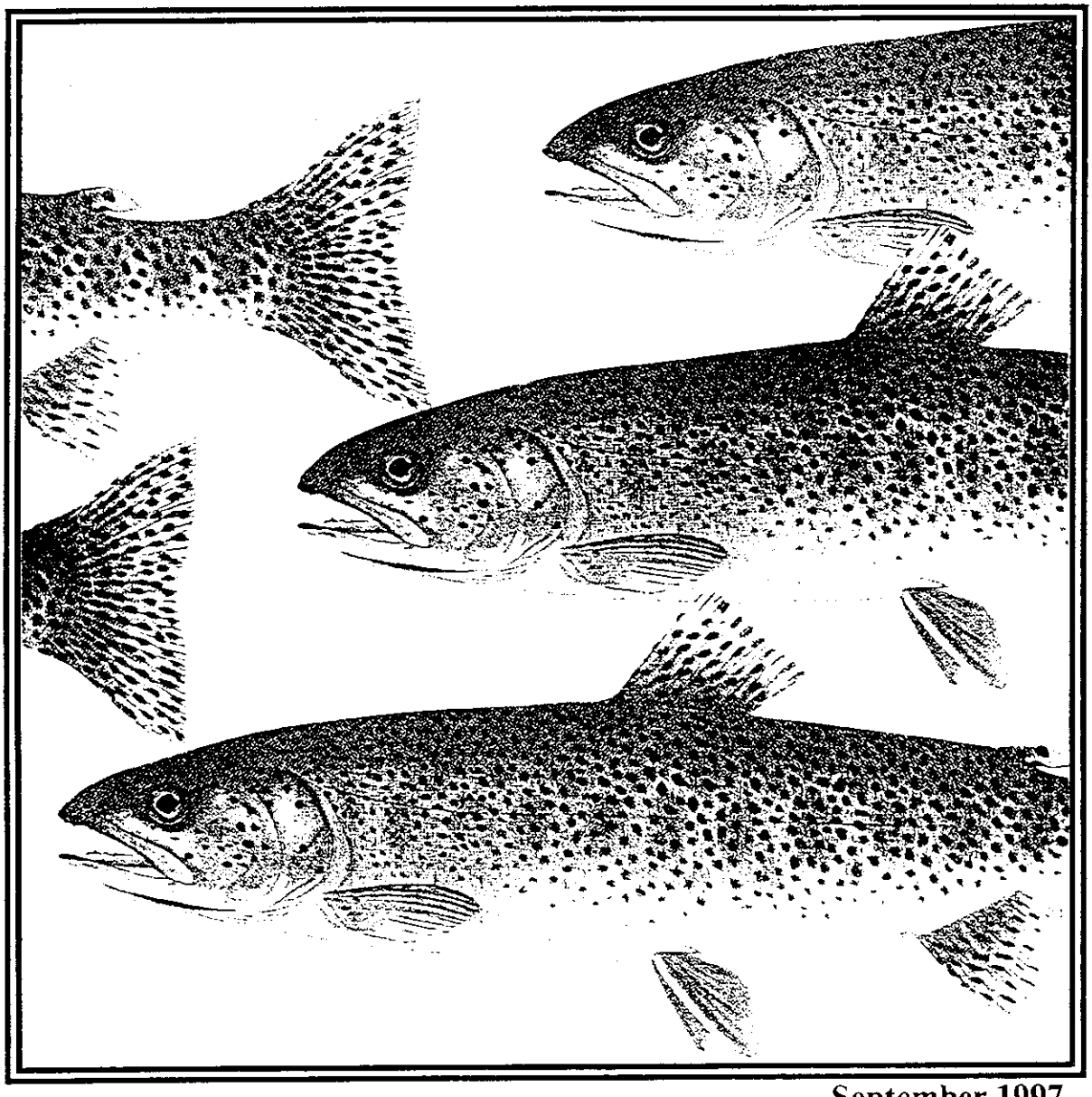
LOWER UMPQUA

WATERSHED ANALYSIS



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This Watershed Analysis Was Prepared By:

CORE TEAM:

Karen Bennett	Team Leader
George Bush	Soil Scientist
Barb Ellis	Geographic Information System Analyst
Michael Clady	Fishery Biologist
Carl Frounfelker	Wildlife Biologist

CONSULTANTS:

Courtney Cloyd	Geologist
Phyllis Steeves	Cultural Resource Specialist
Tom Taylor	Timber Sale Officer
Cal Wettstein	Silviculturist
Larry Johnston	Bureau of Land Management - Coos Bay District
Paul Burns	Fish Biologist - Mapleton Ranger District
Karen Smith	Fish Biologist - BLM

Note On Map Quality:
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CHAPTER I: CHARACTERIZATION

This analysis was conducted by Siuslaw National Forest personnel with assistance from the Bureau of Land Management - Coos Bay District. The analysis was focused on fisheries and wildlife issues. The existing resource conditions were compared to expected natural conditions to assess trends in resource conditions. From this information, a strategy of restoration opportunities to enhance resource conditions on federal lands was developed.

Watershed Analysis is one of the key components of the Aquatic Conservation Strategy (ACS) developed for the Northwest Forest Plan (NFP) (USDA-USDI 1994). The analysis is intended to facilitate watershed planning that:

- achieves Aquatic Conservation Strategy and Late-Successional Reserve objectives
- provides the basis for monitoring and restoration programs

It is important to maintain the context of each watershed analysis to adjacent watersheds as well as to the larger Provincial scale. The Lower Umpqua watershed analysis will utilize information and knowledge gained through several larger scale assessments, including the Assessment Report for Federal Lands in and Adjacent to the Oregon Coast Province (USDA 1995), the South Coast-Northern Klamath Late-Successional Reserve Assessment (R0267 & R0268) (USDI, USDA 1997) and the Oregon Dunes Management Plan Watershed Analysis (USDA undated). Information from the Smith River watershed analysis was also utilized.

This watershed analysis follows the process described in the updated Federal Guide for Watershed Analysis - Ecosystem Analysis at the Watershed Scale (Version 2.2, August 1995). In this document, however, reference conditions are part of the characterization in Chapter 1. Issues and key questions are identified in Chapter 2. Existing resource condition and a synthesis of our understanding of ecological processes are presented by issue in Chapters 3-5. Potential restoration opportunities are described in Chapter 6.

KEY FEATURES OF THIS WATERSHED

- The area is designated as "Critical Habitat" by the National Marine Fisheries Service (NMFS) for the Umpqua cutthroat trout, a currently listed endangered species.

- Franklin Creek has been designated a "Key Watershed" under the Northwest Forest Plan although potential fish habitat quality is poor.

- The Umpqua River mainstem is currently listed as Water Quality Limited (Department of Environmental Quality (303(d) list)) for temperature. Water quality in the Scholfield tidal area is also impaired due to elevated fecal coliform levels.

- Much of the inter-tidal salt marshes have been lost due to diking of the main river channel.

- This area is dominated by steep slopes that are highly susceptible to landslide activity. A logging moratorium was established in the late 1960's to reduce negative resource effects from landslide activity.

- Federal land is dominated by mature conifer seral classes.

- The density of bald eagles along the Umpqua River is currently at carrying capacity.

LOCATION AND SIZE

The Lower Umpqua watershed is the lowest 5th field watershed in the entire Umpqua River Basin. It is in the northwestern portion of the Southwest Oregon Province (**Map 1**). and is in Douglas County. The watershed is bounded by the Pacific Ocean on the west. Steep slopes that drain directly into the Umpqua River including the subbasins south of Franklin Ridge (elevation about 1600') form the northern boundary. The analysis area extends about 16 miles inland from the ocean to the boundary of the Mill Creek subwatershed on the east. Umpcoos Ridge, Scholfield Ridge, and the ridge above Winchester Creek form the southern boundary. Dean Mt. (elevation 1819'), on the southern boundary, is the highest point in the analysis area.

The Umpqua (Hydrologic Unit Code # 17100303) is a 6th-order river, with a drainage area of nearly 3,000,000 acres (**Map 2**). The analysis area only includes the Lower Umpqua 5th-field watershed (Hydrologic Unit Code # 1710030308) with a drainage area of 60,159 acres or 2% of the entire Umpqua River basin. Within the watershed, particular attention is given only to federal lands which occupy about 26% of the area (**Map 2**). The federal portion of the analysis includes several small drainages, i.e. Harvey, Franklin, and the lower portion of Dean Creeks, that flow directly into the Umpqua River (**Map 2**). Butler Creek is also included in the assessment. Butler Creek at one time flowed directly into a side channel of the main Umpqua River. Channel migration has closed off the head of that side channel and the flow currently goes into the Smith River.

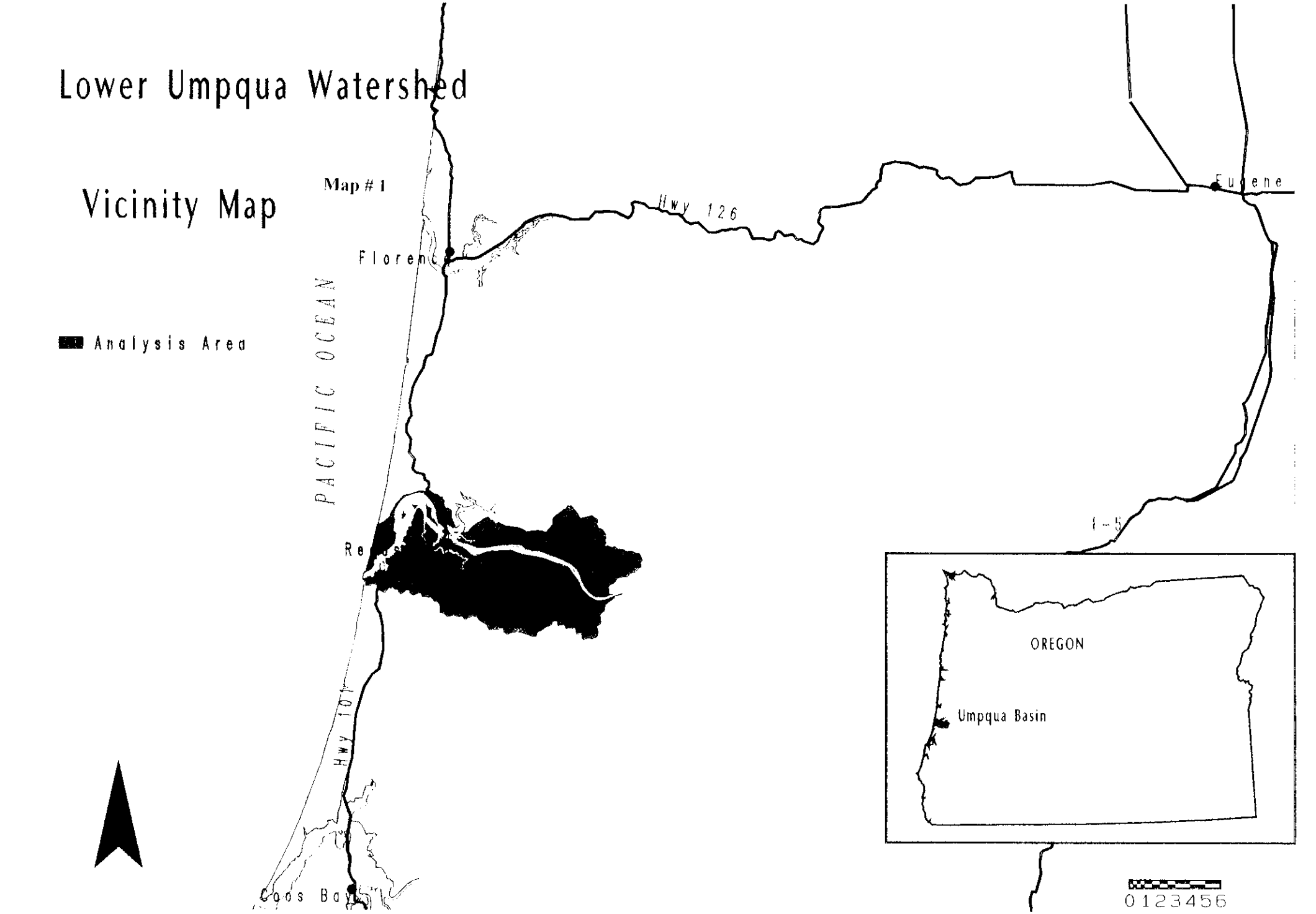
Butler, Harvey and Franklin subwatersheds are 3rd order streams with drainage areas of 3,388, 5,654, and 6,174 acres respectively. More than 150 miles of streams flow through the federal lands in this analysis area. The majority of the streams are 1st and 2nd order channels that are mostly intermittent. South of the Umpqua River, the Dean Creek Special Recreation Management Area (SRMA) is included in the analysis. The Elliot State Forest, private industrial forest lands and other private lands are included only where data on resource condition was readily available (i.e. slope stability, interior forest) but for most resources, the information on State and private properties was not available

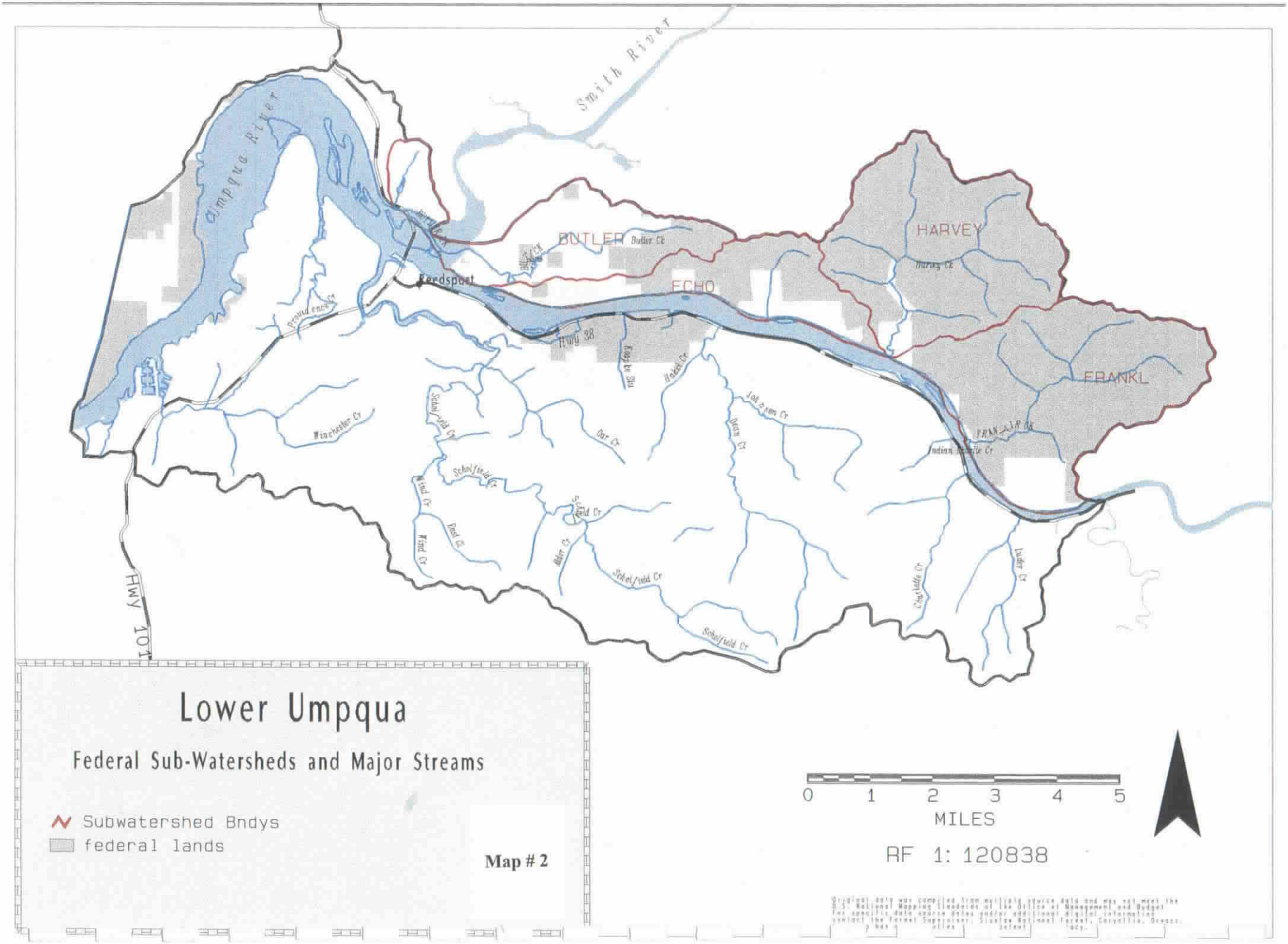
Lower Umpqua Watershed

Vicinity Map

Map # 1

Analysis Area





Lower Umpqua

Federal Sub-Watersheds and Major Streams

Subwatershed Bndys

federal lands

Map # 2

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MILES

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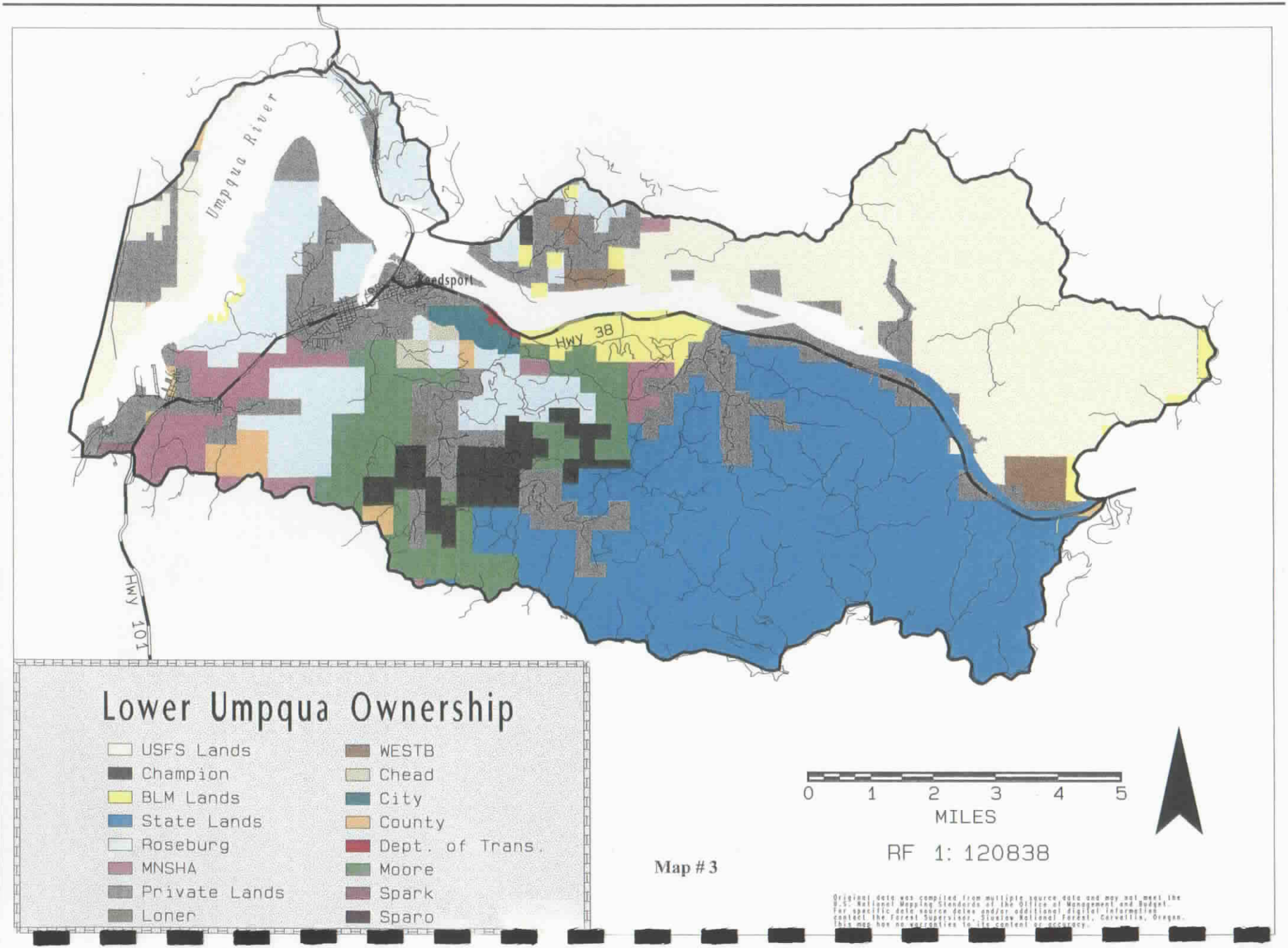
in sufficient amounts to complete an assessment on those lands. The Elliot State Forest will conduct a similar watershed analysis on their lands within the next few years. The Oregon Dunes National Recreation Area has already been covered in a separate analysis (USDA undated) so it was not included in this analysis.

LAND OWNERSHIP

Twenty-six percent of the watershed is managed under federal ownership. The majority (89%) of federal acres are managed by the Siuslaw National Forest with the remaining 11% managed by the Bureau of Land Management - Umpqua Resource Area. In addition, 33% of the area is managed by state and city government entities. The remaining 41% of the watershed is under private ownership with 61% of it in private industrial forest land use (**Map 3, Table 1**).

Table 1: Land Ownership

	USFS	BLM	Total Federal	Other Govern-ment	Private Industrial Forest	Other Private	Total Private	Grand Total
Total Acres	14,051	1,677	15,728	19,627	15,208	9,606	24,814	60,169
% of Federal Ownership	89%	11%	100%	n/a	n/a	n/a	n/a	n/a
% of Public Ownership	40%	5%	45%	55%	n/a	n/a	n/a	n/a
% of Private Ownership	n/a	n/a	n/a	n/a	61%	39%	100%	n/a
% of Total Landbase	23%	3%	26%	33%	25%	16%	41%	100%



Map # 3

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LAND ALLOCATIONS - NORTHWEST FOREST PLAN OBJECTIVES

CONGRESSIONALLY WITHDRAWN

All federal lands in the western portion of the analysis area have been Congressionally designated as a National Recreation Area. This unique area of active and inactive sand dunes is to be managed for a mix of recreation settings and opportunities. Enhancement of the unique scenic and ecological qualities associated with the dunes ecosystem is also a priority (USDA undated). Approximately 1,323 acres or 8% of federal lands in the analysis area are in this land use allocation (**Map 4, Table 2**).

ADMINISTRATIVELY WITHDRAWN

Bald eagle management areas, as designated by the Siuslaw National Forest and Coos Bay-Bureau of Land Management Land and Resource Management Plans (RMPs), are considered administratively withdrawn in the Northwest Forest Plan. Three bald eagle management areas, occupying approximately 109 acres or less than one percent of federal lands within the analysis area are in this land use allocation (**Map 4, Table 2**).

