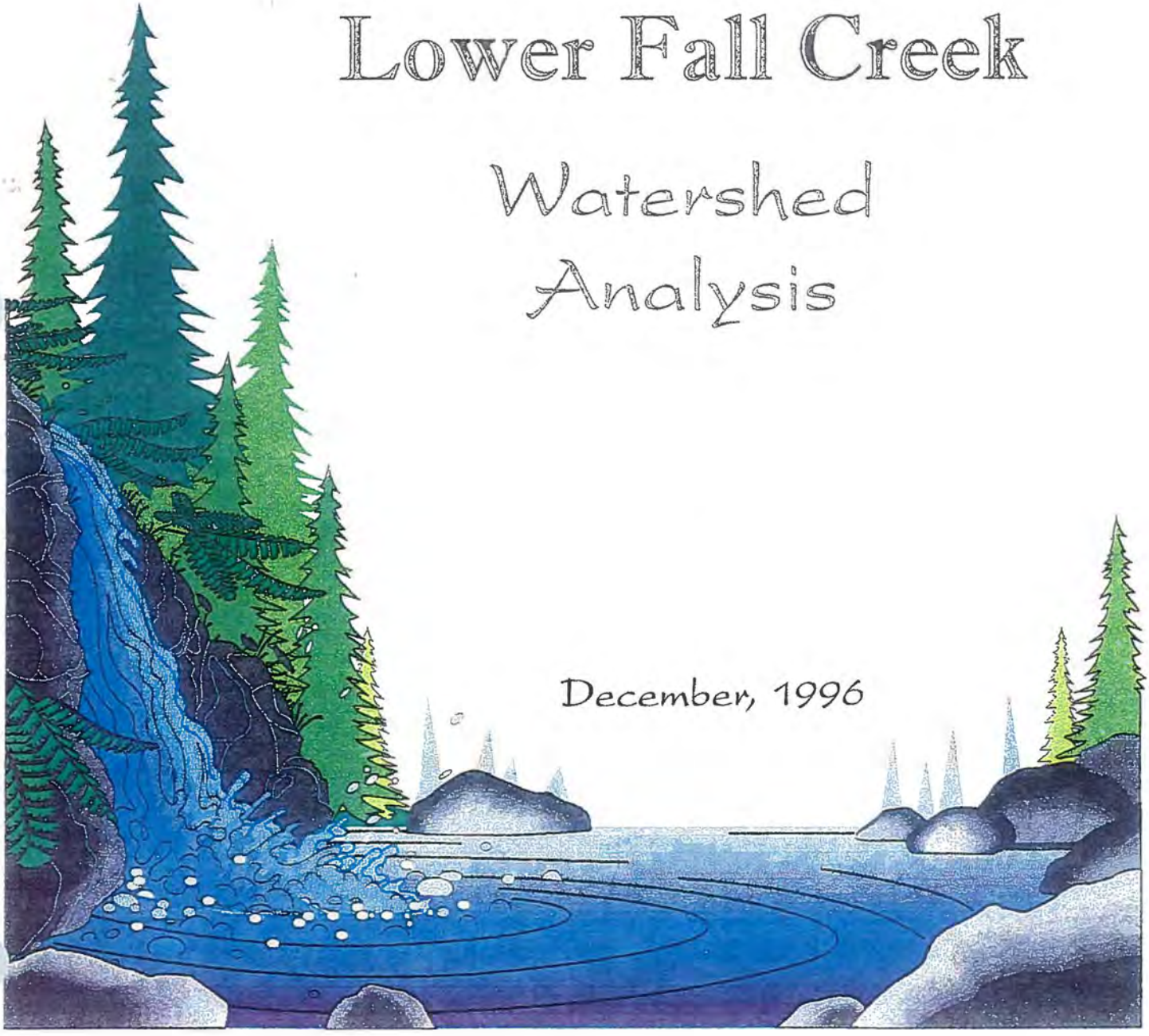
Interagency

Winberry and Lower Fall Creek

Watershed Analysis



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Winberry/Lower Fall Creek Watershed Analysis
Interagency Core Team

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INTRODUCTION

The Winberry/Lower Fall Creek watershed analysis examines Winberry Creek, Fall Creek Lake (referred to in this document as Fall Creek Reservoir), and approximately three and one half miles of Fall Creek below Fall Creek Dam with its associated drainages. The area is a subwatershed of Fall Creek watershed and is located in Lane County, about 15 miles southeast of Eugene near the communities of Lowell and Fall Creek *(see Map 1)*. The analysis area is approximately 69 square miles or 43,890 acres in size; major features are delineated in *Map 2* and a shaded relief is shown on *Map 3.*

From a regional perspective, the analysis area is located within the following geographic area:

Region:	Pacific Northwest
Subregion:	Lower Columbia
Basin:	Willamette River
Subbasin:	Middle Fork Willamette

This watershed analysis was performed at the subwatershed and drainage scale.

