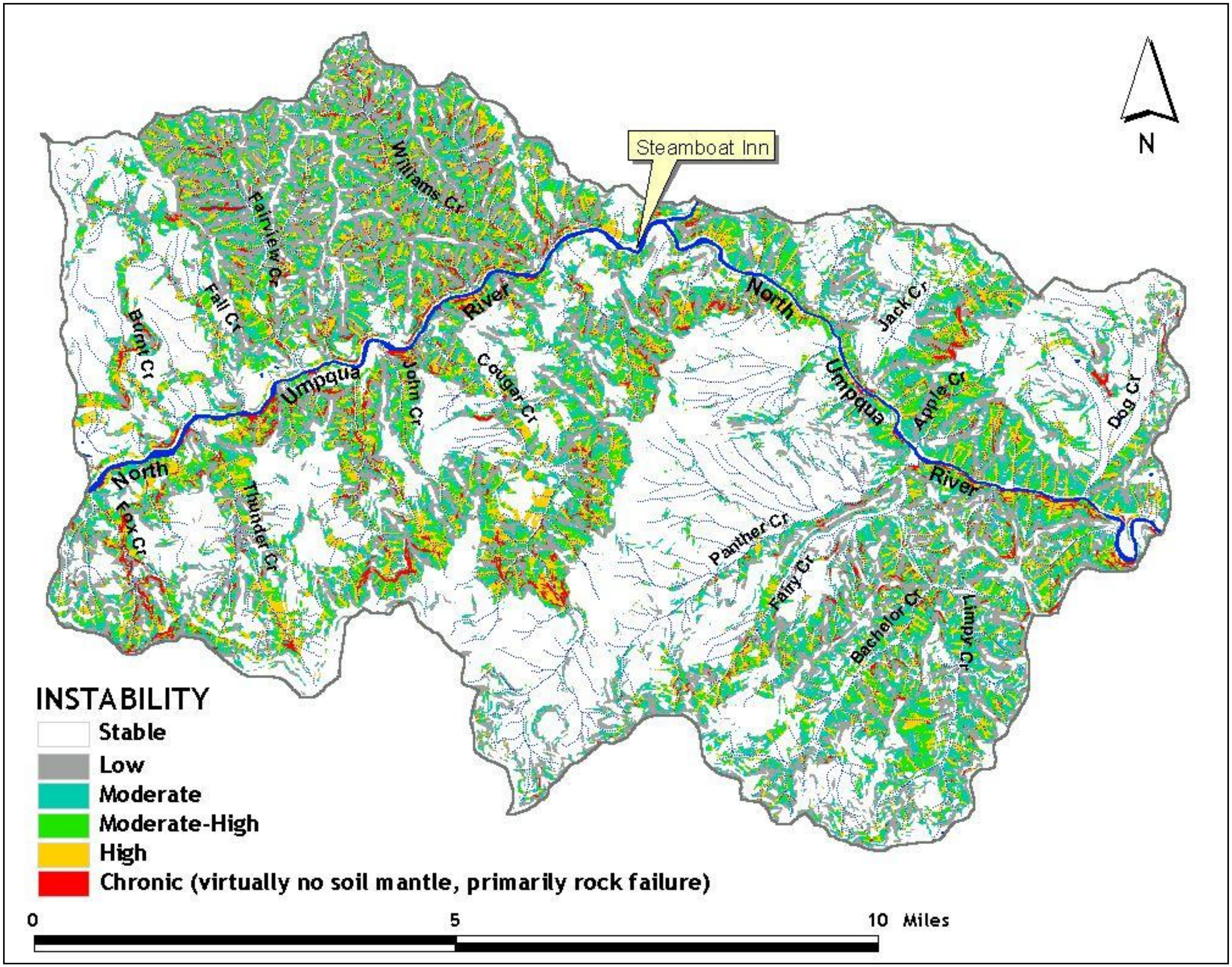

Figure 23. Rapid, shallow-seated landslide risk probability map (SHALSTAB).

CHAPTER 4 – FLORA, FAUNA & FUNGI

THE RIVER

Approximately 17.5 miles of the North Umpqua River runs through the analysis area, splitting the north and south side of the watershed into distinctly different areas. The river canyon itself is a unique feature of the watershed and provides habitat for a few species rarely seen in the Cascade Mountains.

The river is characterized by forced pool-riffle morphology, or a series of pools and bars created by flow obstructions such as bedrock outcrops, boulders, or large wood. Large wood is not a common feature because the river has a high capacity for floating it downstream. Debris jams at bends, constrictions, or channel margins may locally influence channel morphology and habitat, causing additional scour or sediment deposition and, on rare occasions, contributing to the formation of a side channel and/or island habitat. Channel gradients are predominantly 1 to 2 percent, with steeper gradients present for short stretches. Large boulders and abundant bedrock outcrops create pools and provide channel complexity. Bedrock ledges are divided by a deep trough through which most of the bedload is carried and stored.

Substrates other than bedrock are a mix of medium diameter cobbles. Under reference conditions, large gravel bars were likely uncommon due to channel confinement and high sediment transport capacity. Gravel deposits were more likely associated with bedrock and less commonly with large wood. Accumulations of cobble and gravel tend to be found in the tail out areas of large deep pools, islands, large boulder complexes or along the margins of the channel. The extent of bedrock under reference conditions is unknown, although it is assumed that at least a portion of the bedrock reaches in the mainstem and tributaries are largely natural in origin.

Forest management activities and the 1964 flood have substantially altered the river channel and aquatic habitats. Disturbances including road construction and timber harvest contributed to erosion in the river's tributaries. Approximately 40 percent of this sediment is estimated to have been delivered to stream channels, creating high rates of sediment delivery to the mainstem North Umpqua River (Stillwater 1999). Highway 138 has increased the local fine sediment supply due to erosion of the cut slopes and ditch lines and failures of fill slopes. Some of the highway was constructed on the flood plain, reducing channel-floodplain interactions, stream shading, and large wood recruitment to the channel. Channel confinement has been increased by Highway 138 in certain areas where modest channel widening or meandering and sediment deposition may have previously been possible.

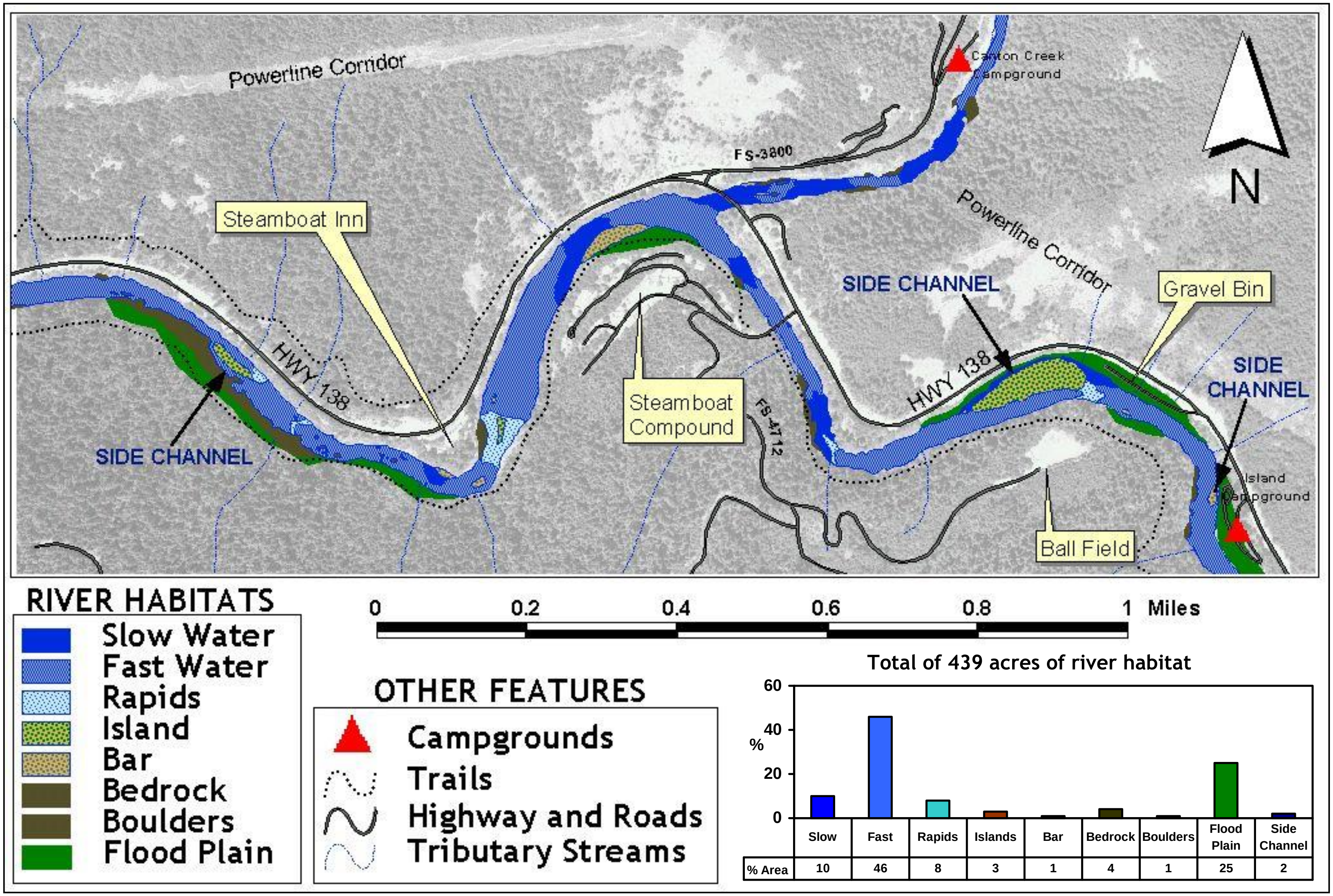

Figure 24. River habitat as mapped at the confluence of Steamboat Creek and the North Umpqua River. Habitat was mapped from aerial photo interpretation during summer flow conditions. The 100-yr flood plains were inventoried and mapped to determine a general estimate of the floodplain area within the analysis reach. The total amount of floodplain area has probably not changed from reference conditions. The bar graph summarizes the percentages (by area) of river habitat within the analysis area.

Changes to channels have likely degraded habitat conditions for anadromous salmonids and other aquatic organisms, reducing pool area, gravel availability, and habitat complexity, while increasing the proportion of glide habitats and bedrock substrates.

Due to the inherent resiliency of the mainstem channel, the gross appearance (and resultant habitat elements) is likely similar today to what it was historically. However, much of the fine-textured and uncommon attributes, such as large wood, side channels, backwater areas, and relatively wide vegetated floodplains, are likely altered and/or reduced in both number and extent. These changes from the reference conditions are primarily due to human-caused alteration and uses, such as road construction, wood removal, and recreational development and maintenance. It is these rare and unusual attributes that provide high-quality habitat elements for a large suite of aquatic organisms, including potentially limiting life-history stages for resident and anadromous fish. The dominant coarse features provide for an abundance of adult resting and older-age juvenile rearing habitat. The non-abundant habitats, such as spawning, incubation, and some rearing habitats (early, post emergence and over-wintering), have been further diminished by dams, floodplain development, wood removal, channelization, fill, and armoring with riprap.

FLOODPLAINS

Floodplains play an integral role in a properly functioning watershed even though they comprise only a fraction of the landscape (Figure 24). A floodplain is defined as a level area formed near the river channel, and overflowed during moderate flood events (Leapold 1994). Rivers "construct" floodplains through the process of moving back and forth across the valley floor over time and depositing sediments. Floodplains are defined based on the elevation reached by a flood peak of a given frequency (for example the 50-year floodplain).

Floodplains function to dissipate flood energy, moderate drought, store surface waters, recharge ground water supplies, provide shade to moderate water temperatures, and reduce erosion (Williams et al. 1997). They also are very productive areas and provide large wood for riparian and aquatic habitats. Through attenuation of peak flows, floodplains increase the chances of juvenile steelhead and coho survival during scouring floods (Everest et al. 1986). Fish are also able to get out of the main current and find safe resting and hiding habitats in floodplains during floods (Bustard and Narver 1975, Everest et al. 1986). Dambacher (1991) documented that winter survival is a limiting factor for juvenile steelhead in the North Umpqua. Everest et al. (1986) attributed low winter survival rates for coho, directly to the lack of suitable winter refuges during a scouring winter flood event. Other authors have documented that winter survival is often a limiting factor for coho.

Highway 138 hinders floodplain connectivity. Road fills and riprap associated with the road block and/or alter the river's access to part of its 100-year floodplain. The highway does not restrict access to broad floodplains during smaller events. In addition, developed and dispersed camping areas are primarily located in floodplain areas.

SIDE CHANNELS

Side channels are rare habitat features along the North Umpqua River. Compared to other similar-sized rivers in western Oregon, the North Umpqua likely contains the least amount of them (personal communication, J. Dose, 1999). Side channels, as defined for this analysis, are separated from the main channel and flow of the river. They provide unique off-channel habitats characterized by lower water velocities relative to the main channel. During low flows, some side channels become dry or have isolated pools, which provide good habitat for various aquatic organisms.

Side channels tend to be areas of sediment and large wood deposition, fine organic matter and nutrient retention, aquatic insect production, and over-wintering sites for fish and other vertebrates (Bustard and Narver 1975, Swales et al. 1986, Gregory et al. 1991). An "incredible diversity" of juvenile fish were found in a 100-meter stretch of side channel directly adjacent to the Gravel Bin raft take-out as compared to other types of river and stream habitats sampled over the years in the watershed (S. Lightcap, personal communication). Young-of-the year and one-year old coho, large amounts of young-of-the year chinook, one and two-year-old cutthroat, young-of-the year, one, and two year-old steelhead, sculpins, and many juvenile lamprey were found.

Within the analysis area there are 9 side channels and approximately 1.5 miles of side channel habitat. Two side channels are immediately adjacent to established recreation sites, where the presence of people may lead to inadvertent disturbance of juvenile salmonids. Most of the recreation sites appear to have little direct effect on the habitat in the side channel adjacent to them.

