United States Department of Agriculture

Forest Service

Pacific Northwest Region

Supplement to the Marys River Watershed Preliminary Analysis

Siuslaw National Forest
Fiscal Year 2005

Marys Peak from Fitton Green

Supplement to the Marys River Watershed Preliminary Analysis

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INTRODUCTION

This report documents an analysis of a portion of the Marys River Watershed. The purpose of the analysis is to develop a scientifically-based understanding of the processes and interactions occurring within the watershed area and the effects of management practices. The analysis focuses on issues concerning values and uses specific to the area. This document supplements the information found in the Marys River Watershed Preliminary Analysis written for Marys River Watershed Council (Ecosystems Northwest, 1999). It refers to, and takes guidance from several larger scale assessments, including the Assessment Report for Federal Lands in and Adjacent to the Oregon Coast Province (USDA-USDI 1995), the Late-Successional Reserve Assessment for the Oregon Coast Province – Southern Portion (R0267 and R0268) (USDA – USDI 1997), and the North Fork Alsea Watershed Analysis (USDI-1996) which have been completed.

This watershed analysis supplement follows the outline described in the updated federal ***Guide for Watershed Analysis – Ecosystem Analysis at the Watershed Scale*** (Version 2.2, August 1995).

CHARACTERIZATION OF THE WATERSHED

LOCATION AND SIZE

The portion of the Marys River Watershed that this supplement covers lies in the central and eastern portion of the Oregon Coast Province. It is about 15 miles west of Corvallis, Oregon (Map 1: Vicinity Map). Portions of Benton and Lincoln Counties are found within the analysis area. It focuses on the National Forest lands within the Marys River Watershed. The analysis area includes the entire City of Corvallis Rock Creek Municipal Watershed. (Map 2 – Marys Peak and Rock Creek Watershed) The analysis area occupies 12,030 acres of land. Ownership within the analysis area includes: National Forest System (8,846 acres), City of Corvallis (2,375 acres), Bureau of Land Management (372 acres), Oregon State University (245 acres) and other ownership (192 acres). The analysis area covers a portion of Greasy Creek (10,284 acres), a portion of Tumtum River (1,075 acres) and a portion of Middle Marys River (669 acres) 6th field watersheds.

OWNERSHIP

Approximately seventy-six percent of the analysis area is managed under federal ownership; seventy-three percent by the USDA – Forest Service and three percent by the USDI – Bureau of Land Management. About twenty percent of the land is owned and managed by the City of Corvallis. Around two percent is owned and managed by Oregon State University. The remaining two percent is in private ownership.

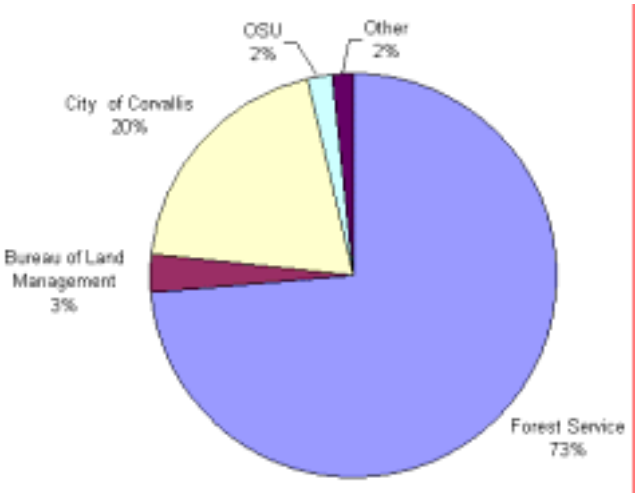
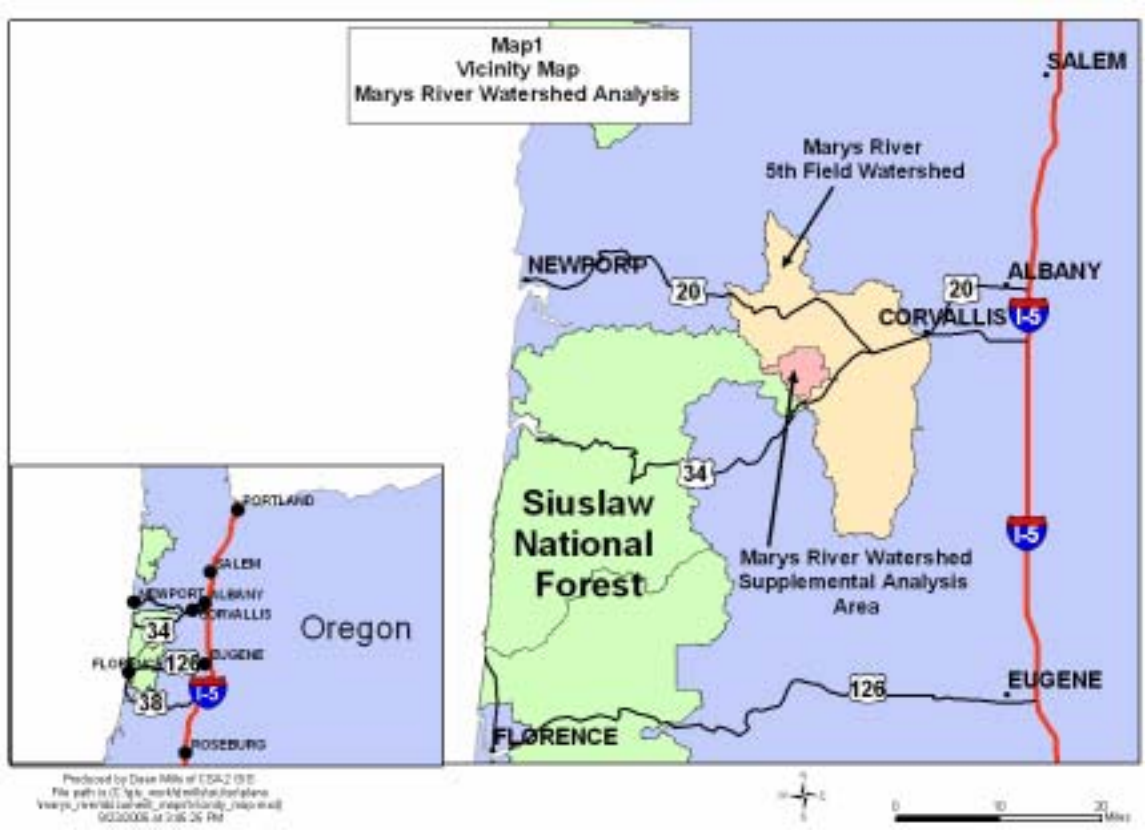


Figure 1: Ownership within the Study Area



FOREST SERVICE LAND ALLOCATIONS – CURRENT MANAGEMENT DIRECTION

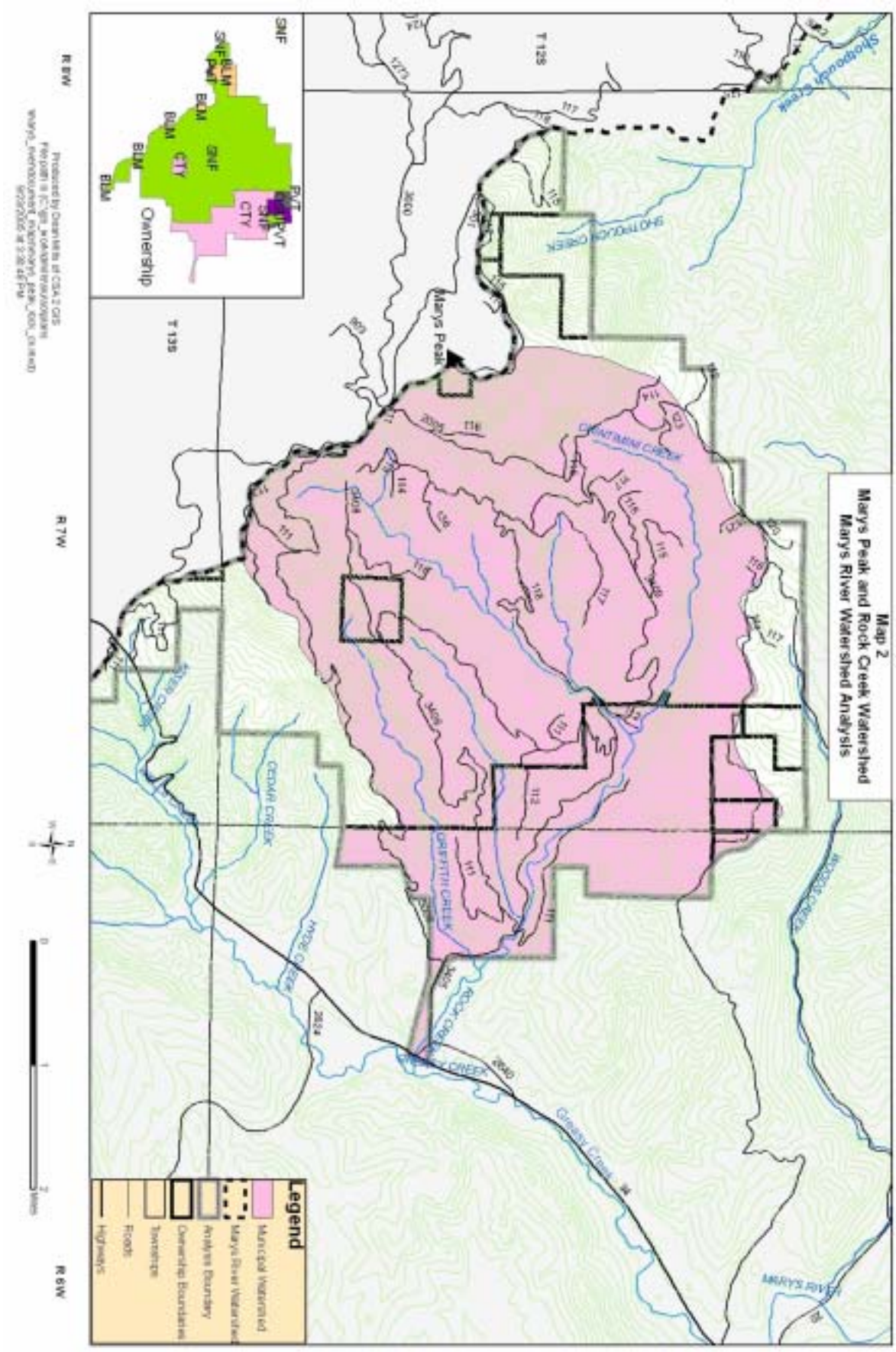
The following summarizes the major resource programs and management direction for Forest Service administered land in the analysis area (Map 3: Land Management Allocations). The Siuslaw National Forest Plan (USFS 1990) as amended by the Northwest Forest Plan (USDA, USDI 1994) contains additional details.

Late Successional Reserves

Ninety-nine percent of the federally managed land in the watershed is allocated to Late-Successional Reserve (LSR) based on the Northwest Forest Plan. The objective of this land use is to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl, bald eagle, and the marbled murrelet.

Riparian Reserves

Approximately 53 percent of Siuslaw N.F. lands in the watershed area are within Riparian Reserve boundaries. Riparian Reserves overlie all other land allocations and are not shown in Map 3. Riparian Reserves include those portions of a watershed directly coupled to streams, rivers, and lakes that are the portions of a watershed required for maintaining hydrologic, geomorphic, and ecological processes that directly affect standing and flowing waterbodies. In addition to aquatic resources, Riparian Reserves were established to benefit other riparian-dependent species and to retain adequate habitat conditions for dispersal of late-successional forest species throughout the LSR network.


Map 2
Marys Peak and Rock Creek Watershed
Marys River Watershed Analysis
Ownership
SNF
BLM
PVT
CTY
Marys Peak
T 12S
T 13S
R 8W
R 7W
R 6W
CEDAR CREEK
GRIFFITH CREEK
ROCK CREEK
Legend
Municipal Watershed
Marys River Watershed
Analysis Boundary
Ownership Boundaries
Townships
Roads
Highways

Matrix

In this analysis area, 80 acres or one percent of the federal lands in the watershed have been allocated to matrix by the Northwest Forest Plan. Matrix consists of those federal lands outside other land use allocations. Timber harvest and other silvicultural activities would be allowed in that portion of the matrix within suitable forest lands, according to standards and guidelines.

FOREST SERVICE MANAGEMENT DIRECTION

Habitat for Threatened and Endangered species will be managed in a manner that protects species that are federally listed or proposed for federal listing. Further, all lands will be managed in a manner that avoids contributing to the need to formally list federal candidate species, Regional Forester Sensitive species, or Oregon Department of Fish and Wildlife (ODFW) listed species.

Special areas will be managed to maintain, protect, or restore their relevant and important values. Such special areas include the Special Interest Area (SIA) on top of Marys Peak.

Visual areas will be managed in accordance with objectives in the Siuslaw National Forest Plan.

Streams, riparian reserves, water quality, and fish habitat will be managed so that activities that retard or prevent attainment of the Aquatic Conservation Strategy objectives will be prohibited or regulated. Through watershed analysis, watershed restoration projects will be planned and implemented to aid in the recovery of fish habitat, riparian habitat and water quality.

Recreation sites, trails, and special recreation areas will be managed to enhance visitor recreation experiences and produce satisfied public land users.

OTHER OWNERSHIP MANAGEMENT DIRECTION

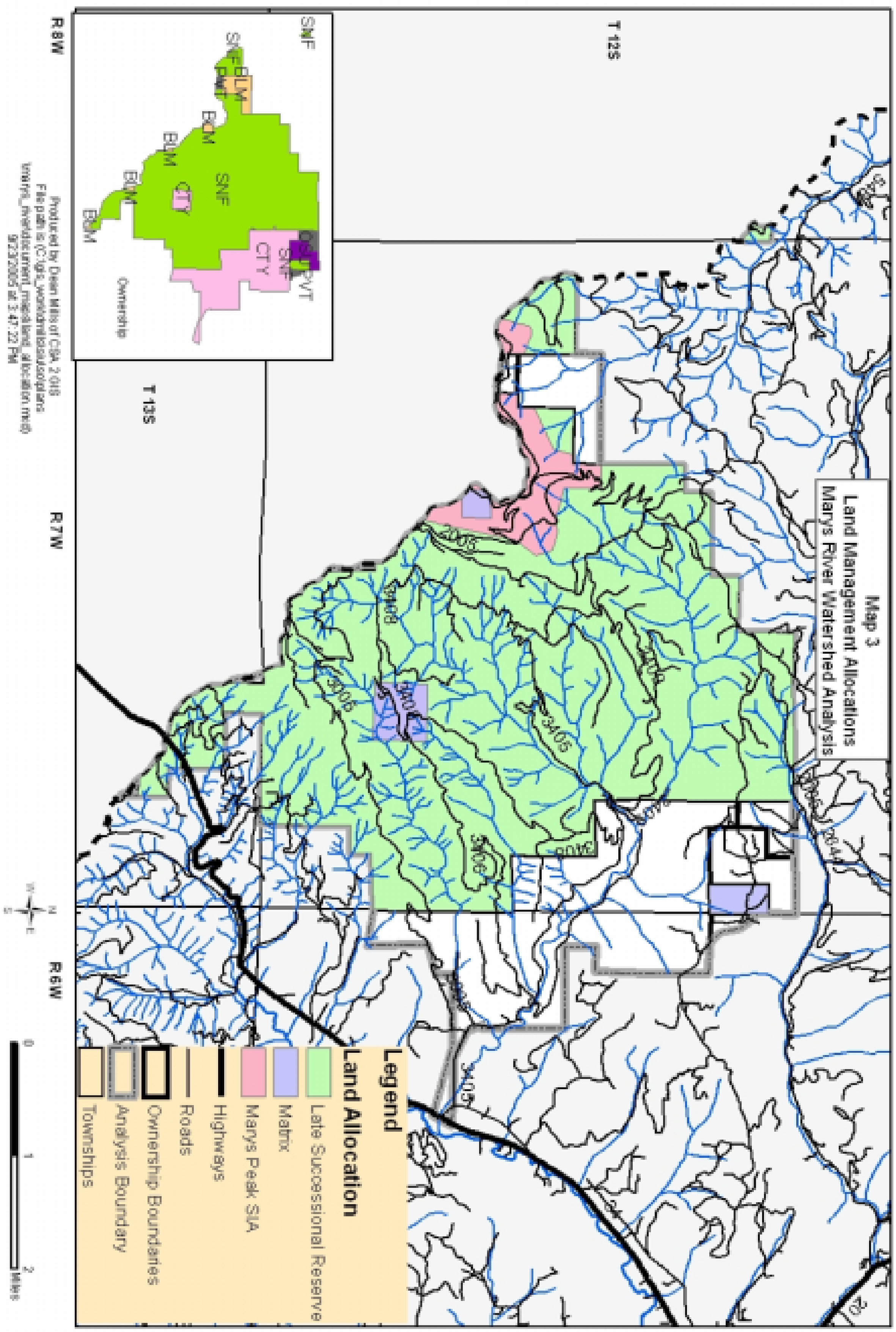
The Bureau of Land Management is guided by the Salem District Resource Management Plan, May 1995. The lands are allocated to Late-Successional Reserve and Riparian Reserve. Additionally, a portion is identified as the Marys Peak Area of Critical Environmental Concern (ACEC).

Oregon State University land is guided by the McDonald-Dunn Forest Plan, 2005.

The City of Corvallis is currently developing a Stewardship Plan for the City owned lands within the Rock Creek Watershed.

TOPOGRAPHY

The terrain is generally mountainous, with steeply incised valleys and sharp ridges. The highest point is Marys Peak (4,097 feet above sea level) and the lowest elevation is 360 feet at the junction of Rock Creek and Highway 34 (Map 2: Marys Peak and Rock Creek Watershed).


Map 3
Land Management Allocations
Marys River Watershed Analysis
Legend
Land Allocation
Late Successional Reserve
Matrix
Marys Peak SIA
Highways
Roads
Ownership Boundaries
Analysis Boundary
Townships
T 12S
T 13S
R 8W
R 7W
R 6W
0
1
2
Miles
Ownership
SNF
BLM
CTY
PVT

GEOLOGY AND GEOMORPHOLOGY

Most of the National Forest lands within the analysis area are underlain by the Siletz River Volcanics (Map 4: Geology and Land Type). This formation is the oldest rock formation in the Coast Range. It was formed in an ancient chain of islands, similar to the modern-day Hawaiian Islands that were accreted to the west coast of North America 55 million years ago. The Siletz River Volcanics consists of pillow basalts, basaltic ash, and lava flows. Beds of basaltic siltstone, sandstone and cobbles were deposited in between the layers of basaltic lava and ash (Orr et al., 1992).

The top of Marys Peak, above 2,000 to 3,000 feet, depending on location, is capped by a massive sill (or horizontal layer) of gabbro, a rock type similar to basalt, but with larger crystals. It is more resistant to erosion than the surrounding sedimentary rocks and the Siletz River Volcanics. As a result, Marys Peak, at 4,097 feet, is the highest peak in the Coast Range (Orr, et al., 1992).

Siltstones and sandstones, which are mapped as Tyee Formation on the State of Oregon 1:500,000 map, but which have been identified as Flournoy Formation by others, are found to the northwest and southeast of the analysis area.

The analysis area is similar to the rest of the Coast Range, with narrow valley bottoms and steep slopes. Scattered areas within the analysis area are underlain by slumps and earthflows. For example, Road 3405-113 is a mid-slope road on the east face of Marys Peak, and crosses several earthflows and slumps.

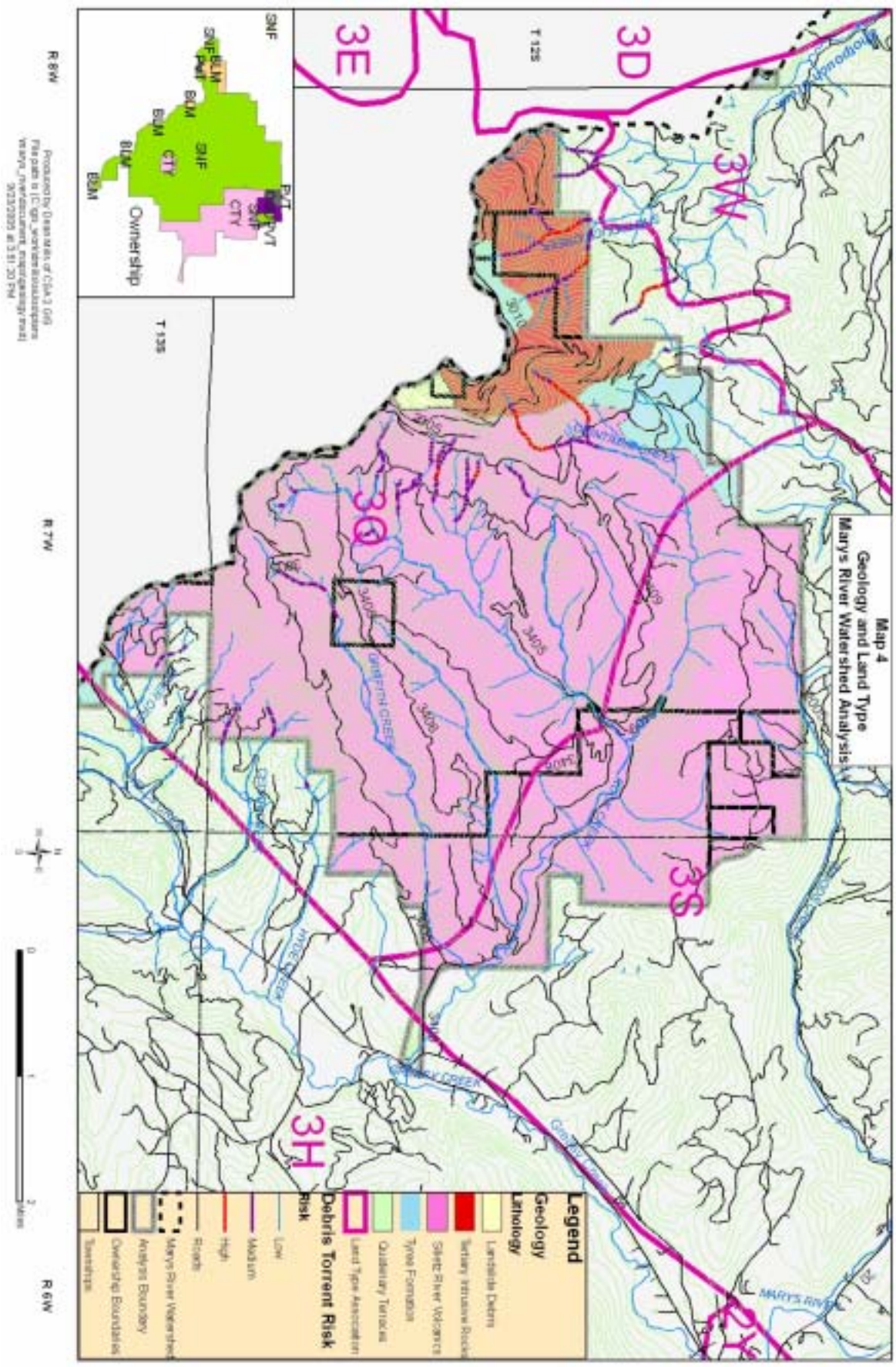
The debris torrent model developed by Daniel Miller (2003) and applied to the Coast Range by Kelly Burnett and Kelly Christianson of the CLAMS (Coastal Landscape and Modeling Study) project, shows that the first and second order streams draining the slopes of Marys Peak and those draining the south slope of Franklin Ridge have the highest probability for debris torrent occurrences. (Maps 4 & 5).