The area is a mixture of private and governmental ownerships, with the largest single parcel of land managed by the Willamette National Forest, Lowell Ranger District. Fall Creek Reservoir and its adjacent lands are managed by the US Army Corps of Engineers as the Fall Creek Lake Project. The Bureau of Land Management, McKenzie Resource Area (Eugene District), has scattered lands in the western portion of the watershed. Private forest products companies comprise the other large landowners in the area. Agriculture lands and rural residential properties constitute most of the remaining lands in the Winberry and Lower Fall Creek basins *(see Map 4)*. Specific land allocations can be found in *Table 1* and *Map 5.*

The Winberry/Lower Fall Creek watershed supports a wide range of uses and provides a variety of commodities to local residents. Demands on the watershed are varied: furnishing local businesses with forest products, providing recreational opportunities, contributing towards flood control, and providing agricultural and rural residential properties for local residents. Both natural processes and land use activities have shaped the landscape into its present form. This document analyzes the processes which determined landscape changes over time, and recommends watershed management activities from an ecosystem point of view while providing needed resources to surrounding communities. Such an approach may make it possible to sustain the diversity and productivity of the watershed. This is not a decision document, but rather a guide for government agencies to maintain or enhance ecosystems in the watershed.

Direction for management of US Forest Service (USFS) and Bureau of Land Management (BLM) lands in the watershed is provided by the Record of Decision (ROD) of April, 1994 and the Final Supplemental Environmental Impact Statement (FSEIS) on Management of Habitat for the Late Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA, USDI, 1994). This FSEIS is popularly known as the Northwest Forest Plan and has amended the

Willamette National Forest Land and Resource Management Plan (USDA, 1990). Hereafter, both the Northwest Forest Plan and the previously mentioned FSEIS will be referred to as the Northwest Forest Plan or NWFP. The Eugene District BLM Record of Decision and Resource Management Plan was finalized after completion of the Northwest Forest Plan and is consistent with it (ROD/RMP, 1995). The Army Corps of Engineers (COE) management is based on their Master and Operational Management Plans.

Table 1. Land Allocations in Winberry/Lower Fall Creek Watershed

Land Allocations	Acres	% of Agency	% of Watershed
USFS (22,661 acres)		% of USFS	52%
• LSR 100 (owl core reserves)	1,341	5%	3%
• Riparian Reserves	10,128	44%	23%
• Other Forest Plan Withdrawn	2,394	10%	5%
• Matrix	9,098	37%	21%
BLM (2,842 acres)		% of BLM	7.06%
• LSR 100 (owl core reserves)	128	5%	0.29%
• Riparian Reserves	1,010	36%	2%
• Bald Eagle Habitat Area (BEHA)	331	12%	0.75%
• Other Withdrawn Allocations	9	0.003%	0.02%
• Matrix:			
◊ General Forest Mgmt Area (GFMA)	1,104	39%	3%
◊ Connectivity Block (CON)	260	9%	1%
COE (3,441 acres)		% of COE	8%
• Reservoir	1,757	50%	4%
• Other Lands	1,684	50%	4%
Other Public Agencies (369 acres)			0.08%
Private (14,577 acres)			34%
• Industrial	10,810	*NA*	25%
• Other Private	3,767	*NA*	9%
Total	**43,890**		

This analysis provides responsible officials with more comprehensive information upon which to base land management decisions. It is based on existing data and additional information was not collected but rather identified as "data needs." Two public meetings were convened to provide a forum for public concerns.

The Federal Guide for Watershed Analysis: *Ecosystem Analysis at the Watershed Scale* (Version 2.2) provides guidance for the process. This analysis will include:

- A general understanding of the ecological conditions and processes occurring in the watershed,
- A list of restoration projects to enhance the ecosystem and close the gap between current conditions and the range of natural conditions,
- Future access and travel management opportunities,
- Identification of recreation uses and trends, and
- Guidelines for future decisions regarding the provision of commodities to benefit local communities.

In accordance with direction outlined in the *Ecosystem Analysis at the Watershed Scale,* this analysis is comprised of the following components:

- **Characterization** *(Chapter 1)*
  describes the unique or particularly important characteristics of the watershed,
- **Issues and Key Questions** *(Chapter 2)*
  describes various concerns and opportunities existing in the watershed and identifies which require further consideration for the best current and future decisions,
- **Reference and Current Conditions** *(Chapter 3)*
  discusses the current watershed condition, presented in relationship to reference conditions,
- **Interpretations** *(Chapter 4: this section provides a response to the Key Questions)*
  explains similarities, differences or trends between reference and current conditions, and what factors affect the capability of the watershed to achieve management objectives (presented in relation to the issues and key questions), and
- **Recommendations** *(Chapter 5)*
  identifies management opportunities that could move the system towards reference conditions or management objectives.