Anecdotal accounts indicate that some side channels are reported to be less connected to the main channel than they were prior to the 1964 flood, while others appear to be more connected. The side channels at Gravel Bin and Hatchery Ford appear to have had greater connectivity with the river prior to the flood (J. Howell, personal communication, 1999). The Hatchery Ford side channel was the site of an early hatchery operation on the south side of the river. The extent of manipulation of this particular channel is unknown (see River Analysis).

TRIBUTARY STREAMS

Tributary streams to the North Umpqua River within the analysis area provide approximately 327 miles of aquatic habitat for a variety of species. Over 83% of these tributaries are 1st or 2nd order streams (Fig. 25). First order streams are usually associated with class 4 intermittent streams and mark the origination of a stream channel (Fig. 26). Although they are never fish bearing, they host a variety of uniquely adapted and sometimes rare aquatic species, such as the southern torrent salamander.

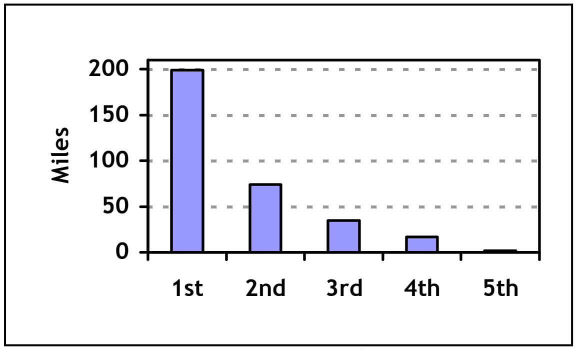

Figure 25. Summary of tributary stream miles by stream order.

Figure 26. First order stream along the North Umpqua trail.

Figure 27. A waterfall in Bachelor Creek, a 4th order stream.

Spatially and temporally, aquatic habitat conditions in tributary streams have always varied considerably. The shape of a stream's channel is the result of its interactions with the basin's geology, hydrology, and input of organic and inorganic material. This interaction, through the fluvial process, creates a network of active channels and floodplains. In narrow valleys, the channel is constrained and streams tend to be relatively straight with little floodplain area. Such is the case for Fall and Williams Creeks, and most of the other tributaries within the analysis area. Waterfalls are common in many of these streams (Fig. 27). These falls often mark the end of fish distributions, however other aquatic species such as the Pacific giant salamander thrive in the fishless reaches above them.

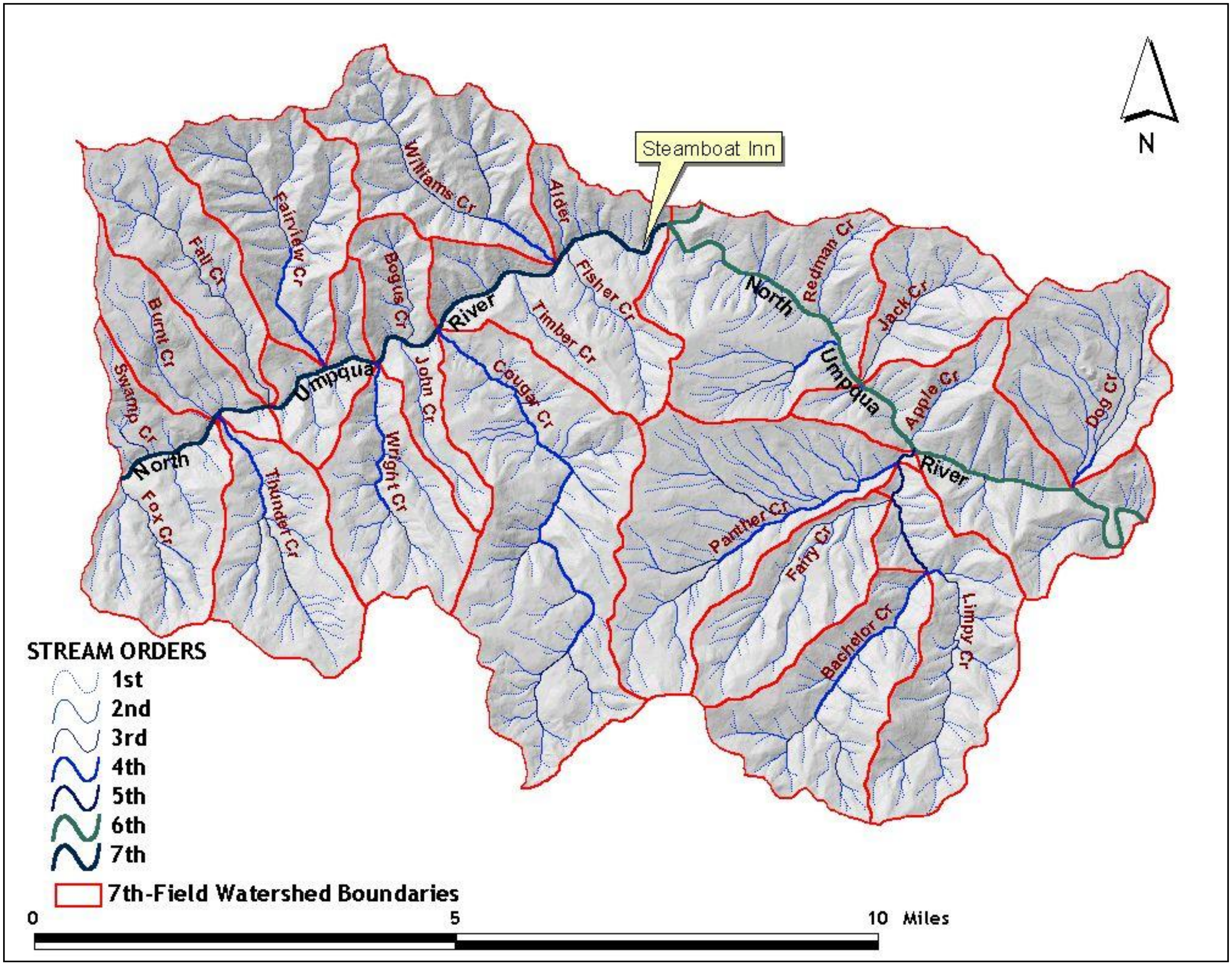

Figure 28. The river and streams, including their drainages (7th-field watersheds), within the analysis area.

In wider valleys, unconstrained stream channels like those seen along the lower portions of Panther and Wright Creeks can be found. These channels can meander from side to side and tend to be more complex with relatively well-developed floodplains. Unconstrained channels are usually found along larger order tributary streams (Fig. 28).

LARGE INSTREAM WOOD

The density and configuration of large wood plays a key role in the aquatic habitat conditions of tributary streams (Fig. 29). Large wood naturally tends to be configured as channel spanning log jams, angle logs, "stilted" logs, channel spanning sill logs, as well as wood in secondary channels and floodplain areas. Seral stages of adjacent and upstream riparian areas dictate the size of wood delivered to the channel, while wood size, channel form (constrained vs. unconstrained) and the stream's hydrology determine how wood is configured within the channel.

Figure 29. Natural large wood in Deception Creek, 1998.

The watershed's disturbance regime dictates the frequency and extent of large wood inputs. Its delivery through debris flows and landslides plays a significant role in the formation of tributary valley bottoms and provides the raw material from which complex stream channels are formed. The quantity, composition and timing of material delivered has a direct effect on the appearance and function of the aquatic environment. These events often have short-term adverse effects on the existing stream channel, but eventually, the stream is able to adjust to this influx of material and return to some form of equilibrium.

Historically, streams were normally gravel-dominated channels whose form was dictated by constraining bedrock and the presence of large wood within the channel. Large wood served to store alluvial and organic material that washed through. Long stretches of exposed bedrock between reaches of gravel tended to be rare because of the high density of large wood. Historically, debris flow, perhaps caused by a large fire, would expose large reaches of stream down to the bedrock. These bedrock reaches were often long-term features (10's of years), dependant upon future large wood delivery and subsequent deposition of sediment.

Large wood surveys were conducted along streams in roadless areas and other stream channels that have been minimally impacted by management to establish local references for large wood densities. In these streams, large wood densities ranged from 50-110 pieces per miles, with densities decreasing with increasing stream order. The roadless areas surveyed have experienced large, high-severity fires in the early 1900s. Wildfire is one of the primary recruitment mechanisms for large wood in streams of the Western Cascades. We would expect streams, within late-successional riparian forests, which have recently burned to have high levels of wood. However, this was not the case in Williams, Fairview and Cougar Creeks. Densities of large wood in these streams were on the lower end of the range. This may indicate that these streams have experienced more than one high-severity fire over the last 150 years. This "re-burning" (in the early 1900s) likely stand-replaced the young riparian forests, which were re-establishing after large fires in the late 1800s. Large wood recruited by the previous wildfire would have been reduced through fire consumption, and the re-establishment of new large trees would have been set back. Today, any large wood remaining would be in the later stages of decay and highly fragmented, therefore more easily moved downstream by high flows. Unmanaged streams in the Panther Creek watershed have relatively high densities as would be expected in streams within older riparian forests.

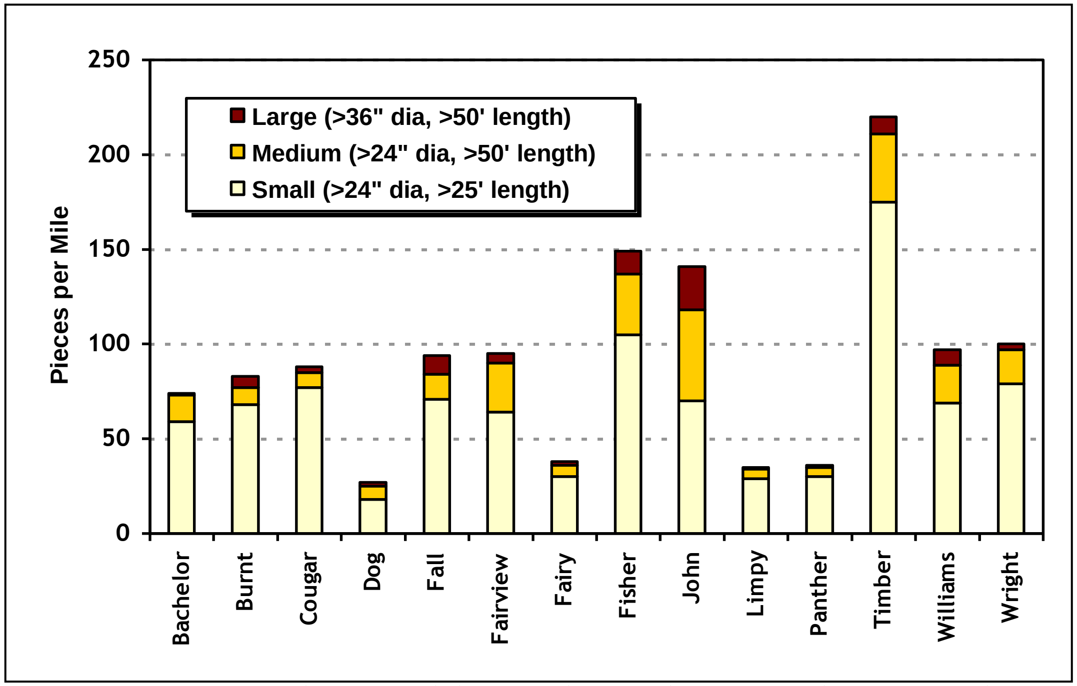

Figure 30. Density of large wood, by size class, within surveyed stream reaches in the Middle North Umpqua Watershed Analysis Area.

Today, wood densities within several tributaries in the analysis area are below reference ranges (Fig. 30). Relative wood abundance within surveyed streams was inversely related to the amount of roads, timber harvesting and stream cleanout along the stream (Table 9). Streams with high road densities, high levels of timber harvest and an extensive stream cleanout history, especially within the Panther Creek 6th-field (Panther, Limpy, and Fairy Creeks), have the lowest wood densities within the analysis area, and are the most degraded.

Table 9. Large wood density and riparian condition within and adjacent to surveyed stream reaches.

RELATIVE ABUNDANCE	AVERAGE PIECES PER MILE	PERCENT AREA WITHIN 180 FT. OCCUPIED BY ROADS	PERCENT AREA WITHIN 180 FT. THAT HAVE BEEN CLEARCUT	PERCENT OF SURVEYED REACHES THAT HAVE BEEN CLEANED-OUT
Low	32	28%	18%	78%
Moderate	81	4%	9%	43%
High	143	6%	4%	11%

Today's low numbers of large wood can be attributed to decades of road building, riparian timber harvest, and stream cleanout. The result has been adversely impacted channels, resulting in aquatic habitat that is highly simplified. Stream cleanout, which began in the 1960s and lasted into the 1980s, has been particularly damaging to aquatic habitats. Wood jams were removed with the idea of improving fish passage and also to prevent damage to bridges and other facilities downstream during flood events. Large wood was removed through timber salvage sales or cut into small pieces so that it would wash out with high flows.

The loss of large, instream wood has resulted in a loss of stream channel complexity, channel down cutting and channel isolation from adjacent floodplains and side channels. Many cleaned-out reaches are now bedrock-dominated and have widened, allowing for increased thermal loading. This decrease in channel roughness has reduced the channel's capability to attenuate flood water velocities and retard the movement debris flows. The result has been a change in tributary streams from channels dominated by complex pool and side channel habitat, into relatively homogeneous, single-channeled streams with simplified pool habitat, resulting in a decrease in biotic diversity of fish and other aquatic organisms.

In stream reaches that still contain high levels of large wood within the channel, evidence of past conditions exist including complex pools, stair-stepped channel profiles and side channels. In many fish-bearing streams, these areas represent isolated reaches between larger areas of degraded habitat. In some channels (Fox Creek and Thunder Creeks), management related debris flows have adversely impacted aquatic conditions by scouring out long sections of the stream channel (Figure 31). Degraded conditions can be expected to persist for decades without active restoration.

Figure 31. Exposed bedrock riffle in Panther Creek, 1999. A result of stream cleanout.

Figure 32. Large wood placed in Fairy Creek, 1995.

