><br>*developed recreation area east of road 4220 | *Fuels reduction by thinning, pruning, prescribed fire, and/or mechanical treatment<br><br>*2 acre gaps to provide additional early seral structure, edge habitat, and diversity of structure |
| Late Seral (Bald Eagle Habitat)  | * Create Bald eagle habitat | *A13 Bald Eagle land allocation adjacent to Monon Lake | *Thin to promote late seral structure<br><br>*Create or promote snags and LWD where lacking<br><br>*Reduce disturbance by recreation visitors |
| Retain and Promote Late Seral  | * Riparian Protection | * Riparian Reserves | *See ROD |
| Interim Retention of Oldest Forest Patches  | * Habitat diversity<br>* Scenery protection | *Late-large seral stands | * Manage for fire prevention and suppression |

# CHAPTER 4
# KEY QUESTIONS

# KEY QUESTIONS

## KEY QUESTION #1

*What management activities could reduce the potential of wildfire impacts to scenic resources, infrastructure and forest visitors?*

The most important management activity for reducing impacts to this portion of the watershed is the development of a comprehensive management plan for the whole Olallie Lake Scenic Area. This plan is envisioned to include the following items:

- Fire evacuation plan
- Escaped Fire Situation Analysis (EFSA) based upon present and predicted fuel levels (see Mt. Hood Fire Management Action Plan)
- Agreements with the Confederated Tribes of the Warm Springs
- A prescribed fire plan (natural and management ignition)
- An appropriate level of the fire prevention program for the area
- Responsibilities of the concessionaire for the lodge and campgrounds
- National Fire Protection Association Standards for structures within the area

The analysis area was divided into two zones for the purpose of addressing two different management objectives. That portion to the west of Road 4220 has been designated as area A while that to the east is area B.

Area A is designated as Roadless and therefore no motorized equipment is allowed to operate within its boundary. This category limits the management options available for this zone. Therefore, prescribed fire and prescribed natural fire are the key tools for managing tree density and fuel loadings here. An education/prevention program would also play an important part.

On the east, Area B is classified as Semi-primitive Motorized. As in Area A, prescribed fire and prescribed natural fire can be used. But here, the use of mechanical equipment is allowed and there are more alternatives for management. There would be the possibility of establishing fuelbreaks along the roads in the area, around the Lodge and the designated campgrounds. Here trees may be thinned and brush could be removed. Because of the low value and small diameter of the trees in the area, timber probably would not be sold for lumber. Instead it might be used for firewood, chewed up by a track-mounted masticating machine and left in place or burned by prescribed fire. In addition to creating fuelbreaks, thinning could be used to control the stand density away from populated areas. An education/prevention program would also be used here also. In addition, fire inspections of the lodge and associated facilities would be necessary.

It is recognized that any additional management or hazard reduction programs for the area will have budgetary impacts. Given the present economic outlook of the Forest Service, it may be

very difficult to fund any of the above mentioned programs. However, the Agency needs to weigh the present situation and possible alternatives. If one were to prioritize the list of activities above, writing a fire plan for the Olallie Lake Scenic Area would be highly recommended.

## KEY QUESTIONS #2

*Can and/or will this area provide for benefits to late successional forest related species? What management options could best ensure adequate habitat for species that require these habitat types?*

Late successional forest , based on structure, is comprised of trees with diameters greater than 21 inches DBH, snag and down woody debris of varying size and decay class are abundant, crowns are decadent (i.e., broken tops), and a multi-storied canopy is obvious. The existing vegetative condition of the analysis area is that of a transitional eastside-westside forest type. The higher elevation of the area lends itself to cooler, shallower soils with little nutrient value. Conditions such as this contribute to stands with shorter tree heights, brushy understories, and trees with smaller diameters. At present, only 6% (180 acres) of the area contains large-late seral stands. These 180 acres are distributed throughout the landscape in five different patches. This wide and seemingly unconnected pattern is surrounded by stands of small-late-seral forest and mid seral forest , most of which is over 150 years old. Although the age of the mid-seral stands are impressive, the structure is not. Again, the trees are very small in diameter, the snag and down wood components are lacking, and the understory is heavily brushed. Given the current age, density, elevation, and soil productivity of the area, most of these stands will continue in this pattern. These factors would indicate that unless some form of enhancement occurs, the stands will not provide for long-term needs of late seral associates.

Sites in the Mountain Hemlock Zone tend to support lower numbers of wildlife than those at lower elevations. In the western Cascades, elevation appears to be the most important variable determining the numbers of vertebrate species that occur in a given site (Harris, 1984). In comparison to lower elevations, relative numbers of amphibian, reptile, and bird species are lower at higher elevations while species of mammals are relatively more abundant (Harris, 1984).

