

What is a watershed?

A watershed is an area of land where all precipitation drains down slope to a single point. The boundaries of a watershed are defined by the land that surrounds them. Since water runs down hill, these boundaries are formed by higher ground such as ridge lines or mountain ranges.

Water – from rain, snow, springs and seeps – drains down slope via a network of surface and subsurface pathways. Small streams combine to become creeks which combine to become larger creeks and rivers. Described as a basin or hydrologic unit, a large watershed can cover a multi-state area like the Columbia River watershed or a relatively small area like a local stream, pond or wetland. (OWEB, 2008) Large basins or watersheds are usually comprised of many smaller watersheds called sub-watersheds or sub-basins. Sub-watersheds and sub-basins provide a convenient way to discuss specific areas within a larger watershed.

It is important to understand the connectivity of watersheds. Water quality at a given point is influenced by the entire area upstream of that point; water quality at a given point will affect all areas downstream. For example, if a pollutant enters a stream high up in a watershed it will be transported down slope through the stream network. Pollutants include chemical substances and bacteria from urban and farm runoff and industrial discharge, as well as high water temperature and sediment load. Pollutants such as these can dramatically limit water quality and impact all orders of aquatic life.

Remember, wherever you stand you are in a watershed.

2008, Network of Oregon Watershed Councils, <http://www.oregonwatersheds.org/>

2008, OWEB, http://oregon.gov/OWEB/WSHEDS/wsheds_overview.shtml

Rogue and South Coast Basins **Watershed Health Factors Assessments**

Rogue Basin Watershed Council Areas

Applegate River Watershed Council Area

The Applegate Watershed Council Area encompasses the entire Applegate River drainage. The Applegate River is a major tributary of the Rogue River located on the northeastern flank of the Siskiyou Mountains in southwestern Oregon. The 770 square mile drainage is divided into Jackson County (53%), Josephine County (35%) and Siskiyou County in California (12%).

The Applegate system has the lowest annual precipitation and highest annual summer temperatures west of the cascades. The lack of summer rainfall and over allocation of water for irrigation usually results in very low summer stream flows.

The Applegate River has significant populations of Coho, fall Chinook, winter and summer steelhead and resident trout (rainbow and cutthroat). The main stem Applegate is a primary spawning area for fall Chinook. Steelhead and Coho focus on the 700 miles of tributaries for both spawning and rearing.

Applegate Dam, located at River Mile (RM) 48, blocks all fish passage. However, releases from the dam provide additional summer and fall flows assisting fish movement up to the dam. Murphy Dam, at about RM 10, has a fish ladder to facilitate fish passage but passage for both adult and juvenile salmonids is impacted by numerous small push-up dams on the main stem and irrigation barriers on a number of tributaries

Low summer flows are detrimental to aquatic life and cause high summer water temperatures. DEQ lists water temperature, flows and water chemistry as limiting in the main stem and many of its tributaries.

Soil disturbance from current and past logging, mining, road construction and development significantly increases the sediment load in the system. The lack of large wood in the stream, caused by channel modifications, reduces stream complexity.

Much of the Applegate Watershed Council Area has been recently burned leaving part of the watershed in early seral stages with a high fire risk. Natural fires once burned in close sequence with subsequent fires reducing the accumulated fuel load. That is not the case now and the fuel accumulation and associated fire risk Bear Creek Watershed Council Area

Bear Creek Watershed Council Area

The entire Bear Creek drainage comprises the Bear Creek Watershed Council Area. Also included is the Whetstone and Upton Creek systems, which drain the White City area but do not

empty directly into Bear Creek. Bear Creek is a relatively small but extremely significant tributary of the Rogue River located entirely within Jackson County. It encompasses approximately 400 square miles. The stream flows northwesterly for 28.8 miles and enters the Rogue River at RM 127.

Annual rainfall in the Bear Creek area averages about 20-25 inches per year, which is the lowest in western Oregon. Combined with extensive water withdrawals for irrigation and domestic use, the resultant low flows in Bear Creek and its tributaries cause extremely high water temperatures throughout the summer months.

Bear Creek tributaries originate in the Siskiyou and Cascade mountains. The steep terrain creates erosion and transport of sediment into the valley streams. Historically, this energy and sediment was dissipated, once it reached the valley floor, in oxbow pools, braided channels, and wetlands. However, extensive channelization to accommodate agriculture, transportation and urban growth has eliminated almost all stream complexity and severely compromised instream habitat.

Despite the impacts, Bear Creek still supports a diverse fish community. An increasing fall Chinook run, a small number of Coho salmon, and good numbers of summer and winter steelhead use Bear Creek for spawning and rearing. The stream also hosts populations of resident rainbow trout and several warm water fish species, such as bass, bluegill, dace, sculpin and lamprey.

The Bear Creek Watershed contains the municipalities of Ashland, Talent, Phoenix, Medford, Central Point and Jacksonville. Together these urban centers make up over half of the total population of Jackson County. Rapid population growth poses an increasing threat to already compromised water quality and instream habitat.

Upton and Whetstone Creeks drain the Agate Desert area near White City, which also encompasses the Agate Desert vernal pool ecosystem. These pools support the Endangered fairy shrimp, two Threatened plants and a previously undiscovered "hairy water flea."

The woodland urban interface in the Bear Creek Watershed Council Area has a high fire risk. The forests are relatively young and wood delivery to streams, which would increase stream complexity, is limited.

A number of habitat improvement projects completed in the Watershed Council Area in recent years have improved water quality, which at one time was among the worst in Oregon. As a result, fish populations have also increased.

