CURRY ACTION PLAN

Prepared for
The South Coast Watershed Council

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Introduction

This is a living document. It was co-produced by watershed council members and scientists during the years 2001 – 2002. It represents a flexible strategy for approaching watershed restoration in Curry County, Oregon and is designed as a restoration "map" for the next decade (2000 – 2010).

Of course, this document cannot anticipate every opportunity for the next 10 years. Therefore the Curry Action Plan outlines broad areas of emphasis, focusing on limiting factors for water quality and salmon production.

We welcome your participation in watershed restoration and enhancement on Oregon's South Coast.

The mission of the South Coast Watershed Council is:

- **1) To protect the watersheds of Curry County, Oregon; to enhance native fish populations; and to provide for enjoyment, education, and recreation on our streams and rivers;**
- **2) to provide an organizational framework for all watersheds and watershed councils in the county; and**
- **3) to test new management practices that are designed to support environmental integrity and economic stability in Curry County.**

ASSESSMENT OF HISTORICAL CONDITION

Introduction: Curry County has a rich and varied history. This account is a very brief summary of what we know about the fisheries history of our area. There are a number of other sources of information available (see bibliography at the end of this section).

For approximately 10,000 years (400 human generations), the first people of Curry County lived more or less in harmony with abundant salmon runs. Scientists now believe that over time, the landscape of our area changed, sometimes dramatically, sometimes slowly -- but there was always good to excellent habitat over most of our area for anadromous salmon and steelhead. Landslides, floods, and fires certainly impacted fish populations, and in localized areas, probably severely (if temporarily) depressed fish numbers. Apart from these localized disturbances, however, we believe that fish runs were abundant, healthy, self-sustaining and strong. Although it is difficult to reconstruct hard numbers, it is generally believed that the Rogue River alone supported a run of well over a million fish each year, and some of the other coastal tributaries probably had runs approaching a hundred thousand salmon annually (all species), depending on the year and local conditions.

All we know about the culture of the First People, the native Americans, indicates that they treated salmon as a gift, complete with respectful ceremonies, taboos against over-fishing, and highly skilled and effective tools for harvesting this resource from the sea. However, the 400 human generations of sustainable fishing and harvest began to unravel with the arrival of Euro-Americans in the middle 1800's.

Logging, grazing, mining, ditching, and irrigation were all part of the Euro-American tradition of land use and were all consistent with hard-won private property rights. From 1850 to the year 2000 (150 years – about 6 human generations) most streams that flowed through agricultural land in Curry County were either tapped for irrigation, altered, ditched, straightened, or otherwise "managed" to enhance agricultural uses. In many areas, riparian vegetation was cut down and replaced with pastureland. To cite but one example, in the late 1800's and early 1900's, there were over 400 dairies in Curry County. The land along every river and creek in the county was grazed by dairy cattle – or by sheep or beef cattle. Similarly, many of Curry County's upland forest areas were harvested for timber and lumber.

In addition to changes in the watershed habitat for fish, peoples' attitudes toward salmon also changed. For thousands of years, salmon were simply part of the "subsistence economy" that fed native peoples on a sustainable basis. Because the human population was relatively low and fish populations were relatively high, the amount of fish harvested each year allowed for sustainable runs year after year. Scientists now believe that the conditions in the Pacific Ocean have a huge influence on salmon populations. It is likely that fish numbers fluctuated widely from year to year, with both good years and bad years, depending on ocean conditions - as well as freshwater in-stream habitat conditions.

However, the amount of fish harvested, even in "bad" years, always allowed plenty of escapement for adult fish to reach their spawning grounds, ensuring an adequate supply of juveniles for the next generation.

With the coming of Euro-Americans, the salmon fishery became part of the "commercial economy," where salmon could be harvested for profit. Salmon were no longer taken just to feed the local people. They were salted, canned, exported to other areas, and they became part of a much larger market. This resulted in severe declines in the number of fish, as over-fishing and commercial harvest year after year, along with increasing damage to the freshwater habitat, began to impact the fish populations. In the early years of Euro-American settlement, the human population was low enough, and geographically spread out enough to spare some salmon runs.