Most birds using the Mountain Hemlock zone are summer residents that migrate to lower elevations or lower latitudes in the winter. Chickadees, gray jays, nutcrackers, and ravens are all year round residents that cache food to survive the winter months. The Olallie Lake analysis area supports an abundance of birds and a list of sightings can be found in the analysis file. Birds, mainly cavity nesters, associated with late seral forest habitats may be found in the area despite the marginal habitat. Key habitat features for late seral associates such as pileated woodpeckers, are mature/overmature stands, large amounts of down woody material, large defective trees (for nesting, roosting, foraging), and large snags. Although these features are limited in the analysis area, pileated woodpeckers have been observed using the remnant snags that are scattered throughout the landscape.

Black- backed woodpecker are also likely to forage in the lodgepole but the small diameters of the trees probably limits nesting opportunities.

Most mammals are year round residents. They burrow under the snow or hibernate to survive the

winter. Deer and elk are exceptions to this as they migrate to lower elevations in winter months. Mammals associated with this area and it's late seral stands include the wolverine and pine marten.

Key habitat features for pine marten (*Martes americana)* are large patches of late successional forest, intact forests along riparian zones, and down woody debris of varying decay stages to support prey species. Although the area contains little of the typical habitat for pine marten, sightings have occurred . Documentation was obtained via winter tracking surveys, bait station/camera monitoring, and visual observation.

Preferred denning habitat for wolverine are those areas isolated from disturbance, are above 4000 feet elevation, and have a north/northeast aspect. One high potential denning site is located within the analysis area.

Several management options are available to enhance the existing late seral and to promote mid seral stands. These options include prescribed/natural fire and/or mechanical manipulation via mastication, logging, thinning, or cut and burn. In order to develop late seral stands, disturbance areas will need to be large enough to provide for species needs (i.e., hiding, nesting, foraging, etc.) and replacement habitat. In addition, disturbance around existing late seral stands needs to be large enough that it adds sufficient area to now-deficient interior habitat (interior habitat requires < 500 feet from edge).

However, it must be recognized that there may be trade offs in achieving these conditions. Scenic quality objectives may be compromised if large areas are identified for habitat enhancement. Objectives for short-term scenic quality verses long-term habitat provisions must be considered. By providing for late seral wildlife habitat needs, scenic quality, over time, will be enhanced.

Different types of silvicultural treatments could be used which MAY move the mid seral and late seral small diameter stands towards late seral large diameter conditions. The reason for the emphasis on the word "may" is that soil productivity throughout the area could be a limiting factor in growing trees to diameters greater than 21"DBH. However, there could be small "flower pots" where soil may be deeper and also more productive. The flower pot effect may partially account for the existing patches of large diameter late seral trees.

The treatments mentioned above could include the thinning of existing dense stands of smaller diameter trees. By removing a portion of the stems in a stand, the remaining trees would have less competition and tend to be healthier. Depending upon the age and species of the trees, and site class, the diameter growth rate may increase with reduced competition. Another treatment could include the creation of small openings one-half to two acres in size. This action would release the trees around the perimeters of the openings from competition. As with the previous treatment, vigor would be improved and the rate of diameter growth may increase, The small openings would also add to the habitat diversity of the area by creating edge, foraging areas, and patches where huckleberries could be re-established. Both treatments would change the vertical

and horizontal structure of the resent homogeneous conditions. Thinning could take place in all of Area B, to the east of Road 4220, while the small openings would be created only in non-riparian in Area B.

## Key Question #3

*What are the effects of human use and management on special habitats, riparian areas, traditional use areas, and the recreational experience? Given these types of effects, what are the opportunities and constraints for future development and management?*

Effects on Riparian Areas and Special Habitats

Effects from human use in the Olallie Lake watershed analysis area are greatest in the riparian reserves around the lakes. Ollalie Lake receives the highest concentration of use in the analysis area and the western shore, day use area, resort, and campgrounds of Olallie Lake receive the most intense use. Trail # 731 encircles Olallie Lake but receives less use than the developed recreation sites. Physical impacts along the Olallie Lake shoreline include devegetation, compaction, and erosion with the potential delivery of sediment to the lake. Because soils are shallow, poorly drained, and relatively infertile throughout the analysis area, sites which compacted and eroded are likely to have persistent revegetation problems. Water quality is an important issue in the analysis area, because Olallie Lake is the primary source of drinking water for the resort and campground and is the headwater of Mill Creek which feeds the Warm Springs river. The clear, pure water of the many lakes in the analysis is also considered an outstanding aesthetic quality. Shoreline devegetation along the western shore is caused by dispersed day use in concert with wave action and high winter water levels. Physical effects like devegetation also affects shoreline wildlife habitat for riparian dependent species like amphibians. Another major effect of human use is potential wildlife displacement by species sensitive to human presence. In the Olallie Lake area these species are bald eagles, amphibians, neotropical songbirds, and small mammals like pine marten, mink, and weasel. Boating on Olallie Lake is limited to non-motorized craft and swimming is prohibited to minimize impacts to water quality and shoreline habitat from wave action.