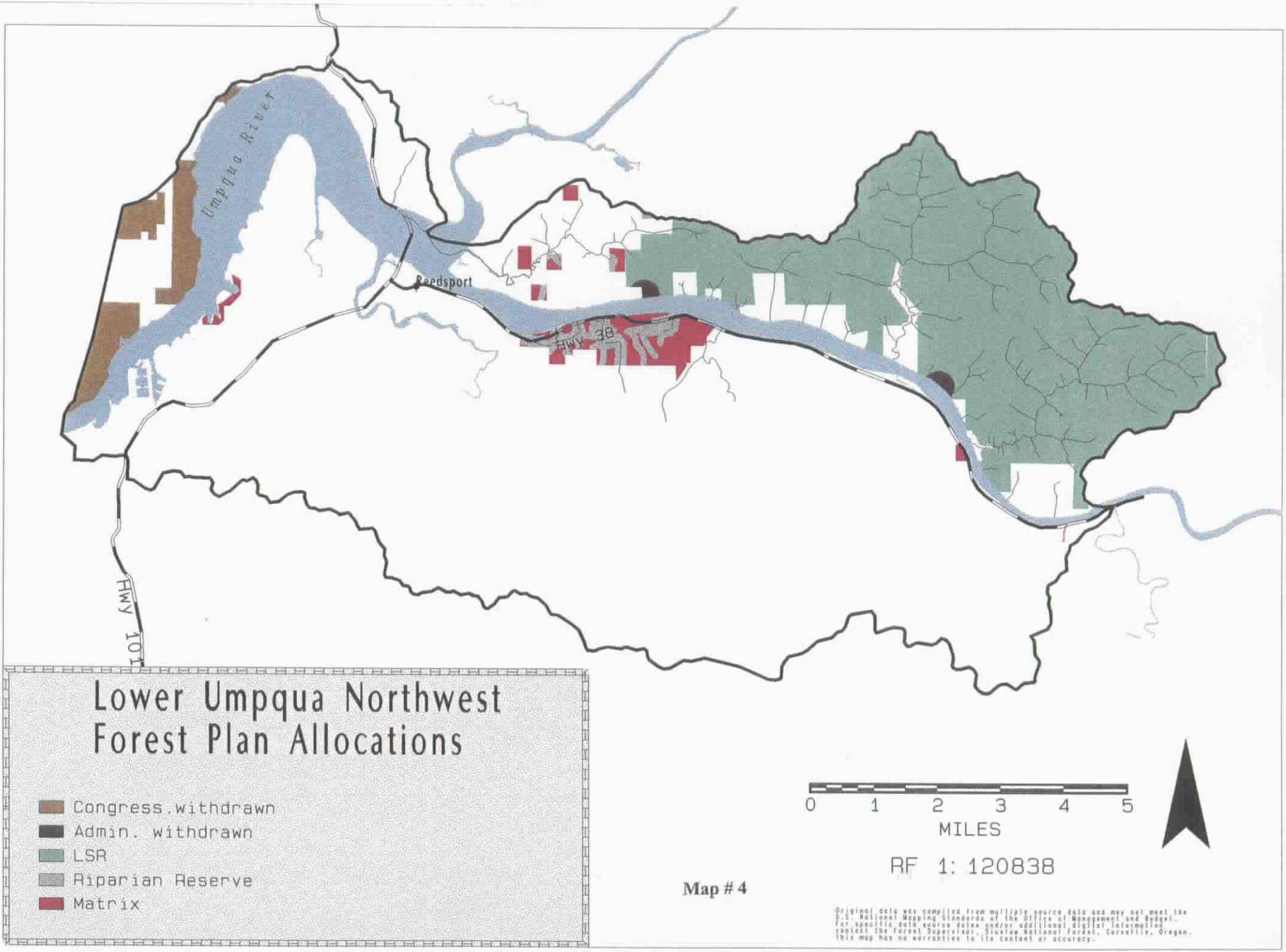
LATE-SUCCESSIONAL RESERVES

The majority, 82%, of the federally managed land in the watershed is allocated to Late-Successional Reserve (LSR) based on the Northwest Forest Plan (**Map 4, Table 2**). The objective of this land use allocation 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.

RIPARIAN RESERVES

Approximately 85% of federal lands are within Riparian Reserve boundaries. Riparian Reserves overlie all other land use allocations. Outside of Late-Successional Reserves, 4% of the Federal land base is in Riparian Reserve (**Map 4, Table 2**).

Riparian Reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecological processes that directly affect standing and flowing waterbodies. In addition to strictly 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.



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MATRIX (USFS) OR GENERAL FOREST MANAGEMENT AREA (GFMA) (BLM)

Table 2: Land Use Allocation

Land Use Allocation	USFS	BLM	Total Federal
Congressionally Withdrawn	1323	0	1323 (8%)
Administratively Withdrawn	109	0	109 (<1%)
LSR	12,593	233	12,826 (82%)
Riparian Reserve outside LSR	0	608	608 (4%)
Matrix/GFMA	26	836	862 (6%)

In this watershed, 862 acres or 6% of federal lands have been allocated to Matrix/GFMA by the Northwest Forest Plan (**Map 4, Table 2**). Matrix/GFMA consists of those federal lands remaining following establishment of all other land allocations. Most scheduled timber harvest takes place in the Matrix/GFMA land use allocations. All timber harvest and other silvicultural activities would be conducted according to standards and guidelines in that portion of the Matrix/GFMA with suitable forest lands. This land allocation also includes the Dean Creek Special Recreation Management Area. The Dean Creek area emphasizes "watchable wildlife", specifically elk.

RESOURCE CHARACTERIZATION - HISTORICAL PERSPECTIVE

CLIMATE

- Marine influenced - cool wet winters (30-50^{0}F), and warm dry summers (40-70^{0}F)
- Climatic variability is influenced by distance from the ocean and topography
- Most precipitation is rain from November-March, biggest storms December-February
- Precipitation comes in heavy cells with an annual average of 55-65" at the coast and 75" on the peaks.
- Fog influence occurs near the coast and up major river valleys 3-5 miles inland.
- Periodic strong winds (70-120 mph) come from the southwest in fall and winter. There are occasional east winds in summer.
- Wind is the dominant erosional force on the dunes in the western part of the watershed.

GEOLOGY AND SOILS

- Massive, slightly fractured Tyee Sandstone (**Table 3, Map 5**) dominates the area, erosional processes result in highly dissected terrain and short, steep, even faceted slopes.
- The landscape is highly susceptible to landslides in headwall areas. Short steep slopes in excess of 100% are common adjacent to headwater stream channels (**Map 6**).

- Shallow to very deep silty clay loam soils result from weathering of sandstone. They are productive soils except where shallow. Deeper soils are on the main ridges and hollows; shallower soils are on steep spur ridges.
- Steep south facing slopes in the headwaters of Harvey and Franklin Creeks typically experience soil moisture deficit in summer.
- Active and stabilized dunes are found along the coast (**Map 5**).
- Ancient marine terraces northwest of Reedsport strongly influence landform and stream characteristics in the area (**Map 5**).
- Alluvial deposits are found throughout the Umpqua mainstem and along most major tributary streams (**Map 5**).
- Poorly developed, coarse grained soils occur on alluvial flats, occupancy by different vegetation species depends on soil drainage class.

Table 3: Geologic Influences On Physical Resource Components

GEOLOGY	FEATURES	SOILS	SLOPES	STREAMS
Tyee Sandstone 92% of area	high relief, dominant erosion process is debris slides and torrents	Damewood/Bohannon/Digger/ Umpcoos soils (30-110%) moderately deep soils, steep, south facing slopes. Possible dry sites on steepest south slopes. Moderately to very productive soils.	0-30: 23% 30-60: 46% 60-90: 29% >90: 2%	very high stream density (7.4 mi/sq mi), dendritic drainage pattern sandstone pebbles and cobbles, sand and silt substrates
Dune Sand 3% of area	gentle relief, rolling dunes. erosion process is wind detachment	Waldport sandy loam (0-90%) deep, poorly developed, well drained sandy soils. Heceta (0-5%) deep soils; poorly drained deflation plain.	0-30: 99% 30-90: 1%	very low density, random stream patterns
Marine Terraces 2% of area	low, gentle relief, fluvial erosion in channels is primary erosion	Bullards SL (25-50%) and Templeton SIL (3-50%) soils moderately deep to deep, very productive	0-30: 71% 30-50: 29%	very low stream density, lower gradients dominate mostly fine-grained graded sediments,(silts, sand)
Alluvial Deposits 3% of area	planear to rolling, repeated reworking of sediments, fluvial erosion adjacent to streams	Yachats VFSL	0-30: 100%	low gradient, sinuous channels, wide range of particle sizes predominate

HYDROLOGY

- The water holding capacities of soil and rock are extremely low, this results in rapid response of streams to the rate of precipitation and very low contribution to groundwater flow during the dry summer periods (June-September). The headwaters of tributary streams, especially from the north are expected to not have continuous flow during the summer months. The lower reaches of Butler, Harvey, Franklin, and Dean Creeks about 1.5 miles up from the mouths and the floodplains and terraces adjacent to the Umpqua have dependable year-long groundwater supplies.
- Cool, well oxygenated water (i.e. 55^{O}F) is expected from October-June, continual mixing of surface and groundwater should maintain cool water temperatures. There may be localized heating following landslides due to the loss of vegetation.
- Riparian groundwater recharge and release, aided by beaver dams and substantial LWD loading of the channel and floodplains, prevented large temperature fluctuations on a daily or seasonal basis.
- The majority of streams are steep gradient and highly confined although low gradient streams extend well into the headwaters. Alluvial deposits and the majority of marine terraces have low gradient streams with unconfined, sinuous channels.
- Water flow in the mainstem of the Umpqua River is greatly influenced by rain on snow events in the Cascade Mountains.
- Expect frequent flooding of alluvial flats. Flooding and deposition are the dominant disturbance processes along the mainstem of the Umpqua in the central portion of the watershed. In coastal drainages, notable flood years have been 1861, 1890, 1909, 1927, 1953, 1955, 1964, 1974, 1982, 1983, 1996, 1997. While there are periods when major floods occur during consecutive years, there are usually 10 to 25 years between floods.
- Much of the land adjacent to the Umpqua River is classified as estuarine wetlands by the National Wetlands Inventory (NWI). Wetlands in the lower Umpqua have historically mitigated the effects of floods by temporarily storing and slowly releasing large portions of the flows.
- Estuary and/or tidal influences extend the entire length of the Umpqua River within the analysis area.
- Highly complex channels are an important component of fresh water and brackish inter-tidal areas. These channels give rise to complex estuarine and fresh water wetland habitat.

VEGETATION

- Fire is the dominant disturbance process for vegetation. Fire pattern has variable size, moderate to low frequency, on the order of 100 to over 300 year return intervals, and moderate to high severity (USDA 1995). The Umpqua River may funnel winds and create conditions which could lead to large (10,000-100,000 acre) or jumbo(>100,000 acre) fire events.
- Vegetation patterns are variable in size and seral composition. Early grass-forb communities, young conifer, and mature to old growth stands containing a wide

variety of structural components were likely all present in large patches encompassing one or multiple drainages at different times throughout the past.

- Fog influences vegetation east of the active dunes and along the lower river valleys resulting in species and structures associated with a spruce climax forest and a slightly longer fire return interval.
- Inland areas are hemlock climax forests but the coarse, shallow soils which create droughty soil conditions tend to be occupied by the drier plant association groups. Vegetation of the Lower Umpqua reflects the watershed's transition zone location between Siskiyou Mountains of Southwestern Oregon and the Coast Range of the Central and Northern Oregon Coast. Species common within the Lower Umpqua Watershed which are less common or absent throughout other areas of the Coast Range include: madrone (Arbutus menziesii), grand fir (Abies grandis), hairy manzanita (Arctostaphylos columbiana), snowbrush ceanothus (Ceanothus velutinus) and poison oak (Rhus diversiloba).
- The low water supply ability of soils results in the potential for conifer and drier plant community dominance to the stream edge, however, landslide activity maintains a portion of the stream adjacent terraces and lower hillslopes in hardwood.
- A relatively continuous riparian canopy shaded tributary streams and maintained cool stream temperatures, probably in the 50-55^{0}F range.
- Wind causes small (1-10 acre) patches of blowdown creating discrete openings and providing wood to the forest floor and stream channels.
- Less frequent, large scale windstorms result in diffuse blowdown through the forest.

AQUATIC SPECIES HABITAT AND POPULATIONS

- Productive capacity is greatest in brackish and fresh water wetlands. These inter-tidal areas contained extensive shallow saltwater marshes that were excellent acclimatization and rearing areas for out-migrating salmonid smolts and other estuary dependent species.
- Most tributary streams from the north provide intermittent habitat due to low flow conditions.
- Low gradient tributaries south of the Umpqua historically provided more year-round anadromous spawning and rearing habitat.
- Relatively continuous riparian canopy shaded tributary streams, maintaining cool water temperatures
- Groundwater recharge and release was aided by beavers and substantial amounts of LWD. The abundance of LWD in stream channels varied through time depending on disturbance events.
- Tyee sandstone breaks down into weakly resistant boulders, cobbles and gravels. Sediments are larger higher up in the drainages and at debris torrent deposits. Riffles in "depositional" reaches were dominated by gravel and cobble which provides an excellent environment for spawning and development of eggs.
- A wide variety of fish and other aquatic organisms utilize the estuaries and tributary streams. Coho salmon, sea-run cutthroat trout, and steelhead, had almost identical distribution which included the smaller tributaries as well as the mainstem and larger

tributaries for spawning and rearing. Steelhead utilized slightly steeper gradient streams. Chinook salmon were found in the lower mainstem of the Umpqua and in Butler and Franklin Creeks. Estuarine salt marshes and tidal flats supported large numbers of cutthroat trout, chinook salmon, smolts, white and green sturgeon, surfperch, stickleback, sole, flounder, shad and many invertebrates (USDA 1972, 1974).

- In the early 1900's, runs of salmon were large enough to support intensive commercial fisheries.
- The species richness and diversity fluctuated with episodic natural disturbance events. Areas were re-colonized rapidly when conditions were appropriate from sufficient refugia.

TERRESTRIAL SPECIES HABITAT AND POPULATIONS

- Wildlife species respond either directly or indirectly to and are products of habitat conditions. The relationship between habitat and species played an important role in shaping the wildlife resources in the lower Umpqua watershed, but at no time threatened any species existence on the landscape.
- Certain indigenous wildlife did not decline until first settlement. Grizzly bear, Pacific fisher, and gray wolf were last reported in the Coast Range around 1860, 1913, and 1934, respectively. Other species that were once more widespread although uncommon were extirpated by mid 1980, (e.g. wolverine - 1972 and lynx - 1984). Still other species that were once common are uncommon to rare today (e.g. peregrine falcon, bald eagle, etc.).
- A variety of plant and animal species are associated with the diversity of habitats in this watershed.
    - Waterfowl, amphibians and reptiles abound in the estuaries.
    - Snowy plovers utilized dune habitat.
    - Bald eagles utilize mature forest along mainstem of Umpqua River.
    - American marten, northern spotted owl, marbled murrelet utilize interior mature to old-growth forests

CHAPTER II: ISSUES AND KEY QUESTIONS

Issues and key questions focuses analysis on elements of the ecosystem that are most relevant to management. These elements include social values and resource conditions within the watershed.

Three issues critical to future management of this portion of the Umpqua River Basin were identified with input from BLM and Mapleton Ranger District staff:

- **Recognition of inherent instability in the landscape**
- **Salmon and other aquatic species viability depends on protection and enhancement of salmonid and other aquatic species habitat**
- **Identification of opportunities available to accelerate attainment of late-successional forest habitat.**

The following is a broad description of each issue and key questions that pertain to it. The analysis is focused solely on these issues and questions.

ISSUE: RECOGNITION OF INHERENT INSTABILITY IN THE LANDSCAPE

This area is noted for its steep , highly dissected landforms and extreme instability. Although natural rates of landslide activity are difficult to quantify, it has been noted that past management activities, including timber harvest and road construction have increased the rate of landsliding relative to the natural rate. The mineral and organic composition of the landslide debris has also changed. The resultant degradation of both on-site and off-site resources has lead to internal reviews and external lawsuits and changes in management. Recognition of instability in this landscape, and application of appropriate forest management activities is critical to maintenance of on-site productivity, future supplies of large woody debris, maintenance of gravel substrates, aquatic habitat complexity, and protection of inhabited dwellings.

KEY QUESTIONS:

- Why is this landscape inherently unstable?
- How are substrates delivered and redistributed in stream channels?
- How does slope stability affect delivery of LWD?
- How do predicted debris torrents influence placement of fish habitat structures?
- What was the influence of log drives, splash dams, dikes?
- What role does the road system play in delivery of material to the stream system?
- How and where have roads influenced stability?
- Where are the road problem areas and what are restoration opportunities?
- How does landslide susceptibility relate to plantation treatment prescriptions?

ISSUE: SALMONID AND OTHER AQUATIC SPECIES VIABILITY DEPENDS ON PROTECTION AND ENHANCEMENT OF AQUATIC HABITAT CAPABILITY.

The status review of the Umpqua cutthroat trout by the National Marine Fisheries Service identified fish in the Umpqua River as part of an Evolutionarily Significant Unit that is endangered. The entire Umpqua basin has been identified as critical habitat for the cutthroat trout. To help meet the federal agencies' responsibility to protect and restore instream habitat in the Oregon Coast Range, one subwatershed, Franklin Creek has been designated as a Key Watershed in the Northwest Forest Plan.

Habitat for aquatic species throughout the Oregon Coast Range has been highly altered. Results of research and stream surveys, (USDA 1993, USDA 1995) indicate that most streams on federal land, including those in this watershed, are deficient in large woody debris (LWD) and that riparian areas generally contain few large conifer trees to supply LWD to stream channels over time. Loss of quality spawning and rearing habitat is one of the reasons that cutthroat trout are endangered and most anadromous fish populations are depressed. Habitat restoration at the watershed scale is critical to protect and enhance anadromous fish runs and critical habitat.

KEY QUESTIONS:

- What are the potential and current habitat conditions and trends for the species of concern?
- What is the current and historic relative abundance and distribution of species of concern in the watershed (i.e. threatened or endangered species, special status species, species emphasized in other plans)? What contributions does the watershed make to the viability of at risk fish stocks? Is it a significant fish producer within the basin?
- Which streams or reaches within the watershed contain relatively intact, functioning systems or serve as critical habitat for anadromous fish species?
- Are the NFP designated key watersheds providing quality anadromous fish habitat? Are anadromous fish capable of using them?
- How has channelization (diking) in the Lower Umpqua River affected fish distribution and habitat quality?
- Where and how does tidal influence affect fish habitat?
- Do the riparian areas currently provide for stability of stream adjacent slopes, provide shade to reduce stream temperature increases and supply large woody material to the stream channels?
- Are stream temperatures within standards? Where is shade lacking?
- What types of restoration efforts should be focused in riparian areas?

ISSUE: WHAT OPPORTUNITIES ARE AVAILABLE TO ACCELERATE ATTAINMENT OF LATE-SUCCESSIONAL FOREST HABITAT CONNECTIVITY.

Federal land in this watershed is designated by the NFP as predominantly late-successional forest habitat. These areas are critical to the recovery of late-successional associated species for reproduction and mobility to and from the reserve system designated to the south. Although large patches of mature forests occur, their ability to function close to their potential is reduced by the heavily fragmented forest nearby. This raises concerns for species continuance across the landscape within late-successional forests. Improving the amount and distribution of this habitat type and maintaining or enhancing connectivity to areas outside of the watershed has been identified as a primary issue.

KEY QUESTIONS:

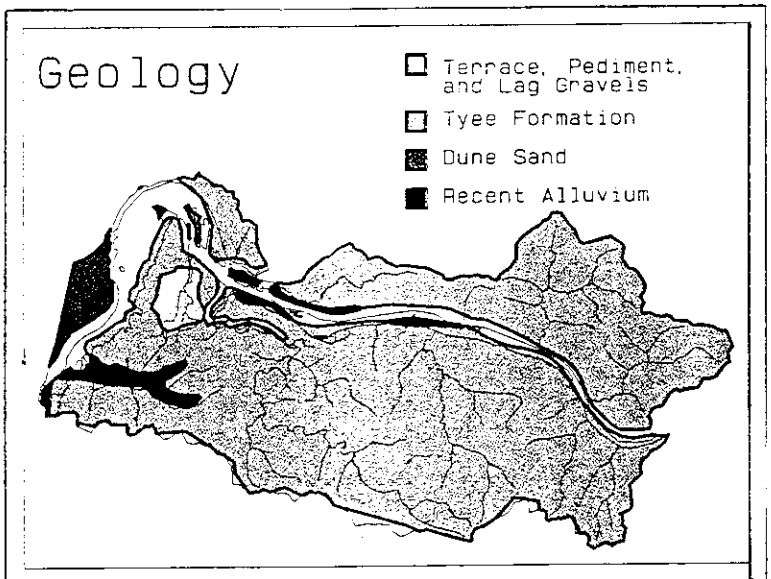
- What types (seral classes) and patch sizes of vegetation existed historically on this landscape? Was it different for different areas within this analysis area? What natural disturbances led to those conditions?
- What are the current seral conditions and patch sizes? What disturbances have led to those conditions?
- What is the acreage and spatial distribution of mature forest habitat? Interior forest habitat? Are there key areas for refugia?
- Are there critical migration corridors that must be maintained?
- What role does this area play in the larger late-successional reserve system?
- What is the current condition of habitat within the provincial home range of Northern Spotted Owl and Marbled Murrelet activity centers? Is existing habitat suitable?
- Where and how can late-successional habitat within the watershed be improved in order to hasten the development of suitable habitat?
- What is the trend for future condition of late-successional species and their habitat in the watershed based on current standards and guidelines outlined in the Northwest Forest Plan? How will management objectives for the different land allocations affect habitat conditions in the future within the watershed? Are there areas of potential conflict with current land management allocations and future objectives within the watershed (i.e. allocation trade opportunities)?
- What is the current status of other than late-successional listed species of concern, including botanical species, within the watershed? How is this watershed functioning for these species, i.e. what is the current habitat condition for species of concern?