Recovery of large wood would facilitate increased deposition of gravel/cobble substrates, which in turn would increase habitat for fish and other aquatic organisms. It would also restore nutrient retention and processing, flood attenuation, and channel stability. In 1993 and 1995, approximately 80 pieces of large wood were reintroduced to fish-bearing portions of Fairy Creek in order to replace wood that had been previously removed. This, coupled with riparian planting and road-related restoration (e.g., upsizing culverts and pulling back over-steep landings), was one of the District's first attempts at a sub-watershed scale approach to comprehensive watershed restoration.

Natural and anthropomorphic disturbances, in the form of fires, landslide and debris flows, will continue to periodically alter aquatic habitat conditions, but with reduced frequency compared to the last several decades. Barring large-scale stand replacing fires, the disturbance would be relatively localized with only isolated impacts on the overall trend of recovery. Roads will continue to pose the largest risk to aquatic habitats within the analysis area. The rate and degree of recovery will be highly dependant upon the climatic conditions and future disturbances.

RIPARIAN HABITAT

Riparian Reserves cover approximately 30% of the analysis area. These reserves buffer rivers, streams, ponds and wetlands by 1-2 site potential tree heights (180-360 feet) and are designed to protect the ecologically important interface between the aquatic and terrestrial ecosystems. Approximately 2% of the Riparian Reserves within the analysis area are associated with ponds and wetlands, the remaining 98% are associated with streams and the river.

Riparian corridors are strongly associated with late-successional refugia, and usually contain high levels of late-successional forests. However, due to the unique high-severity fire regime of the analysis area, only 55% of Riparian Reserve acres were estimated to be late-successional forests prior to the 1950s. At the sub-watershed scale these proportions varied from a low of 9% in the Fairview Creek sub-watershed to a high of 98% in the Fairy Creek sub-watershed (Table 10). Large fires within the Williams Creek, Fairview Creek and Cougar Creek areas around the turn of the century resulted in high-severity, stand-replacement fires, which burned large portions of the riparian corridor.

Figure 33. Reference condition of late-successional riparian habitat.

Late-successional riparian areas were characterized by old forest structure and a well developed riparian plant community (Fig. 33). Large wood on the forest floor and within stream channels would have been abundant. Riparian vegetation along stream channels would have been dominated by early seral species such as red alder and willow, with large bank-rooted conifers helping to stabilize stream banks. Channel adjustments associated with floods, debris flows, and large wood recruitment would "reset" succession in the immediate streamside area during these natural disturbance events.

Riparian areas that had recently experienced high-severity fire would have been dominated by early-successional forest habitat and would have high densities of down large wood. Occasionally, these areas may have re-burned prior to re-establishment of late-successional forest conditions, prolonging the period of large wood development and reducing local densities of large wood. This may be the case in Cougar Creek. Loss of root strength associated with post-fire tree mortality would make steep stream channel headwall areas prone to landslides and were the origination points of natural debris flows.

Today, there is about the same amount of late-successional riparian forest as existed in 1946; however, the amount and condition varies widely across the basin. In general, Riparian Reserves located within or adjacent to harvest units have undergone the largest changes. These Riparian Reserves can be characterized as having narrow bands of early to mid seral hardwood and conifer species. Where buffer strips where left, they were narrow because the larger trees were selectively removed. These altered reserves currently do not provide the myriad of functions associated with intact riparian forests such as stream shade, large wood recruitment, nutrient delivery in the form of litter-fall and whole trees, stream bank stability, natural fire breaks, and the ecosystem functions associated with these natural processes.

Table 10. Changes in late-successional riparian forests from timber harvesting and road construction for each sub-watershed within the analysis area.

SUB-WATERSHED NAME	LATE-SUCCESSIONAL RIPARIAN FOREST			ROADS IN RIPARIAN RESERVES	
	1946 (% AREA)	2000 (% AREA)	NET % CHANGE	MILES	% AREA
Apple Facial	48	57	+9	24	7
Bachelor Creek	85	73	-12	11	4
Bogus -John Facial	40	44	+4	7	5
Burnt Creek	59	55	-4	10	7
Cougar Creek	33	34	+1	19	3
Dog Creek	57	79	+22	5	2
Fairview Creek	9	25	+16	3	1
Fairy Creek	98	51	-47	14	5
Fall Creek	49	52	+3	11	4
Fisher Facial	54	60	+6	20	7
Jack Creek	37	61	+24	5	3
Limpy Creek	84	66	-18	11	3
Panther Creek	72	50	-22	26	4
Raspberry Facial	43	48	+5	9	11
Redman Facial	71	49	-22	38	8
Swamp-Fox Facial	75	67	-8	15	6
Thunder Creek	67	47	-20	15	5
Williams Creek	33	62	+29	3	1
Wright Creek	35	48	+13	10	4
TOTAL	**55**	**54**	**-1**		

Many Riparian Reserves adjacent to roads have been selectively logged with most of the largest trees removed. Fire suppression has altered riparian vegetation allowing for a denser understory, making Riparian Reserves more prone to high-intensity fires than they were historically.

The restoration of late seral vegetation in riparian areas would facilitate recovery of large wood inputs to streams and floodplain as well as the recovery of stream shading. Recovery of stream-side riparian areas especially in the Panther Creek 6th-field watershed would have the most beneficial influence on aquatic habitat for anadromous and resident fish species.

As seen in Figure 34, approximately 3,805 acres (or 24%) of the Riparian Reserves within the analysis area have been clearcut harvested over the last few decades. An additional 451 acres have been partial cut harvested.

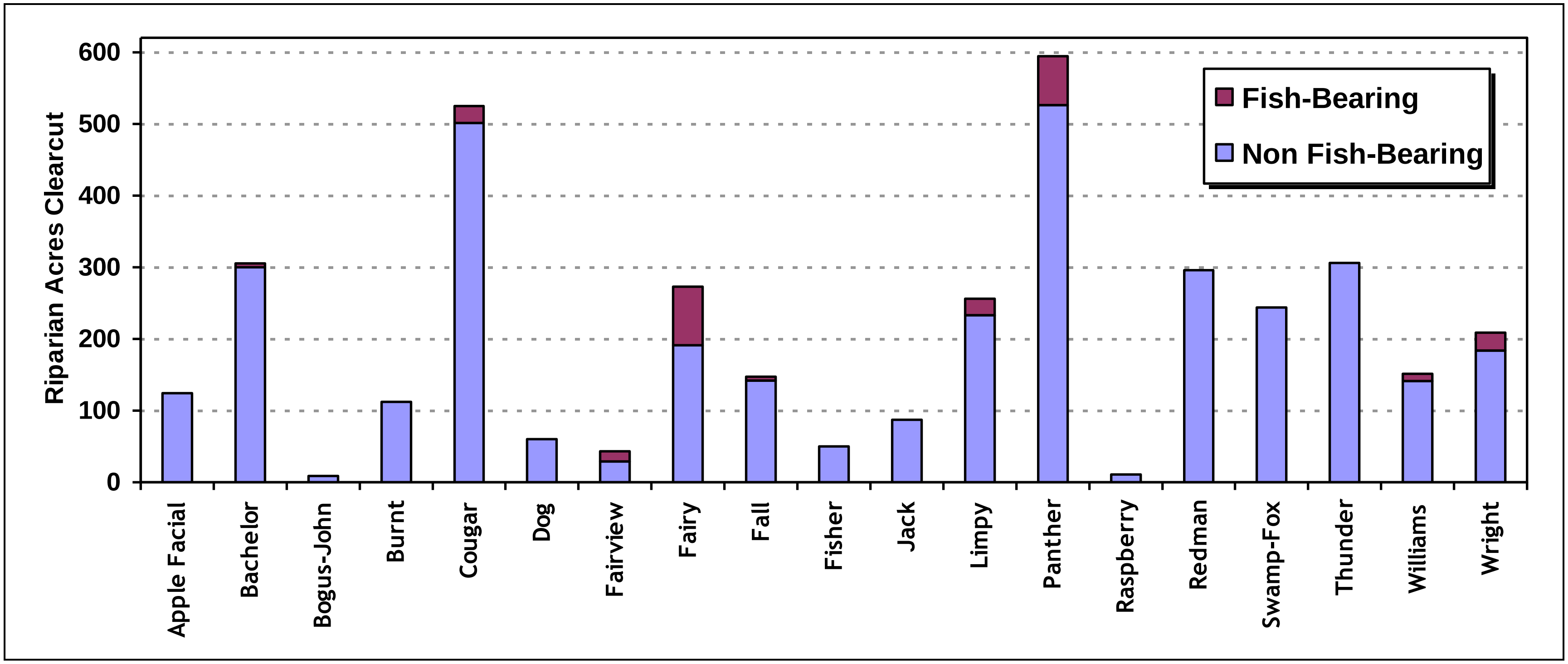

Figure 34. Summary of clearcut harvest of Riparian Reserves along fish and non-fish bearing streams for each sub-watershed.

There are currently 256 acres of road prism within Riparian Reserves in the analysis area. This equates to 5% of the total Reserve area and creates a number of detrimental impacts to aquatic and terrestrial ecosystems including the need for hazard tree removal, displacement of the floodplains and removal of riparian tree growing sites. Within the analysis area most roads that encroach on Riparian Reserves, cut through the Reserves in association with stream crossings. The influence of the North Umpqua Highway, which parallels the entire length of the North Umpqua River is discussed within the North Umpqua River Analysis (2000).

TERRESTRIAL HABITAT

Terrestrial habitats are broadly defined in terms of successional (seral) stages for this analysis. Three stages are used: early, mid and late as described in Figure 14 of Chapter 3. As shown in Chapter 3, the landscape is very dynamic due to various disturbances, most notably wildfire during the reference period and more recently, timber harvesting. Table 11 and Figure 36 show changes in terrestrial habitat conditions within the analysis area over the last 5 decades.

Table 11. Broad terrestrial habitat summary showing reference and current conditions.

Successional Stage	Total Acres		Number of Patches		Mean Patch Size (Ac)		Max Patch Size (Ac)	
	1946	2000	1946	2000	1946	2000	1946	2000
Early	14,468	9,236	103	678	140	14	5,845	405
Mid	11,626	14,567	79	593	147	25	3,955	3,219
Late	25,160	24,780	63	430	399	58	14,657	2,555

Although amounts of habitat are relatively similar between the two time periods, there is a major difference in the number of habitat patches, their juxtaposition and sizes. Today, habitat for many species is highly fragmented in much of the watershed. The existence of three roadless areas, buffers the overall effect of 5 decades of road building and timber harvesting, even so, overall terrestrial habitat conditions in the analysis area have changed dramatically.

INTERIOR FOREST

Habitat change has been most drastic for interior forest species. Interior forest is defined as late-successional forests more than 100 meters from the forest edge. They are the centers of forest patches and historically, the larger patch sizes of late-successional forests contained much more interior habitat and much less edge habitat than today. In 1946, there was approximately 13,668 acres of interior forest habitat spread across the watershed in 26 distinct patches (Fig. 35). Today, the opposite is true. Edge habitat has more than doubled from 341 miles of edge in 1946 to 712 miles today. This increase in forest edge has decreased the amount of interior forest habitat to 6,667 acres in 108 separate patches (Fig. 35).

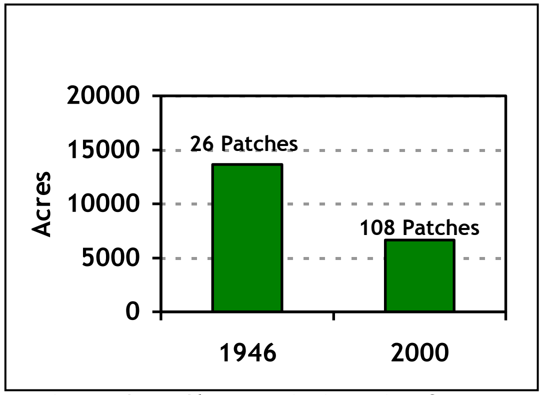

Figure 35. Changes in interior forest habitat.

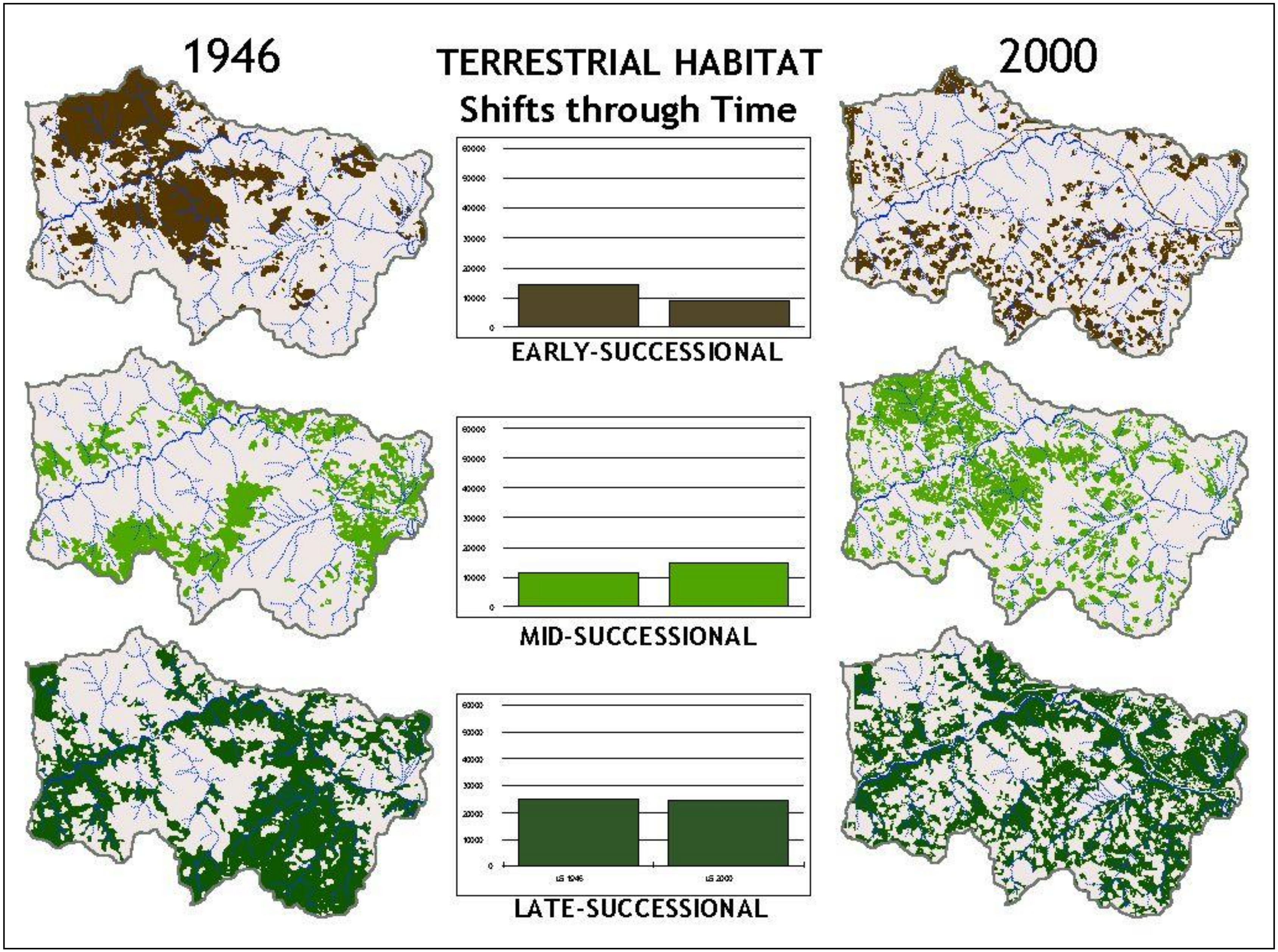

Figure 36. Changes in terrestrial habitats over the last few decades.