Trail # 729 around Monon Lake is within both the Riparian Reserve and the two A 13 Bald Eagle Habitat allocations. The design of this trail addresses the wetland and wet meadow habitat it accesses by raising the trail on puncheon and bridge through sensitive areas. The potential for wildlife displacement due to human activity is present at Monon Lake especially in the Bald Eagle Habitat Area. The lake receives less concentrated recreation use than Olallie Lake and fewer physical impacts to soils and vegetation. One walk-in dispersed campsite is located at the small meadow at Monon Lake and receives only intermittent use. Recreation activity there has the potential to affect wildlife habitat through physical impacts. Because of the fragile soils, loss of vegetation could remain devegetated with a persistent loss of hiding, nesting, foraging, and breeding habitat. The intermittent and seasonal use of the meadow is expected to cause fewer wildlife displacement problems because human presence is not continuous. Additional established dispersed sites are located in the developed component of the analysis area along Forest Service Road 4220. Impacts from these campsites include litter, human waste, compacted bare soil in campsites, exposed roots, and damaged vegetation.

Most of the trail system in the analysis area outside the developed recreation areas doesn't parallel the creeks but does intersect the riparian reserve system. Several trails also lead to back country lakes and peaks. Although there is no available information on the condition or the amount of recreation at Top Lake and Timber Lake, potential effects from recreation use could include compaction, erosion, and devegetation of the lakeshores. Wildlife displacement could also occur depending on the level of use. There is also no survey data on Trail # 704 to Ruddy Hill or Trail # 735 to Double Peak, but both are potential peregrine falcon and alpine plant habitat. Deer and elk hunting occurs, however, the limited road system (Road 4220) in the analysis area also reduces the potential for big game harassment. The limited recreation season in the entire analysis area (summer/autumn) also reduces the potential for human disturbance during breeding season for amphibians (winter/spring) and bald eagles (late winter).

Increasing levels of human activity in the analysis area also has an effect on the recreation experience and traditional use areas. Higher concentrations of visitors, particularly in the developed recreation areas around the major lakes, diminishes the opportunity for privacy and solitude and can move the ROS classification toward a more 'urbanized' setting. Increased use can also increase the competition for facilities like campsites and cause more wear and tear on those facilities. Increases in dispersed recreation can also lead to traffic jams along Road 4220 and user conflicts. All increases in human use can lead to an increased risk of human caused wildfire. Effects of increases in human use in the watershed can impact traditional use areas by increasing competition for privacy and resource harvest as well as increasing the potential for trespass on Confederated Tribes of Warm Springs land.

Opportunities and Constraints

The concept of opportunities and constraints can be useful tools to integrate management objectives with the physical and biological potential of a landscape if clearly defined. For the purpose of this analysis, opportunities can be defined as landscape features which facilitate the fulfillment of a management directive. Constraints are those landscape features which constrain the fulfillment of a management objective by adding additional physical or financial restrictions to the accomplishment of a management goal. Some landscape characteristics, like soils, can serve as a constraint to multiple objectives and can exist throughout the analysis area while others are localized in effect. Just as a landscape characteristic can operate as a constraint and close a door on a management activity, the same landscape characteristic can often serve as an opportunity to fulfill another management goal. Opportunities can also indicate pro-active management steps to address resource impacts. The primary constraints in the Olallie Lake analysis area are soils and roads. The main opportunities include improved wildlife habitat, watchable wildlife potential, clean drinking water, and enhanced prospects for privacy and solitude.

Soils are a constraint throughout the Olallie Lake area to both development and restoration activities. Soils in the analysis area are extremely gravelly and cobbly sandy loams and are less than 20 inches in depth. On-site septic disposal opportunities are poor, and would be limited by

the coarse textured, shallow soil profile. This could have implications for development of recreation facilities especially around Olallie Lake which serves as the source of drinking water for the resort and Paul Dennis campground currently under concession to the resort. No other drinking water is provided in developed recreation facilities in the analysis area. Two wells in Forest Service campgrounds were closed after they collapsed and there are no plans to repair or dig new wells because of the expense. Wells in the analysis area have a high cost because of the distance from town to move equipment, the vertical distance to water, and the amount of rock through which the well has to be dug. To meet the standards of the Aquatic Conservation Strategy of the Northwest Forest Plan (ACS) and to provide clean drinking water for recreation use, water quality will have to be maintained. This could mean additional expense for sewage disposal systems. Currently, all toilets in the Forest Service developed recreation sites, except for five, are self contained and pumped. It is expected that all new Forest Service toilets in the future will meet or exceed this standard. The distance from town is also an additional expense for toilet pumping and garbage removal services.