CHAPTER III: INHERENT LANDSCAPE INSTABILITY

COMPONENTS OF INSTABILITY

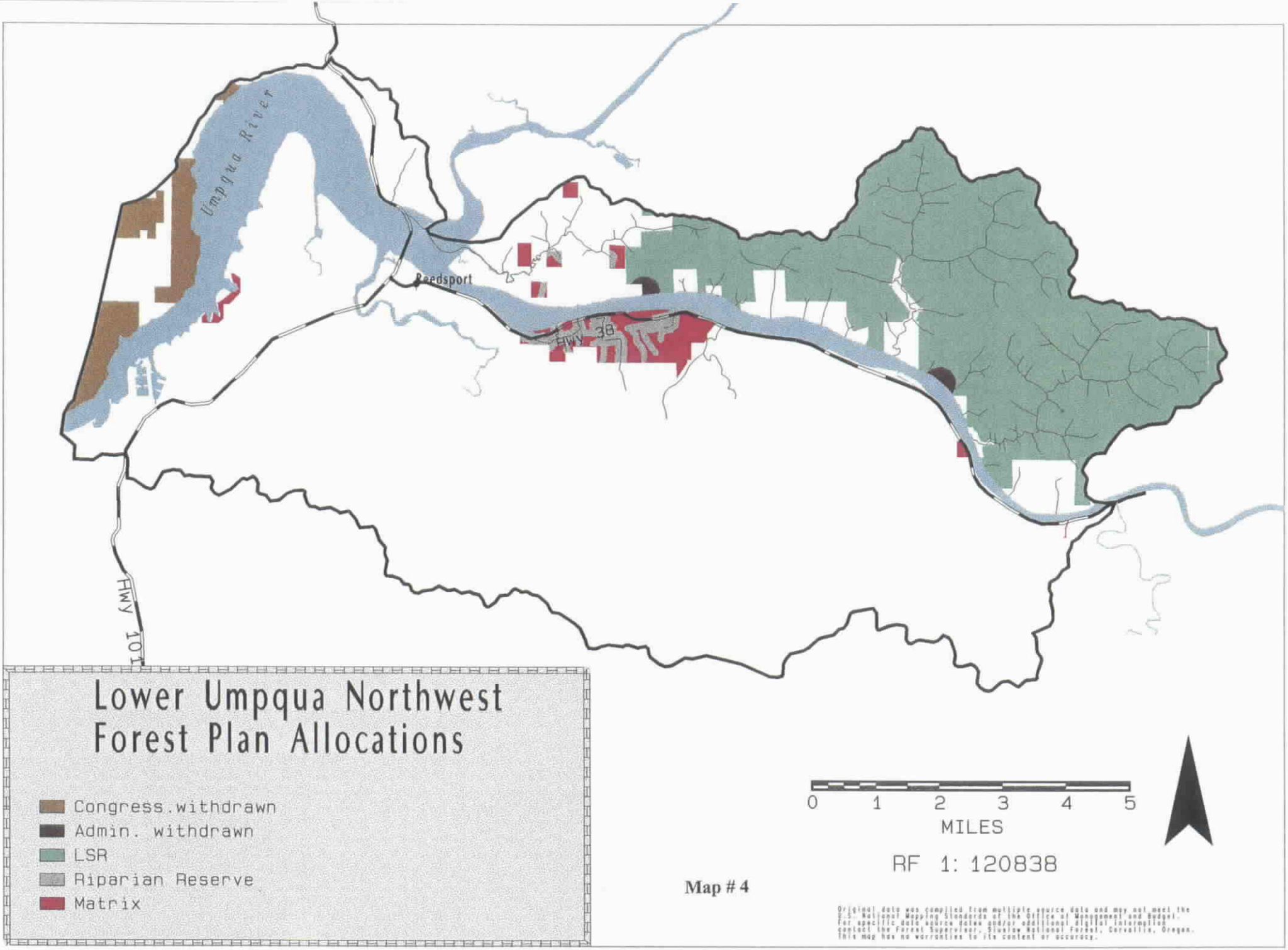
Natural occurrence of landslides is a major component of this landscape. Understanding the mechanisms that initiate landslides and the response of the stream system to landslide events is important to the understanding of how this landscape functions.

The geologic formations which include dunes, marine terraces and alluvium (**Appendix A, Map 5**) are not prone to landslide activity. Therefore, this portion of the analysis focus's on the area influenced by Tyee Sandstone. Slope classes help to display the range of landform conditions that result from geologic influences (**Table 3**). Relative to most of the Forest and to adjacent watersheds, this analysis area overall has very steep relief (**Map 6**). Twenty-nine percent of the landscape has slopes greater than 60%, while 43% has 30-60% slopes, and 28% of the slopes are 0-30%. The difference in slope classes is pronounced between the steep, high relief of the Tyee Formation, and the gentle, low relief of the dune formations, marine terrace, and alluvial deposits. These percentages only account for the average slopes across broad ridge systems. They do not account for localized slope breaks in highly dissected terrain. Short, very steep slopes in excess of 100% are common adjacent to headwater stream channels in the majority of the analysis area.



Map #5: Geology

The Tyee Formation is a thick impermeable deposit of rhythmically bedded medium and fine-grained marine sandstone, interbedded with micaceous siltstone. This formation dominates most of the analysis area. The sandstone beds are very thick in the Umpqua area compared to other areas of the Forest. Combined with the absence of ingneous and volcanic intrusions and flows, these rocks lack fracture zones, are particularly impermeable, and resistant to erosion. The result is a steep, very highly dissected landscape in which the water is channelized into deep erosion canyons. The combination of impermeable bedrock and steep slopes results in soils in steep headwall areas that are highly prone to debris torrent activity (**Map 7**). Due to the uplift of the



Map # 4

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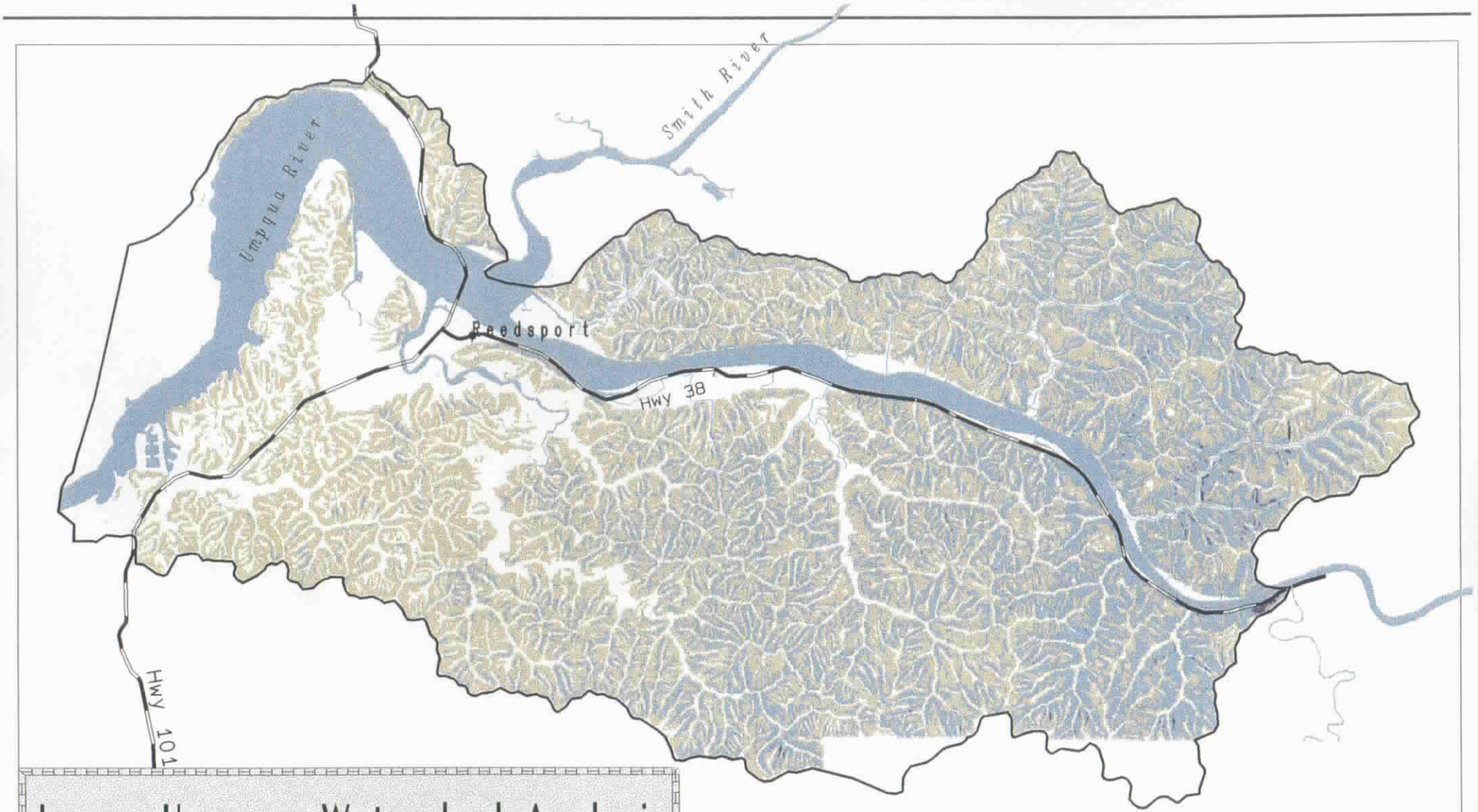


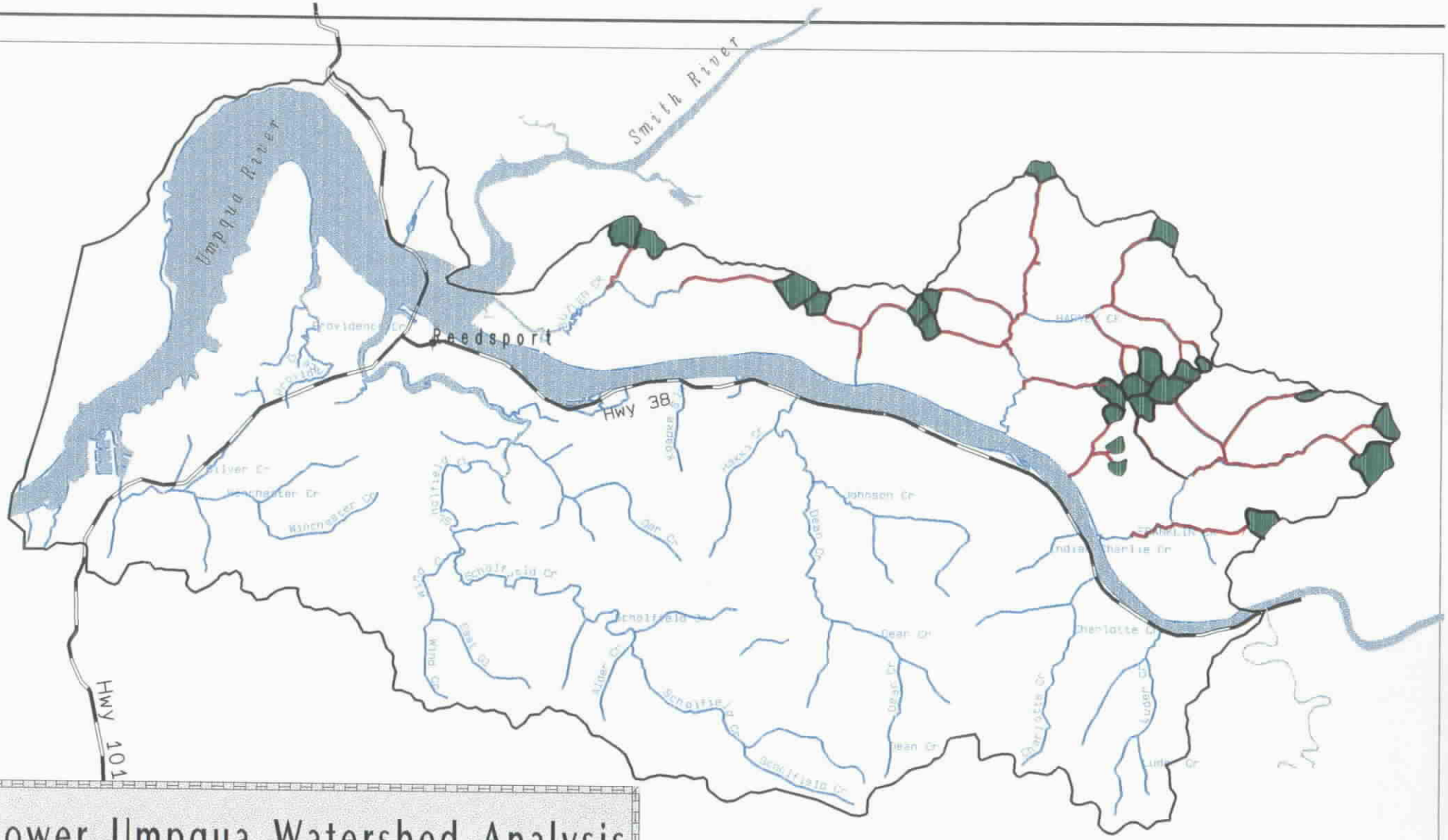
Lower Umpqua Watershed Analysis

- Watershed BND
- Slope 0-30%
- Slope 30-60%
- Slope 60-110%
- Slope 110-1500%

0 1 2 3 4
MILES

RF 1: 116444

Map # 6



Lower Umpqua Watershed Analysis

Potential High Landslide Impact Areas

Map # 7

sedimentary beds in the easterly direction, slope angles and lengths are greatest in the eastern portion of the analysis area. Instability too is greatest in this portion of the watershed.

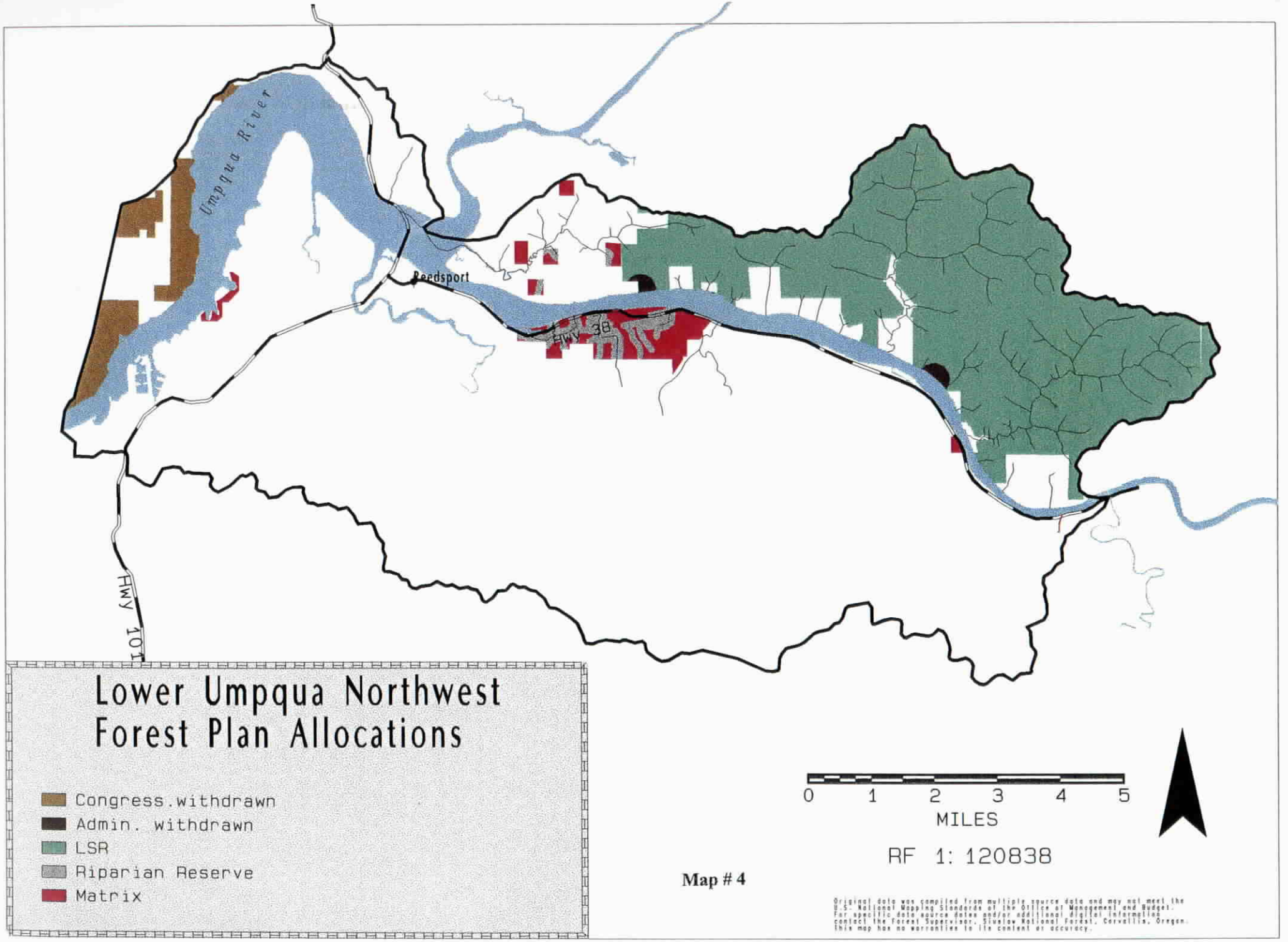
Debris slides and torrents are the dominant erosion process on the steep slopes of the Tyee Formation. The recurrence interval for debris flows from a single location in the central Coast Range is on the order of hundreds or thousands of years (Benda 1990).

Torrent deposits can be large and provide a long-term source of sediment and wood for the channel. Valley width, channel gradient and tributary angle influence how far a debris flow travels and where they will deposit their loads. When root strength is lost following timber harvest activity or an area is undercut and/or groundwater flow changed due to road construction activity or sidecast construction, acceleration of the natural rate of landsliding tends to occur. In this area, it was recognized, in the late 1960's and early 1970's, that conventional clearcut timber harvest and sidecast road construction activities accelerated landslide rates. A moratorium was put on harvest of National Forest lands at that time. As a result, few areas have been harvested.

In an attempt to mitigate the inherent instability in this area, the majority of the road system is located in a ridgetop position (**Map 8**). However, during road construction, debris was often pushed over the side and many boulders, and smaller rock fragments ended up in the stream channels to be transported over time. Only one stream crossing culvert was necessary for the road system on National Forest Land. Ditch relief culverts, however, are common and have altered natural routing of sediment and water through these areas. To mitigate the change in water flow, many of the collector and spur roads were waterbarred in 1994 and 1995 as road maintenance dollars were substantially reduced. For ridgetop roads in this analysis area, this treatment will provide adequate drainage and stability. Midslope and valley bottom roads will need further assement.

ROUTING OF LANDSLIDE MATERIAL THROUGH THE STREAM SYSTEM

All of the steep, highly dissected slopes are considered high risk for acceleration of debris landslides following harvest and road construction (**Map 7**). However, a small subset of the oversteepened headwater slopes contribute the majority of channel scour and sediment to the high quality habitat in low gradient depositional streams. These slopes are identified as "high impact" areas (**Map 9**). Any landslides originating in the shaded areas are very likely to develop into torrents that travel great distances. The map shows both the likely origin of landslides and torrents as well as the likely length of torrent scour and the depositional zone in which unsorted sediments from the torrents could cover both spawning and rearing areas.


Umpqua River
Reedsport
Hwy 38
Hwy 101
Lower Umpqua Northwest
Forest Plan Allocations
Congress.withdrawn
Admin. withdrawn
LSR
Riparian Reserve
Matrix
0 1 2 3 4 5
MILES
RF 1: 120838
Map # 4
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U.S. National Mapping Standards or the Office of Management and Budget's
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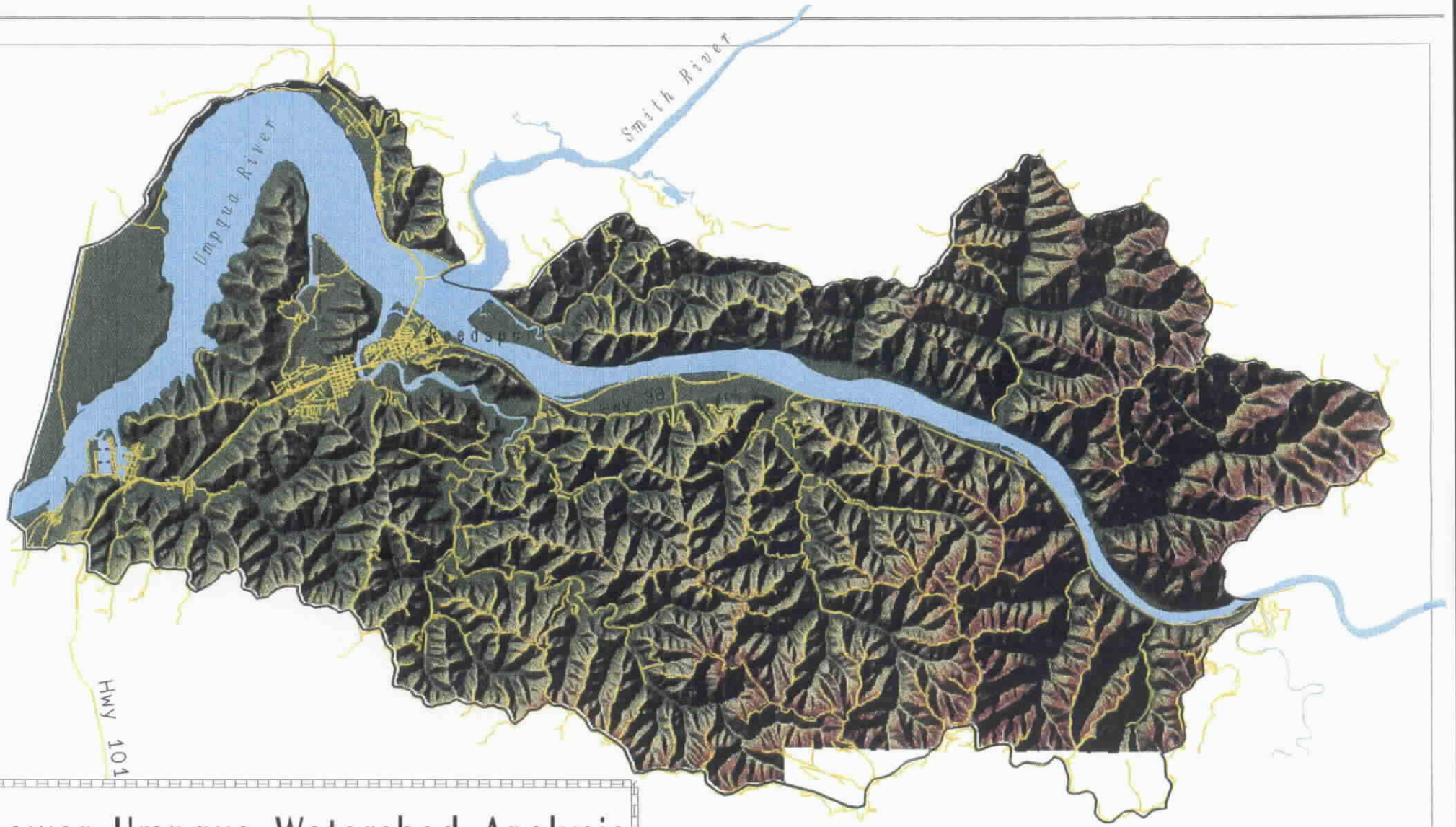