OLD GROWTH FOREST

Old growth forests (called old forest for this analysis) are a subset of late-successional habitat. For a description of old forest habitat see Chapter 3. Estimations of historic levels of old forest within the watershed are based on historical mapping and 1946 aerial photography. For this analysis, it is assumed that most of the late-successional habitat mapped for 1946 was old forest (25,160 acres). Today, old forest was mapped using higher resolution aerial photography, and is estimated at 17,722 acres. This equates to a 30% decrease in old forest habitat within the watershed over the last 5 decades (Fig. 37).

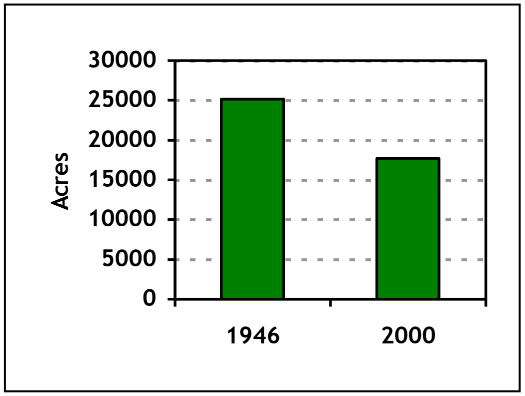

Figure 37. Changes in old forest habitat.

COARSE WOODY DEBRIS

The term "coarse woody debris" refers to dead trees (snags), fallen trees, large limbs and branches on the forest floor. It is a major structural component of the forest, providing habitat for many species. It is also necessary for the proper functioning of the forest ecosystem. Amounts and distribution are affected by several processes including; tree growth and mortality, fire, wind, insects, disease and decomposition. Topographic position and site productivity, or the ability of the ground to produce biomass, are also critical factors affecting levels of coarse woody debris.

Dead and fallen trees dominate the forest structure immediately after a stand replacement fire. This legacy of the pre-existing forest is as important to the functioning of a healthy forest ecosystem as it was before it burned. Large pulses of dead trees (sometimes as large as 6,000 acres) were created by wildfire at varying frequencies and spatial extents through time. At a finer scale, levels within the forest vary with the occurrence of wind or wet snow events, insect and disease outbreaks and the occurrence of small fires. Plot inventory data within unharvested late-successional habitat is used to characterize coarse woody debris levels within late-successional forests.

The watershed is highly deficit of natural stand initiation conditions (patches of dead trees) at the landscape level. Today, only 165 acres occur in small patches throughout the watershed as a result of the 1987 Apple Creek wildfire (a portion of which was not salvaged) and mortality incurred from prescribed burning. Stand initiation patches of today are very different from natural conditions in that they are mostly devoid of snags and down wood, especially in clearcut units, which were harvested after 1970. Approximately 3,045 acres (or 12%) of the existing late-successional habitat has been salvaged or thinned and has low levels of coarse woody debris.

UNIQUE HABITATS

Currently, approximately 473 unique habitats have been identified within the analysis area, scattered across approximately 4% of the analysis area (Fig. 38). These unique habitats generally consist of places where combinations of soil, hydrological and climatic conditions preclude robust conifer cover. Dry meadows, rock outcrops, areas of hardwood or broken canopy and wetlands fit this description. These areas contain the greatest diversity of vascular plants within the forest. Based on studies conducted on the Willamette National Forest, upwards of 80% of species diversity is represented by them. Of the 32 species currently included on the Umpqua National Forest's sensitive species list, 26 are found in unique habitats.

In certain areas, foundation elements such as exposed rock or saturated soil govern the existence of many unique habitats allowing them to remain stable over time. Historically, fire has played an important role in maintaining the size and species composition of some unique habitats. Fire suppression over the last half century has caused a significant reduction in the size of dry meadows in particular. Species, such as the grass species California fescue (*Festuca californica*), that depend on edges (ecotones) between meadows and forest have lost habitat.

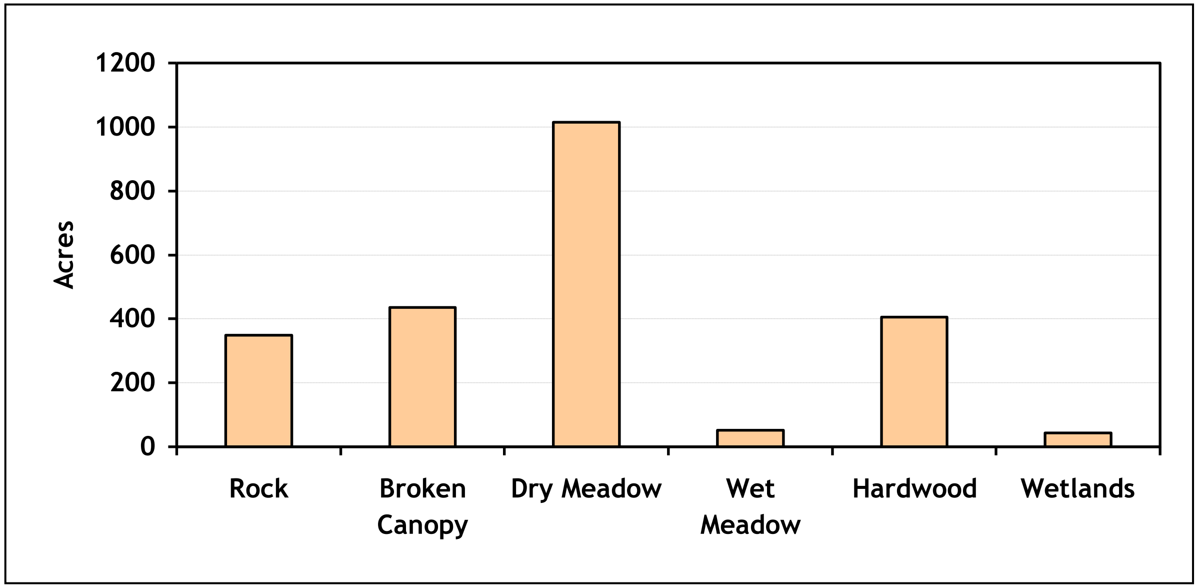

Figure 38. Current amounts of unique habitat within the analysis area.

Prior to significant land management influences by euro Americans, larger areas of non-forested communities could be found within the analysis area. Early documentation of this exists in turn-of-the-century timber inventory and fire maps. Comparing the first series of air photos taken of the area (1946) with current ones (1997) demonstrates a clear decrease in the size of openings. Most of this can be directly linked to the suppression of wildfires.

The reference condition was also a time when such sites had not yet been compromised by the introduction of non-native species or by large-scale disturbances caused by the construction and use of rock quarries, road construction and timber harvest. Over the last century, activities such as grazing, reforestation activities and fire fighting have also disturbed unique habitats. Most of the dry meadows within the analysis area have been grazed by domestic livestock from the early 1900s to the late 1980s. In particular, the meadows on the north side of the North Umpqua River from Apple Creek to Illahee Flat were grazed early and extensively. As a result, there have been changes in plant species frequency and diversity. In some cases rock outcrops have been used as quarries or landings. Nearly all types of unique habitat have been intersected and damaged by roadways.

LIMPY ROCK RESEARCH NATURAL AREA

Research Natural Areas (RNA) are lands where natural processes are allowed to continue and natural features are preserved for education and research. The designation of such sites is identified in the National Forest Management Act which states that “planning shall make provision for the identification of examples of important forest, shrubland, grassland, alpine, aquatic, and geologic types that have special or unique characteristics of scientific interest or importance and that are needed to complete the national network of RNAs (Section 219,25). Designation of the Limpy Rock RNA was based on concerns for its unusual plant species and communities. The area was recognized by local botanists as having a high incidence of species belonging to the rhododendron family, some of them apparently rare, including the population center for Umpqua Kalmiopsis. From 1975 to 1977, a group of volunteers called the “Limpy Botanical Committee” conducted surveys of the area. The information they gathered formed the foundation for the establishment of the Limpy Rock Research Natural Area in 1979.

The RNA covers approximately 1,855 acres of ground within the analysis area. Elevations range from 1,750 to 4,350 feet. It consists of forested, moderate to steep slopes that are generally south facing and occupied by Douglas-fir dominated forests. It supports over 400 species of vascular plants, including a concentration of chlorophyll-lacking members of the rhododendron and orchid families. At the time of its designation it included 18 plant species with special management concerns (only two - Umpqua Kalmiopsis and grass fern - receive management consideration today). It is also noted as having the highest herpetological diversity of all RNAs in Region 6 (Bury 2000).

Recent wind events have caused significant loadings of down fuels in portions of the RNA. The present condition will support a high-severity fire and this area has missed at least one fire rotation. If fire suppression remains successful, fuels will continue to accumulate to a point were fire suppression will be ineffective.

HABITAT CONNECTIVITY

Natural barriers to movement of plants and animals exist in many forms. For instance, waterfalls to fish or fire created gaps in the forest for some late-successional species. Some of these barriers are short-term in duration while others are more permanent. Climatic changes over the millennia have resulted in changes in floral and faunal distributions across great distances through time. Natural movement of species is an important ecological process, which allows them to evolve and adapt with changing environmental conditions or recolonize areas where they may have been previously displaced. One of the objectives of the Aquatic Conservation Strategy (ROD, B-11) is to restore connections where they have been broken by past management activities.

AQUATIC CONNECTIVITY

There are an estimated 518 points where streams are crossed by roads within the analysis area (Fig. 43), nineteen of which are over fish-bearing streams. These crossings primarily consist of corrugated metal pipe, but a few are cement culverts (Fig. 39), low water fords and bridges. The majority of crossing structures occur on 1st or 2nd order streams (Fig.40).

Figure 39. Cement culvert, with a fish passage structure, at the mouth of Williams Creek.

Seven crossings potentially affect fish movement. These culverts are located on Fairview, Williams, Wright, Bogus, Panther, Fairy, and Fall Creeks. Four are associated with the North Umpqua Highway. Some of these culverts include adult fish passage structures (Fig. 39). Coho salmon, steelhead, and cutthroat trout are the species affected by these culverts. Based on criteria established by the Oregon Department of Fish and Wildlife, the target species and age class for fish passage are one-year old salmonids (3-4" long). The degree to which these culverts block fish passage has not been assessed.

The stream system with the highest density of crossings (number of crossings per mile of stream) is Swamp Creek with 4.4 crossings/mile of stream. Figure 41 summarizes the highest estimated stream crossing densities for various streams within the analysis area.

In the past, not much consideration was given to impacts due to stream crossings, in many cases, Humboldt crossings (logs placed across a stream and covered with dirt) were used. Today, there is more concern and awareness of the importance of maintaining stream and riparian connectivity. A stream crossing inventory has been partially completed for this analysis and, when completed, will aid in determining which stream crossings pose the highest resource hazards.

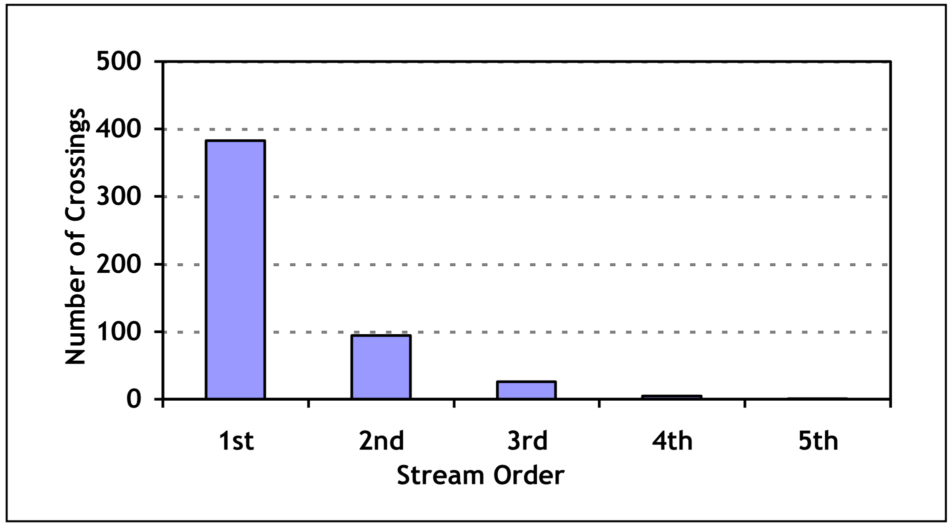

Figure 40. Estimated number of stream crossing structures by stream order.

Figure 42. Metal culvert barrier to southern torrent salamanders on Thunder Creek.