Illinois Valley Watershed Council Area

The Illinois River Watershed Council Area encompasses the entire Illinois River drainage. The Illinois River flows into the Rogue River at RM 27 near the town of Agness, approximately 20 miles northeast of Gold Beach. It is a major tributary of the Rogue system and drains all of southwestern Josephine County and a small portion of eastern Curry County. In addition, the

headwaters of both the East and West Forks of the Illinois River drain small areas of Del Norte County, California. The total area drained by the Illinois is approximately 967 square miles and makes up about one-fifth of the Rogue Basin system.

Annual precipitation varies widely, ranging from a high of 100 inches in the Lower Illinois River Canyon area to about 35 inches per year in the Cave Junction area.

The upper reaches of the Illinois are steep and rugged but flatten out into an alluvial plane near the City of Cave Junction. Elevations range from 3,500 feet up to 7,000 feet.

As with most watersheds in the Rogue Basin, stream flows are low in the summer with water supplies not always meeting existing needs. Summer water temperatures are also very high significantly impacting aquatic life.

The Illinois River hosts substantial runs of Coho fall Chinook winter steelhead, sea-run cutthroat and resident trout. Summer steelhead use the lower reaches of the Illinois for holding in cooler water but do not spawn or rear in the system. The Illinois anadromous fish runs are of particular importance because the majority of wild Coho and winter steelhead stocks in the Rogue Basin spawn in the Illinois

Many of the major Illinois tributaries have been severely impacted by mining resulting in extensive channel modification and elimination of stream complexity.

The Illinois Watershed Council Area includes significant areas of high fire risk, with some woodland/urban interface, early seral conditions and high road densities that influence water runoff and aquatic functions.

Watershed Council efforts include promoting extensive tree planting to improve riparian habitat, stabilize the banks, reduce erosion and increase stream shading, and removing fish passage barriers.

Little Butte Creek Watershed Council Area

The Little Butte Creek Watershed Area includes the entire Little Butte Creek system. Little Butte Creek enters the Rogue River from the east at River Mile (RM) 132 near the community of Eagle Point. It flows from its headwaters in the Cascade Mountains 43 miles until it meets the Rogue River. The Basin consists of roughly 374 square miles located entirely in Jackson County. Elevations range from 1,200 feet above sea level at the Rogue to 7,311 feet at its origin.

Rainfall levels influence the stream flow and water temperature, which are critical to aquatic life. Precipitation varies from an average of 19 inches annually around Eagle Point to over 50 inches in higher elevation areas. Consequently, low flows and high water temperatures are common in the summer.

The basin has a history of water shortages. Four irrigation districts operate in the Watershed. Over 12,000 acre-feet of water from Little Butte Creek are diverted through canal systems for major irrigation developments elsewhere in the Rogue Valley.

Fall Chinook salmon, Coho salmon, and winter and summer steelhead use the Little Butte system for spawning and rearing. Resident cutthroat, brook, and rainbow trout are also present in good numbers. Little Butte Creek contributes significantly to the fishery resource of the Rogue River.

Besides water temperature and flow, sedimentation, chemistry and the lack of instream habitat limit aquatic life in the system. Logging, road construction, rural development, and agricultural activities contribute to the instream impacts.

The Little Butte Watershed Council Area does not have the urban interface problems like Bear Creek and the Applegate basins. However, early seral vegetation limits wood delivery to the streams and roads adversely affect watershed function.

Lower Rogue Watershed Council Area

The Lower Rogue Watershed Area includes all of the Lower Rogue River and its tributaries downstream from RM 55, including the Illinois River and its tributaries below RM 6.6. The Lower Rogue Basin drains about 530 square miles. The area is noted for steep, rugged terrain, narrow winding valleys, and sharp divides. Many of the steep slopes in this reach experience frequent landslides.

Land use is primarily forestry related. The only communities in the Watershed Area are the tiny hamlets of Agness and Illahe at the mouth of the Illinois River and the town of Gold Beach at the mouth of the Rogue.

The climate of the Lower Rogue Basin is mild because of its proximity to the Pacific Ocean. Heavy rains and strong winds are common during the winter months. Rainfall ranges from 80-120 inches per year. Summers are relatively dry.

Stream flows in the main stem Rogue are augmented during the dryer portions of the year by releases from Lost Creek and Applegate dams. The additional flows do not, however, alleviate the higher than desired water temperatures which have occasionally resulted in large losses of spring Chinook salmon killed by temperature-enhanced diseases. Temperature and flow are also a problem in the tributary streams, but not in the magnitude experienced in other parts of the Rogue Basin.

The Lower Rogue mainstem is basically a conduit for the substantial runs of summer and winter steelhead, fall and spring Chinook and sea-run cutthroat moving through the Rogue system. Prior to 1990, very little fall Chinook spawning was observed in the lower Rogue mainstem, possibly due to relatively low runs and in part to the flow regime in the river. In the last two years, however, surveyors have recorded record spawning count numbers in the area between Lobster Creek and Illahe.

The estuary at the mouth of the Rogue River provides a nursery and transition area for juvenile salmonids as they prepare to enter the ocean. The geomorphology of the Klamath Mountains has produced an estuary that is one of the smallest and least productive estuaries in Oregon, even though the drainage area of the Rogue River is second in Oregon only to that of the Columbia River. Jetties at the mouth of the river have decreased the size of the estuary and increased the concentration of fresh water. Upstream damming, channeling, gravel mining operations, and residential development have decreased the amount of natural off-channel habitat. These changes have been detrimental to productivity by reducing the amount of habitat and available nutrients and ultimately reducing rearing time in the estuary for juvenile spring and fall Chinook, producing smaller smolts with poorer rates of survival. Many of the tributaries in the watershed area offer spawning and rearing areas for both salmon and steelhead. Several streams are in relatively pristine condition.