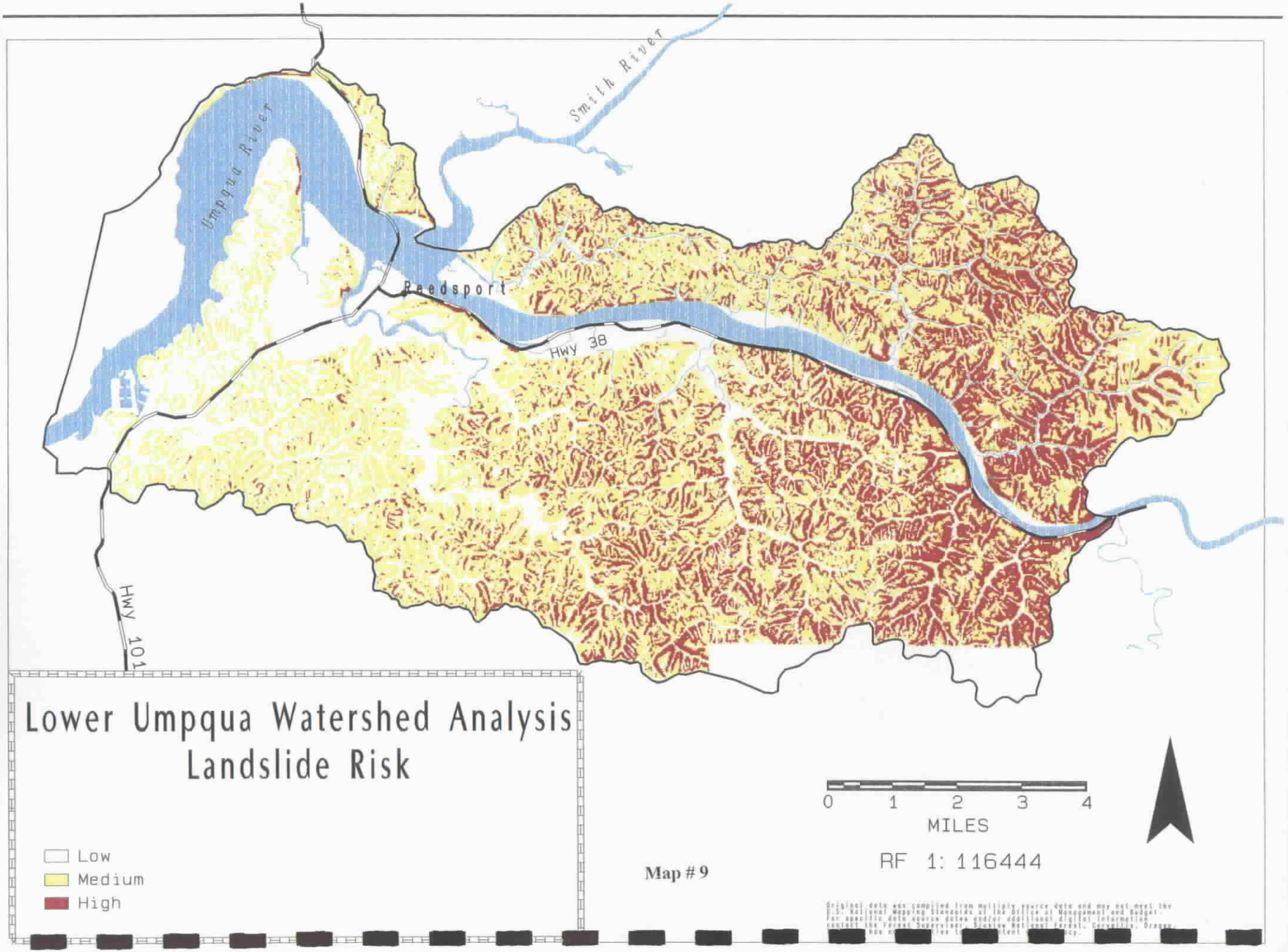
Lower Umpqua Watershed Analysis
Topography

roads

0 1 2 3 4
MILES

RF 1: 116444

Map # 8


Smith River
Umpqua River
Reedsport
Hwy 38
Hwy 101
Lower Umpqua Watershed Analysis
Landslide Risk
Low
Medium
High
0 1 2 3 4
MILES
RF 1: 116444
Map # 9

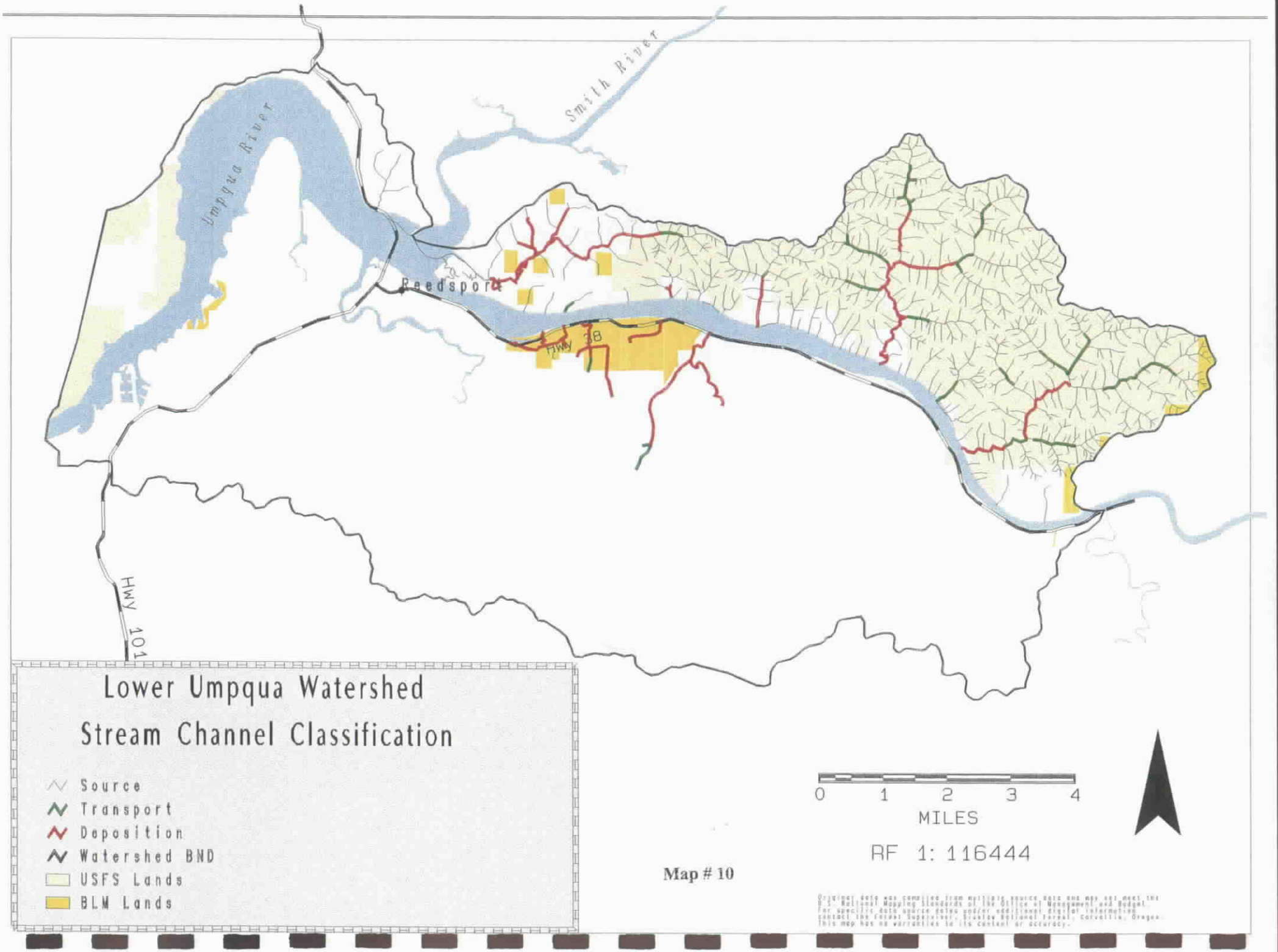
In addition, many other stream adjacent slopes have the potential to deliver wood and sediment associated with landslides directly to the stream channel or to a mainstem channel downstream of a short tributary. Landslides result in a periodic aggradation of the lower stream reaches by the influx of sediment. Following deposition, fluvial processes distribute the sediments over time. Reworking, sorting and deposition of this landslide deposit material is a natural process which results in formation of floodplain and stream terraces in the landscape.

As sediment moves through the stream system, decomposition rates, and particle size of the different rock types affect substrate quality in the streams. In the alluvial and marine terrace deposits, substrates are mobile sand and small non-durable gravel. In these streams, wood is the most stable substrate. Tyee Sandstone streams have slightly more durable substrate and more bedrock is exposed. In these streams, cobbles and gravels are usually found in the upper portions of the stream channels with increasingly smaller substrate particle size farther downstream from the source areas.

CLASSIFICATION OF STREAM CHANNEL TYPE AND FUNCTION

To understand the mechanism of how sediment and debris is transported through the stream system, it is necessary to identify differences in stream channel function and resistance to change. This understanding not only help to predict the potential availability and distribution of in-stream habitat components. Stream function relates to how a channel will move sediment and wood. Stream gradient and valley confinement are the two geomorphic components which are used to classify stream systems into functional segments. Stream gradient determines stream energy. It is the dominant element which influences the shape and structural components of the channel. Valley confinement controls aspects of potential stream response to storm events. The combination of these two factors results in specific channel types which serve different ecological and hydrological functions and which vary in their ability to resist change.

By combining gradient and valley confinement (**Appendix B**), streams can be characterized as either providing a source of wood and sediment, transporting that material, or being a place where that material is likely to be deposited (**Map 10**). "Source" reaches have gradients greater than 8% and are confined or moderately confined. They respond quickly to storm events and are subject to periodic scour by debris torrents. They are important sources of cool water, and pulses of sediment and wood to the rest of the stream system. Vegetation on the stream adjacent slopes strongly influence the channel resistance to disturbance events. Aquatic habitat is low due to the steep gradients and periodic flushing of wood and sediment. The majority, 82%, of stream miles in this analysis area are source streams. These streams are primarily in federal lands north of the Umpqua River and State of Oregon lands south of the river.


Smith River
Umpqua River
Reedsport
Hwy 38
Hwy 101
Lower Umpqua Watershed
Stream Channel Classification
Source
Transport
Deposition
Watershed BND
USFS Lands
BLM Lands
0 1 2 3 4
MILES
RF 1: 116444

Map # 10

reaches historically had the best potential for providing high quality aquatic habitat. During floods the unconfined valley floodplain becomes long-term storage sites for sediments and wood. Gravels accumulated in these reaches provide excellent spawning habitat. Channels can shift laterally over time and therefore create sinuous stream channel patterns. During a flood event, calm water areas and numerous side channels are distributed throughout the floodplains creating areas where small fish could take refuge. Undercut banks, deep pools, large amounts of downed logs and complex log jams are also components of this channel type. While accumulations of wood are lacking today, historically, there likely were transitory accumulations of wood in log jams with associated sediment backed upstream following severe wind storms or fires. High quality aquatic habitat would be concentrated around these wood and sediment accumulations. Riparian vegetation is varied with hardwoods and conifers. Riparian vegetation along the valley floor contributes wood to the channel as individual pieces are undercut or blown down.

CHAPTER IV: ANALYSIS OF SALMONID AND OTHER AQUATIC SPECIES HABITAT AND POPULATIONS

Harvey, Echo, and Franklin creeks, and adjacent unnamed creeks, are the only subbasins in this watershed analysis area with significant federal ownership. More by far is known about Harvey and Franklin, and descriptive statements in this document often apply largely to them. Also, since these streams are located in the "Smith-Umpqua Block" between similar, northward flowing tributaries of the Smith and the mainstem Umpqua River, much of the explanatory information in this report is derived from that in the recent watershed analysis for the Smith River (USFS and BLM 1997; pp. 30-31, 57-60). Some information on Butler and Dean creeks was provided by the BLM (Smith 1997) and the Oregon Department of Fish and Wildlife (ODFW).

Few details are known about habitat conditions in most of the streams south of the Umpqua River. Several on highly urbanized land (Winchester and Providence creeks) are undoubtedly fundamentally different from the others because they flow at least partially through sand in the relatively flat dunal sheet. Scholfield Creek, which enters the Umpqua opposite the Smith River, and Butler and STEP creeks are also mostly privately owned and no information has been gathered by the State. Parts of Scholfield Creek along with Dean, Charlotte, Luder, and Mill creeks are contained in the Elliot State Forest, and will be addressed more thoroughly in a separate watershed analysis.

CURRENT AQUATIC HABITAT CONDITION

IN-STREAM HABITAT COMPONENTS

Hicks (1989) and stream surveys (USFS 1979 and 1993) found that upper "source" reaches of Franklin Creek (**Map 10**) were very unusual compared to other sandstone streams in the Coast Range, being dominated by boulders deposited from fractured, vertical canyon walls that often form the channel margins. Harvey Creek was similar, with steep, actively landsliding slopes, but without so many boulders.

From stream surveys conducted in 1979-93, "transport" reaches of Franklin and Harvey creeks appeared to be inundated with large-sized sediments, and were virtually all shallow, large-gravel, cobble, or rubble-bottomed pools scoured laterally or behind boulders. LWD, sand, bedrock substrate, glides, and most importantly, water were scarce or absent. The base flow in late summer was extremely limited and reaches more than 1.5 miles from the Umpqua were intermittent with isolated pools, although subsurface flow continued through the heavy gravel bedload. Hicks (1989) found this area of Franklin Creek to have the widest channel, narrowest width of water, least depth of water, and least volume in pools of any stream studied in the Oregon Coast Range. Such extremes of width and base flow suggest very flashy conditions in winter. Although channel structure was complex, with 2-3 times as many side channels as elsewhere, these were due to faulting in the bedrock and were too dry or shallow for fish to use.

Huge, shifting deposits of boulders, gravel and rubble continue downstream into the broad valleys (a 300' flat floodplain in Harvey) and "depositional" reaches in the lower 1.5 miles of Franklin and Harvey creeks. These areas (often pastureland) may have alder, few conifers, enormous gravel deposits up to 60' wide and 6' deep, some deep pools with poor cover, and increasing amounts of fine sediments (the lower 0.2-0.3 miles are intertidal), raw or exposed cutbanks, and deeply entrenched channels.

These stream survey data show that streams are dynamic systems, and cumulative effects of increased sediment, nutrients, food, and wood moving down the channel during high flow events usually are most prominent in mainstem "depositional" reaches further downstream. In addition to these effects from upstream and upslope land use, nearly all the subwatersheds have been homesteaded from their mouths at the Umpqua through the majority of their depositional zones. Settlement activities such as logging, stream cleanout, and building valley bottom roads along these key reaches have left little or no LWD in channels and riparian areas (**Map 11**), few live streamside conifer trees and areas where the stream interacts with its floodplain, entrenched channels, and fewer side channels and backwater alcoves (very important for coho salmon rearing). Removing roughness elements (logs and boulders) from the channel increases velocity of the water and causes additional scour. Additional impacts include reduced subsurface flow and increased water temperatures, and widening of streams due to lateral scour of streambanks when the channel reaches bedrock. These agricultural areas and home sites (465 acres 25 years ago; Anon. 1974) are the most sensitive to change and the most altered since European settlement.

Given the existing channel instability, based on the large gravel deposits and shifting channel locations noted in 1979-93, it is not surprising that major floods in February and November 1996 dramatically altered the lower 1.5 miles of Franklin Creek and probably nearby streams. About ten large log jams (up to 200' long set up on trees over 32" in diameter) resulted largely from sluiceouts of most of the small tributaries during the storms (P. Burns; pers. comm.). It appears that some of the extensive gravel beds have stabilized, and could raise the water table, lower water temperatures, and maintain higher flows through the summer. The floods have created some good, complex rearing pools.

It is difficult to determine if the conditions seen in these channels are due mostly to variations in natural conditions or to forest management activities. Debris and sediment movement cycle through channels in response to large-scale disturbance events and the time since such events. In this area, the Coos Bay fire of 1868 was the last large scale event. It is hypothesized that sediment and debris input from that fire and transport of that material through the system would have somewhat stabilized over these past 130 years. We know that past timber harvest and road construction activities have accelerated landslide activity so it is suspected that a combination of forest management and natural instability is the cause of the high sediment transport seen in these channels.

In some cases, such as in Butler Creek and Dean Creek, the homestead effort has included channelization and/or diking. To a much lesser extent, the Harvey creek channel has also

been impeded by the road constructed adjacent to the stream. The lower reaches of Butler, Dean, Echo, and Scholfield creeks are heavily impacted by agriculture, particularly grazing with base flows in certain tributaries of Dean Creek being particularly low (D. Harris, ODFW; pers. comm.). These alterations have dramatically reduced the quantity and quality of fish habitat by increasing the stream's velocities, changing the dominant substrate, and losing contact with off channel water courses in the flood plain. Diking and channelization has encouraged further downcutting of the channel and otherwise reduced winter rearing habitats. Effects of such entrenchment are that former depositional and shallow intertidal areas with high-quality habitat have now become transport reaches, moving wood and substrate out of the system and into the open estuary. Dredging of gravel from the mainstem Umpqua is also a major activity (Anon. 1974).

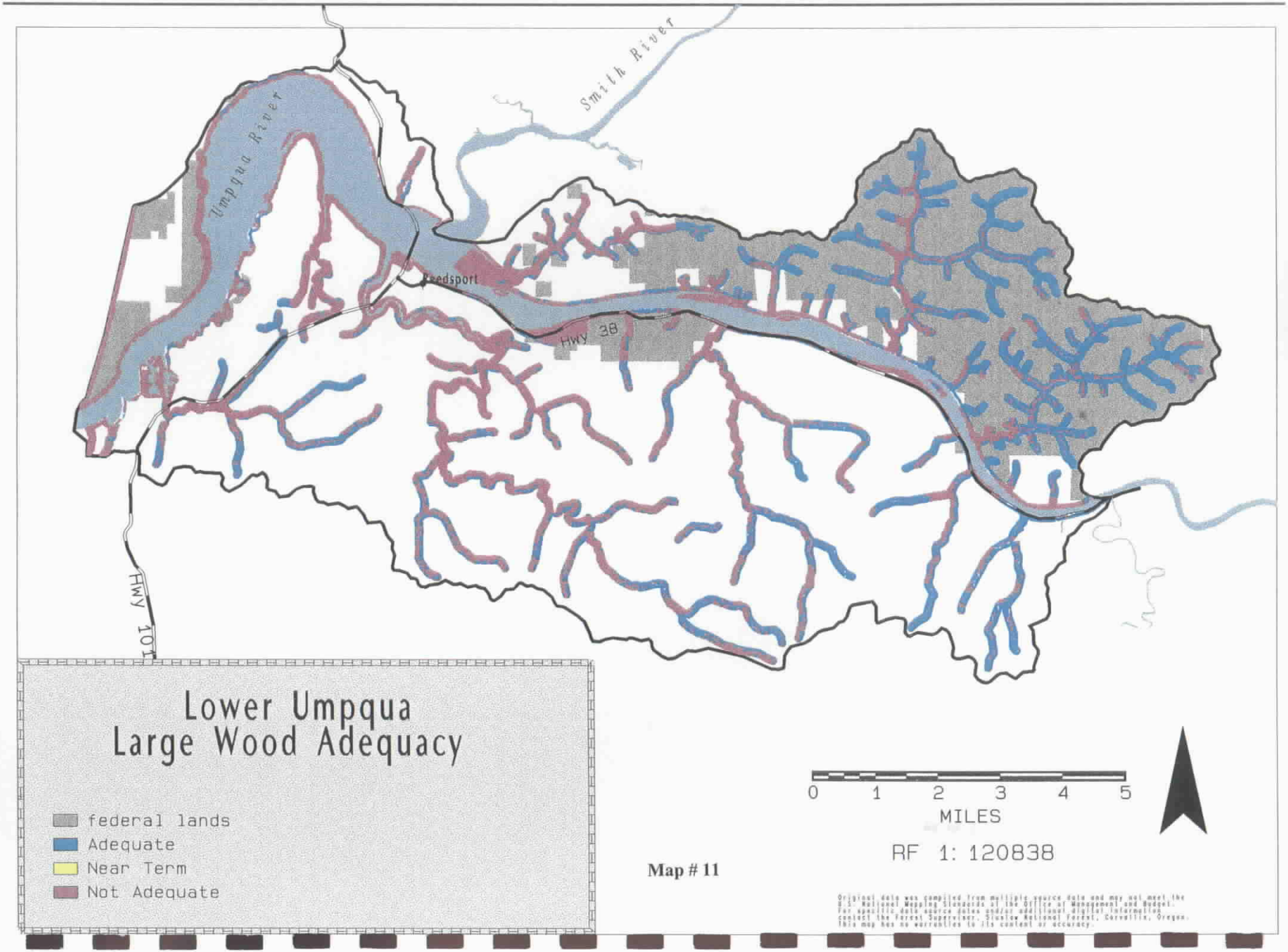
These early homesteading efforts have resulted in extensive low-lying, fresh-and saltwater marshes and tidal flats being converted through diking and channelization into dry pastureland at the mouths of Dean, Butler, and Providence creeks and other streams. Also, historic deltas, sloughs, and flats at Scholfield Creek (LUHS 1976) and probably Winchester Creek as well have been rigidly confined and more permanently cut off from their floodplains to allow filling for municipal, port, and industrial development in the Reedsport-Winchester Bay vicinity. These wetlands were important for control of flood waters. The effect of converting wetlands is that runoff is much more rapid and peak flows in the major streams and possibly the main Umpqua have become more frequent, longer lasting and higher.

WATER QUALITY

Streams within the subwatersheds appear to have stream temperatures higher than optimum for salmonid production. As a result, they are marginal for summer rearing of salmonids. Stream surveys during mid August, which is often the time of maximum stream temperatures, found through grab samples that all major streams had maximum temperatures of 70^0F. These point samples, however, probably did not capture the maximum stream temperatures that occurred. Continuously recording temperature probes are needed to document maximum stream temperatures.