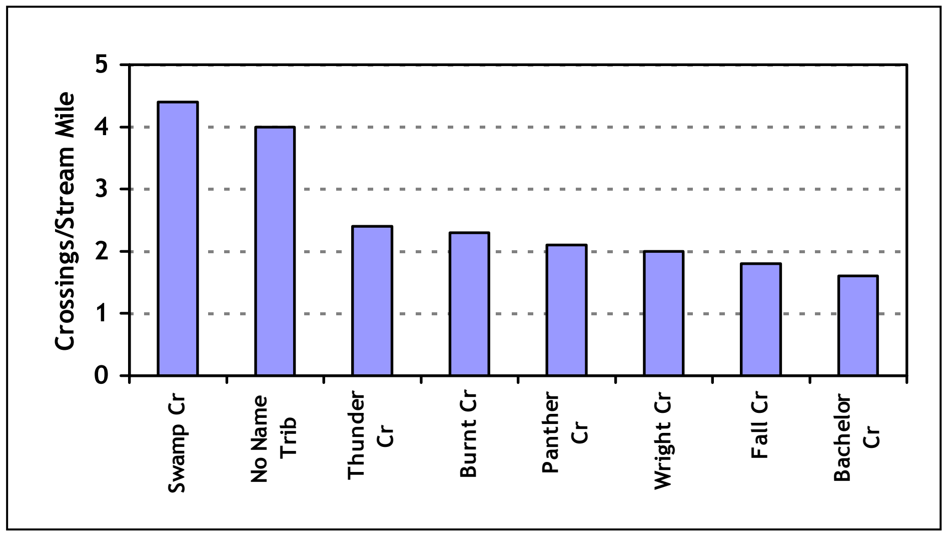

Figure 41. Tributary streams with the highest estimated density of stream crossing structures.

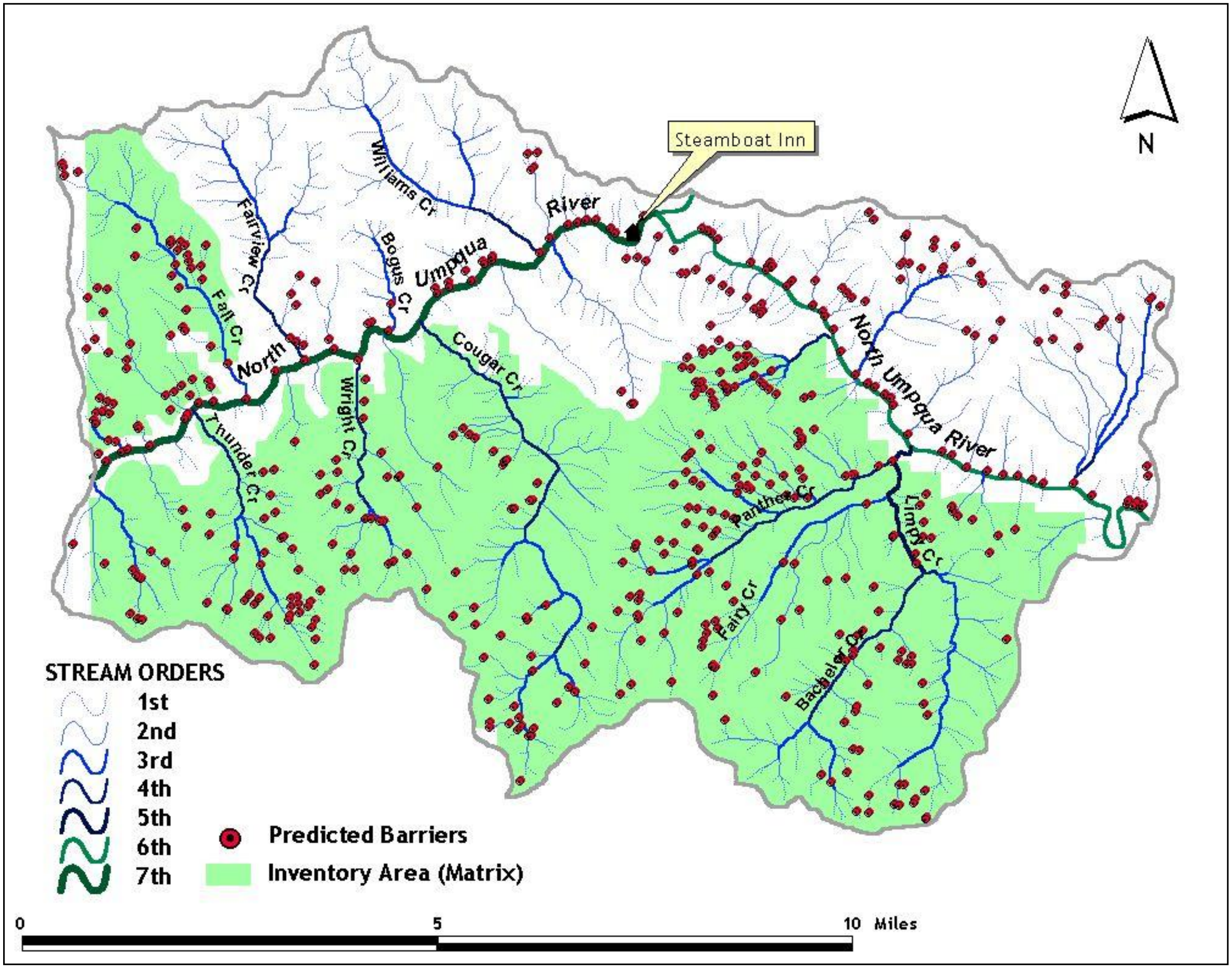

Figure 43. Predicted stream crossing structures, which act as barriers to aquatic and riparian species, within the analysis area. The shaded area represents the area being inventoried in 2000 and 2001 (Matrix land allocation).

TERRESTRIAL CONNECTIVITY

Maintaining and restoring connectivity of late-successional forests within and between watersheds is an emphasis of the Northwest Forest Plan (ROD, B-11). The gentle/moist landscape features within the watershed are referred to as late-successional refugia (not to be confused with Late-Successional Reserves). These landscape features are ecologically suited for development and maintenance of late-successional forests through time. A relatively stable landscape feature, refugia have a disturbance regime that differs from the surrounding landscape (Camp 1995). It tends to have a low occurrence of high-severity fire, but does burn from time to time. Soils are moist and productive, helping to develop old forest structure and long-term stable areas of interior forest habitat. There is a strong relationship between refugia and Riparian Reserves, as refugia contains high densities of streams and wetlands.

Refugia represents the strongest connection between the aquatic and terrestrial ecosystems within a watershed, and provides important long-term maintenance of ecosystem function and biodiversity. Approximately 35% of the analysis area is capable of developing late-successional refugia. Of this, approximately 56% was forested with late-successional habitat during the reference period. Today, that amount has been reduced by approximately 19% (Fig. 44).

Another method used to assess terrestrial connectivity (both within the watershed and between watersheds) analyzed the spatial quality of habitat for late-successional wildlife species with large home ranges (e.g., 500+ acres). Basically, this analysis looked at the amount of late-successional forest habitat that occurred within a 0.5 mile radius circle (Fig. 45). Many late-successional species select nesting sites, travel corridors and establish territories in areas with high levels of contiguous habitat. Habitat quality was based on the amount of habitat within the circle. The higher the amount, the better the quality of the habitat and the higher the probability of use by certain late-successional species (Swindle et al. 1999).

As a result of intensive forest management over the last five decades, a large decrease in the “excellent” quality habitat has occurred (Fig. 45). Re-establishing these “blocks” of habitat or landscape patterns more similar to historic patterns addresses the need to shift landscape-scale features toward the range of natural variability to achieve late-successional habitat connectivity objectives (ROD, B-10 & 11). Compensating for the loss of “excellent” habitat, a strong network of “good” quality habitat, which serves as corridors between patches of the best habitat, remains well distributed within the analysis area. Barriers to movement between patches are roads (see Road Densities in Chapter 5), harvest units, and microclimate changes caused by edge effects.

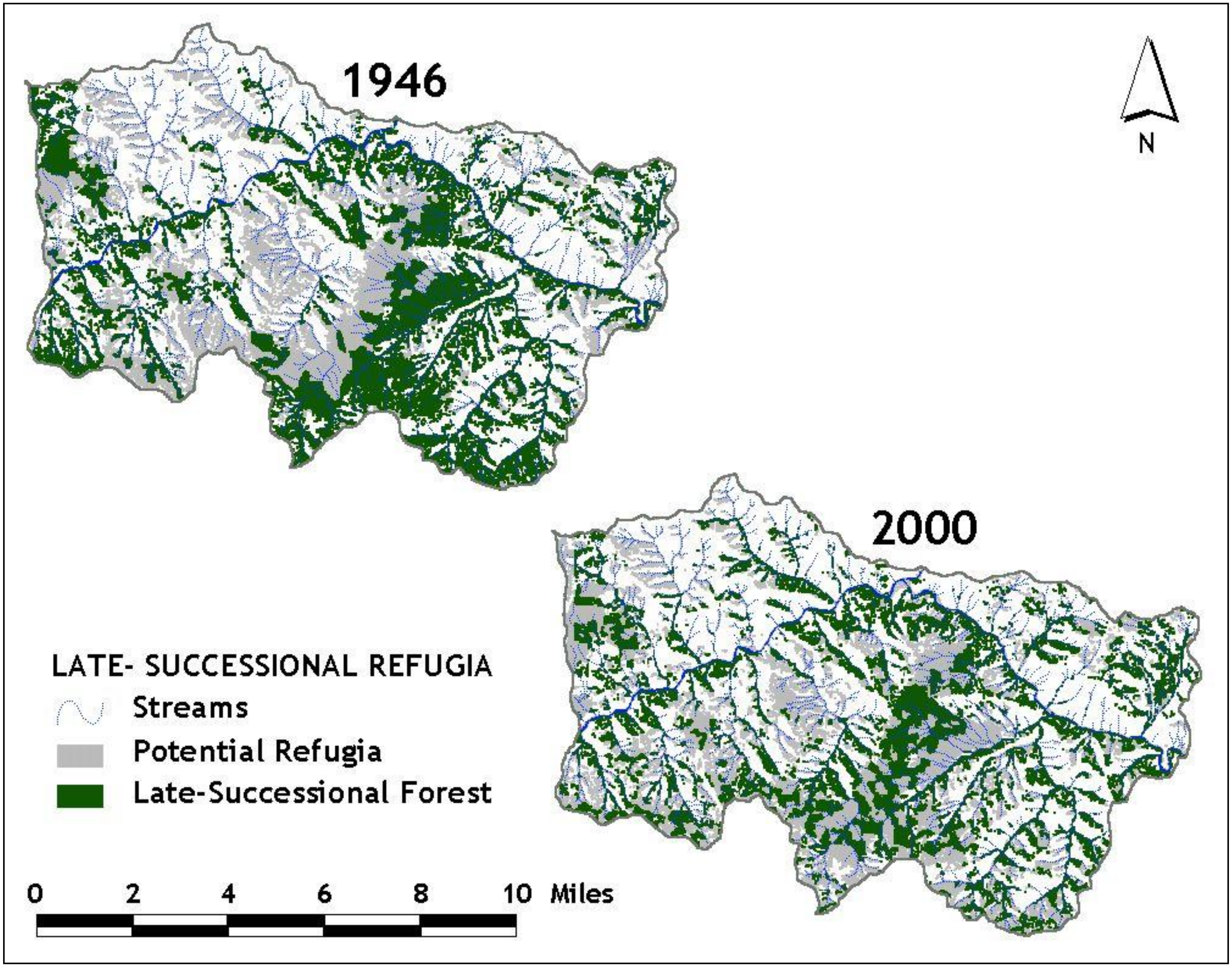

Figure 44. Past and present conditions of the late-successional refugia network within the analysis area.

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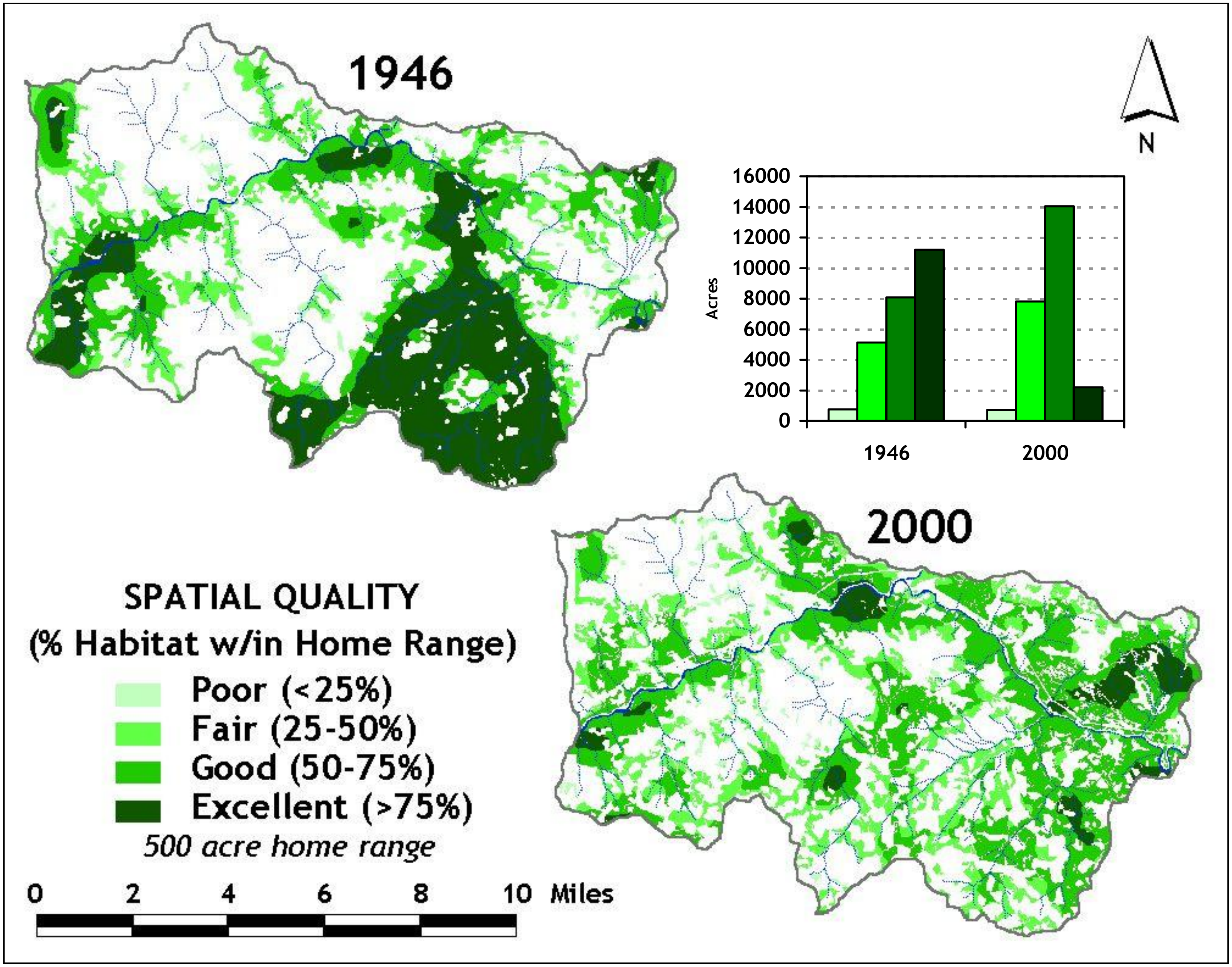

Figure 45. Changes in late-successional connectivity as a function of spatial quality.