Landslides off steep, unstable slopes and roads cause sedimentation problems in the mainstem and tributaries. High, flashy, winter flows limit the amount of large wood able to remain in the stream as habitat. Dredging the main stem for gravel and boat passage had considerably modified the stream channel and reduced complexity.

The Lower Rogue averages over 80 percent cover, but the trees are relatively small (early seral condition) and in some tributaries roads contribute significant amounts of both chronic and episodic pulses of sediment to the streams.

Middle Rogue Watershed Council Area

The Middle Rogue Watershed Area includes the main stem of the Rogue River from the Josephine County line (RM 55) upstream to the mouth of Evans Creek (RM 110) and all the tributaries in between. Almost all of the 660 square mile watershed area is in Josephine County.

The watershed area is made up of five sub-watersheds: Wild and Scenic, Grave, Jumpoff Joe, Galice and Grants Pass. Each sub-watershed is different from the other in ownership patterns, stream condition and topography

Residential development line both sides of the Rogue River in this watershed area and the City of Grants Pass is growing rapidly along with the communities of Hugo, Merlin, Galice, Shan Creek, Leland, Wolf Creek and Sunny Valley.

This increasing development, along with instream dredging to facilitate jet boat use, generates concerns about the impact on the extensive spawning and rearing habitat available for anadromous fish in this area.

Stream flows and, to some extent, water temperatures are regulated by releases from both Lost Creek and Applegate Dams.

This Watershed Area is used extensively for spawning by fall Chinook. Spring Chinook pass through the area and primarily spawn further upstream. Both summer and winter steelhead, along

with Coho, utilize the tributaries for both spawning and rearing. The Grave Creek system, entering the Rogue from the north, is one of the larger tributaries and is an important fish stream. Extensive irrigation withdrawals in this system create flow and temperature problems.

Savage Rapids Dam at RM 106 is laddered but is considered a major fish passage problem. This irrigation dam is scheduled to be removed and replaced with pumps in 2009.

The Middle Rogue Watershed Area naturally experiences frequent fires but modern fire suppression programs have significantly affected that pattern. There is a considerable amount of woodland/urban interface where both land values and fire risk is high. Large wood delivery to streams is minimal since most stands do not have large diameter trees.

Seven Basins Watershed Council Area

The Seven Basins Watershed Area does not include any of the mainstem Rogue River but encompasses all of the Rogue tributaries between RM 110 near the City of Rogue River and RM 135 below the City of Shady Cove. The 405 square mile watershed area is split between Jackson and Josephine Counties and is dominated by two large valleys: the Evans Creek Valley and Sams Valley.

Elevations range from 1,000 to approximately 4,000 feet above sea level with steep slopes covered with a heavy vegetation cover.

The miles of road per square mile is one of the highest in the Rogue River Basin and fire risk is very high. However, riparian cover is surprisingly good.

Numerous vernal pools exist in the Sams Valley and Table Rocks areas that contain the Endangered fairy shrimp and two species of Threatened plants.

Low summer rainfall, high temperatures and extensive irrigation withdrawals cause many of the small tributaries in this area to dry up in the summer. These streams are still used extensively by summer steelhead for spawning. After hatching, the juvenile steelhead migrate to the main stem Rogue before the tributaries dry up.

Evans Creek provides spawning habitat to a few fall Chinook and both spawning and rearing habitat to Coho and summer and winter steelhead. The lower and middle reaches of this system are in agricultural use with the upper reaches managed for forest activity. Consequently, water withdrawals for irrigation are extensive. The low stream flows also result in high summer water temperatures. Mining, road construction and channelization has limited stream complexity and instream habitat.

Upper Rogue Watershed Association Area

The Upper Rogue Watershed Area includes all of the Rogue River Basin above RM 110. This area is located in the northeastern corner of the Rogue Basin and encompasses 1,250 square miles. Approximately 75 percent of the area is located in Jackson County with 200 square miles in Klamath County and 105 square miles in Douglas County. About 100 square miles is located within the boundaries of Crater Lake National Park.

A dominant feature in the Watershed Area is Lost Creek Dam that was constructed in 1977 at RM 157, primarily for flood control. A substantial amount of the water stored in the reservoir has been set aside for fish enhancement, irrigation, municipal, industrial and domestic use. However, only a small percentage has actually been purchased so most of the releases are allocated to benefit fish. The dam is a total barrier to anadromous fish but Lost Creek Hatchery, located immediately below the dam, was built to mitigate for the loss of spring Chinook, Coho, and winter steelhead spawning and rearing area.

Partially completed Elk Creek Dam, located about one mile upstream from the Rogue on Elk Creek, is also a barrier to anadromous fish. Chinook, Coho, steelhead and cutthroat are collected in a trap below the dam and trucked above to maintain the integrity of the wild runs.

Spring and fall Chinook and summer and winter steelhead all migrate up to the regulating dam at the hatchery. Fish then spawn below the hatchery or are captured at the hatchery for their eggs that are hatched and eventually released back into the Rogue. Resident rainbow, cutthroat, brook and brown trout utilize the Rogue and tributaries above the dam.

Water quality problems, including water temperatures and flow, are less severe in the Upper Rogue area than elsewhere in the Rogue Basin. Except for residential development along the Rogue River, Trail and Elk Creeks, and some expansion of the City of Shady Cove, There is relatively little population or development within this area and limited potential for future growth. Most water temperature and flow concerns are on the tributaries, which are used extensively by both salmon and steelhead. Large water diversions by the Eagle Point Irrigation District and the City of Medford aggravate the problems by further reducing instream flows.