The Scholfield-tidal area of the Lower Umpqua and the entire Lower Umpqua within the analysis area have been listed by DEQ as exceeding one or more of the water quality parameters on the 303d impaired water body list. The Umpqua mainstem has documented summer water temperature levels that exceed state standards. In addition, the Scholfield-tidal area has elevated fecal coliform levels that may cause dangerous levels in shellfish.

Elevated stream temperatures in tributary streams flowing into the Umpqua from the north are due to stream aspect and variable shade condition, very low summer flows and minimal groundwater inflow.. For federal lands, many of the tributary, and all of the mainstem streams have southerly or westerly exposures. Based on analysis done in



Map # 11

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.

conjunction with the Yachats Watershed Analysis (USDA, 1997) streams with southerly or westerly aspects tend to have warmer temperatures in general but the amount of canopy closure is likely to be more of a determining factor in the temperature of streams than aspect. **Map 12** displays the distribution and concentrations of the high to low quality shade. The mainstems of Franklin, Harvey, Echo, and Butler Creeks are dominated by less than adequate shade. Most streams, with the exception of Butler Creek have adequate shade in the middle and upper tributary reaches.

The influence of altered stream temperature regimes in the Lower Umpqua Basin on other aspects of salmonid life history such as egg to fry survival, emergence timing, incidence of disease, competition and food production are not well understood but are considered important to freshwater survival.

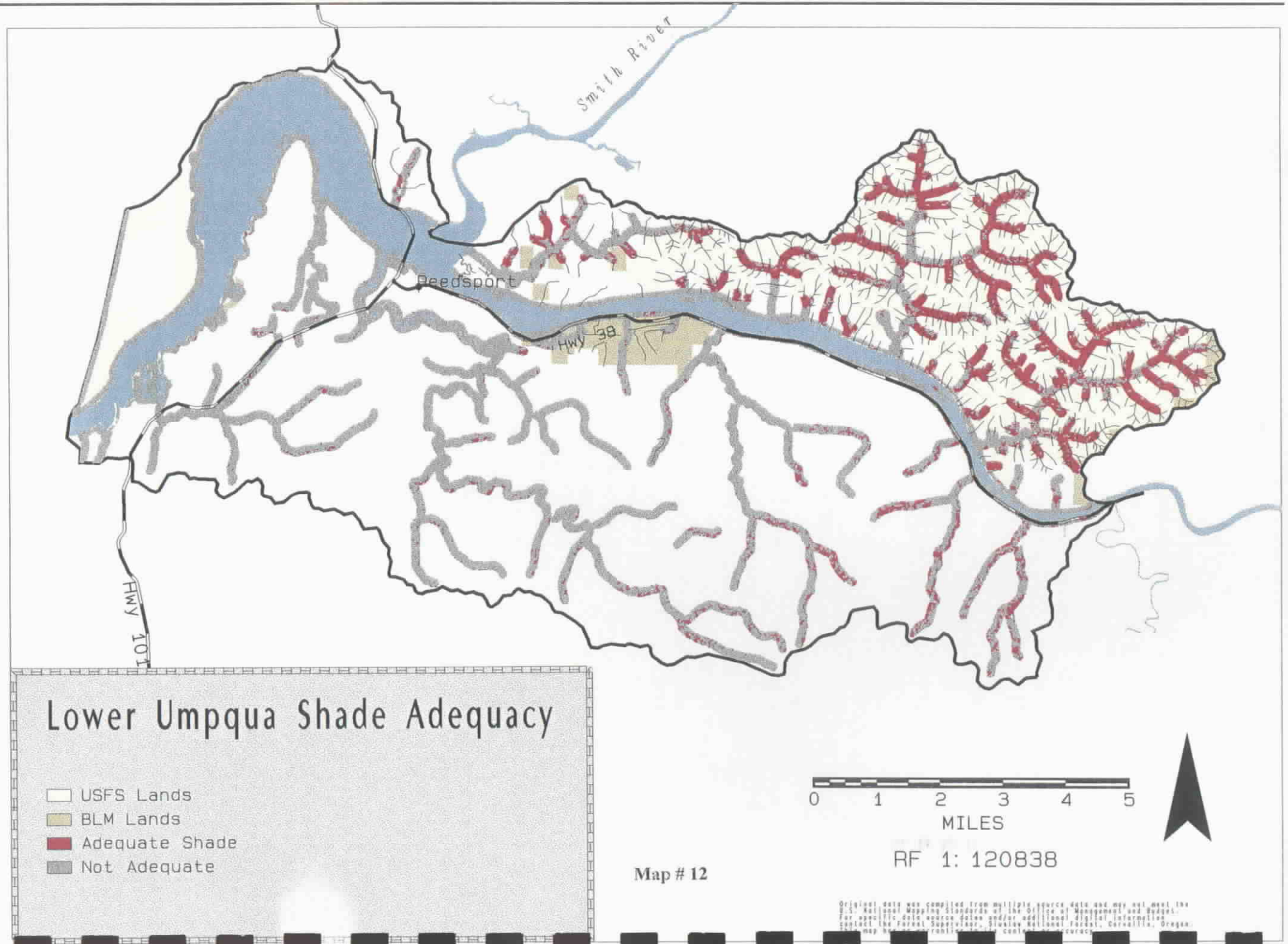
RIPARIAN VEGETATION

Riparian vegetation in the middle portions (transport and deposition reaches) of the stream systems consists of a mixture of mostly hardwoods and some conifer. The riparian zone in Franklin Creek was relatively undisturbed (only 15% of the subwatershed has been logged), yet like in Harvey was dominated by hardwoods and had the least stream shading of any sandstone stream studied (Hicks 1989). Nevertheless, some large conifers are standing right next to the active channel. Repeated landslide activity maintains the early successional hardwood component in many of these stream systems. Patches of pure conifer are common in the upper (source reaches) of streams where slope failures have not occurred, alder dominates the recent failure sites of several headwater streams. Grass/forb communities and scattered alder and maple dominate the agriculturally influenced, lower (deposition reaches) of Franklin and Harvey Creeks.

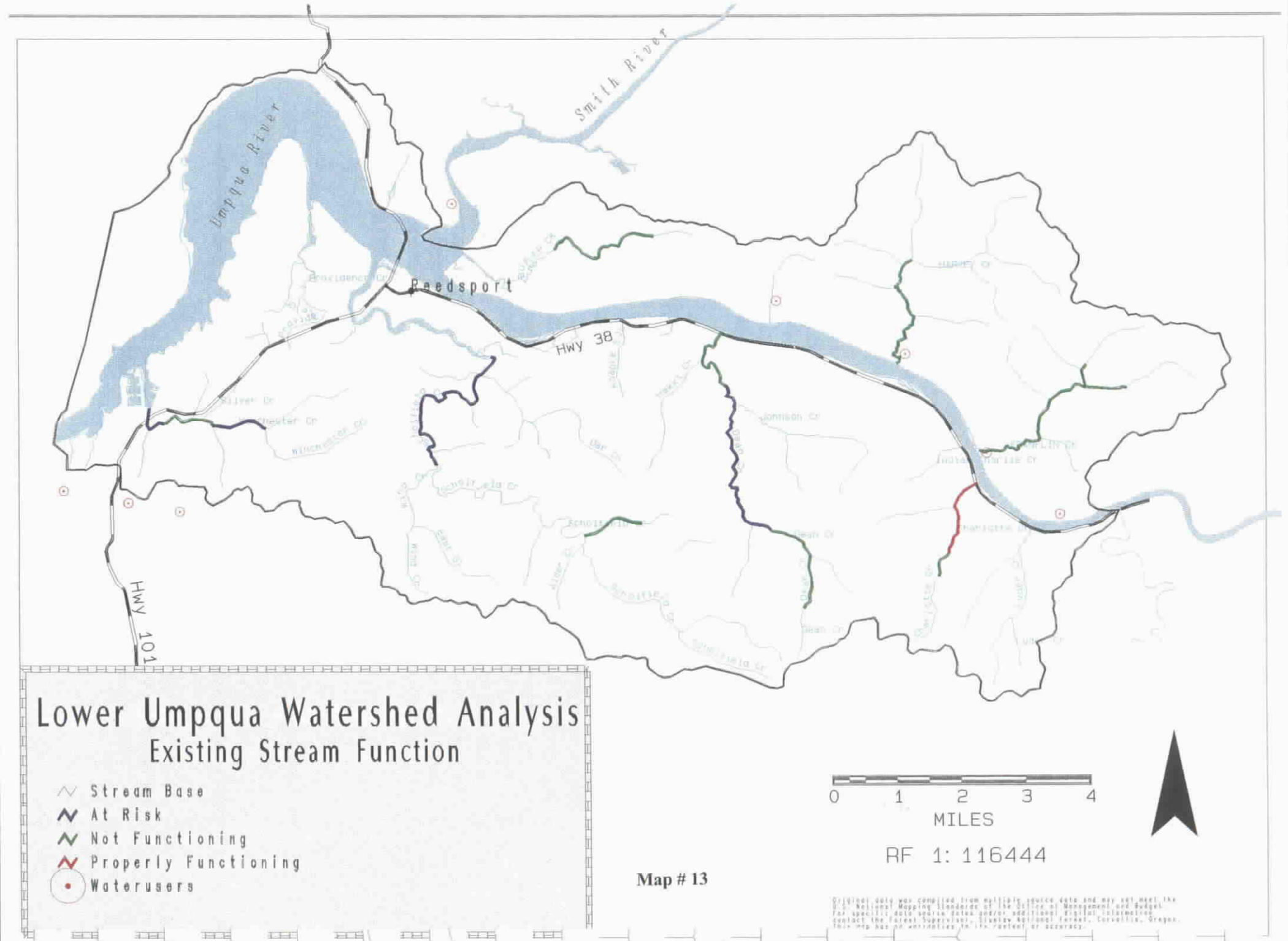
In the 1950's, timber harvest and road construction began to remove riparian vegetation from steeper streams. The result of these activities has been to locally reduce the amount of large conifers available to provide shade, nutrients and a source of future LWD. For the most part, natural succession has been allowed to proceed resulting in small and medium conifers and alders established in most riparian areas. However, it may be several more decades before the riparian vegetation is large and begins to be recruited into the streams. Conifers are expected to be a more dominate component of riparian stands within the next few decades.

WATER QUANTITY

Water use permits from the Oregon Water Resources Department (OWRD) data bases was obtained (**Map 13**). There are 4 state water rights permits for a total of less than 4 cubic feet per second in the National Forest portion of the Lower Umpqua River. Franklin Creek; Harvey Creek, and two unnamed watersheds have one water permit each. All the permits are for domestic and irrigation purposes. None of the permits is for more than 1 cfs. Based on the very low current and historic water withdrawal quantities, none of these water use permits pose any threat to aquatic habitat. All water rights are for


Smith River
Reedsport
Hwy 38
Hwy 101
Lower Umpqua Shade Adequacy
USFS Lands
BLM Lands
Adequate Shade
Not Adequate
0 1 2 3 4 5
MILES
RF 1: 120838

Map # 12


Smith River
Umpqua River
Reedsport
Hwy 38
Hwy 101
Lower Umpqua Watershed Analysis
Existing Stream Function
Stream Base
At Risk
Not Functioning
Properly Functioning
Waterusers
0 1 2 3 4
MILES
RF 1: 116444
Map # 13

irrigation and domestic (one house each) use. The influence that the minimal water withdrawal has had on stream temperatures in these basins has not been documented, but is probably insignificant.

The population of this area has remained very low and stable. Future water supply for the individuals and communities in the analysis area may become an important issue if industry or population growth occurs. In addition, Oregon Department of fish and Wildlife may secure in-stream water rights for aquatic resources, however, at this time, there are no in-stream water rights allocated on these small drainages.

STREAM FUNCTIONAL RATINGS

Quantitative measures of components of fish habitat within seven Lower Umpqua tributaries were taken from existing Level-II stream survey data gathered by the Forest Service (Franklin and Harvey), and sketchy though similar information from elsewhere (Butler, Charlotte, Dean, Winchester and Scholfield; provided by S. McKinney and K. Palermo). These measures of various habitat components were rated according to the Matrix of Factors and Indicators for the Southwest Province Tyee Sandstone Physiographic Area developed for consulting with NMFS on effects of activities on the endangered cutthroat trout (**Appendix C**) (**Map 13**). Ratings were limited to unconfined, low-gradient reaches with good potential for rearing anadromous salmonids (for the most part coho salmon). **Map 13** shows the overall ratings for each stream reach that had completed surveys, while **Table 4** shows how each reach rated for each habitat component. No stream habitat information was available for Mill, Luder, Providence, STEP, and Echo creeks.

Habitat conditions over the entire area are far below their potential. None of the surveyed reaches met LWD criteria; a few met others, mainly temperature, pool area, and road density (only 0.4-2.8 mi./sq. mi. north of the Umpqua). No quantitative measures of estuarine habitats could be made, but the mouths of many of these streams are highly modified and would not be functioning properly.

Reaches that were rated as non-functioning are presently the poorer areas for salmonid rearing. Although some are steeper, somewhat more confined reaches where extensive rearing habitat would not be expected, many others are in places that would have had substantial habitat at one time. Lower Butler, Dean, Franklin, and Harvey creeks probably fall into this latter category.

Several reaches in Charlotte and Scholfield creeks could be functioning reasonably well, although data are very sketchy. Any such reaches might be considerable fish producers (e.g., some areas of Scholfield Creek have good counts of spawning coho; D. Harris, ODFW pers. comm.), with potential for fairly quick gains from restoration. Most streams apparently lack LWD in the channel and associated deep, complex pools. Many reaches

Table 4: Stream Habitat Rating By Component

	STREAM NAME AND SURVEY REACH																									
FACTOR	Butler	Charlotte		Dean								Scholfield				Franklin			Harvey			Winchester			
	1	1	2	1	2	3	4	5	6	7	M	1	2	3	4	1	2	3	1	2	3	1	3	4	
WATER QUALITY																									
Temperature		P	P	N	R	P	R	P	P	P	P	P	P	P	P	N	N	N	N	N	N	R	P	P	
Turbidity																									
Chemical Contam.				N																					
Habitat Access																									
Physical Barriers				N	N	N	N	N	N	N															
HABITAT ELEMENTS																									
Substrate	R															N	P	P	P	P	P				
Large Woody Material	N			N	N	N	N	N	N	N	N	N	N	N	R	N	N	N	N	N	N	N	N	N	
Pool Area	P		N													P	P	P	P	P	N				
Pool Quality		P	N	P	P	P	P	P	P	N	N	P	P	P	P	R	R	R	P	R	N	P	N	N	
Off-Channel Habitat	N																								
CHANNEL CONDITION																									
W/D Ratio	P	P	N	R	N	R	R	N	N	N	N	N	R	N	N	R	R	R	N	N	N	R	N	P	
Streambank Stability	N			N	N	N										N	N	N	N	N	N				
Floodplain Connection																N	N	N	N	N	N				
WATERSHED COND.																									
Road Density	R																								
Disturbance History	N			N	N	N										N	N	N	N	N	N				
Landslide Rates																									
Riparian Resource Cond.	N			N	N	N										N	N	N	N	N	N				
OVERALL RATING	**N**	**P**	**N**	**N**	**N**	**N**	**R**	**R**	**R**	**N**	**N**	**R**	**R**	**R**	**R**	**N**	**N**	**N**	**N**	**N**	**N**	**R**	**N**	**R**	

N= Not Properly Functioning **P**= Properly Functioning **R**= At Risk

in Butler, Franklin, and Harvey meet criteria for extent of pools, but their overall value for providing cover and rearing coho salmon is highly suspect.

FISH POPULATIONS AND DISTRIBUTION

On August 9, 1996, the National Marine Fisheries Service listed the Umpqua River cutthroat trout as "endangered" under the Endangered Species Act. This evolutionarily significant unit includes all anadromous, potentially anadromous, potadromous, and resident cutthroat occurring below natural, impassable barriers in the Umpqua River (**Map 14**). On July 30, 1997 NMFS proposed the entire Lower Umpqua Basin as Critical Habitat for this species. On August 3, 1998, anadromous coho salmon on the mid and northOregon Coast, which includes the Umpqua, were listed as threatened.

Quality of fish habitat varies considerably throughout Franklin and Harvey creeks, but generally is limited by low water levels, high summer/fall water temperatures, lack of cover, and flashiness. Overall, fish habitat and production was rated as fair to poor in 1979-93, but relatively good (qualitatively) by Paul Burns in 1997, with good habitat and densities of coho salmon in some deep pools in certain years. Steelhead and cutthroat trout were present, but not abundant. In some reaches of Harvey Creek, rearing quality appeared to be much better (i.e., 90% of the stream consisted of gravel-bottomed pools), but much of the habitat was probably not used because of warm, low water. In 1979, more tolerant squawfish were the dominant species in lower Harvey Creek. Numbers of salmonids rearing in estuarine areas at their mouths are also probably quite low.

The simplification of habitat and changes in water temperatures described in the previous section, has primarily reduced spawning and rearing of chinook salmon, and summer and winter rearing of other salmonids. Other factors affecting wild anadromous salmonid populations include commercial and recreational fishing, ocean conditions, release of hatchery fish, and naturally occurring and accelerated events such as floods, fire and landslides. On the Coast, fishing in particular removed a significant portion of fish runs, especially when they were in decline. Historically, coho salmon were the main fishery, with chinook next. The productivity of this fishery declined with degradation of coho and chinook habitat which began in the 1900s and probably peaked during 1950 - 1970.

Assuming that fish populations in the analysis area are similar to others on the Coast, wild anadromous runs declined throughout the first half of the century, until in the 1970s many, particularly coho, plummeted. Recent theories are that degraded instream habitat, as well as ocean conditions, which were favorable for coho until they changed for the worse in 1976, have both been at least partly responsible. Estuaries have also changed dramatically since settlement. Dredging of channels, removal of LWD, and filling, diking, and channelization of floodplains have all altered intertidal environments that smolts must pass through on the way to the ocean. Introduction of large numbers of hatchery fish and exotics like shad, striped bass, smallmouth bass, and non-native salmonids have also affected wild anadromous salmonid stocks. Runs of shad and striped

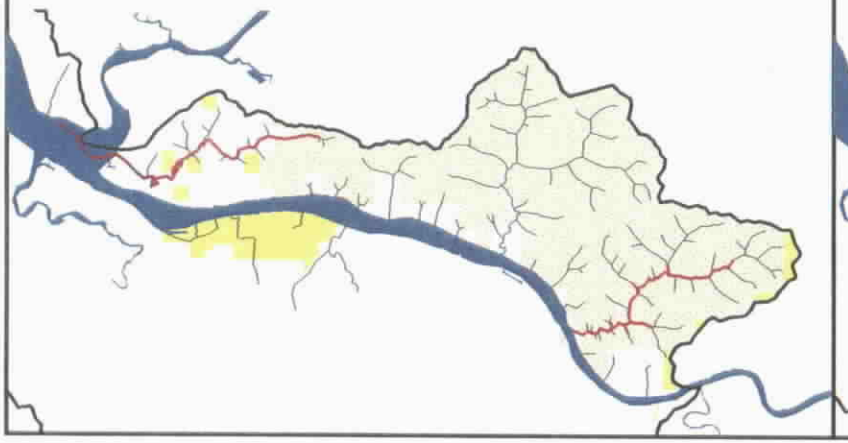
bass became large enough at times to support commercial fisheries in the Umpqua (Anon 1974).

Currently Coho salmon seem to be holding their own in some streams in the Lower Umpqua. Huntington et.al. 1994 found that the Smith River and Lower Umpqua River were two of only six moderately healthy coho populations in the entire state (no populations were considered very healthy). Coho and chinook salmon are being reared by ODFW's Salmon and Trout Enhancement Program (STEP) in a reservoir on STEP Creek built to supply water to the town of Gardiner.

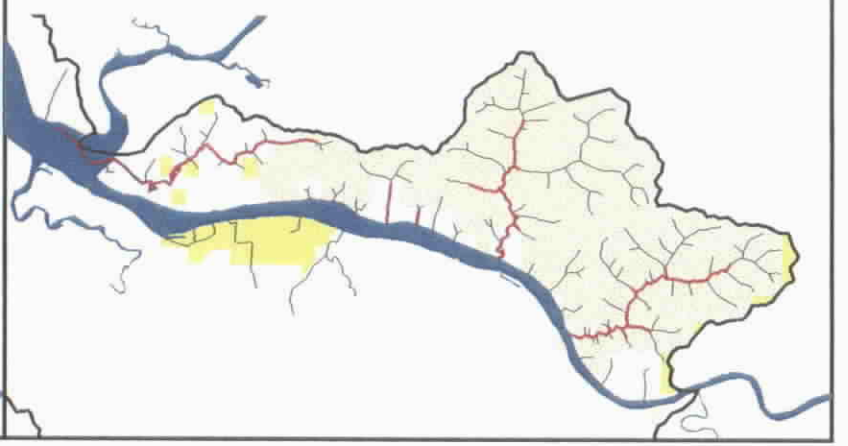
Lower Umpqua

Historic Fish Distribution

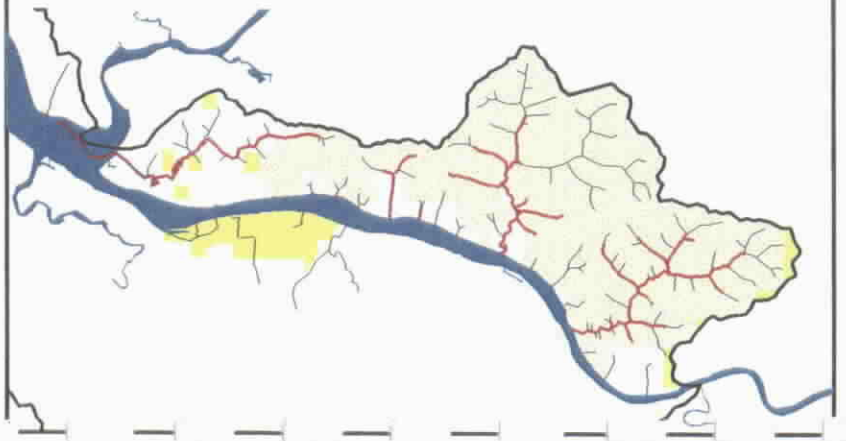
CHINOOK



COHO



STEELHEAD and CUTTHROAT



Map # 14

CHAPTER V: ANALYSIS OF TERRESTRIAL HABITATS AND SPECIES RESPONSE

The vegetation analysis is focused on how changes from historic conditions have altered the suitability of the watershed and larger landscape for some terrestrial species. Current vegetation is analyzed as two interrelated but distinctly separate elements. The first element is the overall amount of particular seral stages of vegetation. The second element is the pattern of particular seral stages of vegetation on the landscape. Interpreted from this is the connectivity of habitats across the landscape which is an important factor in sustaining some species in the Coast Range.