Appendix A defines acronyms used in the document. *Appendix B-F* contain more detailed information separated by functional area. All maps pertinent to the document are found following the Bibliography.

CHAPTER 1
CHARACTERIZATION

The purpose of this section is to place the Winberry/Lower Fall Creek watershed in context within the river basin and province, and to briefly analyze and describe its dominant physical, biological, and social features.

PHYSICAL DOMAIN

GEOLOGY

Winberry Drainage is located within the Western Cascades physiographic province, at the northwest boundary of the Basin and Range Province. It consists of rocks which range in age from approximately four to forty million years formed during the Eocene through Pliocene epochs *(see Map 6).* Elevation ranges from 600 feet at the confluence of Fall Creek and Little Fall Creek to 4,969 feet above mean sea level (msl) on top of Saddleblanket Mountain.

A dendritic drainage pattern is typical due to the volcanic geology. The most extensive and oldest rock formation in the area has been called the Little Butte Series (Peck, *et. al.,* 1964). Its age is estimated from early Oligocene to early Miocene and the formation is believed to range from 5,000 to 10,000 feet in thickness. The Little Butte Series is comprised of pyroclastic volcanic rocks (such as tuff, lapilli tuff, welded tuff and breccia) and, to a lesser extent, lava flows with small intrusions of andesite and basalt *(shown on Map 6).* Deep colluvial and residual soils developing on moderate slopes are usually high in clay content and cohesive, with slope failures common in both soil and bedrock materials. On steep slopes, streams become deeply incised, attesting to the massive and easily erodable nature of the bedrock.

Stream gradients are high, ranging from above 20% in the upper portions of the watershed to less than two percent in the lower reaches of Winberry Creek and Fall Creek (below the reservoir). High stream gradients produce high energy streams which carry a large volume of sediments to Winberry Creek. Here, the stream gradient decreases and deposition occurs upstream of small geologically constrained areas or behind large woody debris. Fine suspended sediment, derived from the erosion of pyroclastic rock, tends to stay in suspension for long distances.

EROSION PROCESSES

Mass wasting, hillslope and road-related land movements are the dominant erosional processes within the watershed. Mass wasting is the downslope movement of soil and rock material through a variety of landslide movement mechanisms. The presence of weak, erosive rock on steep slopes provides ideal conditions for land movement, particularly in the eastern portion of the analysis area. Under natural conditions, sediment and wood

delivered to streams are essential elements of channel geometry and ultimately form fish habitat. Hillslope erosion occurs on moderate to steep slopes where detachable soils with low soil strength are exposed to rainfall and overland flow, creating gullies and rills.

A mass wasting potential for the Winberry drainage was developed by classifying the landscape into areas with a High, Moderate, or Low potential for mass wasting and subsequent sediment delivery to streams. Thirty-three percent of the area was identified as having high potential; most is located on steep sideslopes near ridgetops *(see Map 9).* The predominant types of landslides are shallow, rapid slides and debris torrents *(see Map 10).*

The relative potential of hillslope-related surface erosion for the Winberry drainage was analyzed by developing a soil erosion potential map based on topography (slope steepness) and soil erodability (soil K-factor) *(see Map 7).* Forty-eight percent of the analysis area is in the High Erosion Risk Class. Road related failures are often related to timber harvest, primarily associated with sidecast road construction on steep slopes and, to a lesser extent, cutbank failures, stream-crossing failures, headwall-crossing failures, and poor road drainage. Aerial photo inventory of landslides for the period of 1949 to 1995 suggest that road-related failures accounted for 63% of all landslides; approximately 22% of these resulted in sediment delivery to streams.

Hydrology

The Winberry/Lower Fall Creek drainage has a maritime climate characterized by mild temperatures and a long frost-free growing season. Winters are wet with prolonged cloudy or overcast periods. Summers are typified by high pressure systems producing fair, dry weather for extended periods of time. Annual precipitation ranges from 45 inches in the west to 70 inches in the east *(see Map 13).* Most of the precipitation occurs between October and April. The western lowlands are in a rain-dominated precipitation zone. Approximately sixty percent of the watershed is in the transient snow zone (1,500 - 4,200 feet elevation) with only three percent in the snow zone above 4,200 feet *(see Map 11).*

The most prominent hydrologic feature in the watershed is Fall Creek Reservoir, primarily created for flood control. The reservoir has two main arms: the northern arm associated with Fall Creek and the southern arm fed by Winberry Creek. During full pool, the Fall Creek arm is approximately six and a half miles long and the Winberry arm about three and a half miles long. Maximum depth at full pool is an estimated 160 feet near the dam. Construction of the Fall Creek Dam was completed in October, 1965 and operations began in 1966. The dam is located on Fall Creek, 7.2 river miles upstream from the confluence of Fall Creek and the Middle Fork of the Willamette River.