There is plenty of evidence from historical records and oral interviews that at the beginning of the 20th century (1900), fish runs in all coastal streams covered by this assessment were still at sustainable levels. During the 20th century, however, there began a steady decline in fish numbers, as more and more of the salmon's freshwater habitat was altered, and the technology of ocean commercial fishing pushed harvest rates to dangerously high levels. (Lichatowich, J. , *Salmon Without Rivers*, Chapter 5)

Presently, many biologists believe that for all salmon species, we are at 5% to 50% of historical abundance, depending on the species. (Stouder, Bisson, and Naiman; *Pacific Salmon and their Ecosystems.* pp. 152-154.) Coho salmon are now listed as a threatened species under the Endangered Species Act (ESA listing in May, 1997). Steelhead and chinook in our area (the Klamath Mountain Province) have been studied, their populations evaluated -- and at this time (Sept 2001) there is no plan to list them under the Endangered Species Act. There is some evidence that steelhead populations have not been impacted as heavily as other species, and their numbers may be closer to historic levels of abundance. Since no accurate population counts were kept during pre Euro-American times, it is nearly impossible to directly compare current numbers with historic populations. We can only use approximations based on anecdotal evidence and historic research (See bibliography.)

Briefly, here is a summary of the habitat changes over the past 150 years, along with our current understanding of their impacts on fish populations:

Logging: Every drainage in Curry County has had some logging activity. Before the first Forest Practices Act of 1972, there were no regulations regarding forest practices. Old growth timber was extensively logged, beginning with the most accessible areas, often along streams and rivers. Since there were no restrictions, much logging took place right down to the edge of the rivers and streams – then logs were transported down the streams to mills on the coast.

Clear cut logging was the preferred method in Curry County, mostly for the economic benefits of taking every available tree, and also because Douglas fir, the dominant timber species, regenerates best in sunny, open areas without any canopy cover.

The impacts to Curry County streams and rivers from decades of unregulated logging was considerable. Many residents living today remember the rivers running "like dark chocolate" from turbidity and sediment for weeks at a time in the rainy season. Extensive logging tends to make the soil more susceptible to heavy run-off and erosion during heavy rains.

Lack of cover along streambanks has had a number of other effects on the fisheries. One of the primary consequences is the elevation of water temperatures due to the loss of canopy cover and shading. Solar radiation in the summer heats up streams, sometimes to lethal levels. (Salmon do best at temperatures below 64 degrees Fahrenheit.) As a consequence, most all streams in Curry County are listed as "water-quality impaired" for excessive temperatures by the Oregon Department of Environmental Quality (DEQ). Logging also reduced organic material available to young salmon by removing a critical part of the food web, riparian vegetation.

The period of intensive logging on private lands in Curry County was roughly 1930- 1990. Historical records show the following distribution for sawmills and plywood mills during the 20th century: Brookings/Winchuck area: 15 mills; Pistol River area: 6 mills; Rogue River/ Hunter Creek area: 17 mills; Euchre Creek area: 15 mills; Port Orford/Elk area: 14 mills; Sixes area: 16 mills; Langlois/Floras Creek area: 18 mills. During the time of most intense logging, historians believe there were 75 -80 mills in the county running simultaneously to process the timber coming out of the woods. As one example, a million board feet a day was logged and transported out of the Sixes River drainage in the early 1960's.

Forest Practices Act rules enacted in 1972 and modified since then offer some protection for riparian areas. At present (2001), on large, fish-bearing streams, there is a 20-foot "no-touch / no-cut" buffer within a 100-foot riparian management area (RMA). Timber harvest outside the 20-foot no-touch zone is allowed within the RMA, but some trees are required to be left standing to protect streams.