Dispersed recreation sites along the heavily used western shore of Olallie Lake and all the dispersed campsites in the analysis area have no developed toilet facilities. This aspect of dispersed recreation has ramifications for the provision of clean water, scenery, and public health.

Because of the high elevation, short growing season and limited nutrient storage in the soil profile, these soils pose extreme limits to tree growth and may be a challenge to revegetate following disturbance. This could mean that it would be difficult to establish vegetative cover in areas disturbed by new construction and both developed and dispersed recreation use. In areas where vegetation loss occurs, there is a potential for increased sediment delivery to the lakes, elevated water temperatures, loss of riparian habitat, negative impacts to scenery, and a more visible human presence. Managing use sites to prevent loss of riparian vegetation is also an opportunity to enhance wildlife habitat, scenery, and the recreation experience. New and/or improved facilities which could handle current peak use at the most popular sites could protect sites where vegetation loss is occurring. Dispersing use into less popular areas with appropriate site facilities can also be an opportunity to reduce the number of visitor encounters , enhance the scenic character of the setting, and increase the potential for watchable wildlife as well as comply with the standards of the ACS.

Road 4220 serves as both a constraint and an opportunity for recreation use in the analysis area. The primitive condition of the road limits easy access for recreation visitors. The drive to Olallie Lake on Road 4220 can be painstakingly slow and dusty on the best days. During high use weekends and holidays, it can seem like a traffic jam in downtown Portland. Parking for day use, trailhead, or dispersed recreation use is also extremely limited. Random parking on the west shore of Olallie Lake occurs bumper to bumper and can obstruct through traffic. This can deter repeat visitor use and be a less desirable part of the recreation experience for some visitors. During weekdays and low use periods, however, the primitive condition of the road can also serve to reenforce the semi-primitive recreation experience depending upon the driver's skill and

expectations.

The road's primitive condition could also be a constraint to the timely response of emergency personnel like law enforcement as well as fire and medical evacuation. An alternative evacuation site at Peninsula Campground needs upgrading and expansion to be functional.

While improvements to the road could facilitate recreation visits and improve emergency response time, it can also create more traffic and increase the number of recreation visitors. There is an opportunity to control growth and maintain the scenic and social values of the analysis area through traffic, parking, and facility development.

# CHAPTER 5
# RECOMMENDATIONS

# RECOMMENDATIONS

## RECOMMENDATIONS SUMMARY

- Stabilize the level of current use and reduce resource impacts due to human uses.

## RECREATION

- Develop capacity study for the entire Olallie Lake Scenic Area.
- Future restrictions of the number of vehicles allowed in the area should be considered. Ensure continued access of tribal members.
- Manage parking to reduce the number and concentration of users, facilitate emergency vehicle access during a fire, and reduce the negative impacts to resources from unmanaged parking.
- Evaluate the impacts of mechanized recreation use (mountain bikes, snowmobiles, ATV's) to Warm Springs Indian Reservation.
- Control random roadside parking, especially adjacent to Olallie Lake, with the creation of managed off-road parking.
- Consider closure of Road 4220 between Horseshoe Lake and Breitenbush Campground to reduce day use in Mt. Jefferson Wilderness, reduce trespass onto Warm Springs Indian Reservation, and control vehicle use in the Olallie Lake Scenic Area.
- Continue current maintenance level of Road 4220 in Analysis Area and consider continuing the same maintenance level throughout the Olallie Lake Scenic Area. Evaluate opportunities to facilitate fire engine access.
- Limit winter sports activities to prohibit snowmobile use south of Olallie Lake Resort. Do not groom trails (snowmobile or ski) in the Olallie Lake Scenic Area.
- Manage dispersed camping along Road 4220 to allow vehicle access.
- Develop trail heads with adequate parking.
- Maintain trails to the Pacific Crest Trail and high use lakes in the Olallie Lake Scenic Area to disperse concentrations of users and to reduce negative resource impacts.

- Place limits on guide permits concerning number of people in party, frequency of use, and time period of activity. Prohibit guide permits east of Road 4220.