Riparian and upland cover, averaging 82 and 75 percent respectively, are high for the relatively young seral condition of the terrain. Road densities are generally high between Gold Ray Dam and Lost Creek Dam but low throughout the rest of the watershed.

South Coast Basin Watershed Council Areas

The following areas are described from north to south.

Sixes Sub-basin

Floras Creek Watershed Council Area

Floras Creek, a tributary of the New River basin, drains approximately 81 square miles of land. Floras Creek is located primarily in Curry County with a small portion of the East Fork extending into Coos County. It is the most northern watershed in Curry County and crosses Highway 101 just south of the community of Langlois. Elevations in the watershed range from sea level to approximately 2,786 feet on Edson Butte. Major tributaries include the North Fork, East Fork, South Fork, West Fork, Willow Creek, and Floras Lake.

The upper portion of the basin is characterized by steeply sloped forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Grazing, rural residential development and other agricultural uses are dominant in the lower portion of the basin. Over 90% of the watershed is in private ownership

The watershed has been intensively managed for 150 years and is more than 90 percent privately owned. Dairy farming was extensive in the early 1900's and carries on today, though at a reduced level. Most of the watershed has been logged, with some areas in a second or third rotation. Spruce swamps were cleared for agriculture, and many of the wetlands/floodplains in the watershed have been drained, ditched and channelized. Industrial level cranberry harvest was introduced in 1915 and now represents more than half of water rights in the watershed. The Floras Watershed Assessment does not formally address conditions in the New River Watershed, though certain features are mentioned.

Present and potential sediment sources in the system are identified as the Otter Point formation (landslides) and the high number of stream crossings, especially in the middle Floras Mainstem. Some serpentine soils are present and probably contribute to the sediment load via earthflows and gullies.

Salmon use in the middle and upper portions of the watershed is limited by a natural barrier. Steelhead and cutthroat are well distributed throughout the watershed. Coho habitat is identified in the Lower Floras, Willow Creek, and Floras Lake subwatersheds, with the best available habitat in Bethel, Butte, and Morton Creeks (near New Lake). Chinook use the lower mainstem of Floras and portions of Willow Creek.

Riparian vegetation in Floras watershed is greatly reduced from its potential. Nearly all sub-watersheds have high potential increases in shade, but Willow Creek, the Mainstem Floras, and the North Fork sub-watershed have the greatest potential. Most subwatersheds have some high reproduction to mature conifer trees located near the stream channels, showing potential for large wood inputs and providing high quality shade. Water withdrawals in the Floras Creek watershed are a concern for fish habitat and water quality, both in terms of amount taken and timing. Water users are mostly "selfregulating" and the level of un-permitted or non-compliance use is unknown.

Water quality in Floras Creek and its tributaries, both based on water temperatures and chemistry, is rated the lowest of all South Coast streams. Stream temperatures are very high, nearing 80 degrees in the lower mainstem. Water quality is rated as impaired for nitrate levels, and moderately impaired for phosphates, fecal coliform bacteria and turbidity. Heating reaches are identified between White Elephant Bridge and Mormon Camp on mainstem Floras, between

McCleod road and the mouth on the North Fork, and between Mormon Camp and the pump-house site, also on the mainstem Floras.

The Lower Floras Creek/New River complex has the most acres of wetlands of any of the South Coast watersheds. More than 2,300 acres are identified within 67 different wetlands. Nearly two-thirds are highly altered and a third are altered very little.

Limiting factors to fish production appear to be water quality (both temperature and chemistry), altered channels and hydrologic function, greatly reduced stream shade, water use, and sediment transport.

Elk/Sixes Rivers Watershed Council Area

The **Sixes River** watershed drains approximately 134 square miles of land and is situated almost entirely within Curry County, except for a small area of the Upper Sixes Mainstem subwatershed that extends into Coos County. Flowing in a westerly direction Sixes River crosses Highway 101 and drains into the Pacific Ocean just north of Cape Blanco. Elevations in the watershed range from sea level to approximately 3,315 feet. Major tributaries include the North Fork, Middle Fork, South Fork, Dry Creek, Edson Creek, and Crystal Creek.

The upper portion of the basin is characterized by steeply sloped forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Grazing, rural residential development and other agricultural uses are dominant in the lower portion of the basin. Approximately 69% of the watershed is in private ownership.

The Sixes River Watershed is contained mostly in the Southern Oregon Coastal Mountains with high natural erosion rates and steep slopes. The lower end of the watershed is within the Coastal Lowlands ecoregion and has very gentle gradients and low erosion rates. The watershed is 93 percent forest and 7 percent agriculture/rural use. National Forest lands cover about a quarter of the watershed, primarily in the Dry Creek (Grassy Knob Wilderness Area), South Fork Sixes, and the Big and Otter Area.

The Big and Otter Area has a high density of road crossings. Elephant Rock, Dry and North Fork Sixes are moderate-high density for crossings. Crystal Creek, Edson Creek, the Middle Fork, and South Fork Sixes are moderate density of crossings. In density of roads on steep slopes, Dry Creek is ranked high, and the South Fork Sixes and Big and Otter Area are ranked moderate.

Coho distribution is spread widely through the watershed, with only the South Fork Sixes blocked by natural falls. Chinook distribution is similar, with more limited use in the upper watershed. Steelhead distribution is very widespread, including the entire mainstem and all significant tributaries. An area of coho habitat in the upper Sixes Mainstem may have good potential for restoration. Dry Creek is very high quality spawning habitat, especially in the lower portion. The Sixes estuary is the most complex of any on the South Coast, with large wood, large size and a variety of habitats available. Riparian vegetation is strong in Sixes watershed, with lots of mature forests to contribute large woody material to the stream and provide high quality

shade. Expansion of gorse populations are a large concern. In some areas riparian stream cover seems to be receding, possibly due to high sediment loads and channel movement.