Water Quality

Primary beneficial uses of water in the analysis area are aesthetics, aquatic life and water-contact recreation. Water is also used for irrigation and domestic purposes; 20 water right permits are currently on record with the Lane County Watermaster. The majority of these permits pertain to water diverted from Fall Creek below the reservoir.

Many more permits have been recorded for locations downstream from the analysis area. There are no Bureau of Reclamation contracts for agricultural water supply obligated from Fall Creek Reservoir (COE, 1989).

During summer months, weekly samples are collected from the reservoir to test for coliform at various recreation sites; levels have always been within acceptable limits. Algal blooms have occurred in the past, reducing water clarity and impacting aesthetics. Recreational boating and wind-generated waves contribute to shoreline erosion, which is most pronounced along the north shore of the Fall Creek arm. Suspended sediment due to wave action is a concern aesthetically; however it has little impact on water-contact recreation.

Downstream from the reservoir, Fall Creek is proposed for listing by the Oregon Department of Environmental Quality (DEQ) as a Water Quality Limited stream (pursuant to Section 303 (d)(1) of the Clean Water Act) due to elevated summer temperatures. Based on data collected between 1990 to 1994 at the USGS gaging station on Lower Fall Creek (14151000), maximum late-summer water temperatures were between 65.4 and 67.1 degrees Fahrenheit (the state standard is 64°F). If Fall Creek is formally listed as Water Quality Limited and considered a high priority stream, the DEQ would develop Total Maximum Daily Loads (TMDLs) and a management strategy. Restricted use of the water could be a result of final 303 (d) listing.

In the eastern portion of the watershed, water temperatures in several streams are higher than the state standard of 64°F based on data collected by the USFS between 1991 and 1995. *Map 16* shows Fall Creek, Fall Creek Reservoir and Winberry Creek, all on the DEQ list of *Waterbodies of Concern.* Fall Creek below the reservoir is on this list due to flow modification and sediment; the reservoir and Winberry Creek are listed due to public concern about excessive suspended sediment levels (turbidity). These streams and the reservoir were identified in the 1988 Oregon Statewide Assessment of Non-point Sources of Water Pollution, indicating that water quality may impact the beneficial uses discussed earlier. This listing does not require data as does the Water Quality Limited list (303(d)).

ROADS

Lowell Ranger District of the Willamette Forest manages almost half of the analysis area. The remainder is primarily comprised of multiple private holdings. Major land owners are Weyerhaeuser and Giustina, with numerous smaller ownerships. It is assumed that the majority of roads within private holdings were constructed to access timber and that this road system is consistent with roads constructed on federal lands. However, aerial photos show that private land is more extensively roaded due to tractor-logging in the 1950s. These roads are probably not maintained to the extent of roads within the national forest system.

Historically, the US Forest Service (USFS) and Bureau of Land Management (BLM) emphasized timber management, resulting in a large road system to access timber and

other forest resources. Timber sale revenue paid for the majority of past road construction and road maintenance. However, timber harvest has declined with the current shift toward ecosystem management. This shift has caused a reduction in funds for road maintenance. A consequence is that most roads are no longer annually inspected for maintenance requirements and deficiencies are not corrected. As a result, many roads and drainages have become obstructed, roads often channel water along wheel ruts instead of flowing into drainage structures, and many shoulders built by side-cast construction are slumping. Together, the cumulative results are a road system at risk of failure. This was dramatically illustrated during the 1996 flood event, a three to five year flood event for the area (USGS, unpublished records). Three debris torrents and four road slumps in the headwaters of Winberry are directly attributable to the lack of road maintenance.

Both BLM and USFS access and travel management policy dictates that all roads remain open unless some overriding reason for closure exists. District and Forest policies reflect this commitment to retain open travel corridors unless otherwise designated. However, changes in forest management have seriously reduced the federal agencies' operating budgets and their ability to maintain such an extensive system. Some roads may be removed from the system; others closed until future access is needed; and many will be kept at the lowest possible maintenance level.

BIOLOGICAL DOMAIN

TERRESTRIAL

VEGETATION

Winberry/Lower Fall Creek watershed is located near the community of Lowell in the southern Willamette Valley. There are no late successional forest habitats in this area, a result of intensive forest and agricultural practices. The natural forest landscape is fragmented due to past management practices. Federal lands retain some tracts of late successional and old-growth forests. These mature forest blocks provide valuable habitat within the watershed and connectivity to surrounding watersheds.