FISH WITHIN THE WATERSHED

Five anadromous and numerous non-anadromous fish species occur within the analysis area. The anadromous fish are chinook salmon, steelhead, coastal cutthroat trout, coho salmon, and Pacific lamprey. The analysis area contains 42 miles of fish-bearing stream (Fig. 47). This is approximately 12% of the total stream miles - predominantly 3rd order or larger streams.

CUTTHROAT TROUT

Cutthroat trout inhabit all 42 miles of the fish-bearing streams within the analysis area. This includes the sea-run (anadromous), river-migrating (potamodromous), and nonmigratory (resident) cutthroat. Earlier this century, sea-run cutthroat occasionally supported intensive sport fisheries in the Umpqua River basin, although the species was never targeted by a commercial fishery (USDA Forest Service et al. 1992). Winchester Dam fish ladder counts show that sea-run cutthroat numbers declined precipitously in the late 1950s. From 1946 to 1956, the count averaged 950 fish, but dropped to an average of 90 in the years from 1957 to 1960. Since 1976, wild sea-run cutthroat returns have declined to an average of about 60 fish. From 1991 to 1994 the returns over Winchester were 10, 0, 29, and 1 respectively. A total of 159 sea run cutthroat returned during the 1998-1999 season--the largest return in the last 20 years.

COHO SALMON

Coho salmon in the Umpqua basin are listed as “threatened” under the federal Endangered Species Act (ESA), as part of the larger Oregon Coastal coho salmon species. The analysis area contains approximately 19 miles of habitat for this fish, including the river and the lower reaches of Williams and Panther/Limpy Creeks. Of these tributaries, Williams Creek currently shows the highest amount of use and supports a substantial amount of coho salmon spawning. Surveys conducted from 1992 to 1999, have shown that number of coho spawners using Williams Creek fluctuate widely on an annual basis. In 1992 and 1999, forty-six and forty-two redds, respectively, were observed in Williams Creek, while in 1994 only one coho redd was seen. Many of the coho observed in Williams Creek during spawning ground surveys are hatchery fish and are believed to be strays from the Rock Creek Hatchery, located 15 miles downriver.

Figure 46. Female coho salmon digging a spawning nest in Williams Creek, 1999.

Coho salmon were once the most abundant anadromous salmonid in Oregon's coastal waterways, likely approaching one million returning adults in exceptional years. Coastal coho populations started to decline in the early 1900s, as a result of overharvesting by the commericial fisheries industry (Cobb 1930, as cited in Gharrett and Hodges 1950). In 1924, an estimated 250,000 coho were harvested at the mouth of the Umpqua River. Sharp declines on the Umpqua began around the 1930s (Kostow 1995). Based on Winchester Dam fish ladder counts beginning in 1946, coho escapements experienced a decline from an average of 1,800 fish between 1946 and 1956, to an average of 400 between 1970 and 1980. This 10-year period represented a period of high commercial and sport harvest, extensive timber harvesting and road building in the North Umpqua River basin, and the beginning of a cycle of declining ocean productivity. Coho escapements into the North Umpqua River appear to have partially rebounded since then, averaging 1,080 fish from 1981 to 1997 (ODFW 1998). This apparent increase may reflect reduced ocean harvest, hatchery supplementation and increased natural production from native or introduced stocks, or both. This increase in escapement coincides with a relatively large hatchery program that used a non-indigenous stock, from out of the river basin. Limited genetic analysis of "wild" coho has revealed no significant differences from the original donor stock, indicating a substantial amount of interbreeding of hatchery stock with native coho. This has potentially resulted in a loss of genetic fitness, producing fish not as well adapted to conditions in the Umpqua as the original wild stock. The loss of genetic fitness combined with continued impacts from land uses may preclude any appreciable recovery of the native run, irrespective of any improvements in freshwater habitat conditions (North Umpqua River Analysis 1999).

CHINOOK SALMON

There are approximately 18 miles of habitat within the analysis area for chinook salmon. Fall chinook spawning occurs in the lower reaches of the North Umpqua River during October and November and few if any make it into the analysis area. However, Spring chinook are present in the analysis area year round. Normally, adults return to the river in March and migrate to deep, summer holding pools until September when spawning begins, usually just prior to the onset of fall rains. Spawning continues throughout the month of October. The highest spawning densities are found along the river between Boulder and Calf Creeks, although spawning occurs throughout the middle and upper mainstem. Redd surveys conducted on the North Umpqua have found that most redds are built in pool tailouts, glides, side channels or in the lateral margins of riffles.

Juveniles typically occur in low gradient reaches of the mainstem and densities in pools have been found to increase with increasing amounts of cover (e.g., banks, over hanging vegetation, larger substrates, or large woody debris). Water temperatures in the river from Soda Springs to Steamboat Creek remain in the range preferred by juveniles during the Summer, which may partially explain why North Umpqua River Chinook have longer freshwater rearing periods than most other Oregon coastal basins. Overwintering juveniles typically enter interstitial habitat within cobble-boulder substrates at temperatures below 7°C. Some juvenile chinook may overwinter in deep pools with large wood and/or along river margins.

The Umpqua River basin once supported large commercial fisheries for chinook.   By the 1940s, spring chinook runs had declined to levels, which were too small to support a commercial fishery in the Umpqua River (FCO and OSGC 1946). Wild spring chinook population sizes in the North Umpqua River have generally remained at these levels since 1946 and have shown no clear increasing or decreasing trends in abundance. Escapements have averaged about 5,400 fish over the past 50 years and 5,200 over the past 15 years (ODFW 1998).

STEELHEAD TROUT

Steelhead trout are currently the most abundant anadromous salmonid within the middle and upper portions of the North Umpqua River basin. Both summer and winter steelhead use the approximate 28.4 miles of habitat within the analysis area for spawning, rearing, and as a migration route.

Summer steelhead begin entering the river in May and continue migrating and holding within the mainstem well into December. The majority of the summer steelhead run is believed to spawn within the Steamboat Creek basin. Although poorly documented, the mainstem North Umpqua River and some of the larger tributaries are also used for spawning as well. Winter steelhead use the same spawning streams as the Summer fish, but a larger percentage of the winter run is believed to use the mainstem river. Summer steelhead begin spawning in January and continue through March, while winter fish spawn from April to June. It is reasonable to expect that some overlap occurs.

Within the mainstem river, steelhead eggs and/or alevins (developing embryos) may be present within the gravel from January until mid-July. After emergence, juveniles take up residence within pools and lateral channel margins. As they grow, they move into deeper and faster habitats and increasingly use areas with cover. During the summer, juveniles appear to prefer habitats with rocky substrates, overhead cover (such as that provided by large wood or over-hanging vegetation) and low light intensities (Stillwater Sciences 1998). Steelhead overwinter in pools, especially low-velocity, deep pools, including backwaters, with large rocky substrate or woody debris for cover.

Approximately 70% of juveniles hatched within the tributaries display an uncommon life history known as "partial rearing" (Harkleroad and La Marr 1993, Dambacher 1991). These juveniles leave their natal stream in favor of the mainstem river for continued freshwater residence. Studies have shown that North Umpqua steelhead exhibiting a partial rearing life history emigrate as larger smolts than individuals which remain in natal tributaries, thus increasing their opportunity for survival (Stillwater Sciences 1998). This suggests that the mainstem North Umpqua River plays an inordinantly important role in providing rearing habitat for juvenile steelhead produced within the basin. After two to three years of freshwater residence, juvenile steelhead outmigrate during the spring.

Large steelhead harvests from 1926 to 1928 were followed by smaller harvests and a sharp decline in abundance in 1933 (FCO and OSGC 1946). This population decline of Umpqua River summer steelhead prompted curtailment of the commercial steelhead fishery. Populations of wild steelhead appear to have remained stable over the last 50 years. The summer run of wild steelhead averaged about 4,100 fish from 1983 to 1997, an increase over the 52-year average of 3,400 fish from 1946 to 1997. The winter run of steelhead, which consists entirely of wild fish, has averaged about 7,000 fish since 1946 and 6,300 from 1983 to 1997 (ODFW 1998).

OTHER FISH SPECIES

A variety of other "game" and "non-game" fish are also known to occur within the analysis area. These include the native resident rainbow trout, a fish that exists in relatively low numbers throughout the river and are some times seen following steelhead on spawning runs. Non-native salmonids which have been documented nearby include brown trout and brook trout. Both of these introduced species emigrated from lakes where they were stocked for recreation and established stream-dwelling populations. Native non-game fish which are present or can be expected to occur include Pacific lamprey, brook lamprey, large-scale sucker, long-nose dace, Umpqua dace, speckled dace, and a variety of sculpin species.

Pacific lamprey was designated as "sensitive - vulnerable" by ODFW following annual stock status review meetings in 1993. The basis for this designation is a widespread perception that abundance has decreased markedly over the last several decades. Counts at Winchester Dam show a clear declining trend from a high of 46,780 in 1966 to a low of 15 in 1997, with consistently low counts in recent years and an average escapement of 210 from 1993 to 1997.

Likely threats or causes for lamprey declines include habitat destruction in spawning and rearing areas. Spawning habitat is similar to salmonids including cool, flowing water and clean gravel, while rearing areas are slow-moving backwaters with fine sediment. Larvae spend several years in fresh water before transforming and migrating to the ocean. Introduction of predacious smallmouth bass may play a role in population declines along the North Umpqua River. Also a reduction in adult prey is a possible contributing factor to abundance declines, but this has not been confirmed.

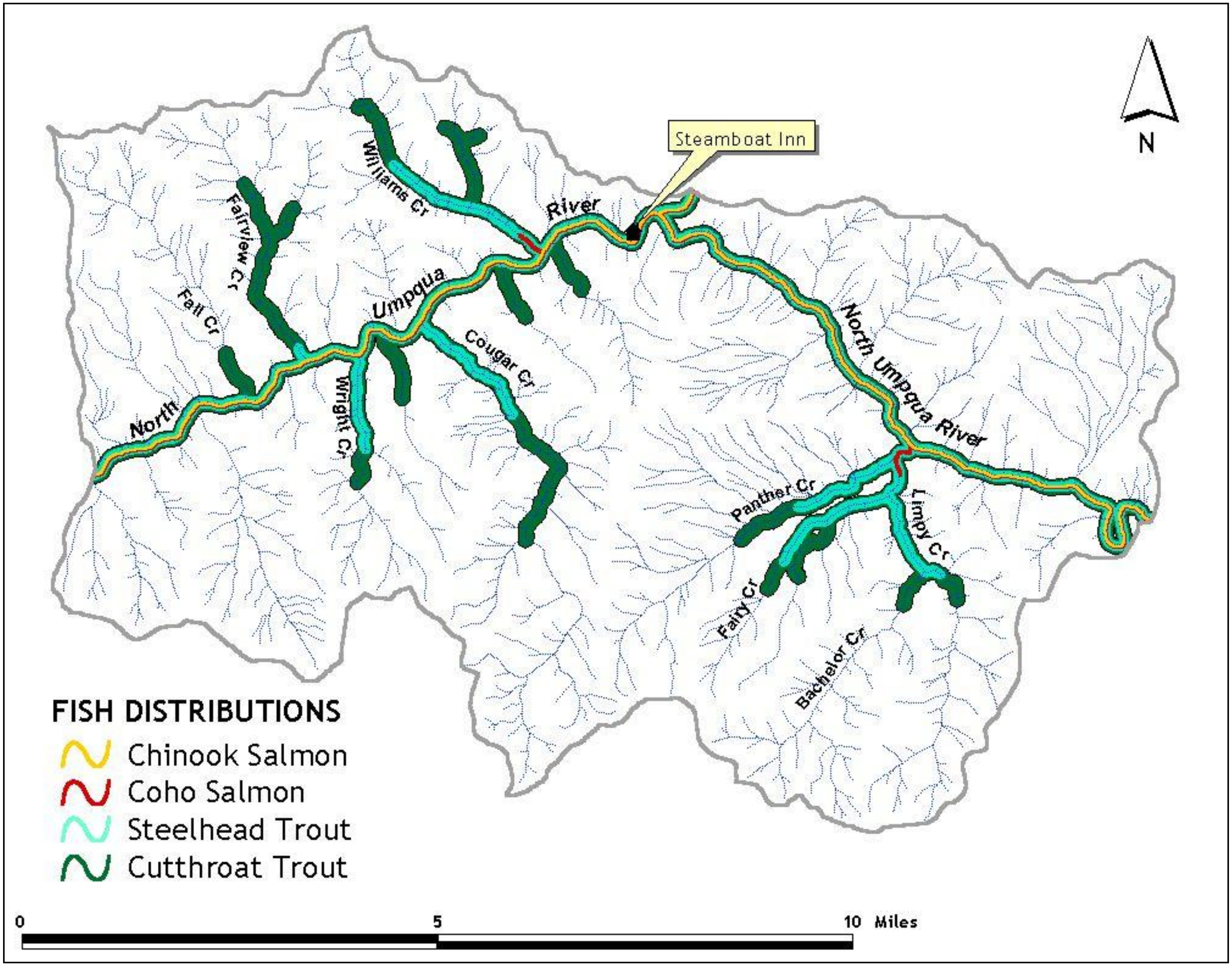

Figure 47. Salmonid fish distributions within the analysis area.