Water quality is a concern in the Sixes watershed. The Mainstem Sixes and the South Fork Sixes are 303(d) listed by the Department of Environmental Quality (DEQ) for temperature concerns. The Mainstem and Benson Creek are being investigated for sedimentation issues, and Rusty Creek is under investigation for habitat modification. Measurements of chemical water quality at the Highway 101 bridge show moderate impairment for nitrate, phosphate and fecal coliform bacteria. Dissolved oxygen levels are low in the summer months. Heavy metals contributed by mining activities are a concern, especially near the Sixes River recreational mining site. High turbidity (compared with Elk river) is a result of both soil clay content and more intensive land management. Temperatures are warm to very warm. The highest measurement was 76 degrees F, taken in the mainstem above the confluence with Dry Creek. Water temperatures in the mainstem increase considerably in the reach between Elephant Rock and Dry Creek, and again between Edson Creek and Highway 101.

The Sixes watershed has 44 different wetland areas, containing about 1,372 acres. Nearly all are in the lower watershed, with roughly a third having low alteration and good restoration/protection potential. A number of opportunities exist for reconnecting wetlands to the mainstem for providing better off-channel coho rearing habitat.

Limiting factors to fish production and water quality in the Sixes watershed appear to be water use and water quality (temperature and chemistry, possibly pollution), as well as a lack of large pools and wood in the mainstem for fish habitat. Sediment transport/storage and noxious weed invasion are also of concern.

The **Elk River**, located primarily in Curry County, is contained in the Southern Oregon Coastal Mountains and drains approximately 92 square miles. A small portion of the North Fork extends into Coos County. The Elk is slightly less than 40 miles in length and flowing in a westerly direction the Elk empties into the Pacific Ocean just north of the town of Port Orford. Elevations in the watershed range from sea level to approximately 4,080 feet on Iron Mountain. Major tributaries include the North For, South Fork, Blackberry Creek, Panther Creek, Butler Creek, and Bald Mountain Creek.

The upper portion of the basin is characterized by steeply sloped forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Natural erosion rates are high in the upper watershed and quite low in the lower watershed. Grazing, rural residential development and other agricultural uses are the dominant land uses in the lower portion of the basin. A large percentage of the Elk River watershed is in National Forest management, and includes the southern portion of the Grassy Knob Wilderness Area.

Gold was discovered in the Elk River watershed in the 1850's, which combined with active logging caused considerable impact to the river. Up to 15 mills were active at one time for the timber industry, and placer and hydraulic mining were common in the upper watershed. European Beach grass was introduced in the 1930's. Agricultural development in the lower

watershed resulted in removal of large log “drifts”, loss of wetlands and reduction of riparian vegetation.

Sediment concerns include high sediment yield in Bald Mountain Creek as well as numerous steep roads in unstable soils in Purple Mountain Creek (Middle Mainstem). Elk River has very steep slopes in portions of the watershed, some of the steepest in Curry County. In the Lower Elk Mainstem, densities of road crossings are ranked as moderate to high, and densities of roads on steep slopes are moderate.

Fish use is considerable in the Elk River watershed, with steelhead, coho and chinook using a large amount of the watershed. Coho do spawn in the mainstem Elk, but have little over-wintering habitat available to them. Coho numbers were historically more than 20 times what they are now, and chum salmon were reported historically. The Elk River Fish Hatchery has operated since 1969, has an unknown impact on the water quantity, water quality and fish ecology of the watershed.

Riparian vegetation in the lower watershed is heavily impacted with gorse and Himalayan blackberry. Two-thirds of the lower mainstem is in pioneer and brush communities with little to offer for stream shade and large wood.

Water quality is limited for temperature and habitat modifications in the mainstem as well as Bald Mountain Creek. Butler Creek is listed on the DEQ’s 303d list for temperature. Temperatures in the mainstem are warm to very warm and tributaries are generally cool. Water quality though is the best of any stream in Curry County.

Wetlands are all located in the Lower Elk Mainstem and Coastal Area, with 434 acres in 27 different ID’s. More than two thirds have high levels of alteration, though 65 acres near the dunes may have some potential for restoration.

Elk River has considerable recreational use both by campers, fisherman, and miners. Commercial and recreational mining have an unknown effect on water quality, relative to heavy metal contamination.

Limiting factors to fish production and water quality in the Elk River appear to be weak riparian cover (especially in the lower sections), sediment sources (present and potential), high water temperatures, and noxious weed invasions impacting riparian plants.

Port Orford Watershed Council Area

The Port Orford watershed includes three distinct basins that drain directly into the Pacific Ocean. They include Garrison Lake, Hubbard Creek, and Brush Creek. In total, these three watersheds drain approximately 20.8 square miles and are situated entirely within Curry County. Garrison Lake and certain portions of Hubbard Creek are located within the vicinity of the Port Orford community. Brush Creek, located a few miles south of Port Orford, empties into the Pacific Ocean near Humbug Mountain. Elevations in the Port Orford watersheds range from sea level to approximately 3,040 feet on Rocky Peak, located in the Brush Creek basin. Land uses

include urban, forestry, agriculture, range and rural residential development. A reservoir, located on the North Fork of Hubbard Creek, serves as the primary water source of the City of Port Orford. In total, approximately 69% of the watersheds are in private ownership.