Forested lands are in the Douglas-fir and Western Hemlock forest series. These series are commonly found on low to mid-elevations throughout the Central Oregon Cascades. The most common associates with Douglas-fir and western hemlock are western red cedar, incense cedar, sugar pine, and western white pine. Associated hardwood species include bigleaf maple, red alder, chinquapin, and madrone.

FIRE AND FUELS

Fire has played an important role in determining the species, density and age of vegetation in this area. Recently, the type of fire has changed from natural fire

occurrences to prescribed fire used to reduce post-harvest, logging debris. Natural fires continue to occur, although their significance in the watershed has greatly diminished.

Fuel loading has also changed over time. Prior to the arrival of European settlers, fuels were primarily modified by the forces of nature, including disease, insect infestation, wind events, and natural fires. In addition, local Native Americans manipulated fuel loading by using fire to clear unwanted vegetation from the forest floor. During the past 75 years, the fuel loading of this area was greatly altered by timber harvest, post-harvest activities and active fire suppression.

BOTANY

At the western edge of the watershed, the Willamette Valley ecosystem comes into contact with the Western Cascade mountain ecosystem forming a region of high botanical diversity. It includes US Army Corps of Engineer (COE) land where the rare giant helleborine and a hybrid iris are tracked due to their limited distributions. The watershed headwaters also support high biodiversity. Here, meadows provide habitats for unique species including Cusick's checkermallow, Umpqua swertia and Thompson's mistmaiden.

Special habitats include rock outcrops and gardens common in the Tire Mountain area, wet meadows surrounding Saddleblanket Mountain and the drier beargrass meadows of Sourgrass Mountain. In the western part of the watershed, Mt. Salem (BLM) features a large meadow complex at its summit.

The most common noxious weeds are Scotch broom and tansy, although Canada thistle, bull thistle and St. John's-wort are also prevalent. Exotic species dominate the Fall Creek Reservoir in the emergent vegetation area of the draw-down zone and have potential to move up the Winberry watershed.

Habitat for riparian and old-growth Survey and Manage Species (ROD, 1994) is very scattered and distributed in small patches, but populations do exist. Very little habitat for these species is found in the lower reaches of the analysis area.

WILDLIFE

Wildlife habitats within the watershed are moderately diverse with both natural and human induced habitat complexes. Over 300 vertebrate wildlife species are found or have the potential to exist here. The vast majority of federal lands are in some stage of forested seral development. Fall Creek Reservoir contributes human-made habitat for foraging bald eagles, western pond turtles, osprey, and many species of waterfowl, but has eliminated some natural riparian conditions. Small private holdings and intensively managed commercial timberlands provide an abundance of small agricultural tracts and early seral forest conditions in the lower half of the watershed.

The Alpine ridge region at the east end of the watershed has unique forested habitats consisting of mixed true fir and Douglas-fir. These higher elevation areas are

interspersed with Sitka alder patches and both dry and mesic meadows, often used as summer range and calving grounds by Roosevelt elk.

The first intensive amphibian surveys, conducted in late summer/fall of 1995, found two previously undocumented amphibian species in the watershed. These are the tailed frog and the torrent salamander, both Appendix J2 species of concern.

On federal lands, extensive surveys for northern spotted owls have established the presence of approximately 14 activity centers within the watershed. Although approximately 50.2% of the watershed is considered suitable habitat, most occurs on federal lands and is extensively fragmented. It is not anticipated that this condition will improve in the future. In the upper watershed, 3,748 acres are designated as critical habitat for the northern spotted owl.

The analysis area lies approximately midway between LSR RO219 in the north and RO222 to the south. Since the land is designated as matrix, its importance lies in maintaining adequate dispersal and connectivity corridors between these two LSRs. This is essential to the success of the Northwest Forest Plan and the Late Successional Reserve strategy.

AQUATIC

ANADROMOUS FISHERIES

Fall Creek and Winberry Drainages are within the Middle Fork Willamette Subbasin, located at the head of the Willamette River. Spring chinook are native to Fall Creek and Winberry Creek; winter and summer steelhead were introduced.

Construction of Fall Creek Dam in 1965 stopped anadromous fish migration above the reservoir. Adults returning to Fall Creek are trapped and relocated above the reservoir. Currently adults are only released in Fall Creek, although future releases in Winberry Creek are expected. Smolt passage, as with most dams in the region, is a limiting factor for anadromous runs. Research conducted by ODFW in 1991 indicated that alteration of reservoir head and discharge levels during a large portion of the smolt outmigration could result in higher survival of smolts passing through the dam. The COE implemented this plan resulting in an increased number of returning adult salmon to Fall Creek Dam during the last three years. The Oregon Department of Fish and Wildlife has stocked spring chinook pre-smolts in the reservoir since 1966. Winter and summer steelhead returns are low.