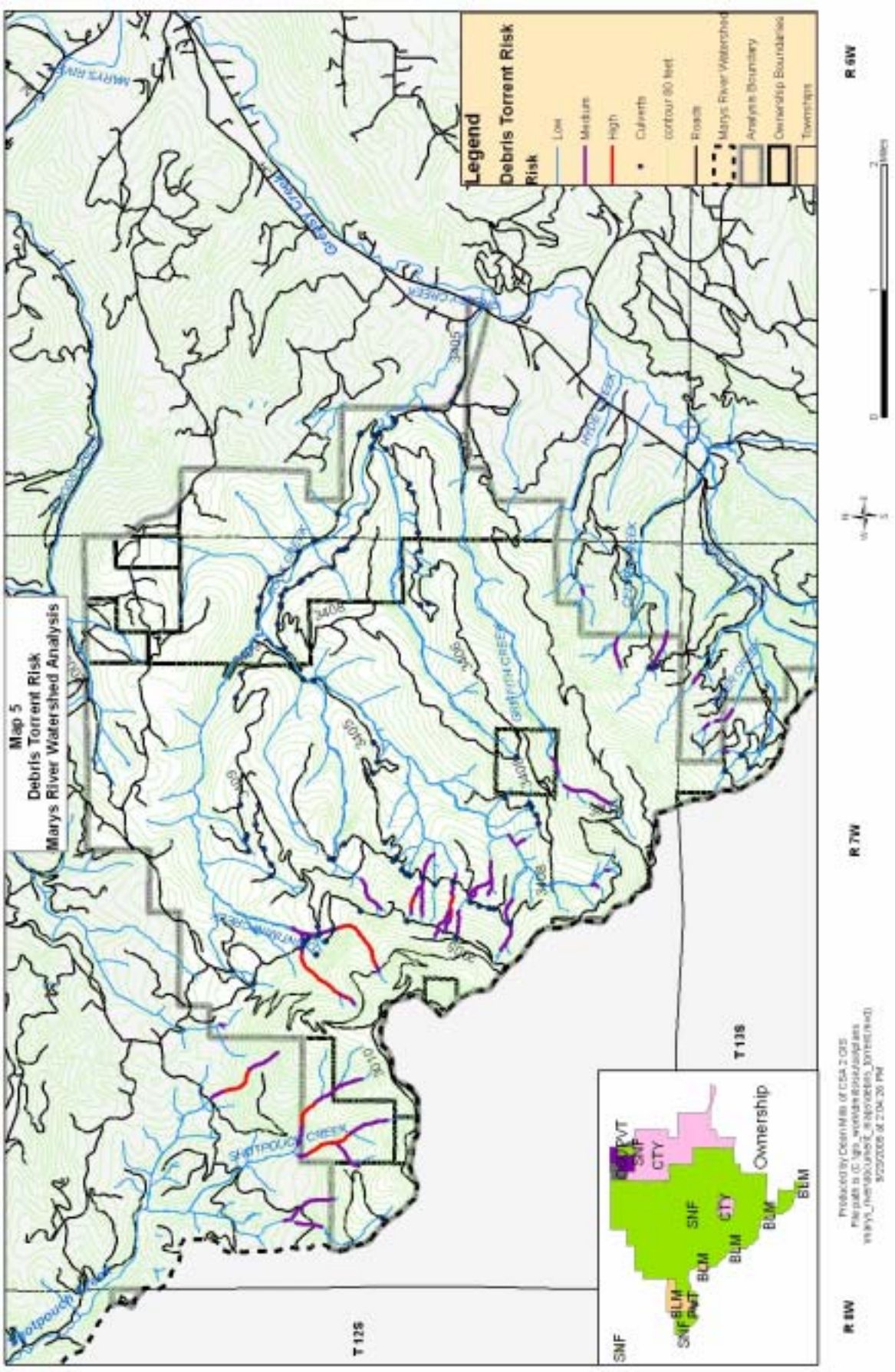
LAND TYPE ASSOCIATIONS

Land Type Associations were developed to characterize similarities and differences in the landscape at the scale of the Coast Range. The polygons were drawn based primarily on geology and geomorphology. These two variables influence topography, landforms, stream density, and soils. All of these variables influence the type of vegetation that is present. The analysis area contains several different Landtype Associations.

Landtype Association 3Q, Igneous Uplands

LTA 3Q is an area of high relief due to igneous intrusions that are more resistant to erosion than the surrounding sedimentary rocks. Marys Peak is within this landtype association, and is the highest point in the Coast Range. Both earthflows and debris torrents can occur in this landtype association. The soils are deep to very deep on hummocky, incised ancient earthflows, and moderately deep on remnant bedrock ridge systems. Soils range from gravelly clay loams on steep slopes to gravelly clay where soils are very deep, and are moderately productive. They have high to very high water holding capabilities. Soil moisture is rarely limiting. This landtype association is characterized by wet winters and


Map 4
Geology and Land Type
Marys River Watershed Analysis
Ownership
SNF
BLM
PVT
CTY
Legend
Geology
Lithology
Landslide Deposits
Tertiary Intrusive Rocks
Siletz River Volcanics
Tyee Formation
Quaternary Terrace
Land Type Association
Debris Torrent Risk
Risk
Low
Moderate
High
Roads
Marys River Watershed
Analysis Boundary
Ownership Boundaries
Townships
3D
3W
3E
3Q
3S
3H
T 12S
T 13S
R 8W
R 7W
R 6W
MARYS RIVER


Map 5
Debris Torrent Risk
Marys River Watershed Analysis
Legend
Debris Torrent Risk
Risk
Low
Medium
High
Culverts
contour 80 feet
Roads
Marys River Watershed
Analysis Boundary
Ownership Boundaries
Townships
Ownership
SNF
CTY
BLM
PVT
T 12S
T 13S
R 8W
R 7W
R 6W
SHOTPOUCH CREEK
GRIFFIN CREEK
3005
3006
3007
3008
3009
3010

moist summers. There are significant differences (more than 5°C) in soil temperatures from summer to winter over all areas below 3,000 feet in elevation (mesic). Above 3,000 feet, winter soil temperatures can be very cold (mesic to cryic). There are occasional high winds in the winter. High biological activity is accompanied by high decomposition rates and moderate accumulations of soil organic matter. The Marys peak area is predominately in the western hemlock zone. Marys Peak itself rises into the noble-fir series at about 3,400 feet on cool aspects. The top of the peak is in open meadows. The moist peak communities (noble fir with Oregon oxalis and starry false solomon's seal) show a cloud forest effect. Below the highest elevations, the western hemlock/salal group is dominant (50 percent of the area) on long upper slopes and mid slopes, with mesic hemlock types on gentle lower slopes and near creeks. Wet hemlock types are generally minor to absent beyond creek banks. The grand fir series is found on the footslopes of Marys Peak below 800 feet.

Landtype Association 3H, Sedimentary Valley Borderlands

Two very small areas within the analysis area are classified as Sedimentary Valley Borderlands (LTA 3H). One area is located near the junction of Highway 34 and Forest Road 3405. The other area is located southeast of the junction of Highway 34 and Forest Road 30. These areas have gently rolling to moderately steep hills and broad valleys adjacent to the Willamette Valley. Unstable areas are not common, but may occur on lower midslopes above incised channels and upper convex sideslopes. Earthflow terrain is not common. Slumps and fluvial channel erosion are the primary hillsope erosion processes. Soils are moderately deep. Soils range from gravelly clay loams on steeper slopes to gravelly clays on lower slope positions. These soils are moderately productive. They have moderately high to high water holding capabilities. Soil moisture limits plant growth on south facing upper sideslopes most years. The plant association is dominantly western hemlock forest, with about 10 percent in the grand fir series. Valley floor vegetation (5 percent), now mainly converted to agricultural use, follows Greasy Creek up to the east of Marys peak. The mesic western hemlock and hemlock/salal group each cover 40 percent of the area. Since the landtype association is mainly in the rain shadow of the Coast Range, the salmonberry community is found mainly in the extreme western end of the landtype association, and to the east is replaced by the mesic hemlock types in valley bottoms, toe slopes, and lower slopes. Upper slopes, mid slopes, and dry lower slopes are generally in the hemlock/salal group. Immediately adjacent to the valley, the grand fir series appears on low elevation slopes up to about 800 feet. The grand fir series is sandwiched between the valley floor vegetation and western hemlock series on the slopes and ridges.

Landtype Association 3S, Igneous Valley Borderlands

The northeast portion of the analysis area is in the Igneous Valley Borderlands (LTA 3S). This area is similar to the Sedimentary Valley Borderlands (LTA 3H), but has slightly more relief because it is underlain by more resistant volcanic bedrock. Slumps and small earthflows are the primary hillslope erosion process. Soils are deep to very deep on hummocky, incised ancient earthflows and moderately deep on remnant bedrock ridge systems. Soils range from gravelly clay loams on steep slopes to gravelly clay where deeper soils occur. These soils are very productive. They have high to very high water holding capacity. Soil moisture is limiting only on upper south facing bedrock sideslopes. This area has moist winters and dry summers. The grand fir series is generally found on low elevation hills and lower slopes bordering the Willamette Valley with valley bottom vegetation, such as oak woodlands, in broad valleys. The western hemlock/salal group is found along ridges. Mesic western hemlock is found in narrower valleys, on toe slopes and on cool lower slopes. Hemlock/salomberry types are very minor, occurring on moist sites or creek banks.

Low-Relief Fluvial Lands (LTA 3W)

A small area in the northwest corner of the analysis area, and north of Marys Peak, is in Low-Relief Fluvial Lands (LTA 3W). This area has low, gentle relief with broad valleys. There is no soil description, productivity or stability data available. The low relief of this inland landtype association is expressed in the dominance of the mesic western hemlock plant association groups (60 percent of the area). The hemlock/salal group (30 percent of the area) is found on warmer mid slopes, upper slopes and ridges, while a scattering of grand fir series (5 percent) is on very low elevation warmer lower slopes near the valley margin. Hemlock/salmonberry is fairly restricted to moist sites and creek banks. This area has moist winters and dry summers.

CLIMATE AND PRECIPITATION

Marys Peak and other high elevations are characterized by wet winters and moist summers, while the lower elevations have moist winters and dry summers. Normal temperature extremes during the summer months vary from 40°F. to 90°F. Occasionally the temperature will drop below freezing, but seldom will it rise above 90°F. During the winter, the temperature range is approximately 20°F. to 50°F.

Winds during the summer months are generally gentle, usually not exceeding 20 miles per hour. During the winter, winds up to 100 miles per hour occasionally blow across Marys Peak.

From 60 to 110 inches of water in the form of rain and snow will fall on the watershed in an average year. About 21 inches of the 75-inch annual average is lost by evaporation or transpiration. This leaves 54 inches for stream flow, of which less than 1/10, or about 4 inches, is used by the city of Corvallis. The annual distribution pattern will explain why so little water is used by the city. Over 55 percent of the runoff is produced in the winter months (December, January, and February). Only 1 percent is produced during July, August and September. Recognizing this situation, the City of Corvallis organized its water system to meet conditions of the low flow period.

HYDROLOGY

Like the rest of western Oregon, the streams in the headwaters of the Marys River watershed are fed by winter rainfall. From 60 to 110 inches of water in the form of rain and snow will fall on the watershed in an average year. The watershed has a pattern of low summer flows during the dry months, and a series of peak flows during the winter wet months. A closer look at the annual distribution pattern explains why so little water is used by the city.

Stream discharge records are available for Rock Creek (USGS 1946-1952, 1975-1980). Rock Creek is a small sub-basin of Greasy Creek on mostly steep, forested lands. Average monthly runoff values for 11 years show runoff peaks in February, which correspond with the onset of snow melt. The importance of snow melt in the Rock Creek sub-basin also may explain the increased discharge for the Marys River in February and March, which reflects drainage of high-elevation areas of the watershed. Low flow in Rock Creek may occur as early as May and extend well into the fall.

Rock Creek had a USGS stream gage in place just upstream of Highway 34 from 1945 to 1952 and again from 1974 to 1979. Average daily summer flows are less than 1 cfs; winter daily peak flows can be between 700 and 800 cfs.

There are 4 main low-gradient tributaries to the mainstem of Rock Creek. All of the tributaries are gravel/cobble bottom streams that are moderately confined with some

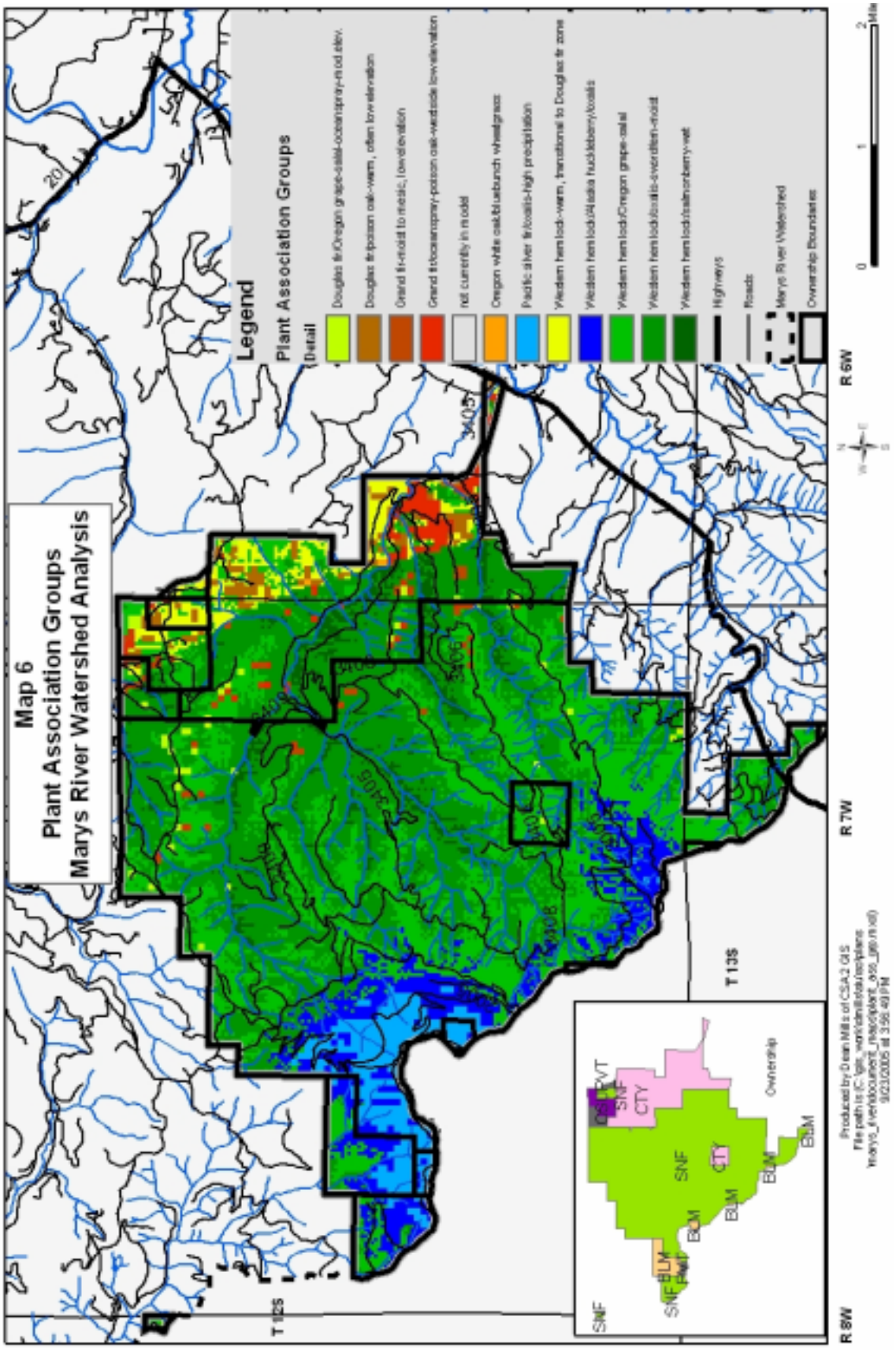
floodplain development. For the most part, the riparian areas are mature conifer and deciduous trees that offer good shade and a source of woody debris.

VEGETATION

The analysis area lies mostly within the Western Hemlock plant series (89 percent), but also contains the Pacific silver fir/Noble fir series (5 percent), the Grand Fir series (3 percent) and the Douglas-fir series (3 percent). These series are named for the climax species which eventually dominates the forested plant community (Map 6: Plant Association Groups). Douglas-fir is currently the dominant tree species within the watershed because it is long-lived species which regenerated after historic wildfires. Major disturbances such as wildfires, windstorms, landslides, floods, insects, pathogens and human activity determine the successional pathways within a landscape. As a result of these disturbances, each plant community within the watershed has vegetation that occurs over a range of successional stages.

Marys Peak meadow complex

In addition to the vegetation groups in Marys River Watershed, there are extensive grassy balds atop Marys Peak. These are rare special habitats in the Coast Range, nearly as rare as the nearly pure noble fir stands on the north and east border of the meadows. The meadow complex occupies approximately 185 acres of which 47 acres within the watershed. Rocky outcrops occupy a small area within the meadow complex, which otherwise is suitable for tree growth. There are three main plant communities in the deeper soil meadow complex: red fescue-bent grass-sedge community, arrow-leafed groundsel community, and iris community (Snow 1984). The size of the meadow complex, the presence of the higher elevation noble firs, and the rock garden species make Marys Peak a unique site in the Coast Range. More details about the meadow and vegetation are in Appendix A.


Map 6
Plant Association Groups
Marys River Watershed Analysis
Legend
Plant Association Groups
(Detail
Douglas fir/Oregon grape-salal-oceanspray-mod elev.
Douglas fir/poison oak-warm, often low elevation
Grand fir-mod to mesic, low elevation
Grand fir/oceanspray-poison oak-westside low elevation
not currently in model
Oregon white oak/bluebunch wheatgrass
Pacific silver fir/cool-high precipitation
Western hemlock-warm, transitional to Douglas-fir zone
Western hemlock/Alaska huckleberry/cool
Western hemlock/Oregon grape-salal
Western hemlock/cool-overstory-moist
Western hemlock/cool-overstory-wet
Highways
Roads
Marys River Watershed
Ownership Boundaries
R 8W
R 7W
R 6W
T 12S
T 13S
SNF
BLM
CTY
Ownership

PLANT SPECIES OF CONCERN

Plant species of concern include those listed as endangered, threatened, or are proposed for listing as such under the Endangered Species Act, and species designated as Sensitive by the Forest Service in Region 6. The group includes vascular plants, mosses and liverworts and fungi.

A site for noble polypore (*Bridgeoporus nobilissimus*) is documented to occur in Township 12 South, Range 7 West, Section 28, on the southwest border of the Watershed (ONHIC 2005). Based on the reported location, the site is outside the Watershed boundary by approximately 100 meters, however, this distance may be within the error of accuracy and for the purpose of this Watershed Analysis, the site will be considered inside the Watershed boundary.

Noble polypore was first given management consideration on federal lands in 1994 when it was included in Table C-3 of the Northwest Forest Plan Standards and Guidelines as a "survey and manage' species (USDA/USDI 1994). With the removal of those Standards and Guidelines (USDA/USDI 2004) noble polypore was added to the Region 6 Forest Service list of Sensitive species.

The noble polypore is a large perennial shelf fungus, or conk, measuring up to 3 feet in diameter. The shaggy upper surface is often covered with moss, algae, lichens and litter from which it gets its other name, the "fuzzy green pizza". Endemic to Oregon and Washington, there are a total of 48 known sites for the species, making it one of the rarer known organisms that occur on National Forest. Conks grow on large noble fir (*Abies procera*) and Pacific silver fir (*Abies amabilis*) snags at elevations of 1,000 to 4,000 feet, essentially where its host can be found in Oregon and Washington. The Marys Peak *B. nobilissimus* site is quite unique in that it is the only site known from the Oregon Coast Range, likely due to the limited availability of noble fir and Pacific silver fir there.

Potential threats to the long-term persistence of the species include actions which cause the removal of noble fir host trees, modify stand characteristics or cause mechanical damage to individual conks. The level of threat to *B. nobilissimus* in the Watershed is probably low, but the species should be given consideration whenever management actions have the potential to affect its habitat.

No other documented plant species of concern occur within the Watershed. Because there are large gaps in our knowledge of where these species may occur and survey efforts are often not systematic or well documented, the possibility remains that species of concern will be located within the Watershed in the future, particularly in the rarer communities found there. For this reason, efforts should be made to maintain and enhance all plant communities represented in the Watershed.

ROADS

There are approximately 67 miles of National Forest System (NFS) roads administered by the Forest Service that provide access to and within the watershed. This includes a segment of the Marys Peak Road that lies outside the boundary but brings visitors to the access point for trails within the upper western portions of the watershed. With the exception of the Marys Peak and Woods Creek roads the NFS roads within the watershed are closed to public traffic, primarily to protect the City of Corvallis municipal watershed. The Marys Peak Road to the current upper parking area was completed in 1941, providing recreation access to the upper elevation of Marys Peak. The majority of the road system within the boundaries of the municipal watershed was constructed in the 1950's for logging access to salvage insect-killed timber.

WILDLIFE

Wildlife diversity within the watershed is quite typical for this region of the Coast Range. There are at least a few hundred vertebrate species and perhaps several thousand invertebrate species which utilize this analysis area. Threatened and Endangered species including northern spotted owl, marbled murrelet, and bald eagle, are known to occur in the watershed for at least some portions of the year.

FISH

Streams of the analysis area, from their headwaters on the northeast slopes of Marys Peak to the edge of the valley floor, are cool water habitat for a limited number of native and introduced fish species. Resident cutthroat trout *Oncorhynchus clarki* are found throughout the analysis area. The cutthroat fluvial life history form, in which individuals leave the small headwater streams to rear in downstream portions of larger rivers and return to spawn in headwater areas, may be present but has not been documented in the analysis area. Sculpin, dace, and brook lamprey are native fish species that could be found in the analysis area. Four species of sculpin *Cottus sp*. are known in the Marys River watershed and could be found in association with resident cutthroat trout. Leopard dace *Rhinichthys falcatus*, a native cyprinid or minnow like fish could be present. Western brook lamprey *Lampetra richardsoni* are widely distributed throughout western Oregon and are undoubtedly present.

Coho salmon *Oncorhynchus kisutch*, summer steelhead trout *Oncorhynchus mykiss*, and Fall Chinook *Oncorhynchus tshawytscha* were unable to pass above Willamette Falls and did not establish populations in the Willamette basin before the late 1800's. These species are not native to the analysis area but steelhead trout have been found spawning and rearing in the Rock Creek system where fish passage is unobstructed.

ISSUES AND KEY QUESTIONS

This step of the watershed analysis process helps to focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the watershed.

Six issues critical to the future management of this watershed were identified. They are:

- Protection or enhancement of wildlife habitat
- Protection or enhancement of water quality, especially regarding future road management.
- Protection or enhancement of grassy bald habitat.
- Protection or enhancement of fisheries and aquatic species habitat.
- Prevention and control of invasive non-native species.
- Management of fire hazard and risk.

This list of issues was developed by the watershed analysis team with input from the City of Corvallis Rock Creek Municipal Watershed managers and the Marys River Watershed Council.

The following is a description of each issue and the key questions that pertain to each issue. Expected outcomes from the analysis, as a result from each of the key questions, will provide continuity from this step in the process and through the remainder of the analysis.

ISSUE 1: HIGH QUALITY WILDLIFE HABITAT MUST BE MAINTAINED OR ENHANCED TO SUPPORT LATE SUCCESSIONAL AND OTHER SPECIES OF CONCERN.

Habitat for late-successional forest species has been altered in this watershed. The patches of remaining mature forests are fragmented. This raises concerns about maintaining the species that are associated with this habitat type. Improving the amount and distribution of this habitat type and maintaining or enhancing connectivity to areas outside the watershed has been identified as a primary issue.

Key Question:

Terrestrial vegetation has been altered by management activities over the past few decades and may be outside of the range of natural variability for the Coast Range ecosystem. What is the current condition of late-successional species and habitat in the watershed? How does late-successional forest habitat in the watershed function in the larger landscape or regional context? Where and how can late-successional habitat within the watershed be improved in order to hasten the development of suitable habitat?

Outcome: Determine the best remaining habitat areas. Delineation of priority areas for late-successional habitat restoration and the time frame required to achieve those goals.

Key Question:

Have changes in riparian vegetation characteristics over the last century affected the long-term health and sustainability of these areas and their ability to function as suitable habitat for terrestrial species? Riparian areas have a variety of functions for terrestrial and aquatic species and provide connectivity across the landscape.

Outcome: Determine key areas to support terrestrial species connectivity and repair and enhance where connectivity is lacking.

ISSUE 2: WATER QUALITY DEPENDS ON THE STABILITY OF THE ROAD SYSTEM.

Scattered areas within the watershed are underlain by slumps and earthflows. For example, Road 3405-113 is a mid-slope road on the east face of Marys Peak, and crosses several earthflows and slumps. Much of the road system was built in the 1950's for logging access. As the road system ages, maintenance is required and culverts need to be replaced. For the foreseeable future, maintenance dollars are limited.

Key Question:

What is the current condition of the road system within the analysis area? Are there areas of perched sidecast material? Are there culverts in need of replacement?