- Utilize multiple types of interpretation in developed areas to disperse concentrations of users.

- Maintain the proportions of the ROS classifications Semi-primitive motorized and non-motorized in the Olallie Lake Scenic Area.

- Develop a site plan, vegetation management plan, and ROS classification for each A10 Developed Recreation facility and Olallie Lake Resort.

## HERITAGE RESOURCES

- Conduct archeological surveys of entire Scenic Area with more intensive testing as necessary.

- Consult with Tribes preceding projects or proposals that may affect Tribal rights and/or interests.

## AQUATIC

- Manage developed recreation facilities, dispersed recreation sites, and trails to prevent or reduce sediment delivery to the lakes and streams.

- Manage developed recreation facilities, dispersed recreation sites, and trails to reduce impacts to wildlife habitats.

- Manage developed recreation facilities and dispersed recreation sites to prevent bacterial contamination of lakes and streams.

- Conduct stream, lake, and riparian surveys before project development or implementation of the Conceptual Design in cooperation with the Confederated Tribes of Warm Springs (CTWS) and the Bureau of Indian Affairs.

- Based on additional surveys by CTWS to determine if there is escapement of stocked fish, fish screen structures may be needed.

## TERRESTRIAL

- Areas which have the potential to be impacted by recreation activities should be surveyed for TES plant species, native wildlife, an culturally sensitive plants (i.e., camas and huckleberry).
- Conduct inventories for survey and manage species to determine the analysis area's relative importance as refugia for high elevation forest species.
- Conduct surveys for noxious weeds around high use recreation areas, including lakes with boat traffic.
- Include educational materials for recreationists explaining the problems associated with noxious weeds in interpretive material.
- Encourage the use of pellet feed for pack and saddle stock.
- Collect broad based stand exam information, including snag and down woody debris.
- Conduct surveys of Ruddy Hill and Double Peaks to determine potential for peregrine falcon use.
- Conduct surveys of meadows to determine if conifer encroachment is occurring, and if so, the impacts of the encroachment.
- Continue winter tracking and bait station surveys for forest carnivores (pine marten, wolverine).
- Field verify potential wolverine denning sites.
- Survey for C3 species (plant and animal).
- Conduct surveys for spotted owls prior to projects.

## SCENIC RESOURCES

- Future vegetation management should be planned and laid out in the field by a landscape architect, silviculturist, and fuels management specialist.

## FUELS MANAGEMENT

- Develop a Prescribed Fire Management plan for the Olallie Scenic Area.
- Develop a fire evacuation plan for Olallie Lake Scenic Area.
- Structures in the Olallie Lake Resort should meet National Fire Protection Association (NFPA) standards including the use of fire resistant material for roofing. Incorporate the "Defensible space" concept for landscaping around structures at the resort.
- Maintain a high presence of Forest Service prevention patrols within the area.
- Utilize prescribed fire (natural and planned ignitions) and/or vegetation management by thinning to reduce fuel loading (see Conceptual Design Map 3-3).
- Survey forest road 4220 segment 5 and roads 4220170, 4220180, and 4220190, for adequate vehicle clearance for a model 80 fire suppression engine.
- To minimize soil compaction, develop fuel treatment prescriptions that minimize the use of mechanized equipment for piling fuels.

# DATA GAPS AND MONITORING

## DATA GAPS

- C3 Survey and Manage species information
- Spotted owl information
- Amphibian information
- Snag and DWD information
- Back country lake information, including dispersed recreation use and water quality
- What type of use is occurring at/on Ruddy Hill and Double Peaks
- People At One Time (PAOT) for trails
- Riparian ecology baseline information - include physical and biological structure and function of Riparian Reserves for both aquatic and terrestrial species
- Broad based stand exam information

## MONITORING

- Continue monitoring for forest carnivores (wolverine, pine marten)
- Monitor for presence of bald eagle
- Monitor effects of human activity on nesting bald eagles should they become established
- Monitor encroachment of meadows
- Monitor Ruddy Hill and Double Peaks for presence of peregrine falcon
- Monitor growth ( i.e., spread) of dispersed camp sites

# ACCESS AND TRAVEL MANAGEMENT

Access and Travel Management (ATM) objectives were determined by identifying access needs for the public and various forest management activities like fire suppression, timber management, and recreation. Objectives of the ATM help focus priorities for maintenance and funding and identifying restoration opportunities. The goal of the ATM plan for the Olallie Watershed Analysis area is to facilitate administrative, commodity and recreational use on Federal lands.

Roads identified to stay on the Forest Road system are not necessarily recommended for year-round access. Roads that are not identified as being needed for access objectives become opportunities for restoration and potential road decommissioning. This determination will be considered at the project level.