AQUATIC HABITAT AND OTHER FISH SPECIES

Common fish found in the Winberry/Lower Fall Creek Watershed include rainbow trout, cutthroat trout, longnose dace, speckled dace, and several species of sculpin. *Map 39* shows known fish distribution on USFS lands. North and South Fork Winberry Creeks are high-gradient, incised streams. High, flashy winter and spring flows are common in this geographic area. Riparian vegetation is characterized by large conifers which

eventually fall into the stream channel. Quality habitat and channel stability are dependent on the presence and availability of large woody debris (Sedell, et al., 1988).

Warm water fish species of Fall Creek Reservoir include: crappie, largemouth bass, bullhead, large scale suckers, chiselmouth, dace, redside shiner, and sculpin. ODFW stocks 15,000 legal-sized rainbow trout each year as part of the mitigation plan for fish losses due to the presence of Fall Creek Dam. ODFW does not currently manage the lake for warm water gamefish. Resident cutthroat trout enter the reservoir from upstream tributaries and comprise a small component of the fish population.

Native fish commonly found below the reservoir include rainbow and cutthroat trout, longnose dace, speckled dace, sculpin, largescale suckers, whitefish, northern squawfish, redside shiners, and lamprey. Spring chinook, along with winter and summer steelhead, migrate through the area. Exotic fish, such as brown bullhead, largemouth bass and crappie, escape from the reservoir and have been observed below the dam in Fall Creek, although no major populations are thought to exist there (Wade, personal communication). Rainbow trout stocked in Fall Creek move downstream with salmon smolts in the fall. These hatchery fish are often fished downstream from the dam and reach lengths of 14-18 inches.

Oregon chub is an endangered minnow indigenous to the Willamette Valley. The largest populations are found in the Middle Fork Willamette River; populations have not been observed in Fall Creek.

Fall Creek Dam has severely altered stream channel characteristics in Lower Fall Creek. Unnatural flow regimes, the loss of sediment and debris transport have caused the channel to downcut and degrade. Floodplain interactions and riparian vegetation have changed with channel incising and rural development along the stream.

SOCIAL DOMAIN

The Winberry drainage has attracted people for at least 8,000 years. Lush stands of conifers provide shade, shelter, food, and fuel for those using the drainage. A broad valley floor at the confluence of Fall and Little Fall Creeks gives way to steep sided canyons. The ease of travel along ridge tops attracts humans; Alpine and Winberry ridges are no exception.

Native American tribes using this area prior to European settlement were the Kalapuya, Molala and later the Klamath. The earliest Euro-American settlements in Lane County were in Pleasant Hill and Lost Valley during the 1840s. Five families made claims in the Winberry/Fall Creek area in 1850 (Heritage Resource Associates, 1982). Although some serious attempts at gold mining occurred from 1925-1937, companies relied heavily on speculation and neither Winberry, Beacon nor North Winberry Creeks yielded much gold (Breim, 1937).

Today much of Winberry drainage is forested, offering shade, shelter, food, and fuel for visitors. The western portion of this watershed is a popular destination for recreation users, primarily due to its low elevation and proximity to the Eugene/Springfield

metropolitan area. Access is by US Highway 58 and paved county roads. The western portion, a mix of federal and private lands, supports heavy seasonal recreation use, timber management, small scale agriculture, and rural residents. Recreation and tourism are increasing in importance as a source of economic stability to small communities as timber harvest declines (COE, 1991). Long-term local residents and those moving into the area may not share the same values regarding land management practices.

The city of Lowell has seen an increase in single family dwellings over the past two years. One local light industry has expanded, but most residents do not work in Lowell. Traffic on the road between Lowell and Springfield has increased noticeably during the morning and evening hours.

The watershed naturally divides into three distinct recreation zones: lower Fall Creek (below the dam), Fall Creek Reservoir and Winberry Creek drainage. Many factors influence recreation use, including weather, reservoir water level, proximity and accessibility to local population, seasonal increases of users, and land management practices.

Below Fall Creek Dam, Fall Creek flows 7.2 miles before merging with the Middle Fork of the Willamette River. Tufti Wildlife area, just below the dam, offers views of local wildlife, such as Western Pond turtles, deer and neotropical song birds. For many years, Drinkwater Landing, 0.5 river miles below Fall Creek Dam, has been used for picnics, bank fishing, swimming, wading, and boat launching. Lane County operates a small day-use area on Fall Creek, at river mile 5.5, and recreation use there is minimal. Public access is extremely limited because most of the river below the dam is bordered by privately owned residences or farms.