AMOUNT AND PATTERN OF CURRENT VEGETATION

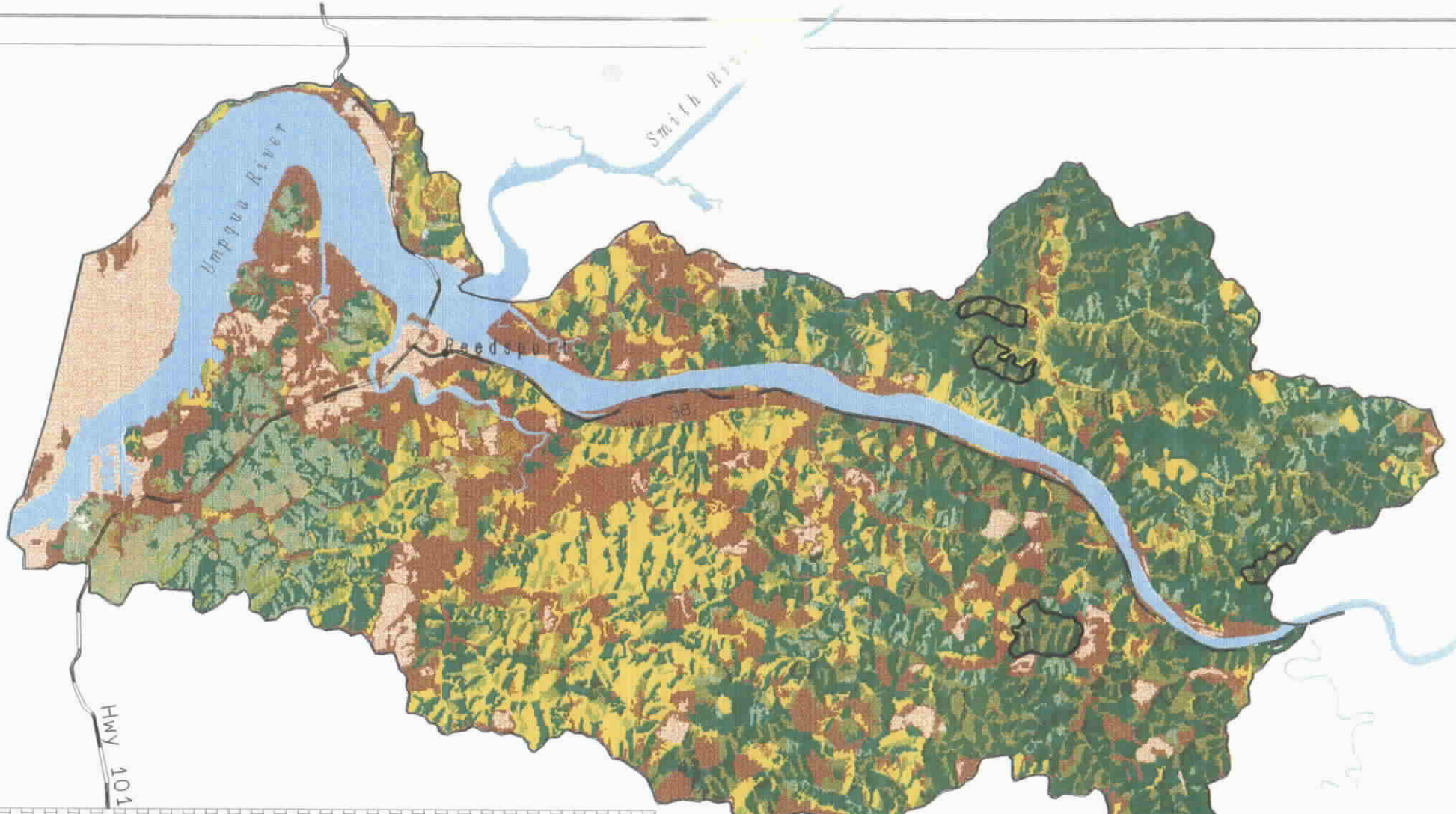
Table 5 and Map 15 display seral stages of current vegetation in the watershed. **Appendix D** displays seral stage of vegetation by subwatershed. The most important seral stages for some selected species (Federally listed and Regional Forester Sensitive from Federal Lands Assessment, Appendix D.6) include mature and old growth conifer dominated communities. Mature and old growth are represented by large and very large (dbh 20-30" and dbh >30" respectively) conifer and conifer/hardwood mix stands.

Table 5: Percent Of Each Ownership in Various Seral Vegetation Groups

Seral Class	USFS	BLM	Total Federal	Other Government	Private	Total
Open	8	1	7	3	10	7
Semi-open	6	42	10	19	29	21
Broadleaf	10	27	12	14	20	16
Small Mixed Con/Hwd	<1	<1	4	1	2	1
Medium Mixed	1	2	1	2	5	3
Large Mixed	20	11	19	14	14	15
Very Large Mixed	19	8	18	18	6	13
Small Conifer	<1	0	4	<1	3	1
Medium Conifer	9	2	8	6	8	8
Large Conifer	22	4	20	17	2	12
Very Large Conifer	4	2	4	5	<1	3

Shaded rows are considered mature to old-growth forest habitats

This is a lower productivity landscape than that of the Coast Range to the north. Historic mapping of the area by County personnel in the late 1940's (**Map 16**) indicates that except for some isolated patches of large trees which probably survived the fire, the



Lower Umpqua Watershed Analysis

Current Vegetation Seral Stages

- Shadow and clouds
- Water
- Open
- Semi-open
- Broadleaf
- small mixed
- Small conifer
- medium mixed
- Medium conifer
- large mixed
- Large conifer
- very large mixed
- Very large conifer
- Centers of Bio Diversity

0 1 2 3 4

MILES

RF 1: 116444

Map # 15

May 19, 1998

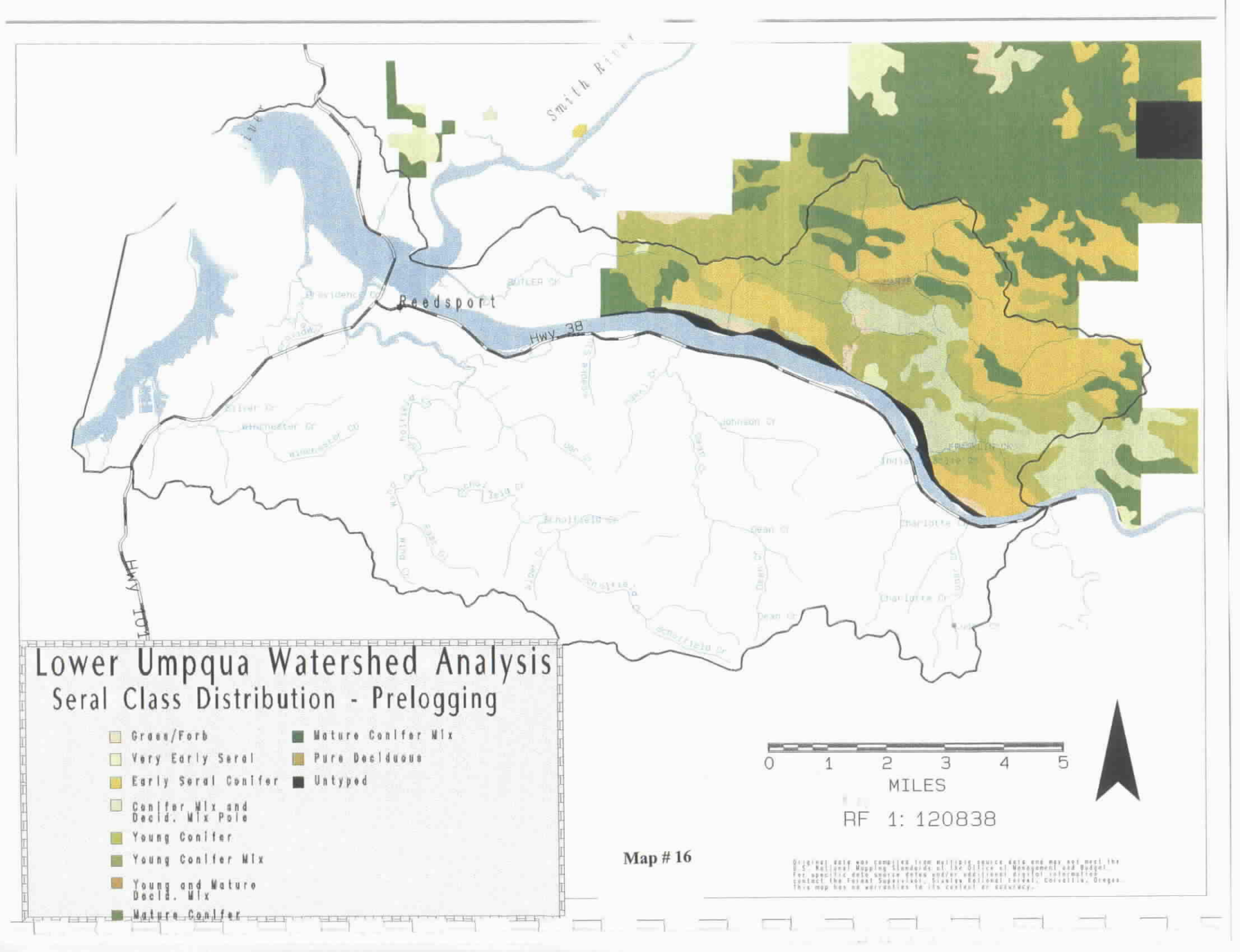
Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Bureau of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.

majority of the landscape was less than 20" diameter trees. That mapping occurred about 70 years after the Coos fire. The poor tree growth may indicate a low site productivity. The inherent soil properties, especially on the steep, shallow soils in the eastern portion of the watershed, limit the ability of this area to rebound after a disturbance. As a result, it takes a long time to grow large trees in this area. Inherently, large blocks of contiguous large and very large mature vegetation are naturally fragmented for long periods. The result is a marginal landscape for late-successional wildlife species.

Currently there is a combination of seral vegetative conditions on the landscape. Overall, about 30% of the watershed has been harvested and is now in open, semi-open or small conifer classes (**Map 17**). Harvest has been greater on private land (about 46% harvested) in the western portion of the watershed than on the northern portion of the Elliot State Forest (about 22% harvested) and on federal lands (about 13% harvested). Sixteen percent of the landscape is currently occupied by hardwood species. About 11% of the landscape are natural conifer and conifer\harwood mix stands that are slow growing and are in the 10-21" diameter class. The remaining 43% of the watershed is in a mature/old-growth condition. The overall amount of mature/old-growth conifer habitat in the lower Umpqua today is likely less than the average amount that existed in the watershed over the past 100 -10,000 years. Only 23% of the private lands in the western portion of the watershed are currently mature. That percentage is expected to be reduced in the future. Mature forests currently occupy 64% of Elliot State Forest lands and 61% of federal lands in the watershed.

Human influence in the watershed has slowly shaped the existing vegetation patterns over the last 100 years, most intensely over the past 50 years. Under natural disturbance regimes (i.e. fire and wind), the changes in mature habitat likely took place over relatively short periods of time. There are several consequences from a slow loss of mature/old-growth habitat and the resultant slow stepwise recovery of vegetation. Due to the varied seral conditions spread across the landscape. The area becomes colonized by species that would otherwise have a low probability of occurring in the area or would not occur in such high numbers. Some of these species have direct or indirect impacts that are additive to impacts from habitat loss alone. Examples include great horned owls that prey on northern spotted owls, and crows and jays that prey on marbled murrelet eggs and young. In addition, the conversion of mature/old-growth forests to grass and early seral communities adjacent to ocean environments result in a loss of complex forest communities that historically served as refugia when large scale natural disturbances impacted inland forests. Examples include marbled murrelets and non-vascular plants in near ocean habitats serving as seed populations when inland forests lost to fires become suitable once again.

Logging and agricultural/ residential use of the watershed have changed not only the amount of mature/old-growth but also it's pattern on the landscape. The location and duration of disturbance on the landscape is different than what would be expected under natural conditions. The western most portions of the watershed that have been most extensively harvested are the areas least likely to have burned and most likely to have


Smith River
Reedsport
Hwy 38
HWY 101
Lower Umpqua Watershed Analysis
Seral Class Distribution - Prelogging
Grass/Forb
Very Early Seral
Early Seral Conifer
Conifer Mix and Decid. Mix Pole
Young Conifer
Young Conifer Mix
Young and Mature Decid. Mix
Mature Conifer
Mature Conifer Mix
Pure Deciduous
Untyped
0 1 2 3 4 5
MILES
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Map # 16

Table 6: Acres of Mature and Interior Forest Habitat By Ownership

Seral Class	USFS	BLM	Total Federal	Other Government	Private	Total
Acres of Mature Forest Habitat	9,092	415	9,507	9,757	5,757	25,021
Percent of Ownership that is Mature	65%	25%	61%	64%	23%	43%
Acres of Interior Forest Habitat	3,218	20	3,238	2,192	78	5,508
Percent of Mature that is Interior	35%	5%	34%	22%	1%	22%
Percent of Ownership that is Interior	23%	1%	21%	11%	<1%	9%

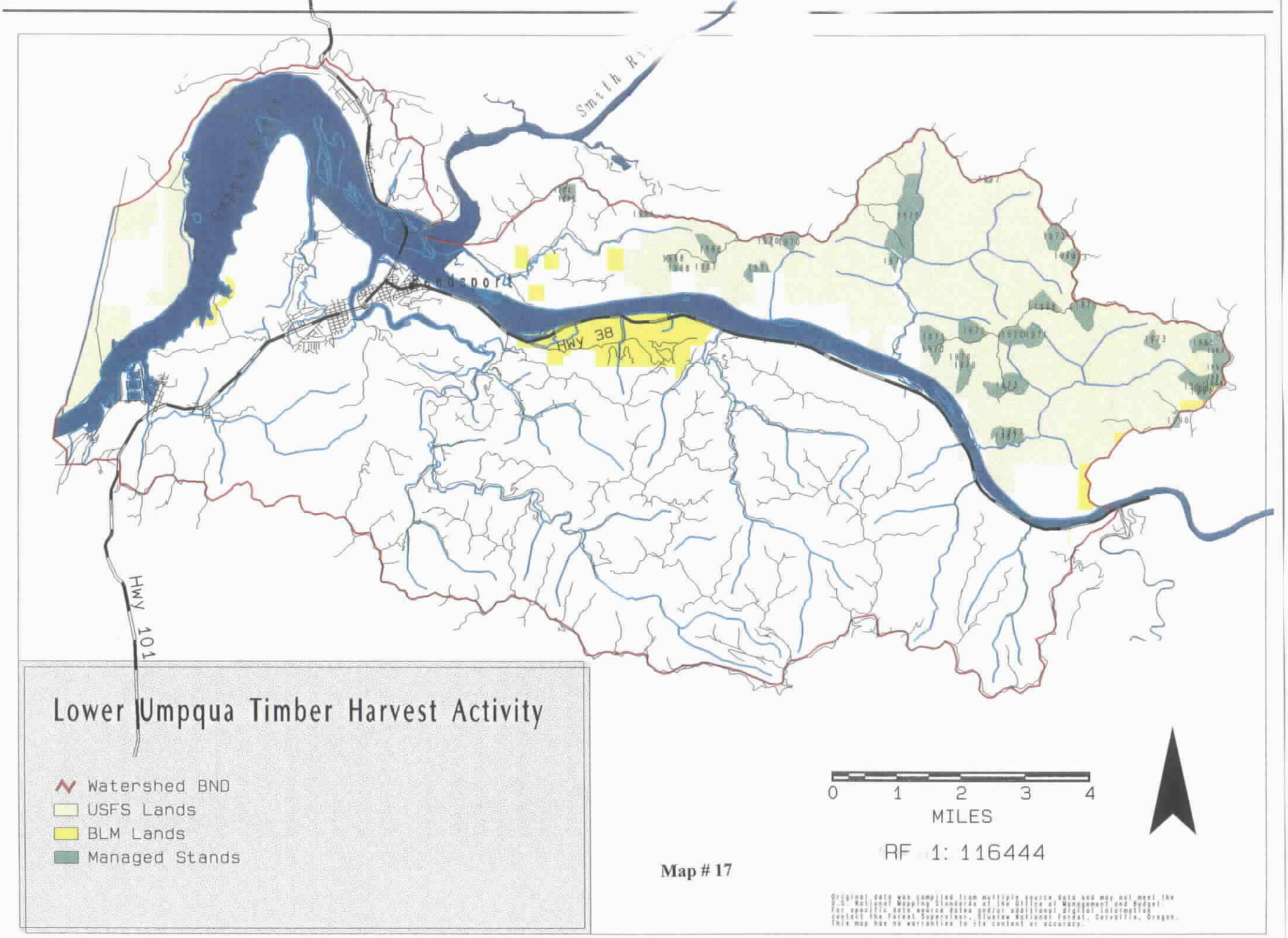
CENTERS OF REMAINING HIGH QUALITY LATE-SUCCESSIONAL AND OLD-GROWTH HABITATS

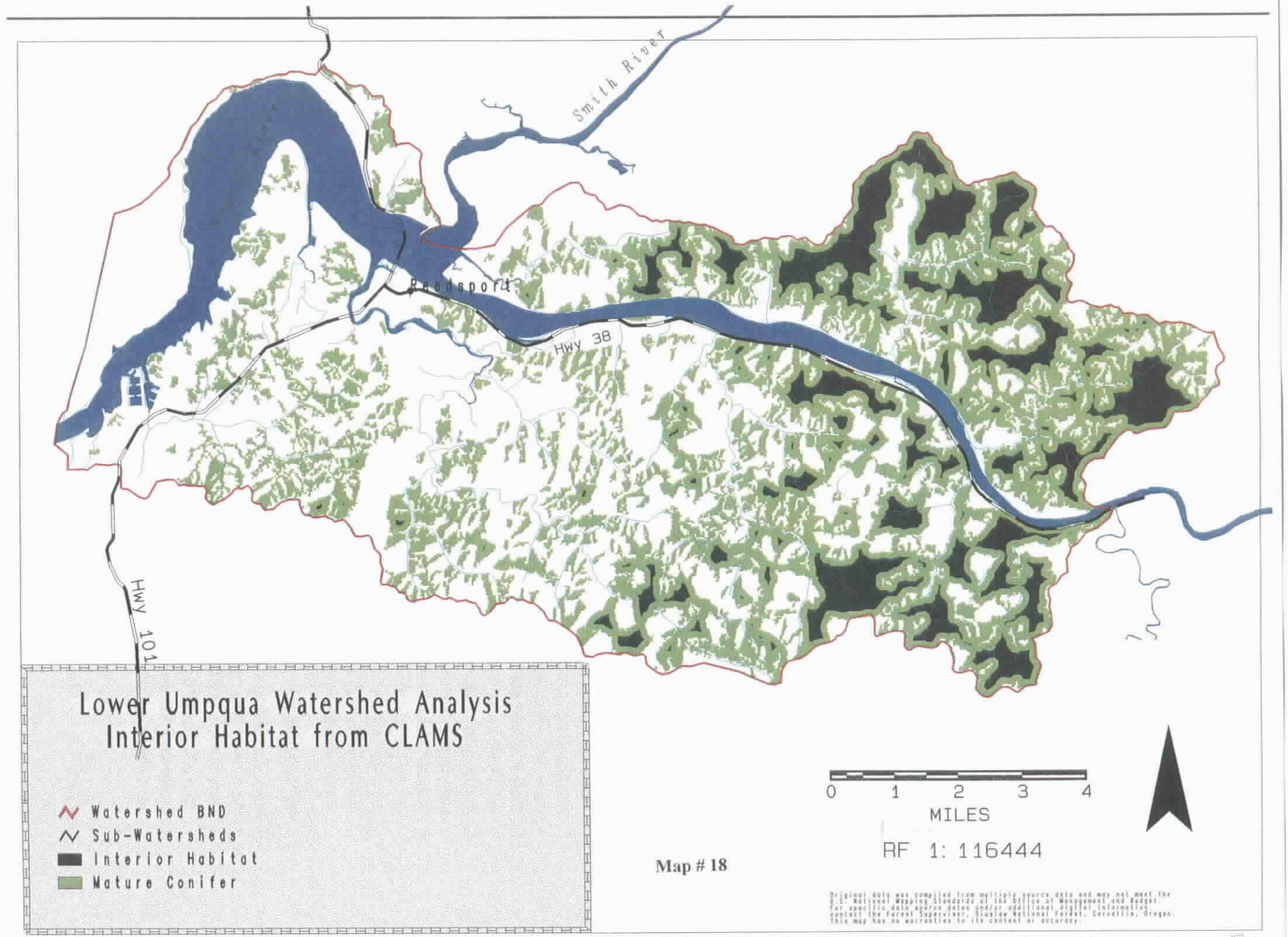
Terrestrial habitats vary widely in their ability to provide suitable environments for multiple species. Biodiversity in late successional and old-growth forest habitats is closely linked to the number of tree species, age, and amount, type and location of structural components (snags, down wood, crown/limb damage, etc.).

There are 4 main areas in the lower Umpqua watershed today that might meet most characteristics associated with the habitat complexity afforded by late successional forests (**Map 15**). The distribution of these late successional habitats are likely far fewer than what occurred historically in the watershed. Historically more and larger sites would be anticipated over the long term. Timber harvest, residential, and agricultural uses over the past 5 decades have reduced the number and size of areas with complex structure and high species diversity. The current situation has less redundancy of these late successional habitats on the landscape as reservoirs of biodiversity from which species can recolonize other areas as habitat becomes suitable. This lack of redundancy places mature/old-growth dependent species with small home ranges or minimal dispersal mechanisms at greater risk of extirpation in the watershed. As a result, the value of these small high quality late successional habitats is heightened.

RIPARIAN AREAS

Riparian habitat in the watershed has been altered primarily along the main Umpqua River and lower tributaries. Terrestrial habitats within riparian areas have been altered from historic conditions by timber harvest and road construction activities as well as by residential housing developments. These changes are most apparent on the Elliott State Forest and private lands. Terrestrial habitats associated with riparian conditions have also been altered on portions of federal lands in mid-Harvey, upper Franklin, and Butler


Smith R
Reedsport
Hwy 38
Hwy 101
Lower Umpqua Timber Harvest Activity
Watershed BND
USFS Lands
BLM Lands
Managed Stands
0 1 2 3 4
MILES
RF 1: 116444
Map # 17
Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source notes and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.



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Creek. Consequences of riparian disturbance that deviate from historic conditions include disruption of reptile and amphibian dispersal up and down drainages and loss of forest structure (large woody debris) that provides protection from hot and dry summer weather patterns.