Wildlife within the Watershed

There are approximately 237 vertebrate species, which occur within the watershed (Fig. 48). For this analysis they are grouped into five categories based on the type of habitat that they need for their survival (Table 12).

Table 12. Terrestrial wildlife habitat and examples of wildlife species that depend on them.

HABITAT	AGE	WILDLIFE SPECIES
Grass/Forb	0-5	Roosevelt Elk, Black-Tail Deer, Western Fence Lizard, California Mtn. Kingsnake
Brush/Forb	6-10	Bushtit, Dark-Eyed Junco, Fox Sparrow, Mountain Quail
Sapling/Pole	11-30	Hutton's Vireo, Black-Throated Gray Warbler, Mountain Beaver
Young Conifer	31-80	Blue Grouse, Band-Tailed Pigeon, Porcupine
Mature Conifer	80+	Spotted Owl, Brown Creeper, Pileated Woodpecker, Red Tree Vole, Douglas Squirrel

As discussed previously, habitat is constantly changing with forest growth (succession) and disturbances. Based on current conditions and assuming passive management and no disturbances, which set back forest stands, wildlife habitat changes as shown in Figure 49.

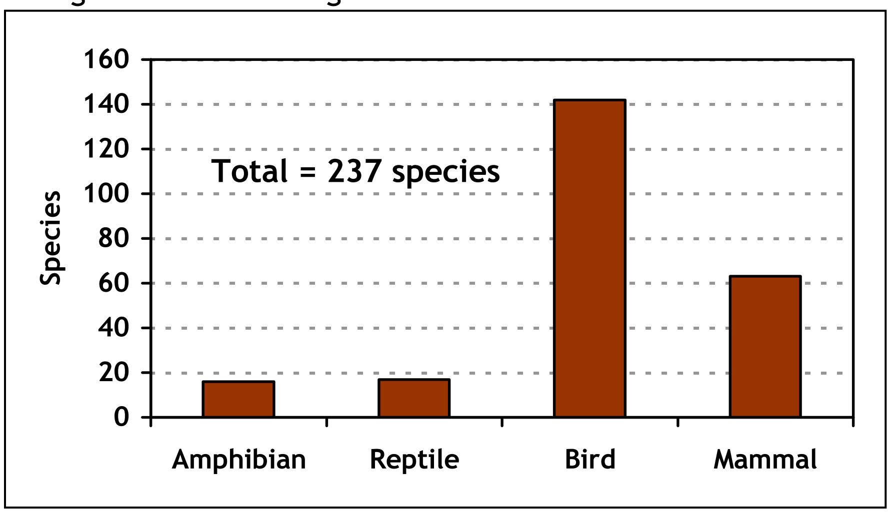

Figure 48. Terrestrial vertebrate diversity within the watershed.

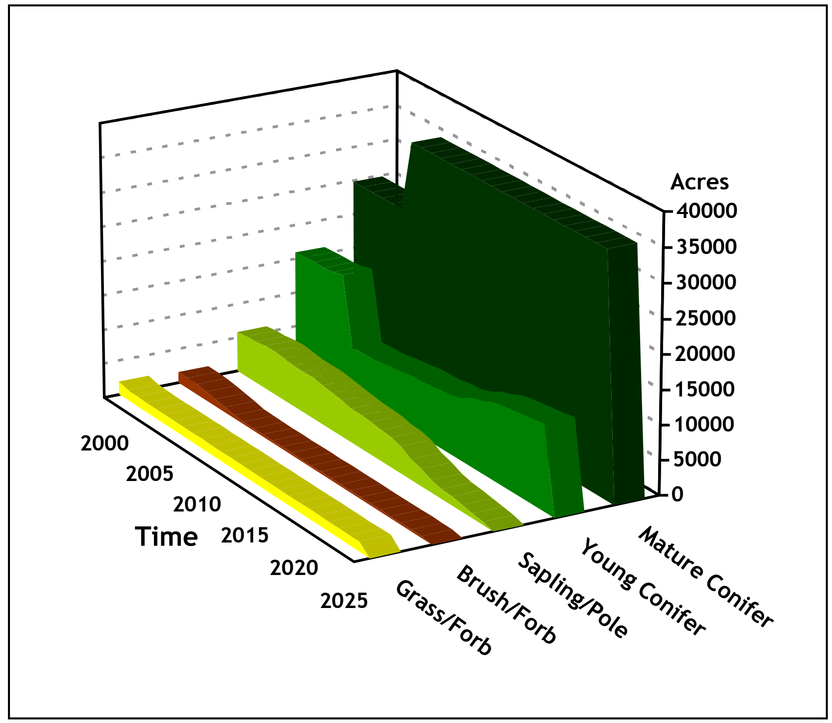

Figure 49. Terrestrial habitat trends over the next 25 years, showing a gradual decrease of grass and brush/forb habitat over the next 10 years and and increase in mature conifer.

As seen in Figure 49, early-successional habitats like grass/forb and brush/forb will become greatly diminished within the next decade. What little that exists will be provided by natural meadow habitat (1,378 acres), agricultural fields (47 acres) and the power line corridor (312 acres).

BIG GAME

Big game residing in the analysis area include Roosevelt elk, Columbian black-tailed deer, black bear and mountain lion. All are native to the watershed. Although elk are now firmly established in Oregon, they were almost extirpated in the late 1800s due to market hunting for meat, teeth, and antlers. Numbers were so low that all hunting was prohibited from 1908-1932. In 1910, Forest Service officials reported Roosevelt elk as "formerly abundant" on the Umpqua National Forest. By the mid-1920s, herd numbers were reported as increasing but statewide populations were still estimated at below 1,000 head. Hunting was resumed in 1933. Translocations, hunting regulations and ample forage resulting from decades of clearcut timber harvesting, forage seeding and fertilization have resulted in the re-establishment of large herds of Roosevelt elk within the watershed.

Elk require a mosaic of early-successional, forage-producing stages and mid to late-successional stages for hiding and thermal cover. Quality, quantity, and arrangement of these habitat components determine elk distributions. Harassment, due to human activities, also has a large affect on elk habitat utilization. In western Oregon, Roosevelt elk utilize clearcuts heavily, as well as fertilized pastures and meadows. During summer, elk use damp sites, which offer nutritious forage, and moist, cool places for escaping summer heat and insects. In the winter, depending on the severity of snowfall, elk will utilize the lower elevations with southern aspects as well as closed-canopy forests for thermo-regulation. Elk tend to become more of a browser of shrubs and lichens in winter, but their survival is primarily dependent on fat stores developed during the summer and fall. Good summer forage is at least as important as adequate winter food for over-winter survival. Elk breeding behavior involves a complex social system, which revolves around mature bulls gathering harems. This process may be altered if bull:cow ratios become skewed. Studies on Roosevelt elk in western Oregon indicate that fewer than 10 older bulls/100 cows during the breeding season can cause delays in conception, affect conception rates, and may reduce calf survival. For this reason, the Oregon Fish & Wildlife Commission adopted a minimum statewide post-season ratio of 10 bulls per 100 cows in 1992.

The analysis area is located within the State's Dixon and South Indigo Big Game Hunting Units, with Indigo being on the north side of the river and Dixon on the south side. Over the last 3 years, bull:cow ratios in these units have averaged 11 bulls:100 cows. Over the last 2 years, annual census surveys indicate an increase of elk in both units, but elk densities were slightly below the State's benchmark in the Dixon Unit.

Columbian black-tailed deer are a common big game species of the Western Cascades and the analysis area. In western Oregon, black-tailed deer are usually found in brushy areas at the edges of forests, not in dense forests. Early-successional habitat such as clearcuts or recent stand-replacement burns, with their characteristic grasses, forbs, and shrubs, are conducive to healthy deer populations. Within the analysis area deer populations characterized as "fair" by the Oregon Department of Fish and Wildlife (ODFW). In the last 2 years, there has been an decrease of deer densities (from annual survey routes) within the Dixon Unit from 4.5 to 3.0 deer/mile, and 2.3 to 1.1 deer/mile in the South Indigo Unit. The State's benchmark for these units is 3.0 deer/mile. There are currently 70 adult deer with radio collars (50 does and 20 bucks) in the North Umpqua drainage and 40 more with just ear tags, as part of an ODFW long-term study on black-tailed deer populations in the south Cascades.

Black bears are a habitat "generalist", using many different habitat types. They do, however, require large-diameter hollow trees or logs for denning and hibernation. These habitat structures usually occur only in old forest habitats. Bear populations in this area are considered healthy by ODFW, and increasing with the highest numbers at low to moderate elevations. In 1999, a total of 88 bears were harvested in the South Indigo and Dixon Units, accounting for 39% of the total harvest for that year in the Oregon Cascades.

Mountain lions populations are considered to be increasing. A study of lion populations in this area indicates that mountain lions occur at a density of approximately one lion per nine square miles (D. Jackson, personal comm.). Annual harvest levels for lions has decreased by approximately 75% since 1994, after the use of hunting dogs was banned. In 1999, four cougar were harvested in the South Indigo and Dixon Hunting Units.

THREATENED, ENDANGERED AND SENSITIVE SPECIES

There are 21 wildlife species listed as threatened, endangered or sensitive by the Federal and/or State Government, and/or the Regional Forester, known to occur within the analysis area (Table 13). Another 11 species are suspected of occurring. There are 18 known spotted owl activity centers within the analysis area (16 pairs and 2 resident singles). Of these, 10 occur within the Matrix land allocation (approximately 9% of the spotted owl population on the North Umpqua Ranger District). An analysis of the habitat utilization of this species, within the analysis area, shows that 89% of the sites occur within old forest habitat. The remaining 11% occur within understory reinitiation stands with remnant old growth trees. Approximately 94% of the sites occur within interior forest patches as described earlier in this chapter. The majority of the other listed species are associated with late-successional forest habitats.

Table 13. Threatened, Endangered and Sensitive wildlife species known or suspected to occur within the analysis area. (T = Threatened, E = Endangered, V = Vulnerable, C = Critical, S = Sensitive, U = Undetermined Status)

CLASS	COMMON NAME	OCCURRENCE	STATUS		
			FEDERAL	STATE	USFS
AMPHIBIAN	Tailed frog	Documented	--	V	--
	Western toad	Suspected	--	V	--
	Red-legged frog	Documented	--	U	S*
	Foothills yellow-legged frog	Documented	--	V	S
	Cascade frog	Documented	--	V	--
	Southern torrent salamander	Documented	--	C	S
	Clouded salamander	Documented	--	U	--
BIRD	Harlequin duck	Documented	--	U	S
	Bald eagle	Documented	T	T	S
	Northern pygmy owl	Documented	--	U	--
	Peregrine falcon	Documented	--	E	S
	Bufflehead	Suspected	--	U	S
	Northern goshawk	Documented	--	C	--
	Pileated woodpecker	Documented	--	V	--
	Purple martin	Suspected	--	C	--
	Western bluebird	Documented	--	V	--
	Northern spotted owl	Documented	T	T	S
	Great gray owl	Documented	--	V	--
MAMMAL	Pacific Shrew	Documented	--	--	S
	Ringtail	Documented	--	U	--
	Townsend's big-eared bat	Documented	--	C	S*
	Pacific Fisher	Suspected	--	C	S
	Wolverine	Suspected	--	T	S
	Pacific Fringe-Tailed Bat	Documented	--	--	S
	Pacific Pallid Bat	Suspected	--	V	S
	Fringed myotis	Suspected	--	V	--
	Canada lynx	Suspected	T	--	S
	Marten	Documented	--	V	--
REPTILE	Western Pond Turtle	Suspected	--	C	S
	Sharptail snake	Suspected	--	V	--
	Common kingsnake	Suspected	--	V	S
	California mountain kingsnake	Documented	--	V	S*

* Recently removed from the Regional Forester's Sensitive Species List (11/28/00).

All of these species are impacted by human activities such as timber harvesting and other ground disturbing activities. Pre-ground disturbance analysis and surveys are required and, if found, protection measures range from seasonal restrictions to small no-activity buffers. Spotted owls nest sites (know prior to 1994) are provided a 100-acre buffer under the Northwest Forest Plan (ROD, C-10), known as an “Unmapped Late-Successional Reserve”.

SURVEY & MANAGE AND PROTECTION & BUFFER SPECIES

The Forest Plan requires protection of certain late-successional wildlife species, which may not be fully protected by other standards and guidelines, when they occur outside of LSR's or Riparian Reserves. There are six survey and manage (S&M) or protect and buffer (P&B) wildlife species known or suspected of occurring in the analysis area (Table 14). Currently, management of known sites and surveys are required prior to ground-disturbing activities (standard and guideline components 1 & 2, respectively). The Forest Service and Bureau of Land Management propose amending the Northwest Forest Plan S&M species mitigation measures by redefining S&M categories based on new information and species characteristics (USDA/USDI 2000).

Table 14. Survey and Manage and Protect and Buffer wildlife species known or suspected to occur within the analysis area.

CLASS	NAME	OCCURRENCE	FOREST PLAN STANDARD & GUIDELINE	
			CURRENT S&G	PROPOSED S&G
MOLLUSK	Prophysaon coeruleum	Documented	1,2	OFF
	Prophysaon dubium	Documented	1,2	OFF
	Megomphix hemphilli	Documented	1,2	1F
	Pristiloma arcticum crateris	Suspected	1,2	1B
MAMMAL	Red Tree Vole	Documented	2	1C
BIRD	Great Gray Owl	Documented	P&B	1C

1B = Pre-disturbance surveys not practical. Manage all known sites, minimize inadvertent loss of undiscovered sites. Conduct strategic surveys.
1C = Pre-disturbance surveys are practical. Until high-priority sites can be determined, all known sites are managed. Conduct strategic surveys.
1F = Status is undetermined. The objective is to determine if the species meets the basic criteria for Survey and Manage. Conduct strategic surveys.

LANDBIRDS

Continental and local declines in numerous bird populations have lead to concerns for the future of migratory and resident landbirds. In the coniferous forests of western Oregon and Washington, 27 landbird species have demonstrated significant recent (1980-1996) and/or long-term (1966-1996) declines (Breeding Bird Survey data). Eight of these species occur in the analysis area (Table 15).