**Roads to Keep Open**

Within the Olallie Watershed Analysis area there is only one primary access route, FS road 4220 (segment #5), and three secondary access routes off of Rd. 42220 that provide access to 3 campgrounds: Rd. 4224170 to Paul Dennis campground, Rd. 4220180 to Peninsula campground, and Rd. 4220190 to Horseshoe campground .

Rd. 4220 segment #5, 4220170, 4220180, and 4220190 are all native surface, single lane, maintenance level III roads. Maintain current maintenance level to retain semi-primitive character of the road and recreation area. Survey for adequate vehicle access for model 80 fire suppression engine.

Rd. 4220 segments #6 and #7 are outside the analysis area on Warm Springs BIA agency land. These segments of Rd. 4220 have had little or no maintenance within the last 10 years and are currently only accessible by high clearance 4-wheel drive type vehicles. At the present time there are no plans to improve these sections of road.

# RESTORATION

Restoration needs in the Olallie Lake watershed analysis area are greatest in the riparian reserves around the lakes. (Map 5-1) Ollalie Lake receives the highest concentration of use and the western shore, day use area, resort, and campgrounds of Olallie Lake receive the most intense use. Shoreline devegetation along the western shore is caused by dispersed day use in concert with wave action and high winter water levels Physical impacts along the Olallie Lake shoreline include devegetation, compaction, and erosion with the potential delivery of sediment to the lake. Because soils are shallow, poorly drained, and relatively infertile throughout the analysis area, sites which are compacted and eroded are likely to have persistent revegetation problems. These restoration needs can also be present in other parts of the analysis area which have not yet been surveyed.

Map 5-1 illustrates dispersed recreation sites in the analysis area which could either be delivering sediment to the lakes and creeks or could exceed Forest Plan standards for compaction. These dispersed sites occur in four distinct groupings: 1) Olallie Lake, 2) Peninsula Campground Area, 3) Monon Lake, and 4) Horseshoe Lake area.

1) Dispersed sites adjacent to Olallie Lake receive a high level of recreation-related impacts listed above.

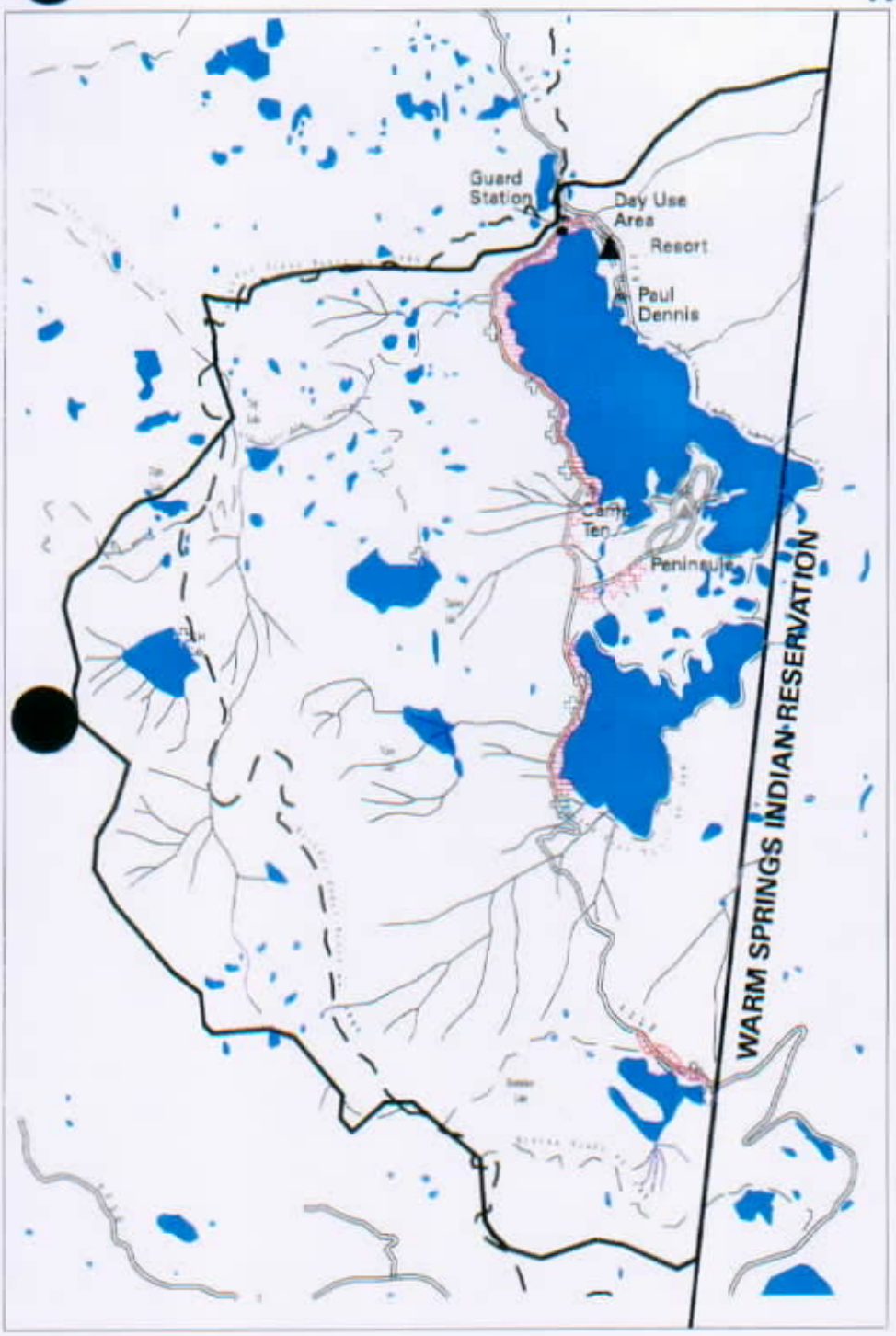
2) The site close to Camp 10 has no available parking. The site adjacent to Rd 4220 at the entrance to Peninsula Campground obstructs access to Rd 4220. Camping at this point has destroyed vegetation and compacted the soil. The three remaining sites are used as overflow camping from the developed campground.