Outcome: Current condition of roads and culverts. Delineation of priority treatment areas and identification of appropriate techniques to protect water quality.

ISSUE 3: CONIFER INVASION IS REDUCING THE AMOUNT OF GRASSY BALD UNIQUE HABITAT.

Magee (1984) investigated tree invasion patterns in the grassy balds of Marys Peak. She speculated that infrequent fires on the summit could maintain the bald; however, she documented conditions favoring encroachment as they varied among the community types. Recent aerial photographs have raised the concern of conifers invading the grassy bald.

Key question

What is the current condition of the gassy balds as compared to the historic condition?

Outcome: Identified opportunities to maintain or enhance this unique habitat.

ISSUE 4: FISH PASSAGE, PRIMARILY FOR CUTTHROAT TROUT, IS COMPROMISED BY BLOCKAGES FROM CULVERTS AND WATER DIVERSIONS.

Marys River and Greasy Creek stream-adjacent land use is dominated by valley agriculture and urban development. Stream and riparian habitats have been highly modified by agriculture pastures, scattered private residences, road/stream crossings, and stream bank stabilization. Therefore, the relatively undisturbed riparian zones and stream habitat in the analysis area served as an important refuge habitat. Eliminating fish passage barriers will allow greater use of high quality refuge fish habitat.

Key Question:

How much habitat is blocked by culverts or water diversions?

Outcome: Culvert survey to determine fish passage blockages. Delineation of priority treatment areas and identification of appropriate techniques to provide fish passage.

ISSUE 5: INVASIVE PLANTS AND NOXIOUS WEEDS THREATEN NATIVE PLANT COMMUNITIES.

A number of non-native plants are known to occur in the Marys Peak area and are likely present in the Watershed.

Key Question:

What is the current condition of invasive plants and noxious weeds within the watershed?

Outcome: Survey to determine the extent of invasive plants and noxious weeds. Identify and delineate priority treatment areas for appropriate techniques to prevent or control invasive plants or noxious weeds.

ISSUE 6: FIRE HAZARD AND RISK

Fire is the primary large scale disturbance agent on vegetation in the Oregon Coast Range though these disturbances occur infrequently.

Key Question:

What is the current condition of fire hazard and risk?

Outcome: Review fire frequency and fire intensity models. Review fire historical records.

CURRENT CONDITIONS

TERRESTRIAL VEGETATION

Of the 8,846 acres of Forest Service ownership within the analysis area, approximately 2,600 acres are plantations and 6,200 acres are natural stands. Of the 2,375 acres of City of Corvallis ownership within the analysis area, approximately 600 acres are plantations and 1,700 are natural stands (Map 7: Vegetation Age).

These managed stands were established through the practice of clearcutting, broadcast burning and replanting with Douglas-fir. These single-story managed stands have approximately 200 to 300 trees per acre, and generally lack species diversity, coarse woody debris and snags.

Table 1 – Stand Age

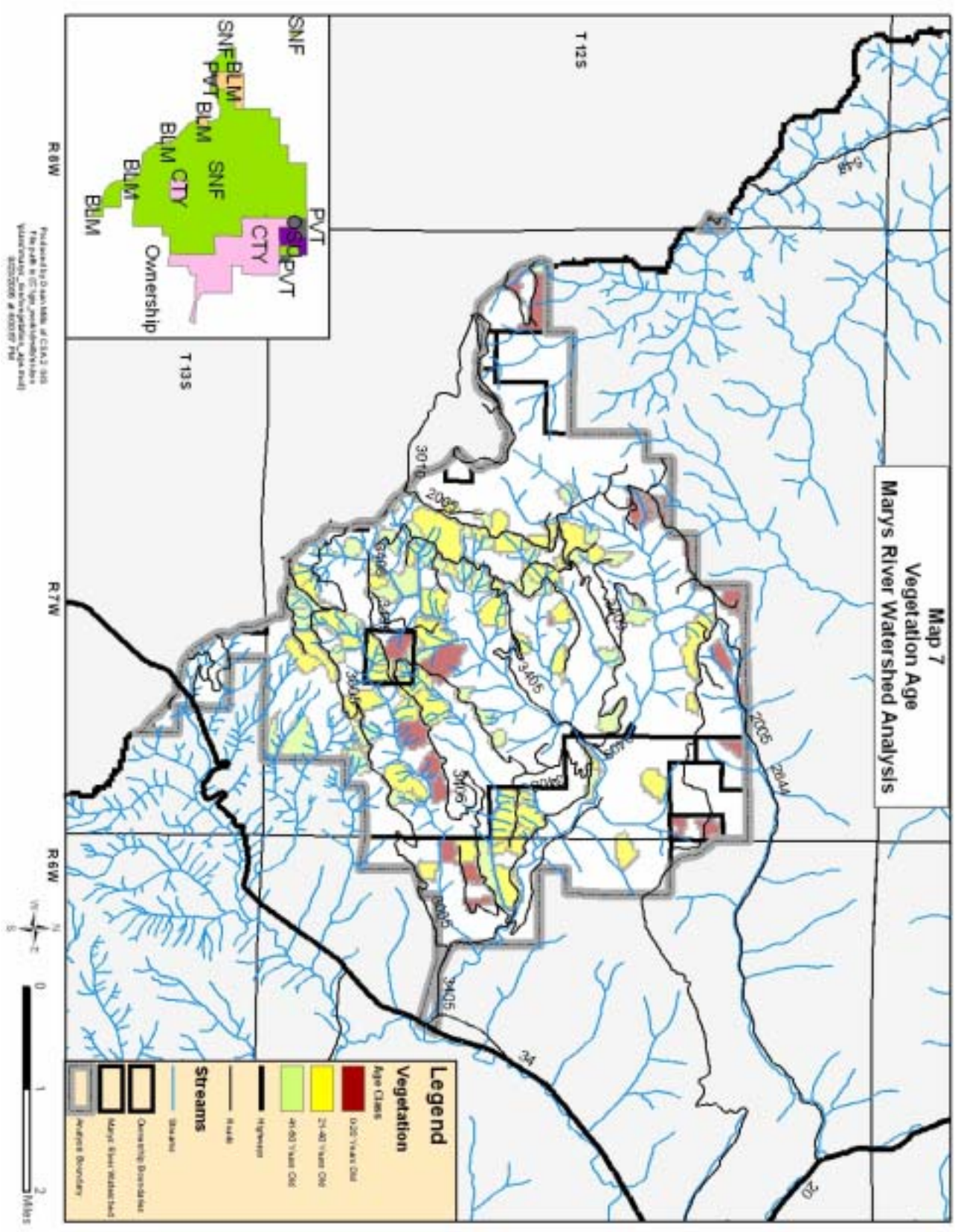
Ownership	Age Group 0 to 20	Age Group 21 to 40	Age Group 41 to 60	Natural Stands	Other	Total
Forest Service	464	1126	958	6,188	110	8,846
City of Corvallis	93	415	77	1,790	--	2,219

All except 80 acres of National Forest system lands have been allocated as Late-Successional Reserve (LSR) by the Northwest Forest Plan (1994) within the Analysis area. The remaining 80 acres have been allocated to Matrix. The Late-Successional Reserve Assessment, Oregon Coast Province, Southern Portion (RO267, RO268) (1997) was developed to help facilitate implementation of appropriate management activities for the LSR and assure that these activities meet the LSR standards and guidelines and further LSR objectives.

The LSR assessment process identified the need to secure the "best" habitat areas first before devoting limited funding and resources to more degraded areas. This strategy aligns with the aquatic conservation and restoration strategy objectives and priorities developed by the Northwest Forest Plan.

Based on the current condition and the amount and distribution of remaining late-successional habitat, the analysis area was identified as a Corridor LSR Zone that serves primarily to connect the analysis area to adjacent LSRs to the North (Hebo) and East (Cascades).

The Corridor LSR Zone was further stratified into Landscape Cells. Prioritization of Landscape Cells for treatment was based on securing the best habitat first, by blocking up large patches and connecting isolated patches. The analysis area was identified as "Priority 1 = Landscape Cell #1 – Mature".

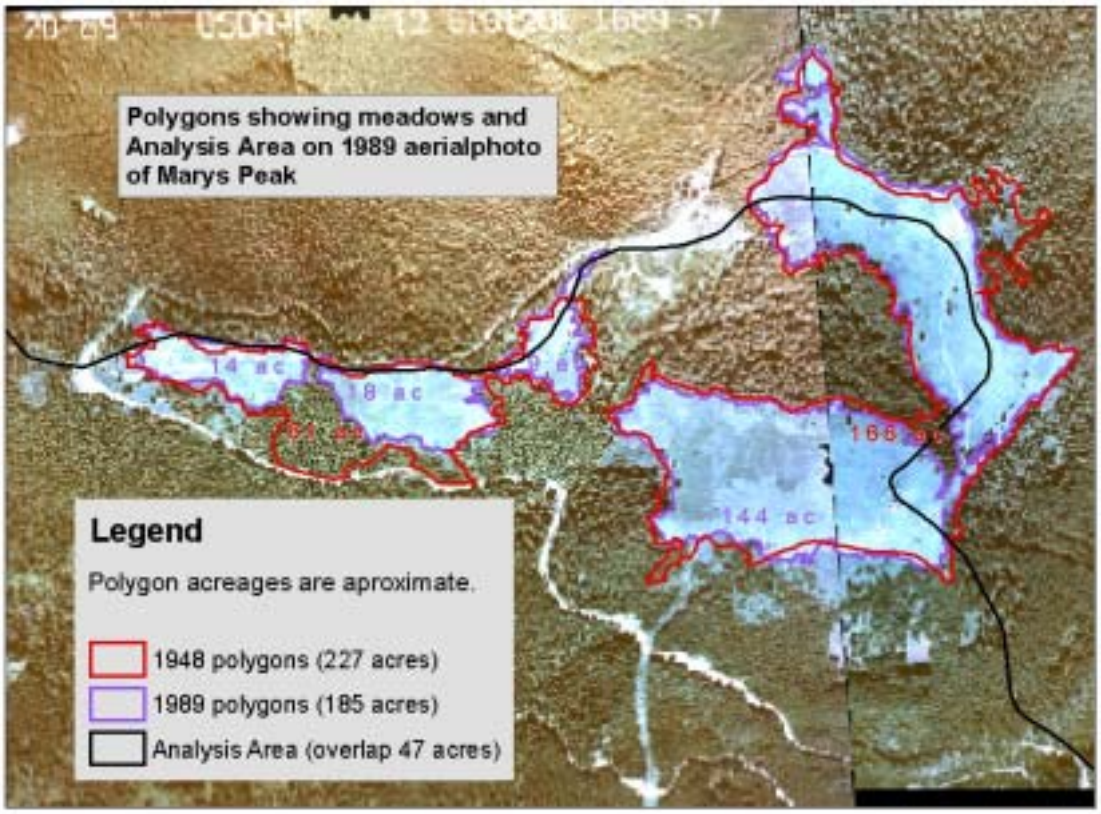

Map 7
Vegetation Age
Marys River Watershed Analysis
Ownership
SNF
BLM
PVT
CTY
OSU
Legend
Vegetation
Age Class
Streams
Highways
Roads
Ownership Boundary
Marys River Watershed
Analysis Boundary
T 12S
T 13S
R 6W
R 7W
R 6W
0
1
2
Miles

MARYS PEAK MEADOW COMPLEX

Marys Peak Meadow Complex rises further than all other ridges in the Coast Range. It and other high ridges rise into the transient snow zone where topography controls allow snow to accumulate and persist in the face of wind and sun. Snow regime determines the distribution and compositions of the grassy bald communities. It also controls patterns of tree encroachment (Magee 1984).

To date, no evidence has been offered that current meadows have been occupied by forest under the current climate, though it is likely that the meadows occasionally burned. Magee (1984) investigated tree invasion patterns in the grassy balds of Marys Peak. She speculated that infrequent fires on the summit could maintain the bald. However, she documented conditions favoring encroachment as they varied among the community types. Magee found three major requirements for invasion: safe sites for seedling establishment, heavy seed years, and suitable weather patterns. Ground disturbance along roads and the old rope-tow have provided "safe sites" for tree establishment. Warm dry climatic periods appear to favor tree encroachment even in undisturbed meadows.

Figure 2: Aerial photos of the Marys Peak Meadow Complex



Aerial photos from 1948 were compared to 1989 photos. Table 2 provides acre figures that are approximate, due to distortion and geo-registration limitations. Most applicable to the Marys River watershed assessment are changes in the largest meadow, the east meadow.

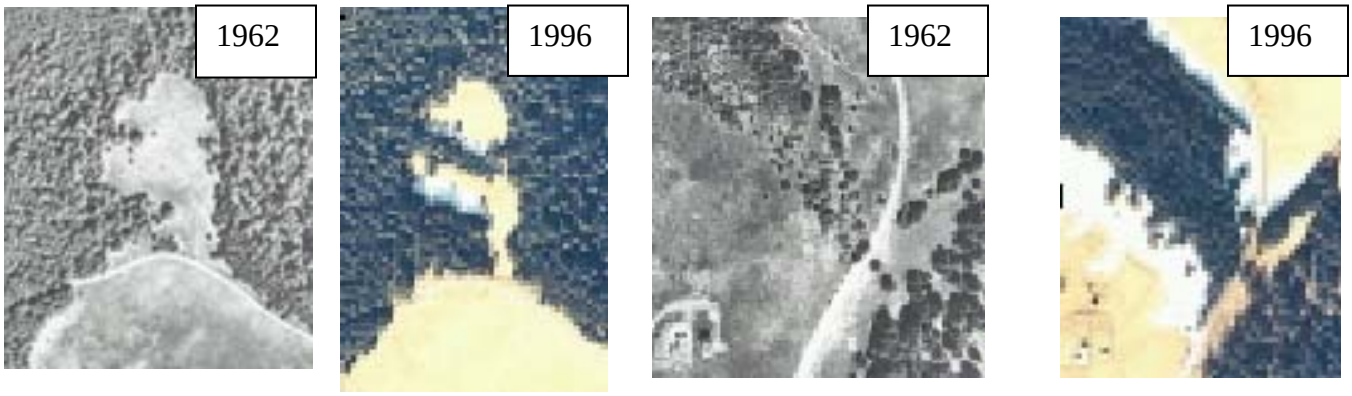
Table 2: Patterns of change in Marys Peak Meadow from 1948 to 1989

	1948 acres	1989 acres	% change
East meadow complex	166	144	-13%
West meadow complex	61	41	-32%
Total "open meadow"	227	185	-18%

Much of the loss to the west meadow complex appears to be from establishment of a young Douglas fir stand below 3,500 feet on a southern aspect. Most of the change in the east meadow complex is due to encroachment by noble fir, above 3,500 feet.

The change averages between 0.5 and 1 acre per year. However, it does not appear as a slow, steady invasion by trees. Aerial photos from intervening years support Magee's results that suggest waves of establishment corresponding to favorable weather coincident with good seed years. The photos illustrate slow infilling behind pioneering trees.

Figure 3: Aerial photos of intervening years from 1962 and 1996



No information is available on potential recovery of the portion of the east meadow where the annual Shriner event took place in the Trek meadow. The annual Shriner event ended in the mid-1980's. Snow (1984) had speculated that grasses were more abundant than they would have been in that meadow because of human disturbance.

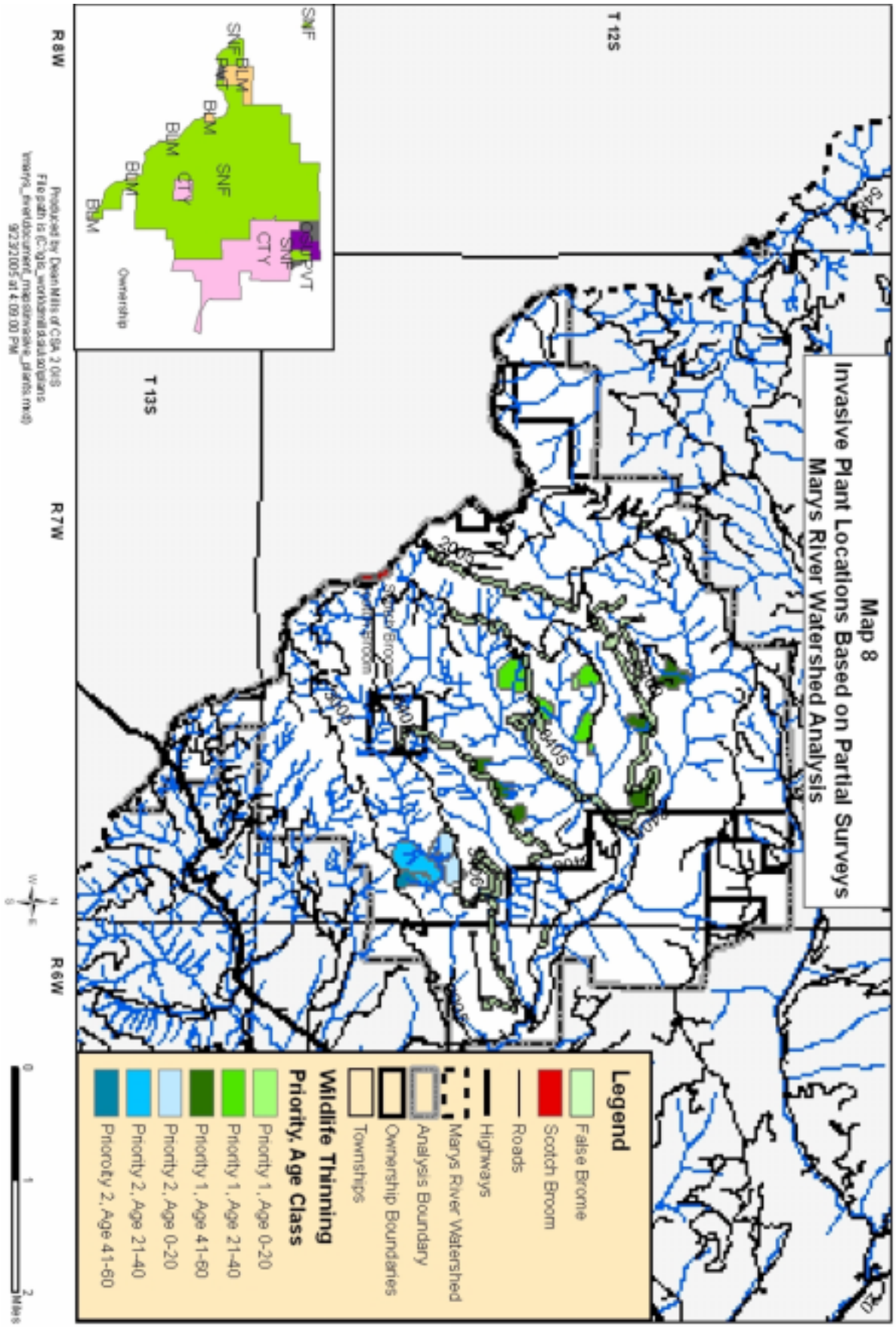
Noxious weeds are not currently found in the meadows. While some non-natives such as sheep sorrel (*Rumex acetosella*) are present, there are not aggressive species that would significantly alter the communities at the present; however, invasion by non-natives such as Scot's Broom, false brome, or knapweeds is a continuing threat that requires periodic survey.

Viola adunca, important to the potential re-introduction of a threatened silverspot butterfly (*Speyeria zerene bremneri*) population on the Peak, is present in the red fescue and iris communities. Although the inland valley form of the silver spot is extinct in Oregon, habitat on Marys Peak that once supported the butterfly is similar to habitat for a population present in the Olympic mountains in Washington.

The silverspot butterfly population on Marys Peak was last observed in the late 1970's. An unsuccessful re-introduction was attempted in the 1980's with butterflies of a coastal origin. Recommendations on establishing a population on the Peak with the inland form from the Olympic mountain population have been recorded for over 15 years.

INVASIVE PLANT SPECIES

A number of non-native plants are known to occur in the Marys Peak area and are likely represented in the watershed (Map 8: Invasive Plant Locations Based on Partial Surveys). The degree to which management efforts should be directed at control and possibly eradication of these species varies greatly. Creeping bentgrass (*Agrostis alba* var. *alba*), colonial bentgrass (*Agrostis tenuis*), oxeye daisy (*Chrysanthemum leucanthemum*), cats-ear (*Hypochaeris radicata*) and sheep sorrel (*Rumex acetosella*) have naturalized and are very prevalent in the Watershed. Control or eradication of these species may be warranted in situations where their presence jeopardizes resource values and the area under consideration is small (< 1 acre) but treatment of larger areas would likely be costly and ineffective. Some invasive species may be more prevalent elsewhere, but still at relatively low levels within the watershed. Efforts to control this group, including meadow knapweed (*Centaurea pratensis*), Himalaya blackberry (*Rubus discolor*), Scot's Broom (*Cytisus scoparius*) and Dalmatian toadflax (*Linaria dalmatica*) should be made whenever possible. The highest priority for treatment is "new invaders", species that have arrived in the area recently and are still relatively limited in occurrence such as false brome *(Brachypodium sylvaticum*). This species was first documented in the watershed in 2004. A partial inventory in 2005 found it to be more prevalent than previously thought, suggesting that it may have gone undetected for a number of years. The survey also found that it is primarily restricted to road shoulders where the forest canopy is relatively open and the soil has been disturbed in the recent past, however, in areas outside the Watershed where this grass has established, it has aggressively colonized forested stands in undisturbed soil. Without intervention, the potential exists for native forest understory communities to be converted to false brome.