Fall Creek Reservoir is located 23 miles southeast of Eugene, nestled in the western foothills of the Cascade Range. The US Army Corps of Engineers (COE) has the primary management responsibility for the Fall Creek Lake Project, which is ideally suited for water-based recreation such as water skiing, swimming, boating, and fishing. Current recreation use averages more than 250,000 visitors per year, with 75% occurring from Memorial Day through Labor Day. Since 1974, COE surveys have consistently shown that 80% of the visitors to Fall Creek Reservoir come from the greater Eugene-Springfield metropolitan area. Seven recreation areas border the reservoir. Cascara Campground, with 50 sites, is located on the upper end of the Fall Creek arm. Four small dispersed day-use areas are spread out along the northern shoreline. Lane County leases and operates the North Shore Boat ramp and Winberry Park, both popular boat launching and day-use areas.

Sky Camp is located on the peninsula between the Fall and Winberry Creek arms. It is a unique facility in an ideal natural setting, and provides a full range of resources for study. This youth education camp is managed by School District 52, under a cost sharing agreement with the Corps.

Green Mountain, above the upper Fall Creek arm, is occasionally used as a launch site by para-sail/hang-glide enthusiasts.

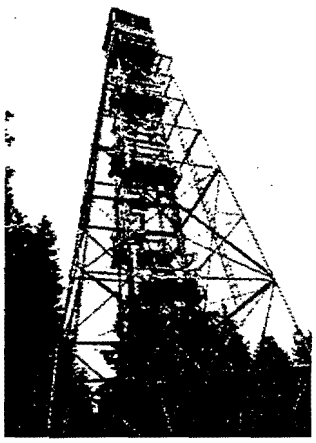
Above the Winberry arm of Fall Creek Reservoir, four miles of private bottomland borders Winberry Creek before reaching the USFS boundary. BLM and private timber lands extend up the valley sides. Public access in this area is limited, with the exception of the Nelson Creek drainage, which accesses BLM managed lands to the north.

The Willamette National Forest encompasses the remainder of the watershed. Most of the people using this area are seeking a more primitive experience. Winberry campground and seven dispersed sites provide solitude in a forested setting. All, with the exception of Little Blanket Shelter, are in riparian reserves.

Although Winberry Creek is not known for outstanding kayaking, both lower Fall and Winberry Creeks are run in the winter during high water. Local boaters are attracted to the quick access, often after work; important during short winter days (Reed, personal communication).

The watershed contains 15.75 miles of trail, most of which are located in upland areas. None were designed for mountain bike use and are showing wear as their popularity increases. The Tire Mountain Trail is categorized as Class I (no timber harvesting within 300 feet), and receives more mountain bike use as the biking population increases locally and the trail is advertised in bike guides and magazines.

Saddleblanket Lookout, a State Historic Preservation site, is the highest point in the watershed and has biological, recreational and historic significance. A former fire lookout sits on top of the mountain, and is accessed by the Saddleblanket trail. It is currently standing but in a state of disrepair. Located on the north side of the mountain, Little Blanket shelter was constructed in the 1930s by the CCC as a shelter for forest workers.



CHAPTER 2
ISSUES AND KEY QUESTIONS

ISSUE 1: TERRESTRIAL HABITAT

Relevant Conditions and Processes

- Alteration of vegetation across the landscape.

Key Questions

1. *How have differences in land ownership and management contributed to changes in the vegetation?*

   Indicators: fragmentation/connectivity, land allocation, land ownership, historic and current seral stages, amount of interior habitat (?)

2. *How have historic management activities affected known populations and habitats of T&E/C3 species, noxious weeds and big game or other wildlife species of concern?*

   Indicators: T&E/C3 species distribution and abundance, special habitats, noxious weeds, big game

3. *How has fire suppression affected vegetation? How and where does fuel loading contribute to the potential for catastrophic fire?*

   Indicators: historic and seral stages, fire history, fuel loading

4. *How does the Winberry/Lower Fall Creek watershed contribute in providing connectivity between adjacent watersheds and Late Successional Reserves?*

   What opportunities might provide or enhance late successional forest habitat for dispersal/movement of terrestrial plant and wildlife species and where are they found?

   Indicators: fragmentation/connectivity, amount of interior habitat, T&E/C3 species distribution and abundance, historic and current seral stages, big game

5. *How has the introduction of non-native species affected the native plants and animals in the watershed?*

   Indicators: noxious weeds, roads, exotic species

Issue 2: Riparian Habitat

Relevant Conditions and Processes

- Changes of riparian habitat function - vegetation changes
- Effects of altered flood levels on floodplains, wetlands and hardwood dominated areas

Key Questions

1. *How have different land use patterns (ex. agriculture, roads, timber harvest) impacted riparian habitat and function above and below the reservoir? What is its importance to federal land managers?*

   Indicators: land allocation, land ownership, historic and current seral stages, roads, channel and floodplain condition, wetlands