The watersheds near Port Orford include Brush Creek, Hubbard Creek, and Garrison Lake. All are small, independent, and flow into the Pacific Ocean. Hubbard Creek is contained within the Southern Oregon Coastal Mountains (48%), Coastal Lowlands (37%), and Coastal Uplands (14%). Brush Creek is Southern Oregon Coastal Mountains (57%) and Coastal Uplands (43%). Garrison Lake is contained entirely within the Coastal Lowlands ecoregion. Approximately 69 percent of the Port Orford watersheds are privately owned. Garrison Lake has had a historic pattern of cycling between lake and lagoon. The watersheds have been mined for gold, timber harvested and partly consumed by wildfires. Brush Creek has been moved from its original channel with highway development through the canyon area.

Sediments in portions of the Hubbard and Brush Creek are unstable, with high sediment production in a Brush Creek tributary. The municipal water supply is in the north Fork of Hubbard Creek, and water quality has been affected by a landslide and by natural tannins.

Sediment is linked to phosphate inputs into Garrison Lake. Water temperatures in Hubbard Creek are above the 64 degree standard. Total Maximum Daily Load allowances have been established for aquatic weeds/algae, nutrients, and pH for Garrison Lake. Phosphate levels have declined since the sewage treatment outfall was relocated out of Garrison Lake.

Fish use is limited to steelhead and cutthroat, with no chinook or coho, and is likely not changed in history. A bypass in Brush Creek was constructed to shunt a 5-year flow away from developed areas. Passage concerns exist on North Fork Hubbard Creek and the mainstem for juveniles.

North Fork Hubbard has opportunities for vegetation improvements, and increases are needed in Upper Hubbard. Gorse populations are a concern. Water use is minimal, with greatest interest in protecting and treating municipal water supplies.

Limiting factors to fish production appear to be road densities and flood peak flow, sediment sources, floodplain connectivity, channel alterations and migration barriers.

Euchre Creek Watershed Council Area

Euchre Creek is approximately 14 miles long and drains about 37 square miles. Flowing in a southwesterly direction the Euchre main stem empties into the Pacific Ocean at Ophir, Oregon. Elevations in the watershed range from sea level to approximately 3,080 feet. Major tributaries include Cedar Creek and Boulder Creek. The lower few miles of the river lie on a relatively low gradient coastal floodplain.

The upper portion of the basin is characterized by steeply sloped forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Rural residential

development, grazing and other agricultural uses are the dominant land uses in the lower portion of the basin. Approximately 22 percent of the Euchre Creek watershed is publicly owned.

Euchre Creek had very heavy logging with little re-forestation in the 50's and 60's resulting in extensive alder regeneration. Intensive land management caused a high incidence of landslides entering the upper mainstem. Fish populations during that time were nearly extirpated. Major modifications to the estuary and lower wetlands occurred with Highway 101 construction. Agricultural development in both the lower section of Euchre and parts of Cedar Creek caused considerable changes in channel patterns.

Chinook and steelhead use the mainstem Euchre and Cedar Creek. Coho have been removed from the system through habitat changes, mostly in the lower watershed. Barriers to migration are identified, with several clustered in Cedar Creek.

The uppermost portion of Euchre Creek has low soil infiltration on steep, gravel-rich parent material, and high rainfall. Disturbance of this area from land management practices, floods, or fire could have direct and immediate effects on habitat in the mainstem. Cedar Creek and Lower Euchre Creek are ranked moderate for densities of road crossings.

Stream temperature data shows Euchre Creek to be "cool to warm" with a maximum temperature of 70.9 recorded. Water leaving the forested lands are relatively cool, with most of the heating occurring in the lower section. Boulder Creek is the coolest tributary; Cedar Creek is the hottest, warming the mainstem. No other water quality data is available.

Riparian shade is fairly intact, with an average seven percent potential increase on Cedar Creek and six percent on Euchre Creek. Mature and high reproduction forests for recruitment of large wood are in short supply. Euchre Creek riparian areas are dominated by old alder stands, which have the potential of destabilizing large volumes of sediment stored within the floodplain when they die.

Ninety acres of wetlands are found in Euchre Creek watershed, mostly in the lower portion, near the estuary. Less than half are highly altered, with more than a third altered very little.

Limiting factors to fish production appear to be: loss of rearing habitat at the mouth, lack of large wood and little recruitment, instability of sediments now, and the potential for large sediment volume to be mobilized as old alder stands deteriorate.

Chetco Sub-Basin

Hunter Creek/Pistol River Watershed Council Area

The **Hunter Creek** watershed drains approximately 44.4 square miles of land. Hunter Creek is situated entirely within Curry County and is among the smaller watersheds on the southern Oregon coast. Flowing in a westerly direction Hunter Creek crosses Highway 101 and drains into the Pacific Ocean just south of the community of Gold Beach. Elevations in the watershed range

from sea level to approximately 3,558 feet on Sugarloaf Mountain. Major tributaries include the North Fork and Big South Fork.

The upper portion of the basin is characterized by steeply sloped forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Grazing, rural residential development and other agricultural uses are dominant in the lower portion of the basin. Over 60% of the watershed is in private ownership.

The Hunter Creek watershed has steep to very steep gradients, with high rates of erosion. Portions of the upper Hunter Creek watershed display the “inner gorge” feature similar to those in the Chetco watershed, including serpentine soils and distinctly different forest species. Over 60 percent of the watershed is privately owned, with 97 percent in forestry use.

Hunter Creek saw extensive logging in the 50's and 60's, with as many as 17 active mills in the Gold Beach/Hunter Creek area. Floods of 1955 and 1964 had considerable impact on the watershed and channel. Very large chinook salmon existed in the watershed historically. Rural residential and light industrial development is prevalent in the lower mainstem.