Map 8
Invasive Plant Locations Based on Partial Surveys
Marys River Watershed Analysis
T 12S
T 13S
R8W
R7W
R6W
Legend
False Brome
Scotch Broom
Roads
Highways
Marys River Watershed
Analysis Boundary
Ownership Boundaries
Townships
Wildlife Thinning
Priority, Age Class
Priority 1, Age 0-20
Priority 1, Age 21-40
Priority 1, Age 41-60
Priority 2, Age 0-20
Priority 2, Age 21-40
Priority 2, Age 41-60
Ownership
SNF
BLM
CTY
PVT
Produced by Dean Mills of CSA 2.0S
File path is C:\gis_work\arcmld\data\projects\marys_river\document_maps\invasive_plants.mxd
9/23/2005 at 4:09:00 PM
0
1
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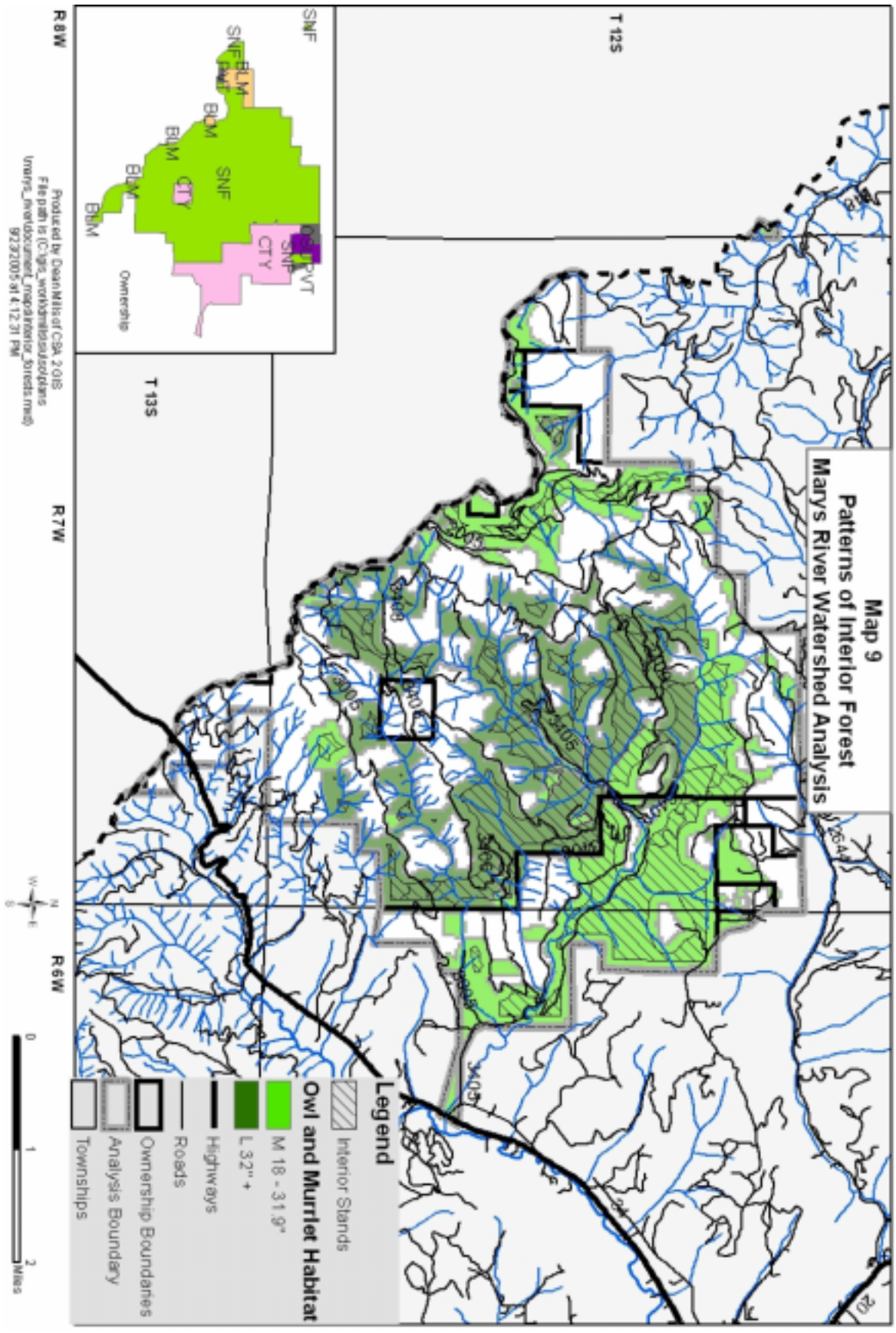
Miles

Table 3: Listing of known invasive plants in Marys River Watershed

Common Name	Scientific Name	OR. Dept. of Agriculture Designation
creeping bentgrass	*Agrostis alba var. alba*	None
colonial bentgrass	*Agrostis tenuis*	None
false brome	*Brachpodium sylvaticum*	Noxious
butterfly bush	*Buddleja davidii*	Noxious
spotted knapweed	*Centaurea maculosa*	Noxious
meadow knapweed	*Centaurea pratensis*	Noxious
yellow starthistle	*Centaurea solstitialis*	Noxious
oxeye daisy	*Chrysanthemum leucanthemum*	None
Canada thistle	*Cirsium arvense*	Noxious
bull thistle	*Cirsium vulgare*	None
clematis	*Clematis vitalba*	Noxious
Scot's broom	*Cytisus scoparius*	Noxious
Portuguese broom	*Cytisus striatus*	Noxious
orchardgrass	*Dactylis glomerata*	None
English ivy	*Hedera helix*	Noxious
cats-ear	*Hypochaeris radicata*	None
English holly	*Ilex aquafolium*	None
policeman's helmet	*Impatiens glandulifera*	Noxious
everlasting pea	*Lathyrus latifolius*	None
Dalmatian toadflax	*Linaria dalmatica*	Noxious
reed canarygrass	*Phalaris arundinacea*	Noxious
Himalayan blackberry	*Rubus discolor*	Noxious
evergreen blackberry	*Rubus laciniatus*	Noxious
Sheep sorrel	*Rumex acetosella*	None
Tansy ragwort	*Senecio jacobaea*	Noxious
Gorse	*Ulex europaeus*	Noxious

TERRESTRIAL WILDLIFE SPECIES AND HABITATS

Interior mature conifer habitats (>500' from the edge of mature stands) are critical to certain species sensitive to moisture, light, and ambient air movement for either their long term existence in one area or for mobility across the landscape for dispersal and genetic exchange with other individuals. Acres of interior forest are a gross measure of the degree to which the mature conifer habitats support interior species. Interior forest habitat in the analysis area is 2,531 acres or 28.6 percent of the watershed. This can be used as a benchmark for interior forest development over time and is not intended to be an absolute measure of the watersheds current health. Factors other than gross acres, such as patch size, shape of interior forest patches, and location all play a part in the overall value of interior forests to species that use such habitats. Map 9 shows the interior forest patterns.


Map 9
Patterns of Interior Forest
Marys River Watershed Analysis
T 12S
T 13S
R 8W
R 7W
R 6W
Legend
Interior Stands
Owl and Murrlet Habitat
M 18 - 31.9"
L 32" +
Highways
Roads
Ownership Boundaries
Analysis Boundary
Townships
Ownership
SNF
BLM
PVT
CTY
Miles

Currently the analysis area is approximately 39 percent (4,730 acres) late successional conifer forest, which is habitat for species such as the northern spotted owl, pileated woodpecker, marbled murrelet, and flying squirrel. Loss of these habitats in the watershed is largely attributable to timber harvest, however historically the forests in the Marys River watershed as well as all forests in the Coast Range of Oregon experienced catastrophic stand replacing fires and the influences of winter storm events.

There is one bald eagle nest site in the watershed that is not on Siuslaw National Forest land as well as 9 northern spotted owl nests and 6 marbled murrelet occupied sites, with 6 and 5 on Siuslaw National Forest land, respectively.

Species for which there exists the most information include northern spotted owls, marbled murrelets, Roosevelt elk, and black-tailed deer. However, many more species of birds (warblers, finches, flycatchers, hawks, thrushes, and hummingbirds), reptiles and amphibians (torrent salamander, western garter snake, and Northern alligator lizard) and mammals (big brown bat, river otter, raccoon, and brush rabbit) would all be expected to reside in the watershed.

A variety of wildlife habitats other than late successional conifer forest can be found in the watershed. Special or unique habitats include cliffs, talus slopes, caves, rock faces, lakes, marshes and sloughs. There is one small reservoir on City of Corvallis land within the watershed. It is 6 acres in size and would be expected to attract a variety of species such as waterfowl during migration, feeding insectivorous birds such as swallows and swifts, as well as wading and diving aquatic feeding birds such as great blue heron and kingfisher. Other unique habitats are likely within the watershed; especially those produced and maintained by other species (e.g. beaver). Any occurrence of seasonal or yearlong high water or sub-irrigated drainages is attractive to many species of wildlife that require such at least seasonally and would include many reptiles and amphibians for both reproduction and feeding. There are no other unique habitats as listed above that are known to occur within the Marys River watershed.

BIG GAME SPECIES AND HABITAT

Big game species (elk and deer) do best in landscapes that offer a variety of habitats. Naturally occurring or man-made openings and cover areas serve to meet the yearlong nutritional and security needs of deer and elk. The Oregon Department of Fish and Wildlife (ODFW) monitors big game trends in number and specific demographic parameters through harvest levels and post hunting season counts. The analysis area is in the Alsea Management Unit for big game. The current Roosevelt elk population Management Objective for the Alsea Unit is 6,500 animals with a 2004 population estimate of 5,500.

Blacktail deer numbers are declining in the Alsea Management Unit as they are throughout western Oregon. The actual number of deer is difficult to determine but the number of hunting tags issued in recent years is an indication of the reduced number of deer. In 1999 there were 5,800 tags issued, but by 2001 only 4,000 antlerless tags were available and in 2003 only 400 were made available. This decline is believed to be due in part to disease (hair loss syndrome), interaction between an increasing elk herd using more of the available range, increased predation from cougars, and lower carrying capacity due to reduced harvest on federal lands and intensive forest management practices on private lands.

THREATENED AND ENDANGERED SPECIES AND HABITAT

Bald Eagle

One bald eagle nest is located on City of Corvallis lands. It has been active since 1996 and has produced a total of 15 young up to and including the 2004 nesting season. It is in mature forest habitat that provides near optimum conditions for nest success.

Northern Spotted Owls

The analysis area contains approximately 4,730 acres of suitable habitat for northern spotted owls. Northern spotted owls reside in late successional conifer stands of multi-storied canopies and mixed tree species that provide habitats for preferred prey species including the northern flying squirrel, red tree vole and bushytailed wood rat. Large snags that contain cavities for nesting are also an important habitat feature of suitable habitat for northern spotted owls. There are 6 northern spotted owl nest sites in the watershed on Forest Service lands. These represent the number of sites that have had some use by owls over the past 15 years, so not all the sites are active with pairs in any one year. One measure of the health of each site is the percent of mature conifer within the home range (1.5 mile radius circle around the nest site) of any one pair. Table 4 provides the acres for each owl pair on Siuslaw National Forest lands. Suitable habitat acres include only Siuslaw National Forest land.

Table 4: Percent of Mature Conifer within the Northern Spotted Owls Home Range

Owl Pair Area Number	Siuslaw NF, Suitable Habitat w/in 1.5 miles (acres)	Percent Suitable Habitat on Siuslaw NF	Acres of non-federal ownership within 1.5 mile circle
2090041*	2,617	58%	20%
1845-6	727	16%	54%
2638-48	1,565	35%	26%
3364-115	1,226	27%	48%
4556-121*	2,267	50%	29%
9063-131	1,611	36%	38%

* - Designates active pairs in the 2004 nesting season.

Barred owls have moved into the Pacific Northwest over the last decade and are a primary threat to the Northern Spotted Owl. The species was first documented in the watershed in the mid-1990's, and has since expanded. They appear to have displaced northern spotted owls from at least one of the nest sites on National Forest land, according to monitoring data. They are closely related to northern spotted owls; however, they are more aggressive. Barred owls compete with, displace, and interbreed with northern spotted owls. The barred owls are adapted to a wide range of forested habitats, including the same late successional habitat as the northern spotted owls. The barred owls are an emerging threat to northern spotted owls throughout their range.

Marbled Murrelets

Marbled Murrelets also reside in late successional conifer stands but use such habitat strictly for nesting and forage on the ocean. Marbled murrelets do best in large old growth trees, and because of their nesting habits, require a flat secure nesting platform in the canopy to lay an egg. Nesting platforms are often the result of moss growth on large horizontal limbs, debris accumulation, or clumps of mistletoe. One additional habitat feature that is important to marbled murrelets is the availability of interior mature conifer habitat. The amount and shape of interior habitat is important due to its ability to provide nesting areas secure from avian predators such as ravens, crows, and jays. Table 5 provides the acres for each marbled murrelet occupied site on Siuslaw National Forest lands.

Table 5: Suitable Acres Within 0.5 miles of Marbled Murrelet Nest Site

Murrelet Master Site Number (MSNO)	Siuslaw NF, Suitable Habitat within 0.5 miles (acres)	Percent Suitable Habitat
1111	350	70%
1112	349	70%
1113	431	86%
1114	360	72%
1115	334	67%

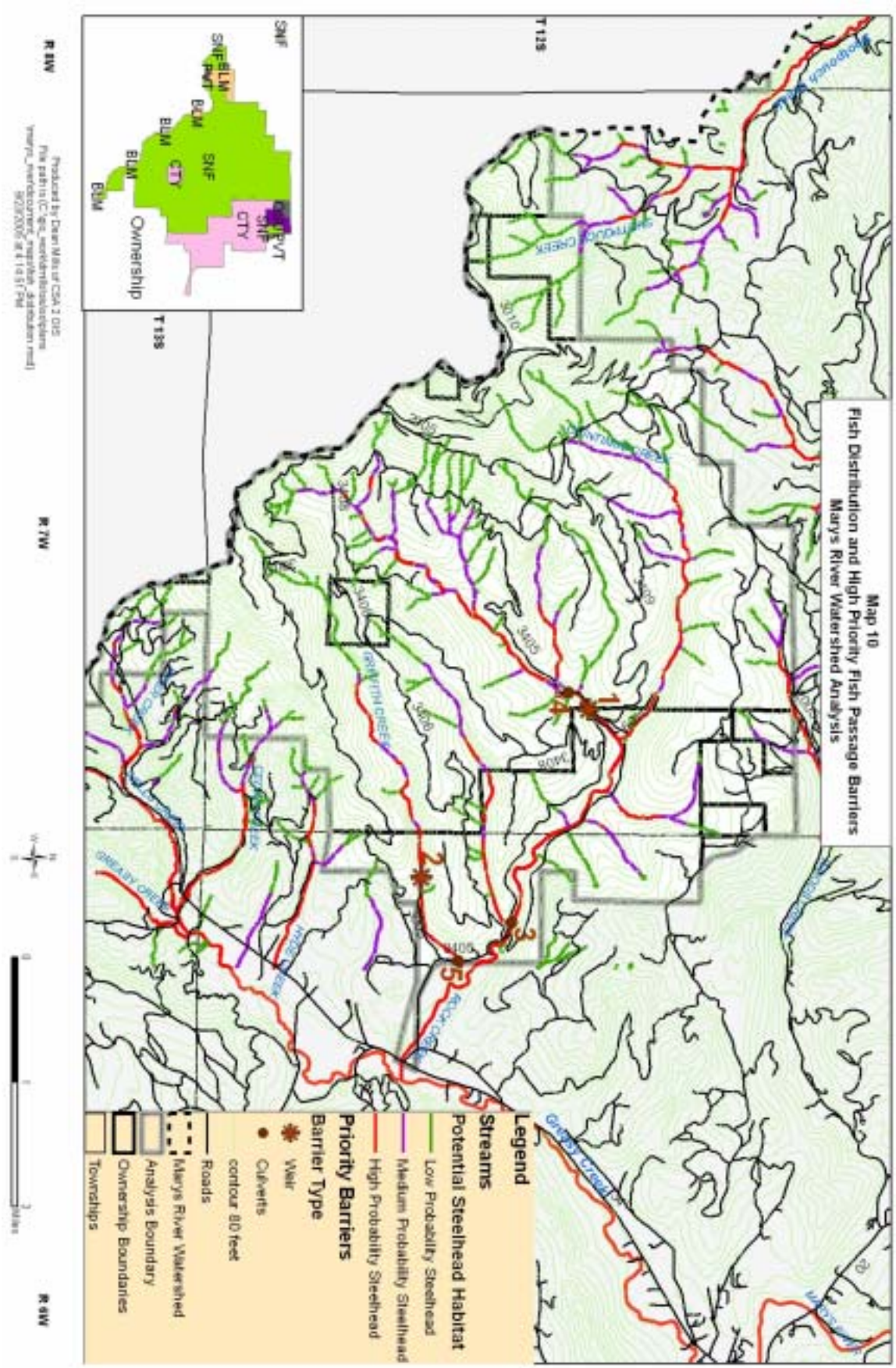
AQUATIC HABITAT

Aquatic habitat in Greasy Creek below the confluence with Rock Creek is considered degraded or in a declining condition (ODFW 1992, BLM 1997). In comparison, stream and riparian habitat in the analysis area is relatively undisturbed. Even though downstream aquatic habitats are highly modified, anadromous fish migrating in the Willamette River could make their way to and from the Rock Creek sub-basin. Map 10 shows the fish distribution in the watershed.

There are 4 main low-gradient tributaries to the mainstem of Rock Creek. They are:

- The North Fork Rock Creek is dammed to create the City of Corvallis reservoir. Above the reservoir, the stream is in a narrow valley.
- The South Fork Rock Creek has a weir and water intake with a minimally functional fish ladder. There is approximately 1.5 miles of low-gradient habitat above the weir.
- Middle Fork Rock Creek is a smaller stream with good gravels and cobbles. There is approximately 1.7 miles of low gradient habitat upstream from Road 3405. The culvert on Road 3405 is a barrier to fish migration. The culvert outlet has a drop of approximately 5 feet into a scoured pool.
- Griffith Creek also has a gravel/cobble streambed with approximately 2.6 miles of exceptionally good, low-gradient habitat above road 3405. A water intake and weir is located 0.7 miles upstream from road 3405, and has no fish passage. The culvert on Road 3405 is passable, however.

A stream survey was completed for the major Rock Creek tributaries on the Siuslaw National Forest (USFS 1994, USFS 1995) summarizing aquatic habitats for the fish bearing portions of NF Rock Creek, SF Rock Creek, MF Rock Creek, and Griffith Creek. The surveys are the source of the following stream characterizations.


Map 10
Fish Distribution and High Priority Fish Passage Barriers
Marys River Watershed Analysis
Ownership
SNF
BLM
PVT
CTY
Legend
Streams
Potential Steelhead Habitat
Low Probability Steelhead
Medium Probability Steelhead
High Probability Steelhead
Priority Barriers
Barrier Type
Weir
Culverts
contour 80 feet
Roads
Marys River Watershed
Analysis Boundary
Ownership Boundaries
Townships
T 12S
T 13S
R 8W
R 7W
R 6W
GREASY CREEK
GRIFFITH CREEK
ROCK CREEK
ROSE CREEK
SPRINGHOUSE CREEK
Greasy Creek
Marys River

North Fork Rock Creek

From its headwaters near the crest of Marys Peak to the confluence with Rock Creek, North Fork Rock Creek is entirely within the Corvallis Municipal Watershed. An earth-fill dam near the mouth of North Fork Rock Creek blocks upstream aquatic organism access to 2.1 miles of native cutthroat trout habitat. The 0.3 mile long reservoir formed by the dam was created by the Corvallis Municipal Watershed as a source of potable water. The North Fork dam and reservoir are on city of Corvallis property. The reservoir is drained by maintenance staff every 5 years to control aquatic vegetation. Cutthroat trout up to 21 inches have been observed when the reservoir is drained.

The National Forest boundary immediately upstream from the reservoir was the beginning of the North Fork Rock Creek stream survey. The surveyors recorded 13 tributaries to North Fork Rock Creek in their 2.1 mile assessment which stopped at the upstream extent of occupied native fish habitat. Aquatic habitat is summarized for similar stream segments termed reaches. The first stream reach extended for 1.2 miles above the reservoir. The bankfull stream channel is estimated at 19 to 24 feet wide with an average wetted channel width of 11 feet. Stream flow was estimated at 3 cubic feet per second (CFS) on July 27, 1995. The majority of stream flow originates from the North Slope of Marys Peak high up in the headwaters with 2.5 cfs from Chinitmini Creek and North Fork Rock Creek headwaters. The remaining 11 short, steep tributaries in this pinnate shaped drainage system contribute minor amounts of low summer flow and are not fish bearing. Water temperatures taken by hand held thermometer throughout the survey were cool recorded at 50ºF to 55ºF.

The mainstem North Fork has the majority of stream flow and a moderate stream gradient averaging 5 percent between River Mile 0.0 and 1.2 and 8 percent between River Mile 1.2 and 2.1. The stream is riffle-dominated with 21 percent pool and 79 percent riffle habitat. Large logs are common (96 pieces per mile in R1 and 117 pieces per mile in R2), often forming channel-spanning accumulations found throughout the survey length. They are important pool forming elements, which also create complex side channels and held valuable spawning gravel accumulations. Pools have an average residual depth of 1.2 feet. Few pools are over 2 feet deep with the deepest pool measuring 2.8 feet deep.

Low numbers of native cutthroat trout were observed throughout the survey. The fish are isolated above the North Fork Reservoir dam.

South Fork Rock Creek

The entire 3,339 acre South Fork Rock Creek sub-basin lies within the Corvallis Municipal Watershed. The city of Corvallis owns land from the mouth of South Fork to a water diversion dam at River Mile 0.4 immediately below the National Forest Boundary. The city of Corvallis owns a small portion of the extreme headwaters and the Bureau of Land Management also manages a small amount of the extreme headwaters in this National Forest dominated sub-basin.

The 7-foot high water diversion structure located below the Forest boundary at River Mile 0.4 can divert as much as 90 percent of the water at low flow for municipal use. South Fork Rock Creek habitat below the diversion dam can be described as simple with low amounts of large wood. Summer low stream flow can be reduced to 0.5 cubic feet per second at the diversion dam, greatly reducing aquatic habitat and wetted stream area. The two tributaries below the diversion dam contribute only minor amounts of flow and are not fish-bearing.

South Fork Rock Creek habitat above the diversion dam is a riffle dominated (19 percent pool) stream with a moderately steep gradient (average 6 percent to RM 1.5 and 11 percent from RM 1.5 to 3.8). Bankfull stream width is estimated 21 feet to 25 feet with the wetted stream width at low flow averaging 7 to 12 feet wide with a low summer flow of 5 cubic feet

per second. The stream substrate is boulder/cobble dominated with moderate amounts of large woody debris (75 pieces per mile between RM 1.5 and 3.8).

Sixteen tributaries were identified in the July 1995 stream survey. Two of the tributaries were fish bearing. At approximately South Fork Rock Creek RM 0.6 the fish-bearing tributary south of the Connection Creek drainage is fish bearing for approximately 0.7 miles. The road/stream crossing culvert at Road 3504 (3 foot diameter round pipe, 60 feet long at 5 percent gradient beneath a 30 foot road fill) is a partial migration barrier to most aquatic organisms. Bankfull width is estimated at 14 feet with a low summer flow of 1 cubic feet per second. Large woody debris is abundant (217 pieces per mile) for this riffle dominated stream (26 percent pool habitat). Stream gradient above the culvert is approximately 5 percent with gradient approaching 15 percent at the upstream extent of occupied cutthroat trout habitat.

The South Fork Rock Creek tributary located at River Mile 1.5 is identified as a fish bearing stream with low summer flow of 1.2 cubic feet per second. Bankfull stream width is estimated at 10 to 19 feet wide. Occupied fish habitat ends at a waterfall at approximately River Mile 0.1.

Middle Fork Rock Creek

The extreme headwaters and lower 1.3 miles of Middle Fork Rock Creek are on City of Corvallis land with Forest Service ownership in between. The entire 832 acre sub-basin is within the Corvallis Municipal Watershed.

The stream channel is best characterized as a riffle dominated (average 75 percent riffle) cobble/gravel stream with few boulders and little exposed bedrock. Stream gradient increases steadily upstream from 2 percent to 15 percent at the end of the stream survey at River Mile 2.2 and grows steeper into the headwaters. Summer low flow of 0.5 cubic feet per second was measured on July 29, 1995. Bankfull stream width was estimated at 15 feet to 19 feet wide with an average wetted stream width at low flow of 7 feet. Pools are typically small and shallow (less than 1.5 feet deep) with only two pools 3 feet deep. Low volumes of large wood (55 Pieces per mile) are found in Reach 1 possibly due to past timber harvest activity. Post-harvest riparian conifer are young in the lower reach. Large wood is more plentiful (118 pieces per mile) and large riparian conifers are abundant upstream but recruitment of large wood is expected to be slow due to a narrow valley bottom and typical winter high stream flows that are insufficient to move large wood in the stream channel. Five small tributaries enter the mainstem Middle Fork Rock Creek; none contribute significant stream flow and are not fish bearing.

Low numbers of cutthroat were observed in mainstem Middle Fork up to River Mile 1.9 where increasing stream gradient and low stream flow ended occupied fish habitat. The road/stream crossing near the mouth of Middle Fork Rock Creek at Road 3405 is a barrier to upstream movement of most aquatic organisms and isolates cutthroat trout reproduction in Middle Fork from spawning fish in the sub-basin. A water diversion dam at River Mile 0.9 is an upstream fish passage impediment. The 3 foot high concrete dam is set in a narrow bedrock gorge creating a falls on to bedrock. Cutthroat trout are isolated from downstream fish in the 1 mile of occupied fish habitat above this barrier.

Griffith Creek

Griffith Creek enters Rock Creek one mile above the Rock Creek confluence with Greasy Creek and is the first significant tributary to Rock Creek. The mouth of Griffith Creek is on private land. The City of Corvallis owns approximately 1 mile of the lower portion of Griffith Creek and has a water diversion structure at the upstream extent of city ownership at River Mile 1.2. This water diversion weir has no fish passage or fish ladder.

The portion of Griffith Creek below the National Forest boundary located on both private and City of Corvallis land has evidence of logging and road building as well as pasture land developed adjacent to the stream. Low stream flow is limited to less than 0.5 cubic feet per second below the water intake structure. Stream gradient is estimated at 5 percent with low amounts of large wood (21 pieces per mile) and few pools.

Native cutthroat trout are found from River Mile 1.2 to 4.0 throughout the National Forest portion of Griffith Creek and the City of Corvallis ownership near the headwaters.

Large woody debris is abundant (143 pieces per mile) in this small boulder/cobble dominated stream with an estimated 19 percent pool habitat. Stream gradient averages 8 percent in this reach. Bankfull stream width is estimated at 13 feet with an average wetted stream width at low flow of 8 feet. Native cutthroat trout in Griffith Creek above the water intake are isolated from other cutthroat in the Rock Creek stream system.

WATER QUALITY

The City of Corvallis municipal watershed enjoys exceptionally high water quality. There are no known sources of pollution, and the forest cover is relatively intact. The road system is relatively stable, with little input of sediment.