3) No developed sites exist around Monon Lake. The dispersed sites provide the only camping opportunity. One site is actually parking for the Monon Lake Trail. Two sites are within 20' of the lake. One site is in a meadow. Two sites are located on an abandoned road.

4) One site is located across the road and up the road from Horseshoe Campground. It is on a hill side and receives heavy use. One site is located on an abandoned road and is rarely used. adjacent developed campground.

# Olallie Lake Watershed (Forest Service)

## Restoration Opportunities




### Legend

- Trails
- Pacific Crest Trail
- Lakes
- Roads
- Streams
- Developed Campground
- Olallie Lake Dispersed Camping Area
- Peninsula Dispersed Camping Area
- Monon Lake Dispersed Camping Area
- Horseshoe Lake Dispersed Camping Area
- Restoration Opportunities

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**MAP 5-1**

The following list of plants could be useful for restoration projects in the watershed:

**Table 5-1. Plants for Restoration Projects in Olallie Lake Watershed**

| Scientific Name | Common Name |
|---|---|
| Abies amabilis | Pacific silver fir |
| Abies lasiocarpa | subalpine fir |
| Abies nobilis | noble fir |
| Acer circinatum | vine maple |
| Amelanchier alnifolia | serviceberry |
| Alnus sinuata | Sitka alder |
| Arctostaphylos nevadensis | pinemat manzanita |
| Berberis nervosa | Oregon-grape |
| Carex lenticularis | lentil sedge |
| Castanopsis chrysophylla | chinquapin |
| Deschampsia cespitosa | tufted hairgrass |
| Eleocharis pauciflora | few-flowered spike-rush |
| Gaultheria humifusa | alpine wintergreen |
| Gaultheria ovatifolia | slender wintergreen |
| Juncus effusus | soft rush |
| Juncus ensifolius | dagger-leaf rush |
| Juncus regelii | Tegel's rush |
| Kalmia occidentalis | western swamp laurel |
| Linnaea borealis | twinflower |
| Lonicera involucrata | black twinberry |
| Lupinus caudatus | tailcup lupine |
| Lupinus latifolius | broadleaf lupine |
| Lupinus polyphyllus | broad-leaved lupine |
| Pachistima myrsinites | boxwood |
| Physocarpos capitatus | ninebark |
| Pinus contorta | lodgepole pine |

| | |
|---|---|
| Pinus monticola | white pine |
| Rosa gymnocarpa | baldhip rose |
| Rubus parviflorus | thimbleberry |
| Salix phylicifolia | tea-leaved willow |
| Sorbus sitchensis | Sitka mountain-ash |
| Spiraea densiflora | subalpine spiraea |
| Spiraea douglasii | Douglas spiraea |
| Symphoricarpos mollis | creeping snowberry |
| Vaccinium deliciosum | blue-leaf huckleberry |
| Vaccinium membranaceum | big huckleberry |
| Vaccinium occidentale | bog huckleberry |
| Vaccinium ovalifolium | oval-leaf huckleberry |
| Vaccinium scoparium | grouse whortleberry |