Sediment mobility and sources are a great concern in Hunter Creek. Steep slopes, debris flows and high road crossing densities are common. The Big South Fork of Hunter Creek has the highest density of stream crossings of any South Coast subwatershed. Lower Hunter and Middle Hunter subwatersheds ranked moderate/high for density of stream crossings. Lower Hunter Mainstem ranked moderate for roads on steep slopes. Channel widening is evident in some portions of the watershed, indicating excessive and unstable sediment loads.

Anadromous fish use in Hunter watershed is restricted to the lower end of the mainstem and lower tributaries for chinook and coho, with steelhead extending into the lower North Fork and Upper Hunter Mainstem. Barriers to migration exist on Little South Fork and several in the Lower Hunter Mainstem. Limited ODFW stream survey data available from 1992 shows a general lack of wood, less than desirable pool quality, and moderate riffle habitat for spawning.

A survey of riparian vegetation reported a small amount of mature timber within the riparian area and seven miles of brush and pioneer species on the mainstem. Big South Fork has the highest potential for increases in shade. Heating within the Forest Boundary (serpentine gorge) may reduce the impact of increased shade in the lower portions of the mainstem.

The Hunter Creek Mainstem is on the DEQ 303(d) list as water quality limited from the mouth to River Mile 16.5, and is being investigated for sedimentation. Water temperatures (7-day maximums) increase 10 to 14 degrees before leaving the National Forest Boundary, and are cooled somewhat at the confluence with the North Fork. Septic tanks may be impacting water quality, though no data is currently available.

Hunter Creek has 25 acres of wetlands, almost exclusively in the lower watershed. Most are buffered by rural development, and most are altered. Six have restoration potential.

Limiting factors to fish production in the Hunter Creek watershed appear to be sediment transport and storage, lack of large wood, simplified and reduced estuary habitat, and high water temperatures.

The **Pistol River** watershed drains approximately 105 square miles of land, situated entirely within Curry County. Flowing in a westerly direction Pistol River crosses Highway 101 and drains into the Pacific Ocean about ten miles south of the community of Gold Beach. Elevations in the watershed range from sea level to approximately 4,220 feet on Snow Camp Mountain. Major tributaries include the North Fork, East Fork, and South Fork.

The upper portion of the basin is characterized by steeply sloped forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Grazing, rural residential development and other agricultural uses are dominant in the lower portion of the basin. Over 55% of the watershed is in public ownership. All but the Coastal Lowlands have steep hillslope gradients and high natural sediment loads. The lower end of the Pistol near Highway 101 crossing has been straightened and riprapped. Hardwood forests dominated the bottomlands in the past. Logging was very heavy in the 1950's and 60's.

Sediment sources and transport are a large concern in the Pistol watershed. Extremely steep gorges, low to moderate densities of roads on steep slopes in Glade and Deep Area, and moderate to high densities of crossings in Glade and Deep Area and the Lower Mainstem all contribute to sediment instability. A high concentration of these roads is in the Deep Creek watershed. Debris flows that alter riparian vegetation and channel structure were most recently

Anadromous fish use all but the upper subwatersheds, with chinook in the mainstem Pistol, half of the South Fork, and the lower mile of Deep Creek. Coho distribution is similar, with less use on the South Fork and some mainstem tributaries. Steelhead use all the tributaries, major and minor, as well as the mainstem itself. Three barriers are reported. Stream habitat surveys in 1991 and 1995 indicate moderate pool and riffle habitat, and poor wood levels for all but one reach in Bull Gulch and the highest reach of the South Fork.

The Pistol Mainstem has about ten miles of large wood production potential, ten miles on the South Fork, seven miles on Sunrise Creek, and 2 miles on the North Fork. The highest potential increases in shade are on the North Fork Mainstem, Crook Creek in 1st, 2nd, and 4th order reaches, and the South Fork 4th and 5th order reaches.

Water use is not a large issue in the Pistol River. Nearly all of the out-of-stream rights are junior to the large in-stream right which is usually not met.

Pistol River is on the 303(d) list as impaired for temperature from mouth to headwaters and is being investigated for flow modification and sediment concerns. Deep Creek is also being investigated for sedimentation. Temperatures (7-day maximums) are in the mid 70's, with the South Fork as the warmest tributary and Deep Creek as the coolest. Biological oxygen demand is the highest of any South Coast stream, but it has the second best water quality of South Coast streams. All the wetlands in the Pistol watershed are in the Lower Mainstem. Approximately 177

acres are identified with a wide range of alteration, restoration potential and surrounding land use.

Limiting factors to fish production and water quality in the Pistol watershed appear to be: sediment sources and transport, especially in Deep Creek and the South Fork Pistol, the lack of large wood to moderate sediment movement, and simplified and reduced estuary/wetland habitat in the lower end.

Chetco River Watershed Council Area

The Chetco River, located almost entirely within Curry County, drains approximately 352 square miles and is divided into 17 subwatersheds. The Chetco mainstem is about 56 miles long with its headwaters and the first 28 miles of the mainstem located within the Kalmiopsis Wilderness. Flowing in a westerly direction the Chetco empties into the Pacific Ocean at Chetco Cove located about 6 miles north of the California line between the towns of Brookings and Harbor. Elevations in the watershed range from sea level to approximately 5,098 feet on Pearsoll Peak. Major tributaries include Box Canyon Creek, Tincup Creek, Boulder Creek, Mislatah Creek, Eagle Creek, South Fork, Emily Creek, North Fork and Jacks Creek.