Table 15. Landbirds within the analysis area with significantly declining population trends in the region.

Common Name	Significant Population Declines		Focal* Species
	Recent	Long-Term	
Vaux's swift	X		X
Rufous hummingbird	X	X	X
Olive-sided flycatcher	X	X	X
Western wood-pewee		X	
Brown creeper		X	X
Golden-crowned kinglet	X		
Varied thrush	X		X
Fox sparrow	X		

* Not a complete list of focal species found in the analysis area.

The Landbird Strategic Plan (USDA 2000) and the Partners in Flight Conservation Program (PIF 2000) recommend maintenance and restoration of forest habitats necessary to sustain long-term, healthy bird populations. The conservation plan is a combination of a landscape management plan, which is focused on 28 bird species. These "focal" bird species represent a range of habitats from stand initiation to old forest. The conservation plan provides recommendations for forest management at both the stand and landscape-scale, which restore and maintain key habitat attributes (e.g., snags) and ecosystem functions, such as landscape patterns, which more closely resemble natural conditions in which bird species evolved. As a result, it is believed that a wider group of bird species with similar habitat requirements will benefit.

BOTANICAL RESOURCES WITHIN THE WATERSHED

Botanical concerns in the analysis area are centered on the viability and distribution of native plant and fungi species. This includes vascular plants, mosses, liverworts, lichens and all types of fungi. The Middle North Umpqua Watershed contains diverse habitats and a wide variety of plant and fungi species. European influence brought the introduction of numerous species not native to the area. Many of these have been highly successful in establishing themselves.

Until recently, efforts to document the diversity of the area have mainly focused on vascular plant species. Since 1990, project areas such as timber sales have been surveyed for species of concern prior to undertaking ground disturbing activities. Since 1992, species lists have been recorded and kept on file at the District offices. The staff of the Douglas County Museum Herbarium has been exploring the area on a limited basis for many years. They have compiled lists of species at seven sites within the analysis area. During 1975 and 1977, local citizen volunteers performed an extensive review of the Limpy Rock Research Natural Area. Numerous plots were established and inventoried. Based on these lists it is reasonable to expect some several hundred vascular plant species to occur within the analysis area.

THREATENED, ENDANGERED AND SENSITIVE SPECIES

Threatened, Endangered and Sensitive (TES) species are so defined because of the small number of individuals scattered across the known habitat and range of the species, the very small or isolated habitat and range or a species with a high risk of loosing reproductive viability. The reference condition of these species is presumed to have been a state in which stable populations were spread across available habitat.

No Threatened or Endangered plant or fungi species are known or suspected to occur on the Umpqua National Forest. There are 21 sensitive species known or suspected to occur within the analysis area (Table 16). Umpqua

Table 16. Sensitive plant species known or suspected to occur in the analysis area.

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE
Adder’s Tongue	*Ophioglossum pusilum* Raf.	Suspected
Wayside Aster	*Aster vialis* (Brads.) Blake	Suspected
Tall Bugbane	*Cimicifuga elata* Nutt.	Suspected
False Caraway	*Perideridia erythrorhiza* (Piperi) Chuang & Constance	Suspected
California Shield Fern	*Polystichum californicum* (D.C. Eat.) Diels	Documented
Coffee Fern	*Pellaea andromedaefolia* (Kaulf.) Fee	Suspected
Siskiyou Fritillary	*Fritillaria glauca* Greene	Documented
California Globe-Mallow	*Iliamna latibracteata* Wiggins	Suspected
Spleenwort Grass-Fern	*Asplenium septentrionale* (L.) Hoffman	Documented
Dwarf Isopyrum	*Isopyrum stipitatum* (Gray) Crumm. & Hutchinson	Suspected
Umpqua Kalmiopsis	*Kalmiopsis fragrans* Meinke & Kaye sp. nov.	Documented
Clustered Lady’s Slipper	*Cypripedium fasciculatum* Kellogg ex S. Wats.	Documented
Columbia Lewisia	*Lewisia columbiana* (How.) Fobins. var. columbiana	Suspected
Lee’s Lewisia	*Lewisia leana* (Porter) Robins.	Suspected
Thompson’s Mistmaiden	*Romanzoffia thompsonii* Marttala	Documented
Howell’s Montia	*Montia howellii* S. Wats.	Suspected
Mingan Moonwort	*Botrychium minganensi* Vict.	Suspected
Crawford's Sedge	*Carex crawfordii* Fern.	Suspected
Sawtoothed Sedge	*Carex serratodens* W. Boott	Suspected
Columbia Water-Meal	*Wolffia columbiana* Karst.	Suspected
Northern Water-Meal	*Wolffia borealis* (Englem.) Landolt	Suspected

Kalmiopsis occurs on numerous sites within a large population that is the main concentration of these species. Five other sensitive species occur on 18 sites scattered throughout the analysis area.

SURVEY & MANAGE SPECIES

The Northwest Forest Plan requires protection of several plants and fungi that may not be protected by other Standards and Guidelines. These plants include lichens, mosses, liverworts and vascular plants, which are suspected to be dependent upon late-successional forest habitat (Fig. 50). They are considered "at-risk" because of the extensive loss and fragmentation of their habitat across the region, their apparent rarity, and their importance to ecosystem functions (e.g., nitrogen-fixing lichen). Approximately 500 acres of the analysis area have been surveyed to date. Incidental finds combined with survey results have identified 31 survey and manage species occurring within the analysis area (see Botanical Appendix for a species list).

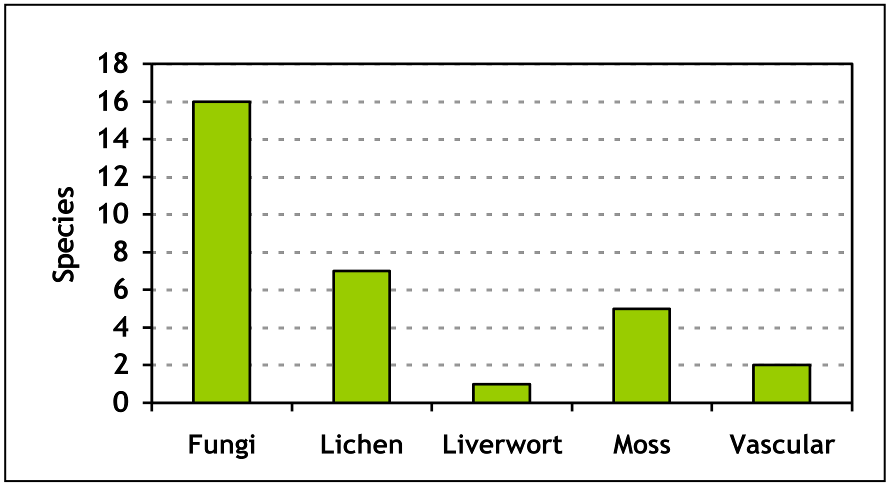

Figure 50. Diversity of survey and manage fungi and plants found within the analysis area.

NON-NATIVE SPECIES

The introduction of non-native species has been occurring at a rapid rate in North America since Europeans arrived on the continent. Some were purposely brought by early settlers as crops and ornamentals. Others arrived as "tag-alongs" with animals and belongings. Many of the species they brought were adapted to take advantage of disturbance. As these plants left their natural controlling pathogens and predators behind, there was little to stop them from spreading into their new environments. This has been exacerbated by land management activities such as road construction and timber harvesting which provide corridors for dispersal and new habitats. In many cases, non-native species out compete native plants and quickly established themselves, displacing native plants and the organisms that depend on them. They continue to thrive as long as ground disturbing activities continue. The exact extent of the presence of such species in the watershed is not known.

NOXIOUS SPECIES

The Oregon State Department of Agriculture (ODA) defines these plants as "injurious to public health, agriculture, recreation, wildlife, or any public or private property". The State Weed Board, in conjunction with ODA, determines which species will legally be considered “noxious” in the state. Each designation carries with it an eradication plan, which may involve the local, county, or state level (see the Botanical Appendix for more detail on these species).

Noxious weeds are spreading rapidly. Even with repeated treatment of known sites, occurrences are expected to increase due to the movement of seed into the area from outside sources, seed production from already established sites, and from seed production on adjacent private land. Noxious weed species that are known to occur in the watershed are listed in Table 17. All except English ivy and Portuguese broom are considered by agency personnel to be too widely distributed to eradicate.

Table 17. Noxious weeds known to occur in the analysis area.

COMMON NAME	SCIENTIFIC NAME	EXTENT OF INFESTATION	CURRENT TREATMENT	MANAGEMENT GOAL
Field Bindweed	*Convolvulus arvensis*	1 site, <50 acres	None	Minimize spread
Himalayan Blackberry	*Rubus discolor*	Scattered small sites	None	Minimize spread
Portuguese Broom	*Cytisus striatus*	1 site, <0.5 acres	Hand pull	Containment
Scotch Broom	*Cytisus scoparius*	Numerous scattered sites	Insects, hand prune or pull	Minimize spread
Giant Horsetail	*Equisetum telmatia*	Common	Native species, no treatment	None
Western Horsetail	*Equisetum arvense*	Common	Native species, no treatment	None
English Ivy,	*Hedera helix*	3 sites, <5 acres	Hand pull	Containment
Meadow Knapweed	*Centaurea jacea x nigra*	Extensive	None	Minimize spread
Tansy Ragwort	*Senecio jacobaea*	Scattered sites	Insects	Minimize spread
St. Johns Wort	*Hypericum perforatum*	Extensive	Insects	Minimize spread
Bull Thistle	*Cirsium vulgare*	Uncommon, scattered sites	None	Minimize spread
Canada Thistle	*Cirsium arvense*	Uncommon, scattered sites	None	Minimize spread

Of the species listed, English ivy, Scotch broom, Portuguese broom and meadow knapweed are of particular concern. Each of these species has the ability to change patterns of succession. English Ivy is limited to a handful of tenacious sites within the river corridor. The Forest Service used meadow knapweed in the early 1960's, for roadside erosion control. It is an aggressive colonizer that has become so widespread that eradication of the population is unlikely. Scotch broom is being treated both mechanically and with biological control insects. Inventory efforts are being used to identify, protect and restore uninfested or lightly infested areas, such as along the Panther Creek Road (FS-4714). Portuguese broom is limited to a small site on the Steamboat Compound. Management consists of hand pulling and monitoring of the site. St John's wort apparently was spread during early grazing activities. It is present in nearly every meadow on the Ranger District. It responds very favorably to fire and in some cases may become the dominant species after a fire. To date, approximately 30% of the roads in the analysis area have been surveyed for noxious weeds.

AGGRESSIVE SPECIES

There are many aggressive non-native plant species that compromise the ecology of the area and may threaten native communities besides those listed as "noxious". For the most part, these are pioneer species that occupy disturbed areas in great numbers. In some cases the invasive ability of these plants rivals those listed as noxious, but they are either already so firmly established that eradication efforts have not been effective or their ecological threat has not been recognized. Three species of particular concern are cat's ear daisy (*Hypocharis radiata*), dogtail hedgehog grass (*Cynosurus echinatus*), and ox-eye daisy (*Leucanthemum vulgare*). All of these species are commonly transported along roads. Dogtail hedgehog grass is quite likely the most common grass species in the watershed. It dominates nearly all dry meadows that were grazed in the past and provides stiff competition to recolonization by native species. None of these species are easily eradicated.

Arguments are often made that non-native species will die out over time as the vegetation moves from open clear-cut to forested conditions. To some extent this is true. Pioneer plant populations decline in the shaded conditions that increase as the seral stages progress. However, non-native seed banks remain in the soil and plants continue reproducing and spreading from and to recently disturbed areas. How this disruption of early seral processes affects the long-term viability of native pioneer plants and the species that depend on them is unknown. The extent of the detrimental effect on the composition of later seral herbaceous communities is, for the most part, also unknown.

Non-native plants impact rare plants by causing physical displacement, loss of nutrient availability, changes in environmental parameters (e.g., water, light, and temperature) and through the interruption of crucial relationships with other species. The extent of this type of disturbance to populations of rare plants is not known. Neither the exact nature of the damage to the rare plants resulting from the presence of non-native plant species nor its extent is known in the Middle North Umpqua Watershed. Based on observed situations, it is reasonable to assume the trend has been negative.

Besides the plant species immediately replaced by non-native invasion, the most highly affected species may be insects involved in pollination. Native plants have established relationships with native pollinators. The decrease in plant diversity caused by non-native encroachment can cause displacement or loss of pollinators. Orchids may be particularly at risk, since they often are dependent on a single pollinator.

In addition to affecting pollinators, the replacement of native plants by non-natives affects both the structure and food production provided to wildlife by native plants. These changes are not necessarily negative. For instance, Himalayan blackberry provides extensive habitat and food for certain species. The net loss or gain to wildlife in the analysis area has not been ascertained, but is likely to be negative.

Riparian areas in the watershed are also being impacted by non-native species. One mode of introduction of these plants is the road system within the watershed. Vehicles traveling these roads pick up non-native seed and deposit it along their way. These non-natives establish and produce more seed that is then transported downstream along waterways. The best current example of this action in the watershed is meadow knapweed (*Centaurea pratensis*). The species was planted in the 1960s for erosion control despite its ability to spread rapidly. It now is common along the North Umpqua and tributary streams near the roads it was planted on. It will likely soon become the dominant riparian herb species. It is actively displacing such species as chatterbox orchid (*Epipactis gigantea*), great northern aster (*Aster modestus*) and willows (*Salix spp.*). Meadow knapweed produces an extensive root system that is capable of rapidly occupying and stabilizing sand and gravel bars. Besides limiting habitat for native plant species, it is likely to affect the ecology of the river system.

Both upland and riparian areas are at risk from Scotch broom and Portuguese broom. These species have demonstrated the ability to change patterns of succession. They dominate disturbed sites and form dense thickets that exclude other species from becoming established. They contain highly flammable oils, are very fire prone, and burn intensely. The plants produce copious amounts of seed that can lay dormant in the soil for decades, then sprout quickly after fire, producing a single species brush field that precludes the establishment of other native species.