2. *How do the riparian reserves (and other withdrawn allocations) currently function as habitat and dispersal corridors for terrestrial and riparian species? What are future trends?*

   Indicators: historic and current seral stages, species distribution and abundance, marten/pileated areas

3. *What opportunities exist for riparian enhancement?*

   Indicators: Riparian seral condition

Issue 3: Aquatic Habitat and Species

Relevant Conditions and Processes

Changes in channel geomorphology and condition such as:

- Downcutting, loss of meander pattern, loss of sediment transportation due to reservoir
- Changes in species diversity and habitat (including herpetiles)

Key Questions

1. *How and where have past management activities (ex. timber harvest, road construction, instream salvage) affected channel complexity above and below the reservoir?*

   Indicators: historic and current seral stages, distribution of riparian seral condition, land allocation, land ownership, reservoir operations, historic fish abundance, channel conditions, changes in stream classification, landslide frequency and distribution, reservoir fish counts, geomorphic processes

2. *Where is the best quality aquatic habitat located, and can these areas be further enhanced or protected?*

   Indicators: channel conditions, distribution of riparian seral condition, reservoir operations, landslide frequency and distribution

3. *How have management activities affected aquatic species (including anadromous and resident populations)? What are the future trends?*

   Indicators: land allocation, land ownership, reservoir operations, relative abundance of species, historic fish abundance, reservoir fish counts

Issue 4: Water Quality and Quantity

Relevant Conditions and Processes

- Changes in stream temperatures
- Landslide frequencies
- Flow condition

Key Questions

1. *What are the implications of applying current state water quality standards on future management of Federal lands in the watershed?*

   Indicators: *distribution of riparian seral condition, water temperature, flow (timing of peak and minimum), road conditions and density (ex. sedimentation), fertilization*

2. *How have reservoir operations affected downstream beneficial uses of water?*

   Indicators: water temperature, flow extremes (timing of peak and minimum)

Issue 5: Timber Harvest

Relevant Conditions and Processes

- Landscape vegetative patterns (ex. tree stocking, maturity and growth)

Key Questions

1. *Where could future harvests occur on federal lands? What acres are available for harvest?*

   Indicators: historic and current seral stages, land allocation, land ownership, big game, special habitat, hydrologic recovery *(from Willamette NF Plan),* Northwest Forest Plan Standards/Guides (15% Late Successional Forest Threshold)

2. *How can silvicultural prescriptions enhance ecosystem process and functions and mitigate impacts to other resources?*

   Indicators: fragmentation/connectivity, amount of interior habitat, historic and current seral stages, land allocation, big game, riparian areas, landslide frequency and distribution, recreation visitor days (RVD)

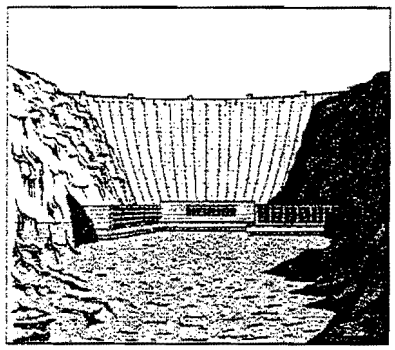
3. *How is federal timber management (BLM) affected by private land management?*

   Indicators: historic and current seral stages, land allocation, land ownership, big game, distribution of riparian seral condition

Issue 6: Reservoir

Relevant Conditions and Processes

- Loss of original stream processes
- Water level fluctuations in the reservoir
- Lack of vegetation causing erosion
- Exotic fish and plants
- Migratory barrier
- Aspect, wind direction and recreational boating impacts on shoreline erosion



Key Questions

1. *What are the effects of operation on anadromous fish, wildlife and recreation? What opportunities exist for reducing conflicts while maintaining ecosystem process and function?*

   Indicators: species distribution and abundance, noxious weeds, water temperature, number of returning adult fish, juvenile fish survival of passage, regulated flow, recreation visitor days, recreation use patterns (location, amount, type of use), public comments, fish mortality

2. *What is the extent of shoreline erosion and what opportunities exist for its stabilization?*

   Indicators: reservoir operations, recreation use patterns, wind direction, shoreline aspect

Issue 7: Human Uses

Relevant Conditions and Processes

- Increased demand and use due to statewide population increases and more urban residents

Key Questions

1. *How will current and future management practices affect human use of the watershed (upstream and downstream of the reservoir)?*

   Indicators: land allocation, land ownership (public access), recreation use patterns, public comments, requests for special use permits

2. *What management practices are available to enhance or protect recreation opportunities in the watershed? How could future recreation trends affect ecological processes?*

Indicators: land allocation, land ownership, recreation use patterns, public comments, requests for special use permits, recreation trends