RECREATION

The bulk of recreation use on National Forest lands within the Mary River watershed is focused on non-motorized trail system use in the upper reaches of Rock Creek and the observation parking lot at the end of the paved segment of Marys Peak Road. Other recreation use includes wildflower and wildlife viewing, occasional hiking, mountain biking and walk in deer hunting associated with the summit area and the road system in the upper Rock Creek drainage. Motorized recreation use not associated with the primary trailhead access points is limited by road closures to protect the municipal watershed and sensitive habitats.

There are three trails currently in use: North Ridge, East Ridge and Tie. Northridge trail was established sometime prior to the early 1920's and remains on essentially the same alignment since establishment. East Ridge and Tie trails were established in the late 1970's and early 1980's. These trails were in part built by volunteers as connections for a proposed Corvallis-to-the-Sea trail. The Corvallis-to-the-Sea trail has been a recurring effort since the 1970's, with at least 4 different core groups promoting and supporting the trail concept. The concept is a trail system with an origin point in the Corvallis area and an end point on the central Oregon Coast. Several potential routes between a number of alternative end points have been proposed. Most of the proposals include segments skirting along the north boundary of the City of Corvallis municipal watershed. The current Corvallis-to-the-Sea Trail effort includes portions of the Old Peak Road which connect Highway 34 near Philomath to Woods Creek Road. There is a segment of intermittently maintained trail originating at the Old Peak and Woods Creek Road junction connecting to the trail head for North Ridge trail on Woods Creek road. The Forest supports the concept of the Corvallis-to-the-Sea Trail, if the Corvallis to the Sea Trail Partnership can gain the support of neighboring landowners, whose land would be used for a complete route, and perform trail maintenance.

The upper trailheads for the East Ridge and North Ridge are accessed from the observation parking lot. Vehicle access to the upper trail heads and observation parking lot is closed from December 1st to April 1st by a gate at Conner's Camp. Recreation use at this access point is heavy during the summer months. Both the observation lot and Conner's Camp parking areas have restroom facilities and picnic tables.

Lower East Ridge trailhead is accessed from the Conner's Camp parking area at mile point 5.6 on the Marys Peak Road. Access to the lower North Ridge trail head is on Woods Creek Road about 7.5 miles from highway 20. The Tie trail connects between East Ridge trail and North Ridge trail in the headwaters of Rock Creek and Chintimini Creek.

The observation parking lot provides scenic views toward the Willamette Valley and Cascade Mountains while an easy half mile walk on a gravel road to the summit of Marys Peak offers views of the Coast Range and Pacific Ocean. This parking lot also provides access to the open meadows and noble fir stands unique to the summit area of Marys Peak. The upper portion of Marys Peak from about the elevation of Conner's Camp to the summit is designated a Scenic Botanical Special Interest Area to protect these unique features.

There is also a small six unit camp ground near the observation parking lot open seasonally. This campground is just outside the analysis area in the upper reaches of the North Fork Alsea watershed; there is a loop trail associated with the campground and adjoining picnic area that includes options for accessing Marys Peak summit with a short connector or tying into the gravel road near the summit.

ROADS

There are about 67 miles of roads considered in this analysis. Eight miles of the Marys Peak Road lying outside the watershed boundary are included in the total, leaving about 59 miles within the Marys River watershed, nearly all within the City of Corvallis municipal watershed in Rock Creek. These roads are not open to public travel as a measure to protect the municipal watershed. About 54 miles of roads were constructed in early 1950's to provide a network of roads accessing widely scattered pockets of insect-killed conifer. The road system first focused on salvage logging of insect-killed timber then provided access for a second major salvage logging operation following the 1962 Columbus Day wind storm.

The road system that was in place by 1960 is nearly identical to the current system. About 5 miles of dead-end logging spurs have been constructed since 1960. The relatively minor additions were constructed to facilitate timber harvest on Forest Service and City of Corvallis lands through the 1980's. Construction techniques were uniform, state of the art and provided a fairly stable road system. These roads generally have not failed or been updated since the original construction other than minor repairs and replacing surfacing as needed.

Current road management priorities focus the limited maintenance and reconstruction funds on Key forest roads identified in the 2003 Forest Roads Analysis (USDA 2003). The Marys Peak Road, which is mostly outside the watershed, and the Woods Creek road are the only roads currently identified as Key roads. Both of those have been reconstructed since 1970. The older road system within the municipal watershed has received very little maintenance and no reconstruction since implementation of the Northwest Forest plan. The goals and objectives of the plan led to reduced timber harvest funding for roads. In 1994 most of the roads within the municipal watershed were heavily water-barred in recognition of the expected lack of maintenance. Roads 3405, 3406, 3408 and 3005 were not water barred. Road 3005 has been decommissioned, leaving only Roads 3405, 3406 and 3408 to receive very limited maintenance and periodic patrol by the City of Corvallis. The remaining roads have essentially been untouched since 1994; some are not currently drivable due to earth berm closures, fallen trees, brush, and in one case, a failed metal culvert and fill wash out. This lack of maintenance and access makes the need to stabilize roads not expected to be used for long time periods more urgent.

REFERENCE RESOURCE CONDITIONS

This chapter develops reference conditions for various resources within the watershed. The purpose of this step in the watershed analysis process is to identify the dominant physical, biological and human components and processes active in the watershed that affect ecosystem functions or conditions.

NATURAL DISTURBANCE PROCESS

Fire

There have been no large fires in the analysis area since settlement by European Americans. Fire has been the primary large scale disturbance agent on vegetation in the Oregon Coast Range though these disturbances occur infrequently. Based on vegetation types, fire frequency is less than 50 years in the City of Corvallis ownership to 100 to 400 years in the National Forest System lands. The shorter fire frequencies may have been influenced by Native American burning along the Willamette Valley fringe. Correspondingly, fire intensity is low to mixed severity within the City of Corvallis ownership and high to mixed severity in the National Forest System lands. Low intensity and mixed severity burns would have caused a more open mature stand structure with patches of younger trees or openings. High severity fires would be stand replacing type fires (Map 11: Fire Severity). There is some evidence that a stand replacing type fire occurred somewhere between 1750 and 1800 within the National Forest System lands.

The Marys Peak fire lookout has been replaced by air and land vehicle patrols due to infrequent ignitions and prevailing low to moderate fire danger conditions. The Marys Peak repeater has important uses for fire management and the communication facilities on the top of Marys Peak are the center of this system.

Most recorded fire occurrences within the analysis area are human caused. Forest Service fire records show five human caused fires from 1975 to 1985 for a total of 95 acres burned. Most of these burned acres were caused by escaped logging slash broadcast burns. Broadcast burning of slash on the Siuslaw National Forest has virtually ended since the implementation of the Northwest Forest Plan. Most of the watershed is gated and human presence is limited which significantly lowers the risk of human caused wildfire.

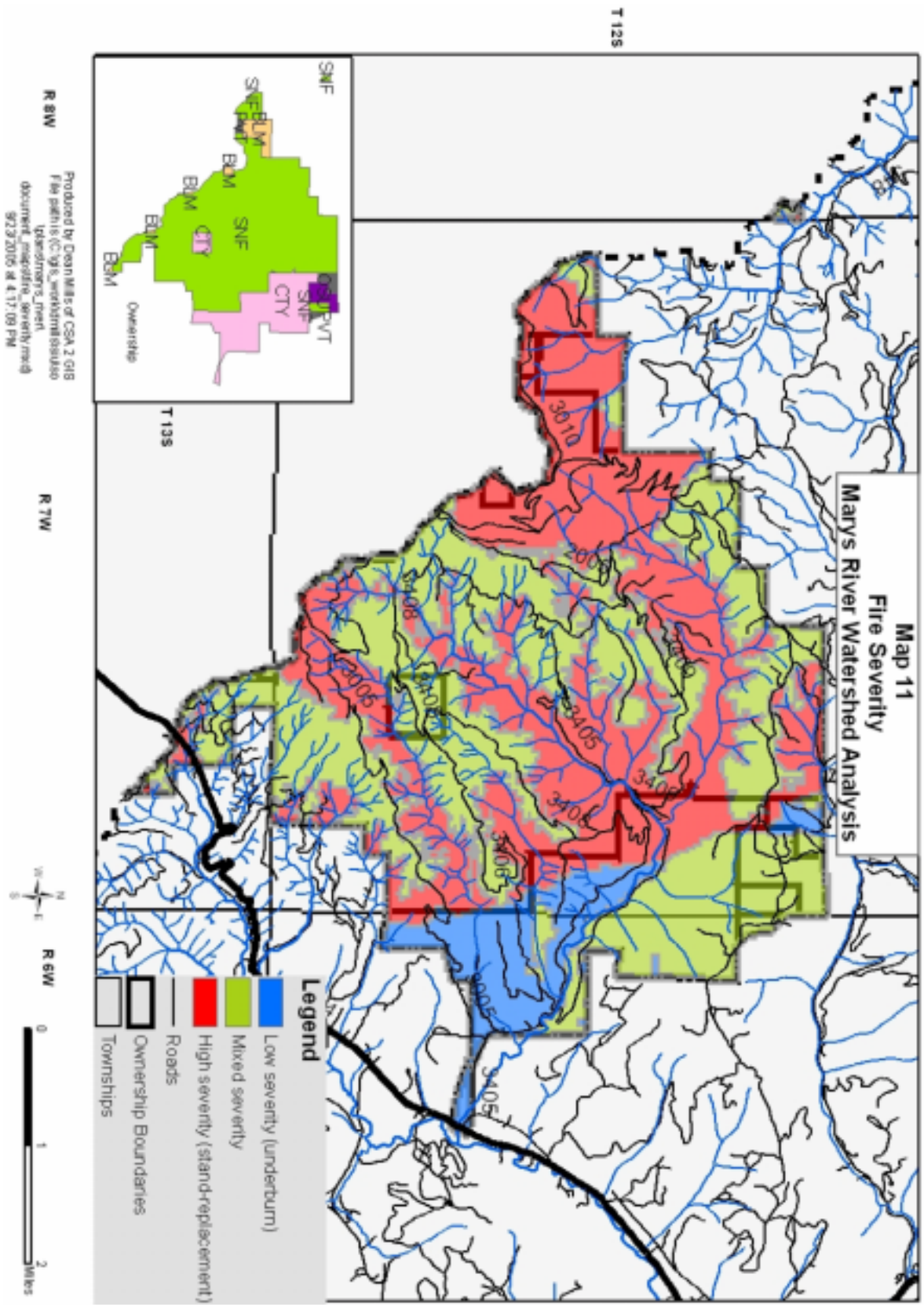
Only one lightning caused fire has been recorded on BLM land near the analysis area in 2003 for less than 1 acre burned.

Wind

Wind is a recognized disturbance factor in the Coast Range. For example, the Columbus Day Storm of 1962 caused over 30 million board feet of timber to be blown down by the violent winds in the analysis area (USDA Forest Service, 1977). Roads were blocked, drainage ditches plugged, and streams strewn with debris. Recurrence intervals are unknown.

Insects and Disease

A series of natural events began late in 1949 that changed the management of the watershed. Two winters of heavy timber windthrow, followed by a dry summer in 1951, provided optimum conditions for a Douglas-fir bark beetle epidemic which left scattered patches of dead trees throughout in the watershed. By the spring of 1952, over 60 million board feet of timber had been killed by windfall and bark beetles (USDA Forest Service, 1977).


Map 11
Fire Severity
Marys River Watershed Analysis
Legend
Low severity (underburn)
Mixed severity
High severity (stand-replacement)
Roads
Ownership Boundaries
Townships
Ownership
SNF
BLM
CTY
PVT
T 12S
T 13S
R 8W
R 7W
R 6W
Miles

AQUATIC COMPONENT

The efforts to protect this area as a water source for the City of Corvallis have also protected high-quality aquatic habitat throughout much of the analysis area.

Cutthroat trout are native to the all the westslope drainages of the Willamette basin and are found throughout the analysis area.

Downstream management of the Willamette River has had a dramatic impact on the aquatic species of the analysis area. Willamette Falls at Oregon City was a partial migration barrier passable at high stream flows to anadromous fish. Native winter steelhead trout were able to make it over Willamette Falls to spawn in the upriver tributaries of the Willamette because the adult fish made their spawning run in the spring during the time of high flows. Spring Chinook salmon also passed over Willamette Falls on their migration run to the tributaries of the upper Willamette. Anadromous salmonids that entered the fresh waters of the Columbia River in the fall such as Coho salmon, summer steelhead trout, and Fall Chinook were unable to pass above Willamette Falls and did not establish populations in the Willamette basin before the late 1800's.

Fish ladders were built at Willamette Falls as early as 1885 to improve access to upstream migrating fish. Coho salmon and summer steelhead trout were introduced into the Willamette Basin to take advantage of the improved access provided by fish ladders at Willamette Falls. Coho salmon introductions have not been successful at establishing a Coho fishery in the Marys River watershed.

Oregon Department of Fish and Wildlife had a very active steelhead trout stocking program throughout the Willamette Basin. Adult hatchery steelhead trout were released in the Marys River watershed from 1968 through 1973. Steelhead fry were released annually from 1985 to 1990 in the tributaries of Marys River. Winter steelhead trout are found today in the Marys River drainage and can be found on the Forest in the analysis area in South Fork Rock Creek. The genetic strain of fish returning to Rock Creek is unknown.

Releases of hatchery rainbow trout have been made throughout the Willamette basin since the 1920's to improve the sport fishery. The stocking of legal sized trout has been discontinued in the rivers of the Willamette basin. The hatchery releases did not establish a naturally producing population of resident rainbow trout.

BIOLOGICAL COMPONENT

Terrestrial Vegetation

Terrestrial vegetation patterns within the analysis area resemble drier Cascadian terrestrial vegetation patterns more than moist Coastal patterns due to the rain shadow effect that Marys Peak provides.

Many of the older trees within the watershed are approximately 200 to 250 years of age, corresponding to a stand-replacing fire between 1750 and 1800. There are places, however, where older trees can be found.

Marys Peak Meadow Complex

Natural disturbances around the Peak are primarily from wildfire and wind. A history of fire is evident in the Douglas-fir dominated stands bordering the lower elevation to the south and west margin of the complex. Survey notes from 1878 (cited in Snow 1984) recorded fire-killed timber in a large ravine in Sec tions 20 and 29 (possibly Parker Creek). The fire burned up the south west slope, reaching the meadows. A 1932 fire burned the south west slope of the peak, and a 1908 fire burned the north slope (Snow 1984). Drainages such as

Parker Creek also funnel wind during large wind storms, causing blow-down in the summit fir stands, as in 1962 and 1981 (Magee1984).

Native American burning may not have played a part in the history of Marys Peak, since early seral species of cultural importance, such as huckleberries, hazel, oak, or camas, are not present in the meadow. After Euro-American settlement, the meadows were used for summer livestock range by homesteaders (Snow 1984). Later impacts of the summit included installation and maintenance of fire lookouts and communication sites. However, the major emphasis has been on recreation: hiking, picnicking, and snowplay, which briefly included a rope-tow.

Figure 4: Sept. 1969 aerial photo showing impact of Trek activities on northern portion of large (east) meadow.

In more recent history, the northern most major meadow (Trek meadow) was the site of the Shriners' Annual Marys Peak Trek (1946 to the mid-1980's); as many as 10,000 people attended the yearly one day event. The Trek event turned the meadow into a parking lot with barbeque pit, approach ramps, access road, and stage. Some mowing of the meadow also occurred.

Terrestrial Wildlife

The species that evolved in the Coast Range environment were primarily forest-dependent species. Many species, particularly large carnivores such as the grizzly bear, wolverine and wolf, inhabited the watershed prior to European American settlement, but have since been extirpated from the Coast Range.

Species strongly associated with old growth forest ecosystems were likely to have been at stable population levels during the early 1800's. Following major disturbance events, such as fire, these species would have been displaced to adjacent unburned areas, which acted as refugia while the burned areas recovered. Patch sizes (100,000 acres or more) were large enough to support stable wildlife populations over relatively long time periods.

Wetlands in the drainage were most likely very limited due to slope and topography. If they existed they were likely most prevalent in the lower portions of the watershed, where gradient was less. These areas were most likely dominated by grasses, rushes, sedges, and forbs and supported a wide variety of resident and non-resident species such as songbirds, shorebirds, waterfowl, amphibians, furbearers, bats and aquatic species. Since the Marys River watershed is part of the Pacific Flyway, any wetlands were likely used extensively for over wintering, migrating, and breeding by many species of ducks, geese, and swans.

Early seral habitat types were relatively short-lived following large fire events and generally converted back to a forested condition within 30 years. During this time period, populations of edge-associated species, such as deer, elk and grouse, likely increased and then returned back to stable levels as the forests regenerated. Historic records indicate that Roosevelt elk were abundant throughout western Oregon in the early 1800's, prior to the arrival of settlers. They were over harvested and virtually disappeared as a result of European settlement.

Many early seral associated species, as well as non-native species (plant and animal) and species which have expanded their ranges westward with settlement (i.e. opossums, red fox, barred owls, cowbirds), were uncommon or absent from the watershed prior to the mid-1800's.

HUMAN COMPONENT

Native American and Early American

Little is known about the Native American use in this portion of the Marys River watershed. The Rock Creek drainage was timbered at the time of historic settlement and limited use for hunting and subsistence gathering is expected. The local Native Americans lived along the lower elevations of Marys River in more open lands. Although Marys Peak was a known spirit quest location, little evidence of Native American activities has been found even atop the peak.

In 1906, the City of Corvallis began using water from the Rock Creek drainage which at the time was a nearly undisturbed watershed. At that time, the watershed was mostly private timber land containing no Forest Service administered public lands. In the early 1900's logging began in the Woods Creek area north of the watershed. As logging operations moved up the north slope of Marys Peak and into the watershed drainage boundary, concerned citizens began an effort to establish Rock Creek as a protected municipal watershed. By an Act of Congress in 1920, 1,720 acres of O & C revested lands in this area transferred from the interior department to the Forest Service specifically for municipal watershed protection. The City of Corvallis had been actively purchasing land in the watershed and working to encourage the Forest Service to purchase lands for watershed protection. By the 1930's various acts of Congress had established the Marys Peak Purchase Unit and authorized a boundary change to include lands acquired by the Siuslaw National Forest. By 1940 major portions of timbered lands within the Rock Creek watershed had been purchased by either the City of Corvallis or the Forest Service. The exterior boundary of the Siuslaw National Forest was extended to include these lands.

An agreement was signed by the Secretary of Agriculture and the City of Corvallis Water Commission on February 7, 1922. This agreement included wording to limit access within the watershed as a measure to protect the water source. Some limited access for logging, research and contract forestry work has been authorized by permit but generally the road system into the watershed had remained closed to motorized use by the general public. A series of recreation trails has been constructed through the upper elevations of the watershed. The trails allow hiking and some seasonal mountain biking. Livestock is prohibited.

On June 16, 1941, the City of Corvallis leased 400 acres of land on or near the top of Marys Peak to the Siuslaw National Forest. The lease specified that the land is to be used for a public purpose. On June 30, 1941, the City of Corvallis donated to the United States 40 acres of land on the immediate top of the Peak. A fire lookout was placed on this parcel. In 1969 the lands subject to this lease were exchanged to the Forest Service with the City retaining an electronic site of 60 acres on West point.

Construction of the Marys Peak Road began in 1938 and was completed in 1941. This work was done under Depression era programs. The Marys Peak picnic ground was constructed in 1941 by the Forest Service on City land. The Lookout and observatory were constructed in 1942. This old log structure was removed and a new lookout constructed in 1959. The second lookout was destroyed in the 1962 Columbus Day storm and again replaced. The last lookout structure was removed in 1978. In 1958, the Air Force extended the road to the top of the Peak and constructed a radar filler station that was never used. Subsequently, all equipment was removed and the building transferred to the Forest Service. Since Marys Peak is the highest point in the Oregon Coast Range, it is an excellent location for

electronic equipment. At present, there are three electronic sites on Marys Peak. For security reasons, users are not listed.

The initial effort to maintain Rock Creek Watershed in a pristine condition was somewhat unsuccessful. A series of natural events began late in 1949 that changed the management of the watershed. Two winters of heavy timber windthrow, followed by a dry summer in 1951, provided optimum conditions for a Douglas-fir bark beetle epidemic which left scattered patches of dead trees throughout in the watershed.

By the spring of 1952, over 60 million board feet of timber had been killed by windfall and bark beetles. Fire hazard was increased; access was mostly undeveloped except for one fire control road accessing the lower watershed. A decision was reached to develop a salvage logging program to control the insect epidemic. Public support was solicited and received for a salvage logging program.

Plans for a salvage operation developed to halt the bark beetle epidemic and recover the value of the dead and down timber. Plans included measures to reduce the fire hazard and develop a permanent road system for future forest management. Maintaining the quality of water supplied to the City of Corvallis was first consideration in all management decisions. From the beginning, all conceivable methods of protecting the water quality and soil stability were tried. Many watershed practices, now commonplace, were first developed on Rock Creek Watershed.

The major concern for managers was maintaining stability of the soil exposed during road construction and logging. Road design and construction emphasized minimum earth movement and when excess soil was created during construction it was end hauled rather than being side cast. Roads were located as far from stream courses as possible. Cut and fill slopes were stabilized by grass seeding and straw mulch. Ditch-relief culverts of at least 15 inches in diameter and ample length were installed at frequent intervals. They were located so ditch water was spilled onto undisturbed forest floor where the silt load could filter out. Perforated pipes were used in unstable, wet areas. All road surfaces were rocked and kept well crowned by frequent maintenance to keep the surface drained.

Logging practices were designed to hold soil disturbance to a minimum. Up-hill cable logging was required on all major clearcut areas. Yarding across live streams was avoided to the fullest practical extent. Tractor logging was used as a last resort and restricted to dry conditions on gentle topography. Upon completion of logging, tractor roads were cross drained or outsloped for drainage.

Increased human activity in the watershed made sanitation restriction necessary. Three special requirements were added to all contracts. Workmen with a history of typhoid fever, amoebic dysentery, or infectious hepatitis were not to be employed. Pit privies or chemical toilets were to be required on each operation. Disposal of refuse including waste lubricants and fuels was to be in approved pits only.

Fire precautions included strict enforcement of normal requirements plus additional firefighting equipment, patrolmen, and an effective communication system. Slash was burned promptly to reduce the fire hazard and kill competing hardwood brush species. Clearcut areas were planted with Douglas-fir seedlings after slash burning.

Another storm event called “The Columbus Day Storm of 1962” altered the Rock Creek Watershed. Over 30 million board feet of timber were blown down by the violent winds. Roads were blocked, drainage ditches plugged, and streams strewn with debris. In a sense this was a repeat of the 1949 event, but this time the existence of an adequate road system enabled management to promptly respond to the situation.

Logging as part of the annual timber sale programs on the Siuslaw National Forest continued through the late 1980’s and on City land as recently as 1991. Timber harvest on City lands was administered by the Forest Service under a succession of formal agreements between the Alsea Ranger District and the City of Corvallis. Implementation of the Northwest Forest

Plan designated the entire area as Late Successional Reserve halting harvest of mature timber. There has been no commercial timber harvest and other activity has been very limited since the early 1990's. Recommendations from this watershed analysis supplement may result in some short term increased activity such as commercial thinning, treatments of invasive plants, repair of selected roads and decommission of roads that have a risk of failure or are not needed for future access. Limited access and consequently low human use levels are expected to continue.

Roads

The portion of the Marys River watershed included in this analysis is comprised mostly of lands administered by the Siuslaw National Forest. The majority of those lands are managed as a municipal watershed serving the City of Corvallis. Due to the emphasis on protection of the municipal watershed, the area was not roaded until a fairly significant amount of insect killed conifer trees lead to a decision to harvest salvageable timber. This salvage effort was begun in early 1950's and was driven by a desire to protect the watershed from insect damage and potential wildfire in the dead timber.

The road system was constructed using pioneering methods to protect watershed values as roads were constructed. Roads were carefully located on the landscape to minimize the amount of soil movement required during construction. Roadcuts and fills were balanced to avoid sidecasting and excess material was hauled to stable areas and stockpiles. All roads were graveled to minimize sedimentation and bare slopes of cuts and fill were seeded and mulched. All live stream crossings had culverts installed and ditch lines had regularly space ditch relief culverts to minimize erosion and infiltration of sediment into the water system that was usually associated with road surfaces and ditch lines. These construction methods were not common on forest roads in the 1950's and were considered state of the art forest engineering. Many of the standards incorporated in the construction of roads within the watershed were adopted in other forest road construction after the effectiveness of these methods in reducing erosion and sedimentation was demonstrated. The fact this road system remains essentially as it was constructed in the 1950's is evidence of the effectiveness of the developing technology. Very little reconstruction has been necessary even following major storm events that have caused considerable damage to roads in other parts of the Siuslaw National Forest. This may be partially due to less rainfall on the east side of Marys Peak if compared with normal rainfall in the Coast Range west of Marys Peak.