Roads & Sediment: Road-building associated with logging is a big contributor to sediment being washed into streams, affecting salmon incubation and survival. Many "old" roads, constructed during the heyday of logging, were not designed to withstand years of heavy winter rains. These roads were simply cut into the side of a mountain to access prime timber. As a result, many of these roads "fail" and become landslides, sending tons of sediment, debris, gravel, and fine material into rivers and creeks. Although landslides are a natural phenomenon, geomorphologists say extensive road building has exacerbated the delivery of sediment to many streams. This legacy from the past is highly visible to many guides, fishermen, and other who spend a lot of time on the rivers. They say the good holes are "filling up" with gravel and fine sediment. This is particularly true on the Sixes River, and Pistol River. Both these systems have a legacy of intensive logging and road-building. The resident time of sediment deposited in the active channel width is in the order of a few decades, and can persist in flood plains for hundreds of years, according to scientists.

Another downstream consequence of sediment delivery is that when a stream carries down an abundance of gravel, that gravel tends to "settle out" at a certain point in the river system. This accumulation of gravel often builds up large gravel bars or berms,

sometimes in the middle of the river down in the lower agricultural floodplains. When high water comes in the winter, then, the high flows get deflected off these accumulations of gravel in the center of the river, and the water tends to put more pressure on the banks, causing severe erosion. (See "Agricultural – riparian" below.)

Another consequence of sediment delivery is the widening and shallowing of river channels. A wider and shallower channel is more susceptible to solar radiation and heating. Numerous studies have shown the influence of solar heating on stream temperatures, with increases of up to 6 - 8 degrees F.

Increased sedimentation has also been shown to smother salmon eggs while they are incubating, depriving the developing eggs of oxygen needed to develop. The extensive road network in Curry County forests began to receive attention in the decade of 1990 – 2000, and a few of the major sediment sources have been addressed and fixed.

Large Wood: One of the most serious effects of logging is the removal of large wood from the rivers and streams. Scientists now believe that large wood plays a crucial role in maintaining salmon habitat. The latest independent scientific review of the Oregon Forest Practices Act says : "Large wood accounts for much of the pool formation in streams draining forestland, and pools are the preferred rearing habitat for coho and other salmonids. Functions of large wood include: a) trapping and regulating the flow of sediment, b) providing substrate and nutrients to the aquatic food web, c) creating complex patterns of hydrologic flow, d) keeping salmon carcasses in the stream, and e) providing thermal refugia." *(IMST Technical report 1999-1; p.21).*

Historically, virtually all of our rivers and streams had substantial accumulations of large wood. Sometimes these jams would extend from one side of the river to another. Sometimes they would be in the form of "drifts," accumulations of large wood and organic debris that would hang up on the side of a river. They might exist for years, or break up, or re-configure and move downstream. Many old timers in the county remember fishing on and from these drifts when they were growing up.

There were at least three forces working to remove large wood from our streams during the past century and a half. *One* was the ability of streams to float large logs downstream to coastal mills. In order to do this, streams had to be "cleared" so the logs could have a smooth passage downriver. One example: In 1883, A.G. Walling wrote that the mainstem of Elk River was used to transport up to 10,000 board feet of Port Orford Cedar every day. With the stream channel cleared, it provided a direct route to get old growth logs out of the woods to the cities on the coast. (Peterson and Powers: *A Century of Coos & Curry*).

Secondly, large wood was systematically harvested from the riparian areas. This reduced the amount of large wood available to fall into the river. And *third*, for a time, some scientists believed that streams needed to be "cleaned" to benefit fish. It was believed that the log jams were an obstruction to fish passage, and that the main stems of rivers needed to be kept clean to facilitate fish migration. As a consequence, for more than a decade in the 1960's and 70's, logs and log jams were removed from many watersheds, although practice was more common on federal lands than on private lands.