BOTANICAL RESOURCES

Vascular Plants

Plant habitats and botanical resources have been greatly altered over the past 5 decades when compared to historic conditions. Saltmarsh and tidewater habitats as well as areas of native dune have all been adversely impacted by human activities. Native saltmarsh species and inhabitants of tidal areas occur on less acres today when compared to historic levels due to diking and channelizing of streams along the Umpqua River.

An important concern in the lower Umpqua watershed is noxious weed species. Noxious weeds were introduced or expanded due to forest road building, clearing of land, or other surface disturbances that made soil/surface conditions suitable for invasion. Most species existed at very low levels and did not spread to unaffected areas until large scale forest management opened areas to vehicles throughout the year. Species known or suspected to occur within the watershed are in **Appendix E1. Appendix E1** species, once established, have the capacity for long term site occupancy (20+ yrs) and the potential to disrupt natural successional development. **Appendix E2** includes species which are aggressive colonizers of disturbed sites but require frequent disturbance (such as grazing or roadside brushing) for long term site occupancy. Species on lists 1 and 2 are generally recognized as "problem species" of ecologic and/or economic importance. Highlighted species are those currently listed on the Oregon Dept. of Agriculture - Noxious Weed List. The South Coast - Northern Klamath LSR Assessment, Bureau of Land Management lists additional species of noxious weed/invasive vegetation that could impact the lower Umpqua watershed area.

Nonvascular Plants

Nonvascular plants have been inventoried for the purpose of long term monitoring and based on a landscape grid of 3.4 mile spacing (CVS plots). Species found on these plots are listed in **Appendix E3**.

SPECIAL HABITATS

Special habitats include sloughs, saltmarshes, and freshwater ponds. These habitats contain unique plant and animal species often times found nowhere else in the watershed.

One area of special habitat is the Dean Creek Special Recreation Management Area (Elk Viewing Area) and Spruce Reach Island. Herptile surveys were conducted by the

Umpqua Resource Area, Coos Bay District, Bureau of Land Management on May 12, 19, and 26, 1996. Species found during the survey are included in **Appendix G**.

EFFECT OF VEGETATIVE CHANGES ON TERRESTRIAL WILDLIFE COMMUNITIES

There is a wide variety of species that inhabit the many seral stages and vegetative types in the lower Umpqua River watershed today. Species that are high priority for analysis in this watershed are those primarily associated with late seral forest communities and listed in the South Coast - Northern Klamath LSRA, BLM 1997, Appendix C). Three species most commonly mentioned as late seral associates and are analyzed here are northern spotted owl, northern bald eagle and marbled murrelet. Two other species analyzed but are not late seral associates are Roosevelt elk and western snowy plover. Elk is an important game animal in western Oregon and therefore warrants analysis. Western snowy plover is Federally threatened and inhabits the dunal system close to the ocean on the north side of the Umpqua River.

NORTHERN SPOTTED OWLS

There are 5 pairs of owls in the lower Umpqua River watershed (3 on the Elliot State Forest and 2 on the Siuslaw National Forest). The amount of currently suitable owl habitat is considered limiting if below approximately 1,900 acres within the median home range radius of 1.5 miles around each owl pair location. All pairs are in very good condition from a habitat standpoint. Habitat conditions varied from a minimum of 1,850 acres for pair 82919 to a maximum of 3,430 acres (**Appendix F1**). The best owl habitat occurs on the eastern 2/3 of the lands on the north side of the Umpqua River and on the eastern 1/3 of the lands on the south side of the Umpqua River.

MARBLED MURRELETS

There are 8 occupied marbled murrelet sites in the lower Umpqua watershed, 7 on the Siuslaw National Forest and 1 on BLM land at Spruce Reach Island. Murrelet habitat needs include large mature conifer or old growth trees with large limbs (>8" diameter) with accumulation of debris or moss clumps as suitable platforms for egg laying and incubation. Also important is the placement of suitable nest trees in the stand (i.e. interior forest conditions are best) as protection against predators and adverse weather conditions. Suitable habitat is considered limited if there is less than 500 acres of mature conifer within 0.5 miles of occupied locations. Suitable murrelet habitat in the western portion of the lower Umpqua watershed is very limited as a result of timber harvest and private land development (**Appendix F2**). The best murrelet habitat in the lower Umpqua watershed are the interior mature conifer patches in Echo, Harvey and Franklin Creeks and the upper reaches of Charlotte, Luder and Footlong Creeks along the Umpcoos Ridge on Elliott State Forest land. The Umpqua River serves as a movement corridor directly from the marine environment and therefore provides easier access to suitable habitat than on other landscapes.

NORTHERN BALD EAGLE

There are 3 active northern bald eagle sites in the lower Umpqua watershed. One is on Bureau of Land Management land and the other 2 on National Forest System lands. **Appendix F3** presents the location of each. Eagles are territorial and do not tolerate other eagles within nesting territories. The distance between each active nest site even in areas of optimal habitat is rarely less than 2 miles. The eagle nests in the lower Umpqua River are approximately 2 miles apart in the reach between Butler Creek and Echo Creek. This density of nesting eagles indicates that habitat in this area is near optimal and is at capacity. Other areas in the lower Umpqua watershed are not occupied but contain suitable eagle habitat (Franklin and Harvey Creeks on the north side of the Umpqua and from Dean Creek east on the south side).

ROOSEVELT ELK

The lower Umpqua River watershed contains a wide variety of habitats that are all used by elk. Elk use both forested and non-forested types to meet their yearlong nutritional and security needs. The capability of lands to grow and support elk are closely correlated with landforms in any particular drainage. A detailed description of elk capability classes is in the Federal Lands Assessment (Appendix D.13). The entire lower Umpqua watershed is classified as Low Elk Capability due to steepness of slopes, dry habitat conditions and lack of natural benches and seep areas. Current habitat conditions for elk in the watershed are better than other Forest areas however due in large part to the amount of natural forest cover and low road density, both adding to the over elk security in the area.

The Dean Creek Special Recreation Management Area is particularly attractive to elk due to availability, quantity and quality of yearlong forage. Although the area was historically a saltmarsh/estuarine environment not used by elk, currently it is heavily used due to meadow management, the highway and tidegates.

WESTERN SNOWY PLOVER

Western snowy plover are small shorebirds that inhabit dunal areas close to ocean beaches and inland on selected habitat sites. The lower Umpqua watershed has one area where plovers nested historically but has been lost to beachgrass and Scotch broom vegetation. Many dunal areas in the watershed along the north spit of the Umpqua River were once open sand that supported distinctly different plant and animal communities than exist today. All along the Oregon coast and in the western most portions of this watershed, large areas of European beachgrass and Scot's broom and the threat of gorse have replaced areas that were historically characterized by constantly moving sand, driftwood, sparse vegetation and few if any predators such as skunks, opossum, crows, raccoons, and domestic cats and dogs. As a result of dune stabilization, open dunal area habitat is declining while wetland habitat is increasing.

SURVEY AND MANAGE SPECIES

Survey and manage species that occur in the Coast Range and could be present in the lower Umpqua watershed are found in the Federal Lands Assessment. (Appendix D.5). Red tree vole habitat has been analyzed following the current protocol and found to be above (40%) which is the level that is needed to require survey prior to alteration of suitable habitat (conifer stands >10" DBH). No other survey and manage species surveys have been completed in the watershed area.

CHAPTER VI: RESTORATION OPPORTUNITIES

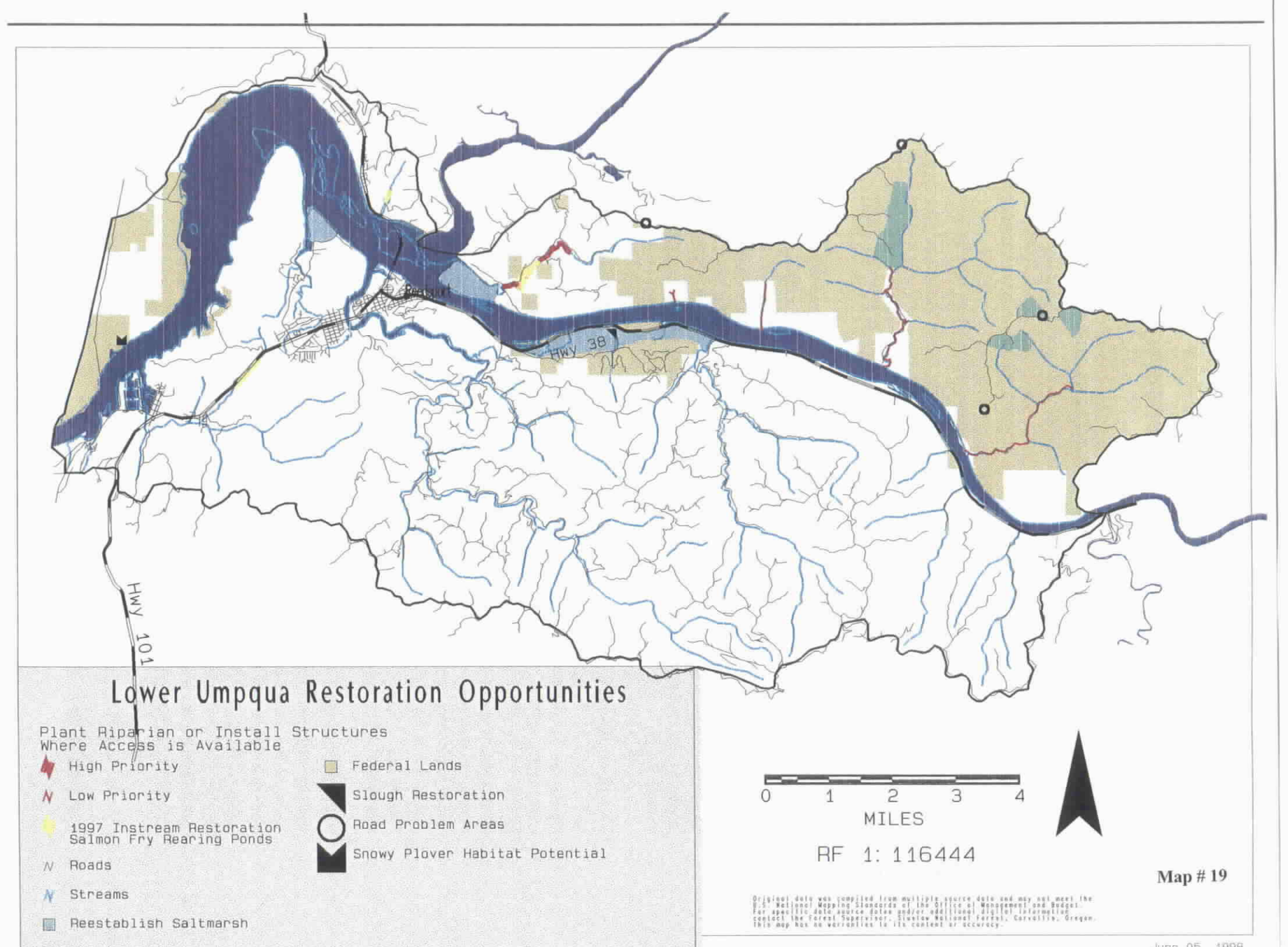
Restoration opportunities relate to the issues identified in Chapter II. Loss of tidal influenced wetlands and associated habitat for fishery and wildlife species is the biggest change in this watershed analysis area. Restoration should focus on reclamation of extensive inter-tidal areas for a variety of fish species and more limited in-stream reaches for rearing of coho and Umpqua cutthroat trout. **Table 7** identifies areas where specific resource functions have been altered and suggests opportunities to restore those resources. Urbanized areas, where the level of development and land use has been altered dramatically, were not considered for restoration.

ISSUE: RECOGNITION OF INHERENT INSTABILITY IN THE LANDSCAPE

This is a highly unstable landscape. Accelerated landslide activity due to forest management in this area was recognized prior to extensive forest harvest activities on National Forest land. Most harvest areas have been reestablished with conifer vegetation that is currently over 25 years old. Studies on accelerated landslide rates have shown that by 20 years of age, the root strength of the soil is reestablished by the new crop of trees and accelerated landslide rates from initial clearcut harvest activities are no longer expected. No inhabited structures were identified to be in jeopardy from landslides from federal lands.

Natural landslides from most of the in-tact forested areas would leave debris and sediment deposits in the 1st or 2nd order channels and create good fish habitat. A few headwalls that are susceptible to landslide activity have been harvested and the composition of the landslide deposit would be changed since the large woody debris component would be lacking. A landslide track analysis highlighted specific headwalls, in which debris torrents, if initiated, would run for long distances and scour intervening reaches to bedrock before depositing in lower stream gradient reaches. These landslides could potentially damage long stretches of productive fish habitat (**Map 9**). These high impact areas are the primary zones of opportunity for restoration. Timber harvest of any kind in high impact areas must keep in mind the central goal of preserving or improving the overall root strength and soil integrity

Other key headwall areas are highlighted to be protected from accelerated landslide activity which may result from road crossings (**Map 19**). Road maintenance in those areas must be especially vigilant to control runoff and ensure stabilization of sidecast material. Waterbars must be maintained to work properly. Since most National Forest roads (excluding ATM Roads i.e. FS Road 1145) in the watershed are ridgetop and not needed for other management opportunities, roads should be allowed to grow closed naturally. BLM roads were not included as part of this assessment and should be considered as part of their TMO's for this area.



Lower Umpqua Restoration Opportunities

Plant Riparian or Install Structures
Where Access is Available

- High Priority
- Low Priority
- 1997 Instream Restoration Salmon Fry Rearing Ponds
- Roads
- Streams
- Reestablish Saltmarsh
- Promote Late Seral Conditions
- Federal Lands
- Slough Restoration
- Road Problem Areas
- Snowy Plover Habitat Potential

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MILES

RF 1: 116444

Map # 19

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June 05, 1998

ISSUE: PROTECTION AND ENHANCEMENT OF AQUATIC HABITAT CAPABILITY

Most "source and "transport" sections in the area (**Map 10**) are under federal and state management. In these areas, it is very important to maintain upslope vegetation so that any landslides provide a mixture of wood, rocks, and soil that will slowly move through the stream system and create complex fish habitat. This is particularly true for headwall areas that are likely to produce landslides that travel long distances and scour fish habitat and deposit unsorted sediments over cleaner gravels in the depositional area (**Map 9**) Stream crossings of roads in these areas should focus on allowing passage of the entire composition of any landslide material, especially the large wood component.

Franklin Creek has been designated as a Key Watershed in the Northwest Forest Plan. In view of the overall poor condition of water flow and quality and often marginal fish habitat documented in this analysis for both Franklin and Harvey creeks, designation of Franklin Creek as a Key Watershed appears questionable despite its relatively uncut and unroaded condition. Such a designation implies that the stream can serve as a refuge for anadromous population during recovery efforts, and/or as a possible place to focus restoration activities. Federal portions of the watershed, is relatively intact on a landscape scale, but due to the inherent in-stream habitat and water flow characteristics, seems to offer little opportunity of harboring large, healthy fish runs. Designation as a RNA or similar area for study of its unusual stream conditions and processes seems more appropriate.

Most "depositional" channels (**Map 10**), are on private and Elliot State Forest land. Although many of these reaches now are confined by valley-bottom roads and pass through open fields (i.e. Dean, Butler, Harvey), they contain the greatest potential for freshwater fish habitat. Where access is available restoration of standing water, i.e. deep complex pool habitat through installation of structures, would benefit anadromous fish runs in the short-term. Restoration of instream aquatic habitat components, especially large woody debris were initiated in sections of Butler and Winchester (Silver) creeks in 1997 (**Map 19**). Restoration of coniferous vegetation in riparian areas would provide habitat in the future. In areas where major in-stream habitat restoration is not feasible due to poor access and/or limited flows, stream side planting of conifers is proposed to shade the channels and increase LWD in the long-term.

Loss of inter-tidal wetlands and salt marsh has been extensive in this watershed. The loss of this habitat type effects not only fisheries but also wildlife species. The hydrologic benefits from these areas, of buffering flows, has also been lost. The salt marsh at the mouth of Butler Creek is the only relatively in-tact wetland system. Others, i.e., Winchester Bay, Winchester Creek, STEP Creek and Scholfield Creek, Reed Creek, and Dean Creek areas have been extensively altered. A few of these altered systems are currently being grazed and little development of the area has occured. Acquisition, breeching of dikes and removal of tide-gates could initiate the restoration of these critical

habitats. In other areas, where extensive residential and/or commercial development has occurred, the loss of habitat and its hydrologic function is more permanent.

ISSUE: OPPORTUNITIES TO ACCELERATE ATTAINMENT OF LATE-SUCCESSIONAL FOREST HABITAT CONNECTIVITY

In assessing needs to accelerate late-successional forest conditions, it was determined that, on a large scale, given the seral status of most of the Siuslaw National Forest landscape, this area is a relatively in-tact mature conifer forest. Although clearcutting was done in this area, the level of harvest was not significant enough to cause widespread disruption of contiguous mature conifer forest. For the Siuslaw National Forest as a whole, this area is a low priority for treatment. However, on a smaller scale, within this analysis area alone, six harvest units were identified as focus areas for the acceleration of attainment of late-successional conditions (**Map 19**). Low stand productivity and scattered nature of existing conifer within these plantations, however, indicate that little can be done to accelerate growth. Suggestions are made in **Table 7** to introduce large conifers into previously harvested areas to bridge micro-climates and create habitat for low mobility species that have been isolated.

There is an opportunity to restore snowy plover habitat directly across the Umpqua River from Winchester Bay boat basin on the North Spit (**Map 19**) in T. 22 S., R 12 W., Section 07, it is the only area where habitat restoration for snowy plover is feasible within this analysis area.

Table 7: Summary of Resource Condition and Restoration Opportunities

Issue	Resource Component	Ecological Function or Attribute of Concern	Location	Restoration Opportunity
Slope Stability	Key Headwalls that directly affect fish habitat - other headwalls with high landslide susceptibility	Aquatic habitat quality, sedimentation due to road construction and past timber harvest activity	see **Map 9**	Heightened maintenance on ATM roads in these areas. Obliterate spurs, most are already waterbarred, ensure waterbars are functioning. Block and let spur roads grow closed naturally. Special protective measures in these areas if thinning is employed.
Aquatic Habitat	Pools - Rearing Habitat	Loss of rearing habitat, particularly important for coho	Non-federal "depositional" streams	Rare, moderately healthy populations of coho will benefit from any restoration of standing water habitat. This is important for maintaining these unique populations. Activities could include installation of complex large wood habitat structures, or encouragement of beaver activities.
Aquatic Habitat	Stream channel complexity	Loss of LWD due to stream cleanout and logging by private land owners Clearing of stream side vegetation for pastures. Water quantity naturally limiting, flashy system, low water storage capacity of both soil and rock.	Unnamed Tributaries to Lower Umpqua, Harvey and Franklin Creeks	Priority is to restore riparian vegetation to decrease stream temperatures and increase and retain flows. Flows may be too low for significant benefits from instream structures. Limited potential for coho and cutthroat restoration but important to initiate long-term recovery. Encourage beaver activity (must provide food source). Harvey Creek - ensure that road access allows channel migration. Acquiring private land here is NOT a priority, benefit does not outweigh costs involved.

Table 7 cont.: Summary of Resource Condition and Restoration Opportunities

Issue	Resource Component	Ecological Function or Attribute of Concern	Location	Restoration Opportunity
Aquatic Habitat	Inter-tidal Wetlands	Loss of rearing habitat, particularly for chinook salmon and Umpqua cutthroat trout	Winchester Bay, Winchester Cr., STEP Cr., Scholfield Creek	Limited opportunity, most of watershed in private ownership, much of area logged, highly developed for municipal, industrial, and residential use.
Aquatic Habitat	Inter-tidal Wetlands Salt marsh	Loss of estuarine fish rearing areas, waterfowl, shorebird, reptile and amphibian breeding, rearing and over-wintering areas.	Providence Creek	Acquisition of Leeds Island property: remove tide-gates; breech dike; restore inter-tidal connection. More of a benefit to wildlife than fisheries.
Aquatic Habitat	Salt Water Marsh Inter-tidal	Loss of salt marsh and associated species, little exchange of water. Inter-tidal exchange cut of due to diking and Hwy 38 access, introduction of tide gates. Area drained artificially behind berm to provide elk forage. Loss of rearing habitat, reduction of nesting, loafing, brooding of waterfowl, loss of salt marsh. Low historic elk use.	Dean Creek Elk Viewing Area	Social value as an elk viewing area, designated a special Recreation Management Area by BLM. Limited opportunity to restore for salmonids. Provide wildlife habitat (i.e. west end - fresh water marsh). Koepke and Hinsdale Slough, dredge to original depth to maintain open water and improve flow, reduce stream temperatures, and restore coho populations.

Table 7 cont.: Summary of Resource Condition and Restoration Opportunities

Issue	Resource Component	Ecological Function or Attribute of Concern	Location	Restoration Opportunity
Late-Successional Forest habitat	Interior Mature Conifer Forest habitat for late-successional dependent species	Edge habitat has increased, size of contiguous interior forest block has been reduced	Throughout watershed **Map 15**	Recover historic patch size through natural succession. Most of area pre-commercially thinned, not in need of thinning currently.
	Connectivity	There are existing barriers for less mobile species i.e. small mammals, reptiles, amphibians. Serves as a genetic barrier for these species	Six priority areas **Map 19**	Drop large conifer from adjacent areas into plantations to provide bridges and establish micro-climates.
	Riparian Reserve Connectivity	Riparian species habitat loss, conversion to early successional plants	Three priority areas in Harvey Creek` **Map 19**	Introduce large conifer into riparian areas for habitat.
Other species habitat	Sand-dune habitat	Stabilization and introduction of exotic species has reduced the amount of open sand habitat	North side of Umpqua River **Map 19**	Manage introduced beach grass

References

Anonymous. 1974. Lower Umpqua. Interagency Inventory Report May 1974. 84 pp.

Baldwin E.M. 1959. Geology of Oregon, Edwards Brothers Inc. Ann Arbor, Michigan Pgs 5-22.

Beckman, Stephen D.; Toepel, Kathryn A.; Minor, Rick. 1982. Cultural Resource Overview of the Siuslaw National Forest, Western Oregon. Heritage Research Associates, Lake Oswego, Oregon.

Benda, L.E., and T.W. Cundy. 1990. Predicting deposition of debris flows in mountain channels. Canadian Geotechnical Journal 27:409-417.

Bilby, R.E., and J.W. Ward. 1989. Changes in characteristics and function of woody debris with increasing size of streams in western Washington. Transactions of the American Fisheries Society 118:368-378.

Burns, Paul. Personal Communication. Fish Biologist Mapleton Ranger District, Siuslaw National Forest.

Franklin, J.F. and Waring, R.H. 1979. Distinctive Features of the Northwestern Coniferous Forest: Development, Structure, and Function. Proceedings. 40th annual biological colloquium; Corvallis OR, Oregon State University Press. p 59-86.