By the early 1960's the road system had been developed to what is basically there today; only a few short logging spurs have been added since the original construction. Roads constructed earlier are the Marys Peak Road starting at the Coast Range summit on Oregon Highway 34 and initially ending at the current parking area about 9.5 miles up the peak. This road was extended the remaining one-half mile to the summit in the late 1950's. There was a road existing by about 1906 which followed Rock Creek from Highway 34 to the original impoundment for municipal water source. This road also serviced part of the water delivery pipeline from Rock Creek to Philomath. There were also some low standard logging roads built on private timberlands that have been acquired by either the Forest Service or the City of Corvallis during an aggressive land purchasing program to protect lands within the current watershed. Most of these lands were acquired between the early 1900's and 1940. A few of these older lower standard road templates still exist on the municipal watershed fringes. There are also some short segments of railroad logging grade near the northwest watershed boundary which are remnants of logging in the 1920's. Some of this railroad grade was incorporated into the current alignment of the Woods Creek Road. A portion of the Woods Creek road within the Marys River drainage and adjacent to the municipal watershed boundary is located along an historic route between Philomath and Harlan, this was an early wagon road that has been obliterated in successive developments of higher standard roads.

SYNTHESIS AND RECOMMENDATIONS

In this step of the analysis, multiple resource issues were combined and integrated to develop a holistic set of recommendations. This chapter is organized according to the five issues and attendant key questions that were presented in Chapter II. The watershed analysis up to this point has captured the key components of the resources or the key processes that are important to understand in order to answer the key questions for each of the issues. This step in the process synthesizes and organizes that information by issue.

The six issues critical to the future management of this analysis area that were identified are:

- Protection or enhancement of wildlife habitat
- Protection or enhancement of water quality.
- Protection or enhancement of grassy bald habitat.
- Protection or enhancement of fisheries and aquatic species habitat.
- Prevention and control of invasive non-native species.
- Management of fire hazard and risk.

The analysis team considered the Issues and Key Questions and looked at them holistically with regard to all resources. Opportunities to address priorities at the same time or in concert were identified (Map 14: Combined Opportunities). Some priorities could be funded by other projects, such as funding fish barrier improvement and wildlife habitat with thinning restoration project revenue. Other projects could occur independently. This synthesis is described below.

ISSUE 1: PROTECTION OR ENHANCEMENT OF WILDLIFE HABITAT

Terrestrial Vegetation and Wildlife

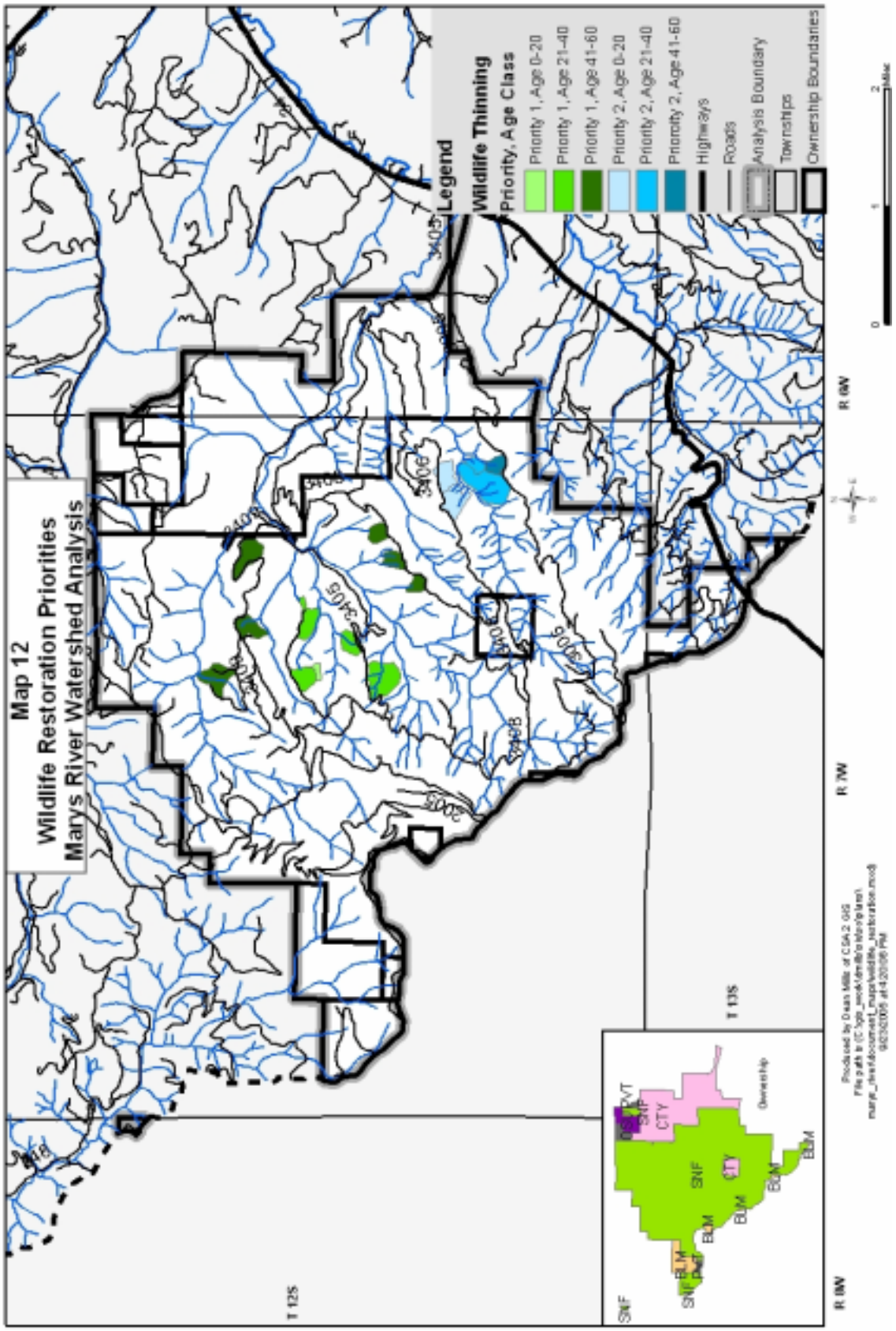
The percent of seral types on the landscape is within the range of historic range of variability. However, the spatial distribution of these seral stages may not be consistent. Approximately 28 percent of the National Forest system lands and City of Corvallis lands are in the early to mid seral stage. About 71 percent would be considered mature or late-seral.

Patch sizes of 100 to 10,000 acres are fragmented with small patches of early to mid seral plantations. Stands that fragment 100 to 10,000 acre patches of late seral habitat are considered priority stands for wildlife restoration management opportunities.

Management opportunities to maintain or enhance wildlife populations dependant on 100 to 10,000 acre size patches are a priority, including the northern spotted owl, would include thinning to accelerate late-successional habitat and decommissioning roads which fragment the habitat (Map 12: Wildlife Restoration Priorities). Management of plantations other than those identified as priority stands also would be beneficial to wildlife species by providing stand diversity.

Recommendations

Regional Ecosystem Office guidelines for silvicultural treatments in both precommercial and commercial age classes emphasize the need to maintain diversity in meeting LSR objectives, including leaving some areas untreated. This is particularly important when determining


Map 12
Wildlife Restoration Priorities
Marys River Watershed Analysis
Legend
Wildlife Thinning
Priority, Age Class
Priority 1, Age 0-20
Priority 1, Age 21-40
Priority 1, Age 41-60
Priority 2, Age 0-20
Priority 2, Age 21-40
Priority 2, Age 41-60
Highways
Roads
Analysis Boundary
Townships
Ownership Boundaries
T 12S
T 13S
R 8W
R 7W
R 6W
SNF
BLM
CTY
PVT
Ownership

the primary need for treatment within LSR or riparian reserves and to evaluate the future outcome of the stand.

Although the majority of the analysis area is in Late-Successional Reserve, forest management must still be pursued if long-term objectives are to be met and the attainment of those objectives accelerated to the degree possible.

The Late-Successional Reserve Assessment, Oregon Coast Province, Southern Portion (RO267, RO268) (1997) determined that the high density and predominant monoculture of trees in the managed plantations on federal land identified several options that are appropriate and desirable to accelerate the attainment of late-successional characteristics. These include:

- thinning to control density and accelerate desirable forest stand characteristics
- underplanting with shade tolerant species
- selecting for both species and structural diversity
- developing prescriptions that are ecologically based i.e. working within the successional pathways of different environments
- creation or maintenance of snags and coarse woody debris (CWD) to meet objectives

The difference between the current conditions and desired future conditions drive the potential management activities that may facilitate meeting the objectives of a given area.

An important aspect to enhancing conditions for terrestrial wildlife species in the Marys River watershed is the management and protection of late seral conifer dominant forests. Man's influence has reduced the patch size and amount of interior mature conifer forest and overall diversity of the landscape due to regeneration harvest. Where plantations occur, the stocking levels are much greater than natural forest development and have far fewer tree and shrub species in the understory. The primary objectives of enhancement actions are to recover patch size of mature late seral forests, adjust stocking levels to promote stand development on a trajectory closer to old growth scenarios, diversify tree and understory plant species, and increase the complexity of stands through coarse woody debris management.

Table 6 summarizes recommendations and considerations related to management of the Marys River watershed for the terrestrial wildlife resources.

Table 6: Management Recommendations for Terrestrial Wildlife Resources

What	Why	Comments
Terrestrial Projects on National Forest		
Thin upland stands to a minimum 40 percent crown cover (hemlock and mixed conifer stand may carry a higher density). Vary spacing.	Enhance forest diversity and complexity. Ease edge-effect, increase connectivity between older forest stands that result in greater interior forest habitats. Increase wind-firmness.	Prioritize important habitat for T&E[1] species and younger stands along roads that connect existing older forests. Highest priority along the ridges accessed by roads 3405, the 117 spur off of 3409 and 3409. Consider risk of blowdown, especially adjacent to large openings.

[1] Threatened and Endangered Species

What	Why	Comments
Precommercial thinning (wide spacing/ 50 tpa) of young stands to promote late seral forest conditions.	Place acres on a trajectory to grow into marbled murrelet habitat with wide spacing of trees.	The best murrelet habitat today grew in very widely spaced conditions at a very young age. This treatment would duplicate those conditions.
Plant trees, enhance coarse woody debris levels, increase forage base and encourage natural regeneration.	Restore diversity and complexity, especially in riparian areas for non-game species and provide winter forage species for big game.	Consider role of red alder vs. conifers within riparian areas, use coarse woody debris standards for pieces/acre, and take advantage of naturally occurring understory for forage production.
Manual release and brushing.	Control unwanted vegetation.	Aggressive brush invades disturbed areas or areas where conifers are widely spaced.

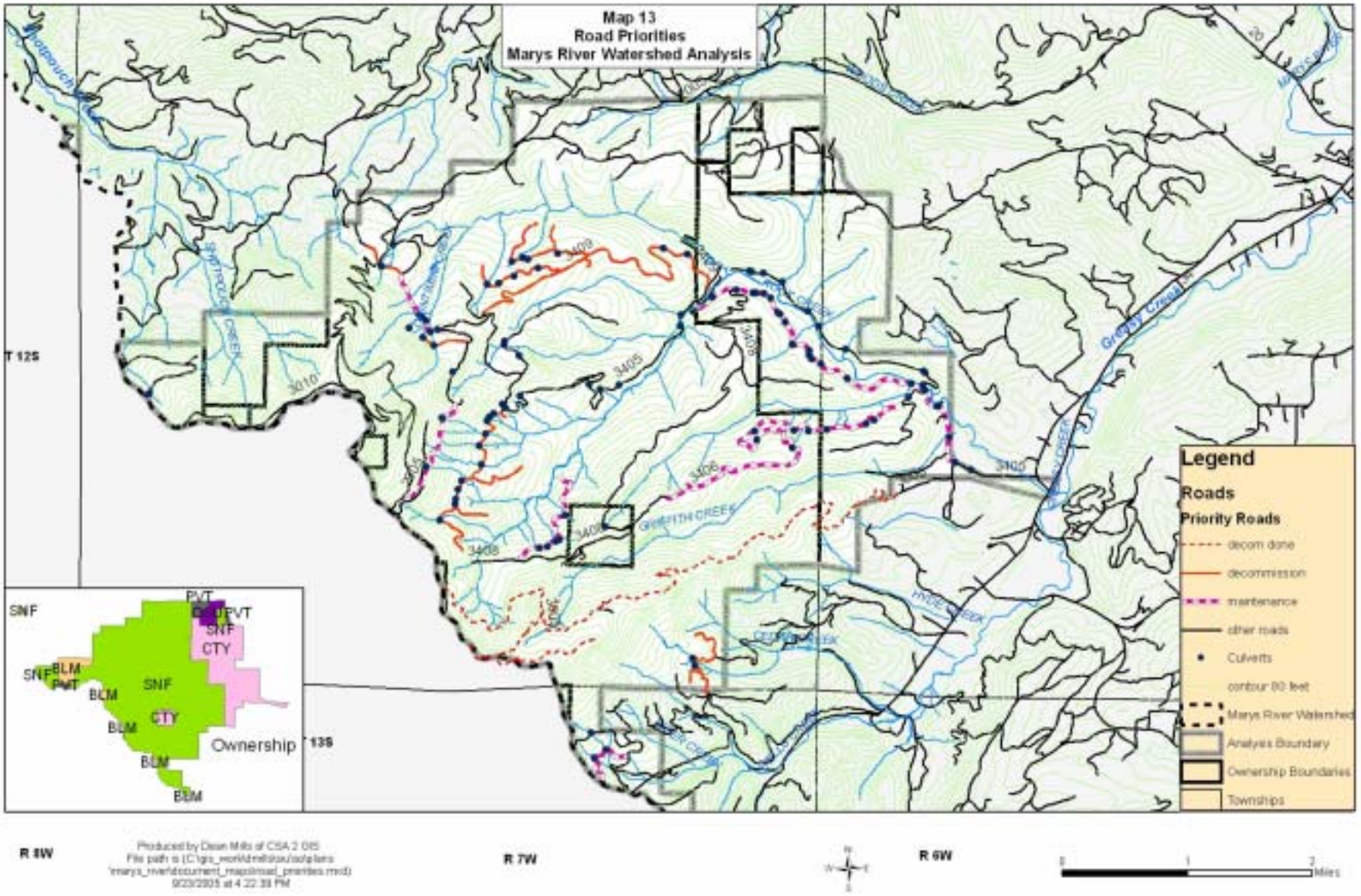
TERRESTRIAL HABITAT AND ROAD MANAGEMENT

Road decommissioning and maintenance have been identified for some roads as a high priority. Wildlife restoration of some stands has been identified as a high priority. By blending these two priorities, it becomes evident that a number of plantations adjacent to roads identified for decommissioning are not high priority for wildlife restoration. However, if the roads are decommissioned without managing those plantations, it would be either a more costly operation requiring aerial logging or an opportunity lost. Additionally, managing only the stands adjacent to roads identified for decommissioning would forego some of the wildlife restoration that has been identified as high priority. At the same time, there are areas where the two priorities overlap.

Blending these two issues together identifies that the highest priority would be to manage all the plantations adjacent to roads identified for decommissioning and to manage all the wildlife restoration plantations identified as a high priority (Map 14: Combined Opportunities).

ISSUE 2: PROTECTION OR ENHANCEMENT OF WATER QUALITY, WITH AN EMPHASIS ON ROAD MANAGEMENT

Current road management priorities focus the limited maintenance and reconstruction funds on Key forest roads identified in the 2003 Forest Roads Analysis (Map 13: Road Priorities). The Marys Peak Road, which is mostly outside the watershed, and the Woods Creek road are the only roads currently identified as Key roads. Both of those have been reconstructed since 1970. The older road system within the municipal watershed has received very little maintenance and no reconstruction since implementation of the Northwest Forest plan. In 1994 most of the roads within the municipal watershed were heavily water barred in recognition of expected lack of maintenance. Roads 3405, 3406, 3408 and 3005 were not water barred. Road 3005 has been decommissioned, leaving only 3405, 3406 and 3408 receiving very limited maintenance and periodic patrol by City of Corvallis public works employees. The remaining roads have essentially been untouched since 1994, some are not


Map 13
Road Priorities
Marys River Watershed Analysis
T 12S
T 13S
R 8W
R 7W
R 6W
3409
3405
3406
3408
3010
GRIFFITH CREEK
Legend
Roads
Priority Roads
decom done
decommission
maintenance
other roads
Culverts
contour 80 feet
Marys River Watershed
Analysis Boundary
Ownership Boundaries
Townships
Ownership
SNF
BLM
PVT
CTY
Produced by Dean Mills of CSA 2 085
File path is (C:\gis_work\Admin\su\ca\plans
\marys_river\document_maps\road_priorities.mxd)
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1
2
Miles

currently drivable due to earth beam closures, fallen trees, brush and in one case a failed metal culvert and fill wash out. This lack of maintenance and access raises the priority to stabilize roads not expected to be used for long time periods.

Management opportunities identify roads to be decommissioned or receive maintenance. Decommissioning would include removing culverts, water bar and/or out slope road beds, stabilize fills and cut slopes to reduce the risk of sedimentation due to road failure. Maintenance would include ditch line and culvert maintenance, surface balding, brushing and addition of new surfacing or culverts as needed. Additional details in Appendix B.

Recommendations

The following roads listed for decommissioning are prioritized for treatment to remove culverts, water bar and/or out slope road beds, stabilize fills and cut slopes to reduce the risk of sedimentation due to road failure. Roads listed for maintenance are prioritized for need of ditch line and culvert maintenance, surface blading, brushing and addition of new surfacing or culverts as needed. Additional details are in Appendix B as road logs.

Table 7: Roads Listed for Decommissioning or Maintenance

Road Number	Approximate Miles	Treatment listed by priority
3405113 and associated spurs	2.0	Decommission
2005115	0.3	Decommission
Non system road accessed via Starker Forests lands in Section 36	0.5	Decommission
3409. 3409115 and 3409116	5.2	Decommission
2005114	0.5	Decommission
Culvert at mile point 1.2 off Marys Peak Road 3000	Single Culvert	Decommission
2005 in the vicinity of Bluff springs and Chintimini Creek	2.5	Maintain, replace culverts as needed
3405 in the segment paralleling Rock Creek	3.5	Maintain, replace culverts as needed
3406 above the Middle Fork of Rock Creek	2.0	Maintain, replace culverts as needed
3408116	1.3	Maintain, replace culverts as needed
3000111, headwaters of Wells Creek	0.5	Maintain, replace culverts as needed

ISSUE 3: PROTECTION OR ENHANCEMENT OF GRASSY BALD AND MEADOW HABITAT

The grassy balds priorities can be accomplished independently of other priorities. However, plantation restoration thinning can generate funding through trust funds or stewardship receipts for these projects.

With respect to invasive plants and noxious weeds all ground disturbing activities proposed within the watershed must be integrated with the prevention or elimination of invasive plants and noxious weeds.

Fire risk in the meadow, though the hazard and the risk are low, all projects that may increase the hazard or the risk to wildfire should minimize that hazard and risk.

Recommendations

Management recommendations to prevent further encroachment into Marys Peak grassy bald habitat include the following:

- Prevent further loss of grassy bald habitat. Stabilize ecotones. Restore meadow habitat where feasible.
- Prioritize ecotones to reduce tree encroachment, based on scenic, recreation, and ecological values as well as operational constraints.
- Minimize ground disturbance in the grassy balds that would accelerate tree establishment or invasion by non-natives. This may address road, facilities, and trail maintenance.
- Eliminate tree islands within the meadows that alter wind and snow patterns, understory vegetation and litter layer, while providing seed sources.
- Experiment with techniques for ecotone maintenance, for example: clipping seedlings, removing saplings, pruning branches of edge trees, or using prescribed fire.
- Experiment with techniques for recovery of native meadow vegetation after trees in islands or along edges is removed.
- Survey and address any long-term impacts of earlier trail or temporary road systems (e.g. in Trek meadow) that pose continued threats to desired meadow condition.
- Survey periodically for invasive species in or near the Scenic-Botanical Area.
- Access suitability of Marys Peak meadows for establishing a population of silverspot butterflies. Survey the extent and abundance of *Viola adunca* in meadow communities on Marys Peak and evaluate management such as mowing that could be anticipated for maintaining butterfly habitat against overall meadow management goals.
- Maintain noble fir-western hemlock forest so that noble fir continues to dominate, and Douglas fir does not become well-established in the stands above 3500' elevation.

ISSUE 4: PROTECTION OR ENHANCEMENT OF FISHERIES AND AQUATIC SPECIES HABITAT

Management opportunities to enhance fish and aquatic habitat include improving fish passage at five barriers that prevent upstream fish movement into the upper reaches of the watershed. Two of these barriers are water intakes for the City of Corvallis. The other three are culverts that prevent fish passage. Restoration of fish passage at the North Fork Reservoir dam should be considered a long-term objective. Additional opportunities to enhance fish and aquatic habitat include stand management to control stocking levels within the Riparian Reserves to the topographical break of the inner gorge to accelerate the development of large diameter trees adjacent to streams. See Table 8 for fish passage improvement priorities.

Table 8: Corvallis Watershed Area of the Marys River Watershed, Priority Improvements for Fish Passage.

Priority ranking	Road	Culvert	GIS layer culvert number	Condition of Culvert	Bankful width	Culvert Width	Drop at outlet	Stream gradient above culvert	Miles of Habitat upstream	Comments
1	3405	South Fork Rock Creek Intake Weir						1%	1.5 miles of good habitat, 0.6 miles of fair habitat	The weir has a marginal fish ladder that is difficult for fish passage.
2	3405	Griffith Creek Weir		Good	17	5 ft	0	3%	2.0 miles of good habitat	Weir is 5.5' high with no fish passage.
3	3405	Middle Fork Rock Creek		Good	14	5 ft	4.5	1.50%	1.7 miles of good habitat, .6 miles of fair habitat	Cobble/gravel stream bottom. Found 1 fish above the culvert. Large scour pool at outlet, where the stream turns sharply to the right (looking downstream).
4	3405	Connection Creek (2 culverts side by side)	3041	2 pipes are side-by-side, One pipe is completely filled with sediment.	12	3 ft	1		0.8 miles of good habitat	
5		Griffith Creek culvert on Road 3405	3090	Good	17		1	1.00%	2.6 miles of good habitat	The inlet has a large, steel-beam, arrow-shaped trash rack. There is a large pool at the outlet, no drop.

Recommendations

Fish habitat restoration recommendations are listed by major tributaries:

North Fork Rock Creek

No fish habitat restoration recommendations. Restoration of fish passage at North Fork Reservoir dam should be a long-term objective.

South Fork Rock Creek and tributaries

- Improve fish passage at the South Fork water diversion structure by improving upstream fish access to the lower steps in the fish ladder. This structure is a partial migration barrier to steelhead and resident cutthroat trout impairing access to 3.4 miles of occupied fish habitat.
- Replace the culvert at Road 3405 and road/stream crossing on unnamed tributary south of Connection Creek with a stream simulation structure to restore access to 0.7 mile of occupied fish habitat.

Middle Fork Rock Creek

- Replace the culvert at road/stream crossing Road 3405 with a stream simulation structure. The existing stream crossing structure is impairing upstream anadromous and resident fish access to 1.9 miles of occupied fish habitat.

Griffith Creek

- Improve fish passage at the water diversion structure at River mile 1.2 restoring anadromous and resident fish access to 2.8 miles of occupied fish habitat.

The fish and aquatic habitat priorities can be accomplished independently of other priorities. However, plantation restoration thinning can generate funding through trust funds or stewardship receipts for these projects.