# RIPARIAN RESERVES

The Northwest Forest Plan designates Riparian Reserves at the margins of all standing and flow water, intermittent stream channels and ephemeral ponds, and wetlands. Unstable and potentially unstable areas effecting riparian and aquatic habitat function are also included in Riparian Reserves. Riparian Reserves generally parallel the stream network but also include other areas necessary for maintaining hydrologic, geomorphic, and ecological processes. The Northwest Forest plan established criteria for delineating interim Riparian Reserve boundaries which are displayed in Map 2-x. The Northwest Forest Plan further directs that critical hillslope, riparian, and channel processes be identified through watershed analysis in order to ensure maintenance and restoration of riparian and aquatic functions.

Riparian Reserve widths displayed in Table 5-2 are based on estimated site potential tree heights. Site potential tree heights were estimated from Clackamas River subbasin riparian plot information and stratified by forest series. Riparian Reserve widths, based on site potential tree heights are to be refined during project level planning.

Table 5-2. Riparian Reserve Estimated Widths

| Type of Waterbody | Pacific Silver Fir and Mountain Hemlock Series |
|---|---|
| Fish Bearing Streams | 320 feet slope distance form edge of channel |
| Non-Fish Bearing Perennial Streams | 160 feet slope distance from edge of channel |
| Constructed Ponds, reservoirs, and wetlands greater than 1 acre | 160 feet slope distance from the edge of the wetland or maximum pool elevation |
| Lakes and Natural Ponds | The body of water plus 420 feet slope distance |
| Intermittent Streams | 160 feet slope distance from edge of channel |
| Wetlands less than 1 acre | The wetland and associated riparian vegetation |
| Unstable and potentially unstable areas | See text |

Interim Riparian Reserve widths were considered adequate for the Olallie Lake Watershed however further investigation is necessary to refine the Reserve widths for the following reasons:

- The Olallie Lake watershed analysis is located within the Mountain Hemlock plant association zone. This is a high elevation site where the growing season is short and soils are cold, shallow, and low in productivity. Currently, most of the interim Riparian

Reserves are in a mid seral condition which could be a persistent condition for the area. The objective for creating and enhancing forest stands in the Riparian Reserves with large diameter trees, large woody debris, large diameter snags, a diversity of species, and multi-storied canopy may not be attainable in the Olallie Lake area.

- This type of volcanic landscape typically has a poorly developed surface drainage system, and the lakes often have no identifiable inflow or outflow. Water to the lakes is supplied by snowmelt runoff in seasonal streams, by direct precipitation, and by subsurface seepage through the volcanic terrain. Little information is available regarding the physical structure and function of the riparian areas in this landscape. It is possible that the Riparian Reserve widths could be decreased based upon additional information.

- Fish stocks in the Olallie Lake Watershed have been artificially stocked since at least 1935. More information would be necessary regarding both the aquatic and terrestrial components of the riparian system before refinement of the widths could occur.

- No mapped unstable or potentially unstable areas were identified to include in the Olallie Lake Watershed Riparian Reserve system.

# AQUATIC CONSERVATION STRATEGY

The Aquatic Conservation strategy (ACS) as described in the Record of Decision (ROD) was developed to restore and maintain ecosystem health at both the watershed and landscape scales. This would protect the habitat for fish and other riparian dependent species and restore currently degraded habitats. The four components of the strategy ( riparian Reserves, key watersheds, watershed analysis and watershed restoration) provide the land management agencies the tools to maintain and restore productivity and resiliency of riparian and aquatic ecosystems.

Although some basic information regarding the physical and biological structure and function of the riparian system in the Olallie Lake analysis area is not available, the riparian system does provide certain clear benefits. The analysis area is the headwater of watershed and plays a role in the provision of cold, clean water to Mill Creek, Warm Springs River, and the Deschutes River. Olallie Lake is currently the only source of drinking water in the analysis area. And the lakes and streams serve as both aquatic and terrestrial habitat. The following recommendations would maintain and accelerate the rate of recovery of aquatic and riparian processes to meet the intent of the *Aquatic Conservation Strategy.*

**Recommendations**

- Manage developed recreation facilities, dispersed recreation sites, and trails to prevent or reduce sediment delivery to the lakes and streams.
- Manage developed recreation facilities, dispersed recreation sites, and trails to reduce impacts to wildlife habitats.
- Manage developed recreation facilities and dispersed recreation sites to prevent bacterial contamination of lakes and streams.
- Conduct stream, lake, and riparian surveys before project development or implementation of the Conceptual Design.

# PARTICIPANTS

The following individuals made this document possible:

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