Franklin, J.F. and C. T. Dyrness. 1988. Natural vegetation of Oregon and Washington. Oregon State University, Corvallis, OR.

Hicks, B.J. 1989. The influence of geology and timber harvest on channel morphology and salmonid populations in Oregon Coast Range streams. Ph.D. Thesis, Oregon State Univ., Corvallis. 199 pp.

Hemstrom M.A. and Logan S.E. 1986. Plant association and management guide, Siuslaw National Forest. USDA Forest Service, PNW, R6-Ecol. 220-1986, Portland, OR. 121 pp.

Huntington, C.W., W. Nehlsen, and J. Bowers. 1994. Healthy native stocks of anadromous salmonids in the Pacific Northwest and California. Oregon Trout. 42 pp.

Lower Umpqua Historical Society. 1976. Pictorial history of the Lower Umpqua. Official bicentennial project. 106 pp.USDA Forest Service. 1972. Resource inventory report for The Oregon Dunes National recreation Area. Siuslaw National Forest. Pacific Northwest Region. 294 pp.

Nehlsen, W.A., J.E. Williams, and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. Fisheries. 16(2):4-21.

Orr and Baldwin. 1992. Geology of Oregon (4th Edition) Kendall/Hunt Publishing Co. ISBN 0-8403-8058-5, pgs. 167-202.

The Oregon Plan. 1997. Coastal salmon restoration initiative: Restoring and Oregon legacy through cooperative efforts. Oregon State, Salem, Oregon.

Regional Ecosystem Office. 1995. Ecosystem analysis at the watershed scale: federal guide for watershed analysis. Rev. August 1995. Ver. 2.2, Portland OR. 26 pp.

Shaw, S.C., and D.H. Johnson 1995. Slope morphology derived from digital elevation data. In: Proceedings, 1995 NW ArcInfo Users Conference. Coer d'Alene, ID. October 23-35, 1995.

Smith, Karen. Personal Communication. Fish Biologist Bureau of Land Management - Coos Bay District.

Teensma, Peter D.A., John T. Rienstra and Mark A. Yeiter. 1991. Prliminary reconstruction and analysis of change in forest stand age classes of the Oregon Coast Range from 1850 to 1940. USDI, Bureau of Land Management, Tech. Note OR-9, Portland, OR. Fire History of the Coast Range.

Tuchmann, E. Thomas, Commaughton, Kent D., Freedman. Lisa E., Moriwaki, Clarence B.; U.S.D.A. Office of Forest & Economic Assistance. December 1996. The Northwest Forest Plan, A report to the President and Congress.

U.S. Department of Agriculture, Forest Service. 1993. Watershed protection and restoration in the mid-Oregon coast range. Unpub report. Siuslaw national Forest, August 18, 1993 18pp.

U.S. Department of Agriculture, Forest Service. 1990. Land & Resource Management Plan-Siuslaw National Forest-Final Environmental Impact Statement. Appendices-Vol. 1, Corvallis, OR.

U.S. Department of Agriculture, Forest Service, Siuslaw National Forest 1979. Stream assessment surveys. Mapleton Ranger District, Siuslaw National Forest. 173 pp.

U.S. Department of Agriculture, Forest Service, Siuslaw National Forest 1993. Stream survey and fish habitat inventory 53-04T0-3-6011N, Umpqua River tributaries. Franklin Creek Little Franklin Creek. Siuslaw National Forest, Mapleton R.D.

U.S. Department of Agriculture, Forest Service, Siuslaw National Forest. 1995a. Assessment report of federal lands in and adjacent to Oregon Coast Province. 112pp.

U.S. Department of Agriculture, Forest Service, Siuslaw National Forest. 1997. Assessment of the effects of the 1996 flood on the Siuslaw National Forest unpub. Report April 28, 1997 47 pp.

U.S. Department of Agriculture, Forest Service, Siuslaw National Forest. 1997. Late-successional reserve assessment - Oregon coast province - southern portion. Unpub report Siuslaw National Forest, Corvallis OR.

U.S. Department of Agriculture, Forest Service, Siuslaw National Forest. 1997. Yachats Watershed Analysis. Unpub report Siuslaw National Forest. Corvallis OR.

U.S. Department of Agriculture, Forest Service, Siuslaw National Forest and U.S. Department of Interior, Bureau of Land Management 1997. Smith River watershed analysis. 96 pp + Appen.

U.S. Department of Agriculture, Forest Service, U.S. Department of Interior, Bureau of Land Management. 1994. Record of Decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. Portland OR.

U.S. Department of Interior, Bureau of Land Management 1997. South Coast-North Klamath LSR Assessment.

APPENDIX A: GEOLOGY

The Tyee Sandstone Formations were formed during the mid- and late Eocene epoch (40-50 million years ago) when rivers extending into the interior of Idaho carried white micas and potassium feldspars identical to minerals of the Idaho batholith to a large depositional basin in a shallow sea off shore. At that time the Coast Range block was located further east ..

The Miocene Epoch (12-26 million years ago) is characterized by rapidly retreating ocean conditions as waters receded to the present limits. It is also a time of regional uplift from tectonic activity and continued rotation of the Coast Range block. There are few marine sediment formations in western Oregon of the Pliocene Epoch (2-12 million years ago) which indicates this was a time of erosion when the area was above sea level and the coastline lay approximately in its present position.

The Coast Range has experienced tectonic uplift for the last 10 million years , from the Pliocene Epoch through the Pleistocene and Holocene epochs, as the Juan de Fuca plate of the Pacific Ocean floor subducts beneath the North American plate. Areas offshore close to the subduction trench have been subject to more uplift than areas farther inland. Major earthquakes along the subduction occur about every 300 years. The varying uplift produces a tilting effect as the western edge of the coastal mountains are rising , while the eastern margin are either subsiding or only rising at a minimal rate. Cape Blanco (only 35 miles from the subduction zone) has fastest uplift rate at 1 inch every 3 years., Astoria is rising about 1 inch in 36 year, and Seattle is sinking about 1 inch every 11 years. Several normal faults, generally trending NW-SE, throughout the analysis area, as well as mapped anticline and syncline folds in the Stump and Keller drainages, are reflective of the crustal stretching from the uplift.

Marine terraces represent recent uplifting in the Lower Umpqua area. The oldest terraces are inland at the highest levels, whereas, the younger recently emergent terraces are on the coast at lower elevations. The terracing reflects both the eastward tilting of the Coast Range block as well as the rise and fall of sea levels several times during the last 2 million years.

Alluvial deposits along river channels are the result of a steadily rising sea level. As the melting glacial ice from the most recent ice age, backed up the river outlets, sediment coming out of the mountains deposited in the stagnant water. As a result, broad fertile plain within the narrow valleys was produced.

The most recent dynamic geologic feature of the analysis area is the beach. The main source of beach sands is erosion of sea cliffs supplemented by material transported and deposited by rivers in coastal estuaries. During the winter, storm waves strip sand from many beaches, depositing it offshore in submerged bars. During the summer months the sand is redeposited onto the beaches. Sand spits partly block the entrance to a number of rivers and frequently the sands have narrowed the opening to restrict tidal movement in and out of the estuary.

APPENDIX A2:

Shallow-rapid Landslide Susceptibility Model

for

Lower Umpqua Watershed Analysis

This rating is based on the protocol outlined in *Slope Morphology Model Derived from Digital Elevation Data* (Shaw and Johnson, 1995). Relationships between slope form—convex, planar, and concave—and slope gradient are combined using standard ArcInfo GRID analysis routines. The slope classes recommended for this analysis are based on information collected as part of earlier landslide inventories conducted on the Mapleton Ranger District.

The results of this DEM-based analysis are useful for identifying areas in a watershed or drainage basin where landslides are likely to occur.While soil thickness and mechanical properties, and groundwater conditions, are not factored into this analysis, the model is based on two primary assumptions: 1) soils are generally thin (less than about 1.5 meters) on steep slopes; and 2) concave landforms (the heads of drainages, also called 'headwalls') concentrate groundwater flow. During high intensity storm events, water flowing in a concave landform on steep slopes are more likely to destabilize thin soils. This model does not predict that landslides will occur in a particular place or within a time-frame. It does indicate areas where landslides are likely to occur if soil conditions and precipitation rates are right.

Areas identified as having moderate and high landslide susceptibility should be targets for field examination of soil thickness and strength characteristics, and other factors known to contribute to slope failure. Field examination will usually result in a reduction of the areas identfied by this model as potentially unstable.

Slope Form	Slope Gradient (percent)		
	A (<35)	B (35-75)	C (>75)
convex	low (11)	low (21)	moderate (31)
planar	low (12)	moderate (22)	high (32)
concave	low (13)	high (23)	high (33)

Table 1. Shallow-rapid Landslide Susceptibility Rating Matrix

susceptibility rating	map color
low	white (no color)
moderate	yellow
high	red

Table 2. Map legend for Shallow-rapid Landslide Susceptibility Rating

The remap tablergy_sli.rmt should look as follows (refer to Table 1 for details):

11:13 - low, no color
21:21 - low, no color
22:22 - moderate, yellow
23:23 - high (red)
31:31 - moderate-yellow
32:33 - high, red

Courtney Cloyd
Forest Geologist

APPENDIX B: STREAM CHANNEL CLASSIFICATION

Methodology for the determination of confinement and gradient is described in detail in Washington Timber Fish and Wildlife's Watershed Analysis Manual (Washington DNR 1993). As prescribed in the manual, aerial photography was used to determine confinement by stream segment. Stream segments with valley width less than two times the channel width were identified as "confined", those with valley width between two and four times the channel width were identified as "moderately confined", and those with valley widths greater than four times the channel width were identified as "unconfined". Confinement information was drawn on base maps and digitized into GIS.

USGS 7.5 -minute topographic maps were used to determine gradient for all segments of the stream network. To provide a minimum segment length, gradient breaks had to be consistent for at least three consecutive contours. As described by the TFW Watershed Analysis Manual, six gradient ranges, when coupled with confinement, generally correspond to distinct transport capacities and they include the following: 0-1%, 1-2%, 2-45, 4-8%, 8-20% AND >20%. as with the confinement data, gradient information was drown on base maps and digitized into GIS.

APPENDIX C: NATIONAL MARINE FISHERISES SERVICE HABITAT CRITERIA

TABLE 1. SOUTHWEST PROVINCE TYEE SANDSTONE PHYISIOGRAPHIC AREA MATRIX OF FACTORS AND INDICATORS

FACTORS	INDICATORS	PROPERLY FUNCTIONING (PF)	AT RISK (All situations not described as PF orNPF)	NOT PROPERLY FUNCTIONING (NPF)
Water Quality:	Temperature (7 Day Max. Avg.)	≤ 64 Deg. F.		≥ 70 Deg. F.
	Turbidity	Frequency and duration similar to unimpacted streams in basin		Frequency and duration higher than unimpacted streams in basin
	Chemical Contamination/ Nutrients	No Biological evidence of chemical contamination		Obvious biological evidence of chemical contamination e.g. fish kills
Habitat Access:	Physical Barriers	No manmade barriers in watershed that inhibit upstream passage of any life stage of salmonid to its historical habitat		One or more manmade barriers that prevent upstream passage of any life stage of salmonid to its historical habita
Habitat Elements:	Substrate/ Sediment	≥ 30 % gravel in riffles & very little embeddedness		≤ 10 % gravel in riffles & embedded
	Large Woody Debris (LWD)	≥ 50 pieces/mile, 24" dia., 50' long, no evidence or record of stream clean out or management related debris flows		≤ 15 pieces/mile, 24" dia., 50' long, evidence or record of stream clean out or management related debris flows
	Pool Area %	≥ 55%		≤ 40%
	Pool Quality	Residual pool depth ≥ .5 m. or 20% pools deeper than 1m.		Residual pool depth ≤ .2 m. or 10% pools deeper than 1 m.
	Off-channel Habitat	Frequent backwaters with cover, and low energy off-channel areas (ponds oxbows, etc.)	Some backwaters and high energy side channels	No backwaters, nor off-channel ponds

FACTORS	INDICATORS	PROPERLY FUNCTIONING (PF)	AT RISK (All situations not described as PF orNPF)	NOT PROPERLY FUNCTIONING (NPF)
Channel condition & Dynamics:	Width/depth ratio (in wetted riffles)	< 15	15 - 30	> 30
	Streambank Condition	Relatively stable banks. Few or no areas of active erosion.	Moderately stable banks. Some active erosion occurring on outcurves and constrictions.	Highly unstable stream banks. Numerous areas of exposed soil and stream bank cutting.
	Floodplain Connectivity	Logjams and other features create pools and secondary channels, which trap debris and food and maintain a high water table that provides cool late-season flows. Floodplain well vegetated.		Secondary channels lacking. Unconstrained main channel often down cut to bedrock and relatively short, without pools, meanders, and food. Warm low late-season flows.
Watershed Condition:	Road Density & Location/ Drainage Network	< 2 mi./mi.sq. No valley bottom roads.	2 - 3 mi./mi.sq. Some valley bottom roads.	> 3 mi./mi.sq. Many valley bottom roads.
	Disturbance History	Entire watershed with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian reserves; and for NWFP area (except AMA's), ≥ 15% retention of LSOG in watershed.		Entire watershed with disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian reserves; does not meet NWFP standard for LSOG retention.
	Landslide Rates	No obvious increase in landslide rates caused from management related activities		> 2X natural rate of landslides, that appears to be management related.
	Riparian Reserves	The riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers include known refugia for sensitive aquatic species (> 80% intact).	Moderate loss of function (shade, LWD recruitment, etc.) Of riparian reserve system, or incomplete protection of habitats and refugia for sensitive aquatic species (~70-80% intact).	Riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species (<70% intact).

APPENDIX D: Acres of Current Seral Condition of Vegetation by Ownership

Seral Class	USFS	BLM	Total Federal	Other Government	Private	Total
Open	1,116	16	1,132	638	2,664	4,434
Semi-open	906	699	1,605	3,450	7,536	12,591
Broadleaf	1,329	458	787	2,536	5,022	9,345
Small Mixed Con/Hwd	61	7	68	179	404	651
Medium Mixed	186	36	222	376	1,256	1,854
Large Mixed	2,800	181	2,981	2,483	3,646	9,110
Very Large Mixed	2,623	133	2,756	3,223	1,467	7,446
Small Conifer	14	0	14	19	779	812
Medium Conifer	1,215	37	1,252	1,023	2,170	4,445
Large Conifer	3,109	75	3,184	3,076	575	6,835
Very Large Conifer	560	26	586	975	69	1,630

Shaded rows are considered mature to old-growth forest habitats

APPENDIX D: Acres of Current Seral Stages and Interior Conifer Forest by Sixth Field Watershed

Sixth Field Watershed - BUTLER

#/Seral Class	USFS	BLM	Total Federal	Private	Total
3/Open	4	0	4	121	125
4/Semi-open	42	21	63	825	888
6/Broadleaf	70	48	118	618	736
7/Small Mixed	0	0	0	10	104
8/Medium Mixed	6	4	10	113	123
9/Large Mixed	97	32	129	271	400
10/Very Large Mixed	154	32	186	82	268
11/Small Conifer	37	18	55	39	94
12/Medium Conifer	112	23	135	49	184
13/Large Conifer					
14/Very Large Conifer	33	6	39	2	41
8/9/10/12-14/Interior*	75	0	75	0	75

*= >500 feet from edge

Sixth Field Watershed - ECHO

#/Seral Class	USFS	BLM	Total Federal	Private	Total
3/Open	0	0	0	5	5
4/Semi-open	95	0	95	168	263
6/Broadleaf	176	8	184	99	283
7/Small Mixed	5	0	5	0	5
8/Medium Mixed	24	2	26	10	36
9/Large Mixed	415	12	427	70	497
10/Very Large Mixed	233	6	239	21	260
11/Small Conifer	0	0	0	0	0
12/Medium Conifer	177	2	179	19	198
13/Large Conifer	361	3	364	19	383
14/Very Large Conifer	22	0	22	1	23
8/9/10/12-14/Interior*	378	0	378	0	378

*= >500 feet from edge

APPENDIX D: Current Seral Stages and Interior Conifer Forest by Sixth Field Watershed

Sixth Field Watershed - FRANKLIN

#/Seral Class	USFS	BLM	Total Federal	Private	Total
3/Open	9	6	15	21	36
4/Semi-open	279	68	347	139	486
6/Broadleaf	655	20	675	58	733
7/Small Mixed	34	0	34	2	36
8/Medium Mixed	88	2	90	29	119
9/Large Mixed	1202	29	1231	150	1381
10/Very Large Mixed	896	24	920	61	981
11/Small Conifer	11	0	11	0	11
12/Medium Conifer	573	15	588	46	634
13/Large Conifer	1221	45	1266	105	1371
14/Very Large Conifer	224	1	225	23	248
8/9/10/12-14/Interior*	1000	18	1018	2	1020

*= >500 feet from edge

Sixth Field Watershed - HARVEY

#/Seral Class	USFS	BLM	Total Federal	Private	Total
3/Open	3	0	3	0	3
4/Semi-open	282	0	282	44	326
6/Broadleaf	473	0	473	125	598
7/Small Mixed	22	0	22	4	26
8/Medium Mixed	62	0	62	16	78
9/Large Mixed	1065	0	1065	44	1109
10/Very Large Mixed	1331	0	1331	18	1349
11/Small Conifer	3	0	3	0	3
12/Medium Conifer	420	0	420	8	428
13/Large Conifer	1403	0	1403	6	1409
14/Very Large Conifer	281	0	281	2	283
8/9/10/12-14/Interior*	1760	0	1760	0	1760

*= >500 feet from edge

APPENDIX E1: Noxious Weeds - Potential for long term site occupancy

Scotch broom (d), Cytisus scoparious	Terrestrial
Giant knotweed (s), Polygonum sachalinense	Riparian
Japanese knotweed (s), Polygonum cuspidatum	Riparian
Himalayan knotweed (s), Polygonum polystachyum	Riparian
Purple loosestrife (d), Lythrium salicaria	Aquatic. riparian
Himalaya berry (d), Rubus discolor	Terrestrial
Evergreen Blackberry (d), Rubus lacinatus	Terrestrial
Reed canary grass (d), Phalaris arundinacea	Riparian
South American waterweed (s) Elodea densa	Aquatic

APPENDIX E2: Noxious Weeds - Short term site occupancy (unless frequently disturbed)

Canada thistle (d), Cirsium arvense	Terrestrial
Bull thistle (d), Cirsium vulgare	Terrestrial
Tansey ragwort (d), Senecio jacobaea	Terrestrial
St. Johnswort (d), Hypericum perforatum	Terrestrial
Poison hemlock (d), Conium maculatum	Terrestrial

(d) = documented within the watershed
(s) = suspected or, high probability of occurrence within the watershed

APPENIDX E, Table 3 Lichens documented in the Lower Umpqua Watershed from CVS plots

Bryoria capillaris
Hypogymnia apinnata
H. imshangii
H. physodes
H. tubulosa
Menegazzia terrebrata
Parmeliopsis hyperopta
Parmelia sulcata
Platismatia glauca

APPENDIX F1. Northern Spotted Owl Locations and Habitat Suitability

Owl Pair #	Location (T.R.Sec.)	Suitable Habitat w/i Median Home Range
SNF 83	T21S,R10W, Sec. 29	3,360 acres
SNF 101	T22S,R10W, Sec. 03	3,430 acres
OR 82917	T22S,R10W, Sec. 19	3,375 acres
OR 82919	T22S,R10W, Sec. 22	1,850 acres
OR 82920	T22S,R10W, Sec. 29	2,925 acres

APPENDIX F2. Marbled Murrelett Locations and Habitat Suitability

Murrelet Site	Location (T.R.Sec.)	Suitable Habitat w/i 0.5 mile radius
Elk Viewing Area	T21S,R11W, Sec. 33	40
Brandy Bar	T22S,R10W, Sec. 05	260
Franklin Crk #1	T22S,R10W, Sec. 02	450
Franklin Crk #2	T22S,R10W, Sec. 03	470
Franklin Crk #3	T22S,R10W, Sec. 03	465
Franklin Crk #4	T22S,R10W, Sec. 03	475
Franklin Crk #5	T22S,R10W, Sec. 10	480
Franklin Crk #6	T22S,R10W, Sec. 10	460

APPENDIX F3. Northern Bald Eagle Nest Locations

U.S. Fish and Wildife Service Pair Name	Location (T. R. Section.)
Butler Creek (BLM)	T.21 S., R. 11 W. Section 31
Umpqua River (FS)	T.21 S., R. 11 W. Section 33
Echo Island (FS)	T.21 S., R. 11 W. Section 35

APPENDIX G: HERPTILE SURVEYS

Herptile surveys were conducted by the Umpqua Resource Area, Coos Bay District, Bureau of Land Management on May 12, 19, and 26, 1996. Species found during the survey include:

- Pacific giant salamander (Dicamptodon tenebrosus)
- Western red-backed salamander (Plethodon vehiculum)
- Dunn's salamander (P. dunni)
- Ensatina (Ensatina eschschotzii)
- Southern torrent salamander (Rhyacotriton variegatus)
- Northwestern garter snake (Thamnophis ordinoides)
- Red-legged frog (Rana aurora)
- Bullfrog (R. catesbeiana)
- Pacific treefrog (Pseudacris regilla)
- Rough-skinned newt (Taricha granulosa)
- Common garter snake (T. sirtalis)
- Northern alligator lizard (Gerrhonotu coeruleus)

Umpqua-Eden Site (*Takimiya*) - 35DO83

This extensively-excavated prehistoric archeological site is located along the Umpqua River between Reedsport and Winchester Bay. It is likely to be the Lower Umpqua village called **Tki'-mi-ye'** (also spelled *Takimiya*) which was recorded by Dorsey (1890:231) and was the setting of four myth tales recorded by Fractenberg (1913).

This site is one of the oldest directly dated village sites along the Oregon Coast, with radiocarbon dates extending back as far as about 3,000 years. Thus, the site includes occupation during both the Archaic and Formative stages, the latest two periods of Oregon prehistory. This site stands out as one of the most important in the region because of the quantity and quality of the information it has yielded about prehistoric lifeways along the Oregon coast. Because of its importance, the Archaeological Conservancy purchased the private parcel containing the site and transferred title to the Coos Bay District of the Bureau of Land Management to be managed as a protected public resource. It also was placed on the National Register of Historic Places in 1995.

References Cited

Dorsey, J. Owen
1890 The Gentile System of the Siiletz Tribes. *Journal of American Folk-lore* 3(10):227-237.

Fractenberg, Leo J.
1913 *Coos Texts*. Columbia University Contributions to Anthropology 1.