ISSUE 5 PREVENTION AND CONTROL OF INVASIVE NON-NATIVE PLANT SPECIES

A number of non-native plants are known to occur in the Marys Peak area and are likely present in the Watershed. The degree to which management efforts should be directed at control and possibly eradication of these species vary greatly. Creeping bentgrass (*Agrostis alba* var. *alba*), colonial bentgrass (*Agrostis tenuis*), oxeye daisy (*Chrysanthemum leucanthemum*), cats-ear (*Hypochaeris radicata*) and sheep sorrel (*Rumex acetosella*) have naturalized and are very prevalent. Attempts to control or eradicate these species from anything but a very small area would be futile. False brome *(Brachypodium sylvaticum*), on the other hand, is a more recent arrival to the Watershed, has proven to be extremely invasive, and is adapted to growing in partial light conditions under a forest canopy. Without aggressive intervention, the potential exists for native forest understory communities to be converted to false brome. Some species may be well established elsewhere, but still at relatively low levels within the Watershed and efforts should be made at control. These species include meadow knapweed (*Centaurea pratensis*), Himalaya blackberry (*Rubus discolor*) and Dalmatian toadflax (*Linaria dalmatica*).

Recommendations

Management of invasive plant species should focus on prevention; limit ground disturbance to the extent possible and avoid the introduction of seed and plant parts through erosion control materials, seeding mixes or on equipment and control; use all the tools available to control and, if possible, eradicate all new invaders and any invasive species that pose a serious risk to native vegetative communities within the Watershed.

Road decommissioning and stand treatment must consider the presence of invasives or noxious weeds and develop a strategy for treatment. Research is needed to understand the spread of false brome in vegetation types and elevations.

ISSUE 6: MANAGEMENT OF FIRE HAZARD AND RISK

Fire hazard and risk is very low within the analysis area. From a fire management perspective the exclusion of human presence through road closures aids in the elimination of unwanted fire ignitions. On the other hand, elimination of roads reduces access for fire control vehicles, personnel and equipment. The consequences of road elimination would generally be minor due to the infrequency of fire ignitions. Thinning of stands to wide crown spacing where tree crowns are spaced 20 feet or more apart would reduce crown fire spread under normal weather conditions. Slash created from thinning activities poses a hazard for three or four years after thinning unless it is treated. Due to low ignition risk slash is generally left to decompose except along main roads and wildland-urban interface boundaries.

Recommendations

Management opportunities to manage for fire risk and hazard are essentially in place. Most of the watershed is closed to the public, eliminating the most probable cause of fires. An additional management opportunity is fire hazard reduction adjacent to Connors Camp through thinning and disposing of the slash. Forest Roads 3405, 3406 and 3408 provide sufficient access.

RECREATION OPPORTUNITIES AND RECOMMENDATIONS

Unauthorized recreation use, such as: user created trails and Off Road Vehicle use, has the potential to compromise the ecosystem and increase the fire risk. Additional signing and continued enforcement is recommended.

Overstocked young stand of trees adjacent to Connor's Camp presents a fire hazard and risk.

Recommendations

- thinning and treating of slash.

PARTNERSHIPS

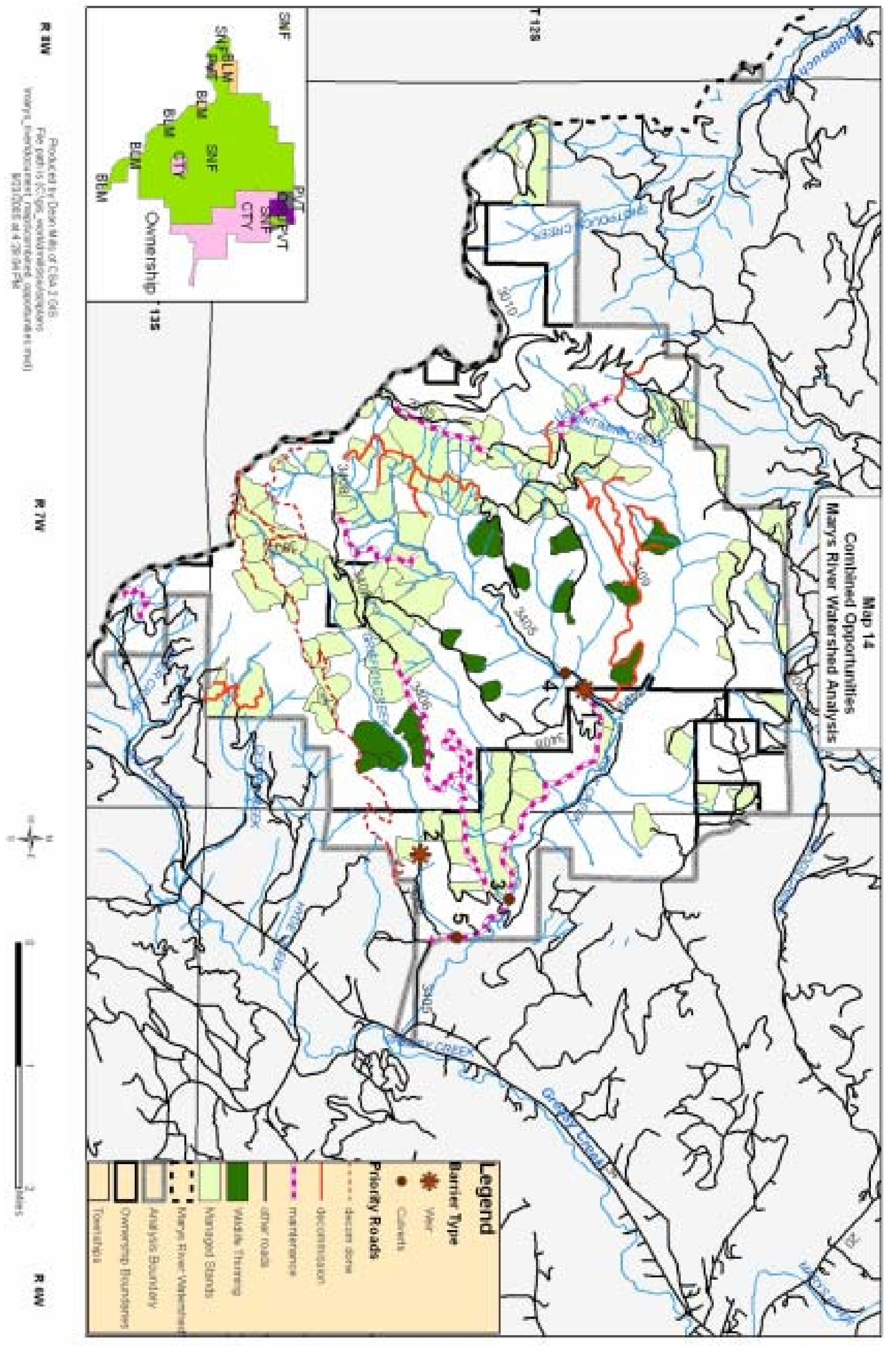
The opportunity for partnerships with the Marys River Watershed Council, the City of Corvallis, the Salem District Bureau of Land Management, Oregon State University, private land owners and others to manage the landscape may exist.

Recommendations

- investigating partnership opportunities.

COMBINED OPPORTUNITIES

The analysis team considered the Issues and Key Questions and looked at them holistically with regard to all resources. Opportunities to address priorities at the same time or in concert were identified (Map 14: Combined Opportunities).


Map 14
Combined Opportunities
Marys River Watershed Analysis
Legend
Barrier Type
Weir
Culverts
Priority Roads
decom done
decommission
maintenance
other roads
Wildlife Thinning
Managed Stands
Marys River Watershed
Analysis Boundary
Ownership Boundaries
Townships
Ownership
SNF
BLM
PVT
CTY
T 12S
T 13S
R 8W
R 7W
R 6W
Produced by Dean Mills of CSA 2 GIS
3010
3405
3409
3406
3408
1
2
3
4
5
Miles

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APPENDIX A

APPENDIX B

APPENDIX A

PLANT ASSOCIATIONS

The analysis area lies mostly within the Western Hemlock plant series (89 percent), but also contains the Pacific silver fir series (5 percent), Grand Fir series (3 percent) and Douglas-fir series 3 percent). These series are named for the climax species which eventually dominates the forested plant community. Douglas-fir is currently the dominant tree species within the watershed because it is long-lived species which regenerated after historic wildfires. Major disturbances such as wildfires, windstorms, landslides, floods, insects, pathogens and human activity determine the successional pathways within a landscape. As a result of these disturbances, each plant community within the watershed has vegetation that occurs over a range of successional stages.

Plant series classifications alone, however, are not sufficient to characterize the analysis area. The following discussion on the groupings of plant association provides a more complete assessment of the conditions.

Plant Association Groups (PAGs) are combinations of plant associations (Table 1). Plant associations are finer scale classifications of potential vegetation communities. PAGs are useful in identifying differences in stand structural characteristics, species composition and successional pathways.

Table 1: plant Associations Included in Plant Association Groups (PAGs)

PAG	Common name for PAG	Plant Associations included in PAG	Ecoclass	Acres
1406	Douglas-fir/Oregon grape-salal-ocenaspray-moderate elevation	PSME/HODI-MANE2 PSME/HODI-SYMPH PSME/HODI-WHMO PSME/HODI/GRASS	CDS216 CDS217 CDS213 CDS212	**119**
1407	Douglas-fir/poison oak-warm, often low elevation	PSME/COCO6-SYMO/POMU	CDS312	**225**
1607	Grand fir-moist to mesic, low elevation	ABGR/ACCI/POMU ABR/MANE2-GASH	CWS527 CWS528	**108**
1609	Grand fir/oceanspray-poison oak-westside low elevation	ABGR/COCO6/VAHE ABGR/HODI/POMU	CWS555 CWS529	**246**
	Oregon White oak/ bluebunch wheatgrass			**8**
2208	Pacific silver fir/oxalis-high precipitation	ABAM/OXOR-NOW Coast	CFF155	**586**

PAG	Common name for PAG	Plant Associations included in PAG	Ecoclass	Acres
1903	Western hemlock-warm, transistional to Douglas-fir zone	PSME/MANE2-GASH TSHE/ACTR-DRY-NWO Coast TSHE/MANE2-DRY-NWO Coast TSHE/MANE2-GASH-DRY-NWO Coast	CDS512 CHF232 CHS152 CHS154	**358**
1906	Western hemlock/ Oregon grape-salal	TSHE/MANE2/OXOR-NWO Coast TSHE/MANES/POMU-NWO Coast TSHE/RUSP-GASH TSHE/VAOV2	CHS155 CHS156 CHS423 CHS610	**3494**
1907	Western hemlock/ Oxalis-swordfern-moist	TSHE/ACCI-GASH/POMU-NWO Coast TSHE/ACCI/POMU- NWO Coast TSHE/OXOR- NWO Coast TSHE/POMU- NWO Cascades TSHE/POMU- NWO Coast	CHS230 CHS222 CHF141 CHF150 CHF142	**5284**
1908	Western hemlock/ salmonberry-wet	TSHE/RUSP TSHE/RUSP-ACCI	CHS421 CHS422	**580**
1909	Western hemlock/ Alaska huckleberry/ oxalis	TSHE/OXOR-ACTR TSHE/VAAL/OXOR- NWO Coast	CHF231 CHS616	**977**

See McCain and Diaz (2002) for descriptions of each Plant Association.

The distribution of the plant association groups have been mapped and modeled for the Siuslaw National Forest.

Stand Structure

Natural old growth stands in the watershed span a range in structure and composition. Ecology plots provide data for stands in three western hemlock plant associations, from 550-2570 feet elevation. These include the Western hemlock/Oregon oxalis-vanilla leaf, Western hemlock/dwarf Oregon grape-salal, and Western hemlock/vine maple-California hazel plant associations.

Most of the Marys Peak old growth is dominated by giant (>48" dbh) Douglas fir between 200 and 300 years old. In some stands, trees over 6 feet in diameter are not rare.

Old growth stand in the Western hemlock/dwarf Oregon grape-salal plant association

There are two main patterns in stand structure in the watershed. One type has a single cohort of Douglas fir, reflecting nearly complete stand replacing fires. The other pattern suggests at least one intermediate disturbance. Three stands (half of the sample) have remnant Douglas fir giants, survivors from a previous stand (as evidenced by tree ages one or two hundred years older than younger site trees). The survivors served as seed sources and significant structural diversity after disturbance.

This old growth stand shows the fully developed understory typical of late successional forests in this plant association group. At this site, 45% of the basal area is in Douglas fir over 4 feet in diameter.

Species composition on most samples is nearly pure Douglas fir. Western hemlock was a major component of only one of the sampled stands (63% of total basal area, compared to an average of 13% over 6 samples, 3 with 0%). In this Western hemlock/oxalis-vanilla leaf stand, the western hemlock seems to have established with a younger cohort of Douglas fir. Generally, other species (western hemlock, western redcedar, Pacific yew, big leaf maple, Pacific dogwood) established beneath the pioneering Douglas fir, or in gaps later in stand development. Western redcedar, western hemlock, and Pacific yew were the most common conifers, with grand fir occurring on a single site. Douglas fir were the only trees in the giant (>48"dbh) class. Western hemlock and western redcedar grew into the large (32-48") class on a single site each. Hardwoods (big leaf maple or Pacific dogwood) were present in 2/3 of the plots. Big leaf maple plays a significant role in stand diversity in some sites, especially in the pole (10-15"dbh), small (15-21"dbh), and medium (21-32" dbh) size classes.

Overall average live basal area was 269 sq.ft/acre (range 190-339 sq.ft/acre). Snag basal area averaged 15 sq.ft/acre (range 0-32 sq.ft/acre). Snag levels were highly variable. Some plots had few snags clearly due to snag falling or salvage.

Noble fir stands:

No Ecology program stand structure data are available for the noble fir stands in the elevations above 3400 feet. Most are mid-seral, site tree and species composition data from 3 reconnaissance plots that show a range of stand types. Two plots are now about 100 years old; one was mixed noble fir/Douglas fir, the other had minor western hemlock. The highest elevation plot was in a pure noble fir stand now about 160 years old (see photos). The site tree there was 46" dbh.

Noble fir stand near the summit of Marys Peak.

Marys Peak meadow complex

The extensive grassy balds atop Marys Peak are rare special habitats in the Coast Range, as are the nearly

Beautiful oxalis and starry false Solomons seal understory beneath noble fir

pure noble fir stands on the north and east border of the meadows. The meadow complex occupies approximately 185 acres. Rocky outcrops occupy a small area within the meadow complex, which otherwise is suitable for tree growth. The xerophytic rock garden occupying the outcrops is a limited edaphic/topographic climax community adapted to skeletal, rocky soils and a south west exposure. Several species in the rock garden are disjunct coastal populations, separated by 70 miles to next nearest occurrences in the Cascades. There are three main plant communities in the deeper soil meadow complex: red fescue-bent grass-sedge community, arrow-leafed groundsel community, and iris community (Snow 1984). The size of the meadow complex, the presence of the higher elevation noble firs, and the rock garden species make Marys Peak a unique site in the Coast Range.

Corvallis Watershed Road Log
Road 2005, Starting at the Marys Peak Road (Rd 3000) and going north
Surveyed by Ken McCall and Barb Ellis-Sugai
Apr-05

Milepost from road junction with 3000	GIS culvert layer number	Location	Description	Bankful width	Culvert diameter (inches)	Culvert type	Fill height	Fill volume (Cubic Yards)	Drop at outlet (feet)	pipe condition	Comments
0.1			Ditch Relief culvert		15	cmp				half plugged inlet	
0.3		Intersection of Road 2005 and 2005-116									
0.3			Ditch Relief culvert		18	cmp					
0.38			Ditch Relief culvert		15	cmp				plugged inlet	
0.49			Ditch Relief culvert		15	cmp				half plugged inlet	
0.51	3083		Stream Crossing culvert (Bluff Springs)	5	18	cmp	12	159	2.5	Trash rack at inlet made of metal fence posts. Inlet 90% blocked.	Abandoned and breached beaver dam about 100' upstream of culvert.
0.65			Ditch Relief culvert		15	cmp				partially plugged, totally rusted	Replace culvert
0.7			Ditch relief pipe		18	cmp				inlet smashed, 30% plugged	
0.8			Ditch Relief pipe		15	cmp				rotten bottom, inlet clear.	
0.85	3082		Stream Crossing culvert.		15	cmp	2			bottom rusted, clear inlet, outlet has open downspout	small steep drainage
1			Ditch relief culvert.		15	cmp				Inlet smashed and half plugged.	
1.02		Small road and landing on the east side of 2005.									

Milepost from road junction with 3000	GIS culvert layer number	Location	Description	Bankful width	Culvert diameter (inches)	Culvert type	Fill height	Fill volume (Cubic Yards)	Drop at outlet (feet)	pipe condition	Comments
1.15	3081		Stream crossing culvert.		15	cmp	9	22	2	Pipe is rusted through in places, outlet mangled.	Small headwater stream.
1.2			Ditch Relief pipe.		18	cmp				Pipe in good shape	
1.25			Ditch Relief pipe.		18	aluminum				Pipe in good shape	
1.3			Ditch Relief pipe			cmp					
1.31			Ditch Relief pipe. Newer pipe in good shape.		18	cmp				Pipe in good shape	
1.5			Ditch Relief pipe. All rust.		15	cmp				Pipe all rust.	
1.55			Ditch Relief pipe.		15	cmp				All rust, shotgun outlet	
1.6		Intersection of Road 2005 and 2005-115									
1.7			Ditch relief pipe. Good shape.		18	cmp				Pipe in good shape.	
1.8			Ditch relief pipe.			cmp				Pipe rusted and smashed	Lots of water running down the ditch into this pipe.
1.85			Ditch relief pipe. Aluminum, good shape.		18	aluminum				Pipe in good shape.	
1.9		Intersection with 3405									
1.95	3080		Stream crossing. Outlet drops 2 feet onto a boulder cascade.		48	cmp	5	37	2		Outlet drops 2 feet onto a boulder cascade
2	3079		Stream crossing.		24	cmp	23	371	0	Culvert very rusty,	Replace culvert

Milepost from road junction with 3000	GIS culvert layer number	Location	Description	Bankful width	Culvert diameter (inches)	Culvert type	Fill height	Fill volume (Cubic Yards)	Drop at outlet (feet)	pipe condition	Comments
2.1	3078		Stream crossing/ditch relief.		15	cmp	3.5			Completely rusted	(This may be where the diverted water from the road above comes out.
2.12			Pipe 20' north of last one in dry swale where one would expect a stream.		18	aluminum					
2.14	3077		Stream crossing. Just south of NFK Chintimini Creek.		15	cmp	2		0	Culvert very rusty	
2.15	3076		NFK Chintimini Creek.		48	cmp	20	486			
2.4			Ditch Relief culvert		15	cmp					
2.5			Ditch Relief culvert in dry swale, pipe in good shape			cmp				Pipe in good shape	
2.55			Ditch relief culvert.		15	aluminum					
2.555		Intersection of 2005 and 2005-114 spur.									
2.6			Ditch relief pipe,		15	cmp				Pipe in poor condition	
2.8			Ditch relief pipe		18	aluminum					
2.85			Ditch relief pipe		18	aluminum					
3			Ditch relief pipe		18	aluminum					

Milepost from road junction with 3000	GIS culvert layer number	Location	Description	Bankful width	Culvert diameter (inches)	Culvert type	Fill height	Fill volume (Cubic Yards)	Drop at outlet (feet)	pipe condition	Comments
3.1	3075		N. Fk. Rock Creek Stream crossing culvert.	5.5	48	cmp	30	901	3	Inlet clear, culvert in mediocre shape. At the outlet, riprap had fallen into the culvert, and partially blocked it. Sediment had built up in the outlet end of the culvert.	

Corvallis Watershed Road Log
Road 2005-114
Surveyed by Ken McCall and Barb Ellis-Sugai
April, 2005

distance in feet from road junction with 2005	GIS culvert layer number	fieldnotes	Culvert diameter (inches)	Drop at outlet	Bankful width	Recommend-ations	
925	3084	Stream crossing. 24" cmp, approximately 22' long. Sahllow fill Inlet partially plugged.	24				
1280		Distance from trail crossing to 2005/2005-114 intersection.					

Corvallis Watershed Road Log
Road 2005-116
Surveyed by Ken McCall and Barb Ellis-Sugai
April, 2005

distance in feet from road junction with 2005	GIS culvert layer number	fieldnotes					
2142		Very rusty ditch relief culvert					
0		length of road (intersection of 2005 and 2005-116)					

Corvallis Watershed Road Log
Road 2005-115
Surveyed by Ken McCall and Barb Ellis-Sugai
April, 2005

distance in feet from road junction with 2005	Milepost from entrance of road	GIS culvert layer number	Description	Fill depth	Fill volume	Culvert diameter (inches)	Culvert type	Drop at outlet	Bankful width
0	0.00		Intersection of 115 and 2005.						
469.2	0.09		Ditch relief.			18	aluminum		
841.5	0.16		Ditch relief pipe in intermittent stream crossing.			15	cmp		
1147.5	0.22		Ditch relief pipe in dry swale.			15	cmp		
1326	0.25	3085	Stream crossing culvert. The inlet was 90% plugged with wood and cobbles. We cleared the inlet. Afterwards, the headcutting through the cobbles created a step-pool morphology.	12	164	48	cmp	3	?
1581	0.30		15' cmp with downspout. A fallen tree knocked the downspout off.			15	cmp		
1581	0.30		Begin of slump in sidecast						
1708.5	0.32		End slump in sidecast. Failure doesn't look recent.						
1958.4	0.37		All fo the ditch water from the diverted channels is flowing across the road and down the slope. Creating a new channel.						
2065.5	0.39		Beginning of sidecase failure						
2065.5	0.39	3086	Smalls tream crossing pipe. Fill depth is 3 feet.Upstream, a cat road diverted the stream out of this channel. It is flowing in a new channel just to the east of the old channel.			15	cmp		
2147.1	0.41		End active sidecast failure due to saturated road conditions from diverted channel.						
2422.5	0.46	3087	Stream crossing. A large, 4-5 foot log has fallen down the drainage and on top of the culvert. Couldn't find culvert. The culvert inlet is completely plugged and buried. Most of the flow is going down the ditchline. (This stream crossing is in a patc			no data		no data	
3187.5	0.60		Road ends in a plantation. The landing is above a steep draw with a large stream. (NFK Chintimini Creek)						

Marys Peak Road
Reconnaissance for Marys River WA
Abandoned road off Peak Road (3000), just west of Starker property

GIS culvert number	Field notes	Fill depth	road width	road length	Bankful width	Recommendation
3062	Water has cut a channel across the roadbed in the past. Inlet is partially plugged and totally smashed from past cleanout. 24" cmp. Outlet of pipe has eroded, pipe is sticking out of fill with a 2' drop	9	25	35	3.5	Remove fill and culvert.

Road 3000-111 off Marys Peak Road
Surveyed by Ken McCall and Barb Ellis-Sugai
April, 2005

Culvert number on GIS layer	Field notes	culvert diameter	fill depth	inlet fill slope	outlet fill slope	
3065	34" cmp is just below the confluence of two tributary streams. Inlet is clear, and the pipe is in good shape.	34	6	5		
3066	36" cmp. Inlet is clear, pipe is in good shape. The outlet is sticking out of the fill with a 2-3 foot drop. Fill depth is approx. 6'	36	15	15	15	

Corvallis Watershed Road Log
Road 3405 along the mainstem of Rock Creek
Surveyed by Ken McCall and Barb Ellis-Sugai
Apr-05

Milepost from gate near HWY 34	GIS layer culvert number	Location	Description	Bankful width (feet)	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
0.5	3088		stream crossing		24	cmp		2		ok	inlet clear, 10" of sediment at outlet. Stream is incised 1' above culvert.
0.69		Intersection of Rd 3405 and Franklin Ridge Rd									
0.71	3089		intermittent stream		15	black plastic		2		ok	
0.9	3090	Griffith Creek	stream crossing	15.5	60	cmp	62	8	0	ok	Culvert is 67' long. Stream gradient is 3% (riffle to riffle). Bankful is 14 and 17'. Inlet clear. Has HUGE arrow-shaped steel trashrack at inlet. Pool is 30' long, approx. 4' deep at outlet. Overflow pipe is directly above and to right of big pipe.
1.21	3091	Just north of old steel railroad rail bridge.	stream crossing		18	concrete	287	19	0	Last segment has separated, 18" between last two segments.	