More than eighty percent of the watershed is publicly owned. The upper portion of the watershed is characterized by steeply sloped forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradients. The lowest 11 miles of the river is lower gradient and bordered by private land. Rural residential development, forestry, and urban areas are the dominant land uses in this lower portion of the watershed. The Chetco estuary, estimated at 1.7 miles in length has been substantially altered from its natural state.

The watershed has mostly high erosion, high runoff soil types both in the upper and lower portions of the watershed. In the upper watershed, rapid runoff and exposed serpentine in the inner gorge strongly influence water quality and hydrology in the Chetco River. Water temperatures increase dramatically through portions of the wilderness area and are not cooled completely by the cooler main tributaries.

Mining is still active in the watershed both for gravel in the lower sections and minerals in the upper. Jetties have greatly altered the mouth of the river and how it functions as habitat for salmon migrating to the ocean. High density of roads on steep slopes in the Coastal Area is a concern, as is the density of road crossings in all of the mostly private subwatersheds (lower five), and the private sections in the mostly Forest Service subwatersheds.

The amount of urban and rural development in the lower watershed is a large concern for fish habitat in the future. As the urban and rural populations grow, so do the risks of peak flow enhancement, sediment inputs, riparian vegetation removal and water contamination.

Segments of the mainstem Chetco and tributaries have been identified as exceeding the standard for maximum summertime water temperature. Subsequently these segments are on the Department of Environmental Quality 303(d) listed for temperature. A water quality

management plan has been adopted by the Chetco Watershed Council in response to the elevated water temperature.

Steelhead and cutthroat trout use the entire watershed. Chinook use is mostly in the lower mainstem channels (below Mislatah), and coho extend slightly higher in distribution. Historically, coho populations were probably quite low, being on the southern end of their range.

A riparian assessment revealed pockets of large wood recruitment areas, and large potential increases in shade. The highest potential shade increases occur in areas on the lower reaches of the North Fork and smaller streams in the Chetco Coastal Area.

Channel widening was documented on the North Fork, The South Fork, and Emily Creek, with increases in width recorded from 50 to 200 feet. Channel widening and canopies opening indicate sediment problems and channel instability in response to floods of 1955 and 1964. Channels are narrowing as they re-vegetate and recover.

25 wetlands (93 acres) have been identified in the Chetco Coastal Area, with some in the North Fork, Jacks Creek, and the Lower Chetco Mainstem.

Water quality rated low in the Chetco, not only from high temperatures but also sedimentation, phosphate levels, dissolved oxygen and pH. Limiting factors to fish production and water quality in the Chetco appear to be water temperature (reduced shade, especially in tributaries), sediment transport and storage, number of roads, and estuary habitat.

Winchuck River Watershed Council Area

The Winchuck River watershed drains approximately 71.4 square miles of land. The Winchuck is situated primarily within Curry County with some sub watersheds extending into California's Del Norte County including the South Fork, Middle Winchuck Mainstem, and Bear Creek. Flowing in a westerly direction the Winchuck River crosses Highway 101 and drains into the Pacific Ocean about a half-mile north of the Oregon/California border and approximately five miles south of Brookings Oregon. Elevations in the watershed range from sea level to approximately 2,925 feet on Mount Emily. Major tributaries include Fourth of July Creek, East Fork, Wheeler Creek, Bear Creek, and the South Fork.

The upper portion of the basin is characterized by steeply sloped forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Grazing, rural residential development and other agricultural uses are dominant in the lower portion of the basin. Approximately 71% of the watershed is in public ownership.

Forestry use is dominant, with agricultural/rural residential use only in the Lower Winchuck Mainstem, South Fork Winchuck and the Middle Fork Winchuck. The Forest Service manages a large percentage of the upper watershed, and Simpson Timber owns the majority of the watershed within California.

The Winchuck has been mined for gold in the Mt. Emily area, and has been extensively logged. Only 5 homes were present in 1961, with a much larger number now. Agricultural lands include a few lily fields. The Winchuck estuary was filled by the Highway 101 improvement project in the 1950's.

Sediment is a concern in the Winchuck watershed, with high sediment soil types, steep inner gorge features and active land use. In 1986, a large slide in the Wheeler Creek subwatershed contributed huge amounts of sediment to the system, and is still delivering fine materials. The Middle Winchuck Mainstem is ranked moderate density for road crossings and moderate density for roads on steep slopes. Bear Creek is ranked moderate density for roads on steep slopes.

Steelhead and cutthroat trout are found throughout the watershed, Chinook and coho use the mainstem and all the major tributaries, with the South Fork being the primary coho spawning area. The mainstem has been significantly modified, including the estuary, which is simplified and small. The watershed has numerous fish passage barriers. Riparian vegetation is poorly understood in the Winchuck, and surveys are needed. Alder is prevalent on the lower South Fork.

The mainstem of the Winchuck is on the Department of Environmental Quality 303(d) listed for temperature from the mouth to the East Fork. The same reach, as well as Wheeler Creek, is under investigation for sediment limitations. The East Fork is being investigated for temperature. Fecal coliform bacteria and phosphates are moderately impaired, dissolved oxygen levels are low, biological oxygen demand is high, and chlorophyll readings are the highest of all Curry County streams. Water temperatures (7- day maximums) are cool to warm, with the highest reading 70.3 degrees F. The tributaries generally cool mainstem temperatures in the lower watershed. All wetlands are in the lower watershed, with less than half highly altered. Nine show potential for restoration.

Limiting factors to fish production in the Winchuck watershed appear to be sediment sources and transport, lack of large wood, estuary conditions, water temperature and chemistry, and barriers to fish migration.