Milepost from gate near HWY 34	GIS layer culvert number	Location	Description	Bankful width (feet)	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
1.22	3092		intermittent stream		15	cmp		3.5	2	Inlet smashed. Pipe is bowed through road.	Channel is scoured all the way to Rock Creek.
1.3	not on GIS layer				15	concrete				Poor shape, needs replacing. Inlet is 50% plugged.	Couldn't find outlet. Fill is 3' at inlet.
1.31	not on GIS layer		swale above culvert, ditchline is wet								Should be a pipe here, but couldn't find one.
1.4		Intersection of Rd 3405 and Rd 3406.									
1.402	3093	at north end of intersection	swale above culvert, ditchline is wet		18	concrete		12		inlet clear	
1.405		dry swale			18	concrete	78	13		Inlet 20% full of dirt and debris, outlet 70% full of dirt (5" of open space at outlet)	

Milepost from gate near HWY 34	GIS layer culvert number	Location	Description	Bankful width (feet)	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
1.5	3094	Middle Fk Rock Creek	Major stream crossing.	14	60	cmp	1180	25	4.5	Pipe is in good shape	Bankful width is 14'. Stream gradient is 1.5%. Pipe is 70' long. Good potential fish habitat above pipe. Cobble/gravel stream substrate. Found 1 fish (unknown sp.) above pipe.
1.9			dry swale		18	concrete	203	18		Pipe is in good shape	
2		right next to old rock pit			18	concrete	360	25		pipe ok	
2.1	3095		small stream		18	concrete		9		Inlet 50% plugged.	Inlet partially plugged with large rock
2.15			dry swale		18	concrete	225	27		Pipe is in good shape	
2.2			dry swale		18	concrete	300	24	0	inlet clear, pipe in good shape	Can't see daylight through pipe. Outlet buried.
2.3					18	concrete	1398	46	1	culvert in good shape, culvert inlet clear	Fetid Adder's Tongue found around inlet area.
2.35			Steep swale		18	concrete		14		Inlet and outlet clear, pipe in good shape	More Fetid Adder's Tongue, false brome.
2.4	3096		stream crossing	2	18	concrete	1997	87	2	Pipe ok	Bankful width 24"
2.5	3097		stream crossing		18	concrete	521	31	0.5	pipe ok	

Milepost from gate near HWY 34	GIS layer culvert number	Location	Description	Bankful width (feet)	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
2.53	3098		stream crossing		18	concrete	106	9		Pipe is separating. 5 to 6 separations. Can't see through pipe	
2.565	3099		stream crossing		18	concrete	838	43	2	First 2 segments separated. 20% f water going through fill.	
2.615			ditch relief/dry swale		18	concrete				can't see through pipe	
2.7			dry swale		18	concrete	367	27		ok	
2.753	3100		stream crossing	4.5	24	concrete	2329	50		First section separated with a 2" gap. Water may be going through fill.	Bankful width 4.5'. Stream gradient flatter upstream, may have plugged in past.
2.8			seep/ditch relief		18	concrete		2		culvert in good shape.	
2.85			seep/ditch relief		18	concrete		2			
2.87			dry swale		18	concrete		6			top of pipe separating? Mushroom growing from roof of pipe.
2.95	3101		stream crossing	2	18	concrete	942	42	5	culvert in good shape	Bankful width 24". Moderately steep drainage.

Milepost from gate near HWY 34	GIS layer culvert number	Location	Description	Bankful width (feet)	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
3	3102		stream crossing		18	concrete	619 cy with 45' road length; 1331 cy with a 100' road length. See notes.	37		Inlet clear, last segment is disconnected.	Pipe is really skewed to right looking downstream. Direction perpendicular to road is 180 degrees, pipe is put in at 240 degrees. 60 degree skew. If old pipe is dug up, road length would be100 feet. If new pipe is put in perpendicular to road with a d
3.02	3103		stream crossing		18	concrete	69	11	5	pipe in good shape	Outlet drop 5' to a half-cmp downspout that isn't connected to the concrete pipe.
3.15	3104		stream crossing		18	concrete	706	36	0	Pipe ok	Outlet of pipe has 3" of free space. 15" of sediment in bottom. 8' horizontal distance from outlet, the stream has a 4' drop. Channel above inlet is full of vine maple.
3.28	3124		stream crossing		18	coated cmp	731	38	0	ok	

Milepost from gate near HWY 34	GIS layer culvert number	Location	Description	Bankful width (feet)	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
3.34	3123		stream crossing		18	concrete		3		pl	Buried culvert, 3" sticking up out of sediment. NEEDS FIXING. Fill saturated.
3.37	3122		major stream crossing	2	18	concrete	243	29	2	pipe separating, has bow in it.	Several partial separations
3.44			ditch relief		18	concrete		7		ok	
3.50	3121	just south of intersection	stream crossing	2	18	concrete	335	17	0	ok	
3.56		intersection of 3405 and 3408									
3.57			ditch relief		18	concrete		7			outlet 20% full of sediment
3.63			ditch relief		18	concrete		2			
3.68			ditch relief		18	concrete		2		ok	
3.73	3120		stream crossing	2	18	concrete	12	3		ok	
3.77			ditch relief		18	concrete		3		ok	
3.88		SFK Rock Cr Bridge									

Corvallis Watershed Road Log
Road 3405-111
Surveyed by Ken McCall and Barb Ellis-Sugai
May, 2005

Milepost from bridge across Rock Cr	GIS layer culvert number	Location	Description	Bankful width	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
0.03	3105	right before switchback after bridge			15	cmp		3		inlet complete plugged, rusted out	
0.4	3106		intermittent stream channel		13	smooth steel pipe	28	5	3.5	OK	
0.42	3107		intermittent stream channel		30	cmp	110	10	0	rusty.	water disperses onto riprap at outlet. Pipe is skewed 15 degrees to east of perpendicular with road.
0.6			ditch relief		13	smooth steel pipe		1	0	rusty, mashed	Needs to be replaced. Outlet full of sediment, flat gradient.
			ditch relief/swale		13	smooth steel pipe		4		rusty, mashed	Inlet and outlet covered with poison oak. Needs replacing.
0.8			Big swale		18	aluminum	25	5		Inlet 15% plugged. Outlet is shotgun about 7'.	Pipe at to pof headwall, trickle coming out of the pipe. Pipe has been replaced.
0.9		Road turns right gently.									

Milepost from bridge across Rock Cr	GIS layer culvert number	Location	Description	Bankful width	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
1			ditch relief			smooth steel pipe		3		completely plugged at outlet. 12' shotgun at outlet.	
1.05			ditch relief		13	smooth steel pipe		4		inlet smashed, 75% plugged	Gentle slope below.
1.1		Abandoned road to left									
1.12	3108		Major stream crossing	2	24	black plastic overflow pipe					Drainage upstream is full of white oak (Q. garryana).Inlet buried under a sediment wedge. Water flow disappears into sediment approx. 30' upstream from culvert. Pipes thru fill to come out on outlet side. Can't find true outlet. Humboldt crossing?
1.3		Road to left. Took picture of S. Fk Rock Cr.									

Milepost from bridge across Rock Cr	GIS layer culvert number	Location	Description	Bankful width	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
1.4	3109		stream crossing	3	30	coated cmp	154	7	3	Fair shape. Inlet fill is scoured 2' past the culvert inlet.	Stream is scoured all the way to SFK Rock Cr, approx. 100'.
1.45			ditch relief		12	cmp		2		Rusty, inlet smashed	Needs replacing.
1.59	3110		Major stream crossing	6.7	48	cmp	109	7	1.5	Good	Stream gradient is 2% above culvert. Nice stream with pools, undercut banks, good cover from logs and vegetation. Saw 4 juvenile fish in pool. Outlet is 5' from SFK Rock Creek.
1.7			ditch relief		13	smooth steel pipe		2		non functional, rusty	
1.8			ditch relief		13	smooth steel pipe		2		Rusty, inlet smashed	Can't find outlet

Milepost from bridge across Rock Cr	GIS layer culvert number	Location	Description	Bankful width	culvert diameter (inches)	culvert type	Fill Volume (C.Y.)	Fill height (feet)	outlet drop (feet)	pipe condition	Comments
1.9	3111		Major stream crossing (Stilson Creek?)	6	60	cmp		19	5	Separated at the center of the pipe.	Stream has 2% gradient, cobble/gravel bottom. Some cobbles in the bottom of the culvert. Inlet clear. Another road is parallel to main road, and below it on outlet side. Width of upper road is 19', then 8', 60% slope to lower road. Lower road is 21'
2	3112		small stream crossing	1	15	aluminum		2		good	
2.1			ditch relief drains slumpy area		13	smooth steel pipe		2	3		
2.2	3113		1 of2 pipes 100' apart, small streams		24	black plastic		3			
2.21	3114		1 of 2 pipes 100' apart, small streams		12	cmp		3			
2.3			ditch relief		12	cmp				good	
2.4		End of road next to outlet of reservoir									

Corvallis Watershed Road Log
Road 3405-113
Surveyed by Ken McCall and Barb Ellis-Sugai
Feb-05

distance in feet from road junction with 3405	Milepost from entrance of road	GIS culvert layer number	Description	Bankful width	Culvert diameter	Fill Height	Fill Volume (cubic yards)	Drop at outlet	Culvert condition	Comments
0	0		Junction of 3405000 and 3405113							
463	0.09	3051	Earthflow slump has a perf pipe runnning in ditchline to drain the slump. The perf pipe empties into a 18" metal pipe that serves as a cross-drain.	2		2	no data			
753	0.14	3052	Culvert in middle of quarry floor.							
948	0.18	3053	Stream crossing. Concrete pipe,		18	24	no data		Pipe in good shape, 60% plugged.	Very steep draw above pipe.
1873	0.35	3054	Stream crossing. Concrete pipe,	11	36	65	no data		3 partial separations, one at outlet, 2 approximately 25' in pipe from outlet	Major stream crossing in a deeply incised channel with a deep fill.
2303	0.44		ditch relief pipe.		18					
2411	0.46	3055	Stream crossing, metal pipe.	4	30	6	no data			Major stream crossing, looks like a huge debris torrent was deposited upstream of road. Long downspout (approx. 60' long) on end of pipe, with a 10' drop.

distance in feet from road junction with 3405	Milepost from entrance of road	GIS culvert layer number	Description	Bankful width	Culvert diameter	Fill Height	Fill Volume (cubic yards)	Drop at outlet	Culvert condition	Comments
3346	0.63	3056	Stream crossing, concrete pipe. I	3.5	36	21	no data	2	Inlet partially plugged.	The outlet drops over a bedrock cascade that is 4' long with a 2' drop
3992	0.76		Ditch-relief pipe.						Can't find outlet or see through pipe.	
4458	0.84		Ditch-relief pipe in earthflow. aluminum pipe.		18					
4633	0.88	3057	Stream crossing, aluminum pipe with a full-round downspout. Debris torrrent/earthflow with large boulders. Alder growing on it.		36				Inlet partially plugged. Outlet has full-round downspout.	Leave a wide, shallow swale when the culvert is pulled, about 50' in width.
5253	0.99	3058	Stream crossing, concrete pipe.	3	18			3	Debris at inlet. Pipe is separated at first joing, half-separated at second joint.	The stream channel should be about 9' below the outlet of the pipe.
5638	1.07		Ditch Relief concrete pipe. .	2	18				OK	
5933	1.12		Ditch Relief concrete pipe. .		18				OK	

Corvallis Watershed Road Log
Road 3408
Surveyed by Ken McCall and Barb Ellis-Sugai
May, 2005

feet starting at intersection of 3408 and 3408-116, going east	Milepost	GIS layer culvert number	Location	Description	culvert diameter (inches)	culvert type	Fill height (feet)	outlet drop (feet)	pipe condition	bankful	Comments
0			Starting at intersection of 3408 and 3408-116								
510				ditch relief	18	coated cmp	3		ok		
1360				ditch relief	15	coated cmp	5				
1650				begin sidecast slumping							Shoulder slumping 2' vertically, 2-3 ' back from edge of road. Small stream in middle of slump, no culvert. Spring 25' above the road. Water appears to pipe through fill. Incipient channel froming at bottom of slump.
1685				end slidecast slumping							
1760				begin sidecast slumping							

feet starting at intersection of 3408 and 3408-116, going east	Milepost	GIS layer culvert number	Location	Description	culvert diameter (inches)	culvert type	Fill height (feet)	outlet drop (feet)	pipe condition	bankful	Comments
1790				end slidecast slumping							
2050				begin sidecast slumping							
2110				end slidecast slumping							
2092				ditch relief	15	coated cmp					
2615				small slump							
2630				ditch relief							

Corvallis Watershed Road Log
Road 3408-116
Surveyed by Ken McCall and Barb Ellis-Sugai
May, 2005

Milepost, starting at entrance of road	GIS number	Location	Description	bankful width	culvert diameter (inches)	culvert type	Fill height (feet)	Fill Volume (Cubic Yards)	outlet drop (feet)	pipe condition	Comments
0		entrance of 3408-116								ok	
0.02			ditch relief		18	cmp				ok	
0.23	3115		stream crossing		18	coated cmp	4	24		ok	
0.28			ditch relief		18	coated cmp	3			ok	
0.36	3116		major stream crossing		18	coated cmp	18	138	1.5		Shoulder at outlet is slumping. Inlet is armored with riprap, inlet smashed. Outlet flows over a series of boulders below the 1.5' drop.
0.45	3117		stream crossing		24	coated cmp	5			ok	
0.51	3118		stream crossing	3' trib to west, 2' trib to east	24	coated cmp	27	541	0		Confluence of two streams is at inlet of culvert.
0.81	3119		major stream crossing	3	48	coated cmp	40	1588		pp	Inlet is bevelled. 20% plugged inlet, old growth windfall across stream 10' upstream from culvert. Outlet has two pipes side-by-side, one is 32", one is 48", both are bevelled. Can't find two inlets.
0.81			ditch relief		18	coated cmp				ok	Pipe sagging in middle

Corvallis Watershed Road Log
Road 3409: Starting at intersetion of 3405 and 3409 near intake on SFK Rock Creek, heading up the hill on Road 3409
20-Apr-05
Ken McCall and Barb Ellis-Sugai

Milepost from intersection of Rd 3405 and 3409	GIS culvert number	Location	Description	culvert diameter (inches)	culvert type	Fill height (feet)	Fill Volume (cubic yards)	outlet drop (feet)	pipe condition	Comments
0		Intersection of Road 3405 and 3409 at intake on S.Fk Rock Creek	Ditch Relief culvert	15"	bituminous coated cmp	2				lots of water flowing through it
0.02		Rd 3409	Ditch Relief culvert	15"	cmp					under spur road, culvert is parallel to main road
0.05		Rd 3409 at property boundary	Ditch Relief culvert	15"	cmp				ok	pipe is a third full of sediment
0.2		Rd 3409 intersection with road to dam								
0.3		Rd 3409	Ditch Relief culvert	15"	coated cmp				ok	
0.4		Rd 3409	Ditch Relief culvert	15"	coated cmp				ok	pipe is a third full of sediment
0.45		Rd 3409 NF boundary sign								
0.5	3074	Rd 3409	Stream crossing culvert	24	coated cmp	41	1027	2	ok	Inlet valley full of blowdown and large sticks. Inlet underneath debris, doucn't see it. Water is flowing unimpeded. Bob said that Beaver have plugged this culvert in the past, and water has run over the road.

Milepost from intersection of Rd 3405 and 3409	GIS culvert number	Location	Description	culvert diameter (inches)	culvert type	Fill height (feet)	Fill Volume (cubic yards)	outlet drop (feet)	pipe condition	Comments
.5 to .7		Rd 3409	water standing in ditchline							
0.57		Rd 3409	Ditch Relief culvert	15	cmp				ok	2" of sediment in bottom of pipe.
0.6		Rd 3409	Natural piping appears to be going under the road.							10' deep hole on upstream side of road. No metal pipe. Comes out in small gully on downhill side, approximately 30' below road. Recommend: Dig out road, pit in riprap and pipe to allow seepage to go through road.
0.65		Rd 3409	Ditch Relief culvert	18	coated cmp				ok	Sediment in bottom of pipe.
0.7		Rd 3409	Stream crossing culvert	18	coated cmp	11	112	0.5	ok	12" coated cmp perf pipe coming into culvert. Water is running through perf pipe, which is in bad shape. Tree growing in front of outlet. Area is seepy, with lots of little springs below road.
0.8		Rd 3409	Ditch Relief culvert	18	coated cmp				ok	2" sediment in bottom
0.85		Rd 3409	Ditch Relief culvert	18	coated cmp				pp	40% plugged
0.9		Rd 3409	Ditch Relief culvert	15		5			ok	pipe is at a seep

Milepost from intersection of Rd 3405 and 3409	GIS culvert number	Location	Description	culvert diameter (inches)	culvert type	Fill height (feet)	Fill Volume (cubic yards)	outlet drop (feet)	pipe condition	Comments
1.09		Rd 3409	Ditch Relief pipe in slump in road. 45' wide past first sharp corner in switchback.	18	coated cmp					Pipe has no discharge. Inlet is trashed and half plugged.
1.2		Rd 3409	Ditch Relief culvert	18	cmp					
1.25		Rd 3409	Ditch Relief culvert	15	coated cmp				ok	
1.3		Rd 3409	Ditch Relief culvert	15	cmp				pp	Culvert is half full of sediment.
1.4		Rd 3409	Ditch Relief culvert	15	coated cmp				ok	Outlet is sticking out of the fill approx. 8'.
1.45		Rd 3409	Ditch Relief culvert	15	coated cmp					Pipe has a severe bow in it. Looks like downspout was disconnected from the pipe when a cherry tree fell on it.
1.5		Rd 3409	Ditch Relief culvert	15	coated cmp				ok	Half full of sediment
1.6		Rd 3409	Ditch Relief culvert	15	coated cmp					
1.7		Rd 3409	Ditch Relief culvert	15	coated cmp					
1.8		Rd 3409	Ditch Relief culvert	15	cmp	15				10' of pipe sticking out of fill at outlet.
1.9		Rd 3409	False brome?							
2.1		intersection of road 3409 and 3409-115								

Milepost from intersection of Rd 3405 and 3409	GIS culvert number	Location	Description	culvert diameter (inches)	culvert type	Fill height (feet)	Fill Volume (cubic yards)	outlet drop (feet)	pipe condition	Comments
2.4		intersection of road 3409 and 3409-116								
2.6		Rd 3409	Ditch Relief culvert	15	cmp				half plugged	
2.8		Rd 3409	Ditch Relief culvert	15	coated cmp					
2.9		Rd 3409	Ditch Relief culvert	15	coated cmp				half full of sediment	
3.3		Rd 3409	Ditch Relief culvert	15	coated cmp					Swale with 10-12' fill, dry swale. (Slump scarp?)
3.4		intersection of road 3409 and 3409-117								
3.5		Road 3409 and intersection of "teardrop" (intersection of 3409 and 3405)								

Corvallis Watershed Road Log
Road 3409-115 (Surveyed by Barb Ellis-Sugai)
20-Apr-05

feet starting at entrance of road	Milepost from entrance of road	GIS culvert number	Location	Description	culvert diameter (inches)	culvert type	Fill height (feet)	Fill Volume (cubic yards)	outlet drop (feet)	pipe condition	Comments
0	0			intersection of road 3409-115 and 3409							
1490	0.28	3069		stream crossing?	18	cmp	3	57	0	some rust, pipe clear	inlet clear, no water. Bottom of pipe is damp, but looks like stream started downhill from road.
1498	0.28			curve to right on road, walking toward entrance of road							
1851	0.35			Dry swale							deep bowl on uphill side of road
2758	0.52	3070		Small steep stream crossing	18	cmp	28	336	2	partially plugged	inlet half plugged with large chunk of wood
2834	0.54	3071		stream crossing	18	coated cmp	25	40	2.5	clear, in good shape	Too many downed trees to get all the measurements.
3109	0.59	3072		Major stream crossing	24	cmp	31	1123	2	rusty, cuvlert 3/4 pluged	
3467	0.66			Ditch Relief cuvlert							no water
3960	0.75		at last curve on road as it goes down the ridge								

Corvallis Watershed Road Log
Road 3409-116 (Surveyed by Ken McCall)
Roadbed is nearly overgrown with salal, ditchline and cutslopes have dense conifer reprod, small diameter. Will be fairly east to re-open, but difficult to walk.
20-Apr-05

feet starting at entrance of road	Milepost from entrance of road	GIS culvert number	Location	Description	Bankful width	culvert diameter (inches)	culvert type	Fill height (feet)	Fill volume (Cu Yards)	Inlet fill slope length	Inlet fill slope %	outlet fill slope length	outlet fill slope %	road width	upstream road length	downstream road length	outlet drop (feet)	pipe condition	Comments
0	0		Intersection of Road 3409 and Rd 3409-116																
450	0.09			Ditch Relief Culvert		15	coated cmp											ok	
720	0.14			Ditch Relief Culvert		15	coated cmp											ok	
925	0.18			Ditch Relief Culvert/dry swale		15	coated cmp	22	198	14	30	31	50	16	30	40	0	ok	
1170	0.22	3073		Wet swale		15	coated cmp	23	371	13	40	34	60	18	45	55	0	ok	pipe is running a trickle of water
1620	0.31			Shallow dry swale		18	coated cmp	10										ok	
2485	0.47	3074		Intermittent stream crossing	1.5	18	coated cmp	17	78	8	20	26	50	20	18	26		ok	
2880	0.55		White carsonite post marking yew wood "super tree" on uphill side of road																
3195	0.61	3075		Live stream crossing	3	18	coated cmp	33	251	17	30	50	55	20	22	26	4	slight separation at first joint, full separation at last joint will fill failure over separation (about 15' from outlet).	

feet starting at entrance of road	Milepost from entrance of road	GIS culvert number	Location	Description	Bankful width	culvert diameter (inches)	culvert type	Fill height (feet)	Fill volume (Cu Yards)	Inlet fill slope length	Inlet fill slope %	outlet fill slope length	outlet fill slope %	road width	upstream road length	downstream road length	outlet drop (feet)	pipe condition	Comments
3750	0.71	3076		Live stream crossing	5	24	coated cmp	23	282	14	40	32	55	32	23	33		ok	Pipe in wide curved fill, scour at inlet has cut into fill about 4' past pipe inlet. Water ponding in scour, then entering pipe.
3800	0.72			End survey															Road enters a 1980's plantatation and proceeds out ridge. INFRA lists the road at 0.9 miles at edge of plantation. Road is blocked with snow break and windfall reprod.

Corvallis Watershed Road Log
Road 3409-117
Surveyed by Ken McCall and Barb Ellis-Sugai
20-Apr-05

feet starting at entrance of road	Milepost from entrance of road	Location	Description	culvert diameter (inches)	culvert type	Fill height (feet)	Inlet fill slope length	Inlet fill slope %	outlet fill slope length	outlet fill slope length	road width	upstream road length	downstream road length	outlet drop (feet)	pipe condition	Comments
0		intersection of road 3409 and road 3409-117														
0			Ditch relief culvert on other approach to road												ok	
229			Ditch Relief Culvert												bottom rusted out, bowed, separated	ditch relief culvert in swale.
1680			Ditch Relief Culvert												inlet buried	water dripping out of outlet.

Dinner Creek non-system FS road
Surveyed by Ken McCall and Barb Ellis-Sugai
Apr-05

Distance from FS road junction with Starker roads (feet)	Distance from FS road junction with Starker Roads (miles)	Culvert number on GIS culvert layer	Field Notes	Recommendations
0	0		Junction of FS road with Starker road.	
370	0.07		String ran out not far from end of road. Paced the rest of the distance.	
1170	0.22		Blow-down patch of timber in draw.	
1425	0.27		Begin sidecast removal at large fir.	Remove sidecast
1580	0.30		End sidecast removal	
1615	0.31	3059	Stream crossing. Inlet completely plugged, stream running over road. Pipe sticking out of fill. Sediment at inlet is level with the road bed. Drop from road bed to bottom of plunge pool is 7'.	Remove culvert and fill.
1840	0.35		begin sidecast removal	Remove sidecast
1950	0.37		end sidecast removal	
1980	0.38	3060	stream crossing that appears to have had logs placed in streambed, no culvert. Blown out. Width of stream crossing, approx. 30'. Recommend removing the remaining logs and dirt in the stream crossing.	Remove remaining logs in road/stream crossing and scatter them downhill.
2220	0.42		beginning of patch of Scotch broom on road	Work with noxious weed program to eradicate Scotch broom.
2380	0.45		end of patch of Scotch broom on road	
2855	0.54		log truck road to landing on top of ridge	
3045	0.58		road going east to Starker property (415' to property boundary on this road)	
4920	0.93		landing at end of road	