Agriculture – riparian: Agricultural lands over the past 150 years have primarily been used for grazing, especially sheep and cattle. Along most of Curry County's streams and rivers, pastureland has been extended to the edge of the creeks, and riparian vegetation has been removed. The removal of riparian vegetation has had a number of consequences. Streams heat up when there is no vegetation to shade out the sun, often to temperatures that are lethal to salmon. The roots of trees and other riparian vegetation help hold the soil together, and reduce erosion. Thus the removal of riparian vegetation exacerbates erosion and sedimentation, and contributes to bank instability and the loss of pastureland.

Riparian vegetation also contributes tons of organic material to the aquatic food web. Macroinvertebrates feed on the detritus from leaves and needles, and the principal food for young salmon is macroinvertebrates.

The loss of riparian vegetation has been severe in some areas, and eroding banks and lost pastureland have been a legacy for some Curry County farmers and ranchers. The situation is especially evident on the lower reaches of Floras Creek, where a relatively small river now flows through a canyon that is several hundred feet wide and 30-40 feet deep.

Agricultural – irrigation: Water use in Oregon is regulated by the Oregon Water Resources Department, which administers and monitors in-stream water withdrawals. Historically, ranchers and farmers secured a water right to a certain period of time or a certain quantity of water that they could legally use to irrigate their crop and pasture land. Agricultural irrigation is mostly used on the three northern watersheds in the county: Floras Creek, Elk River, and Sixes River. There are some small agricultural water rights on the Pistol River, Chetco River, and Winchuck River.

Irrigation is probably both a benefit and a detriment to native fish populations. It is beneficial in that water pumped from the stream, piped and delivered to pastureland, absorbed by the earth, and then returned to the stream is generally cooler than water exposed to solar radiation. This "irrigated ground water cooling" has been documented by stream temperature studies. The negative effects of irrigation are straightforward: water withdrawn from the streams and rivers is not available for fish use. If 50% of a stream is withdrawn for irrigation, 50% of its fish habitat is lost.

The demand for water, even in a county blessed with abundant rainfall, is high. For example, on Floras Creek, **105** cubic feet per second (cfs) of in-stream water rights have been allowed and allocated by the Water Resources Department for the summer season. Yet in reality, in the year 2000, there was not nearly that amount of "real" water available. The actual water in Floras Creek during the summer of 2000 was as follows (with two measurements taken during each month): *July*: 15.6 cfs and 11.3 cfs; *August*: 8.9 cfs and 4.8 cfs; and *September*: 7.1 and 5.28 cfs. (*Oregon Water Resources Dept. Streamflow Data)*

On the Chetco River, 101 cfs are allocated for summer flows, yet in 1999, there was only 45 cfs actually flowing in the river at several low water periods during the summer. Legally, the river could be sucked dry by irrigation rights, with devastating

consequences for the fish. (See additional information in South Coast Watershed Assessments (2001): Chapter 4: Hydrology and Water Use).

Agricultural – ditching: In most rivers and streams in the county, parts of the channel or its tributaries have been diverted or ditched. The reason for this ditching was often to improve drainage, reduce flooding in pastureland, or sometimes to simplify property lines. Often rivers were straightened and forced to flow in a straight line, whereas historically they had meandered with wide arcs, curves, and oxbows. The results of this ditching on fish have been numerous: 1) A straightened channel has far less habitat just in linear length than a natural meandering stream. 2) A straightened channel is more susceptible to erosion and bank failure. 3) A straightened channel often loses its riparian vegetation, causing an increase in stream temperatures, loss of food for the food web that supports salmon, and loss of root material holding the soil together. 4) A straightened channel acts as kind of a "bowling alley" or "garden hose" in high water; the velocity of the water picks up and increases the shear stress on the banks. When there are no meanders to dissipate the stream's energy during floods, the force of the water impacts the streambanks, increasing erosion and damaging riparian areas 5) A straightened channel is highly susceptible to downcutting. When the water's velocity speeds up, if the creek cannot jump into its floodplain, the water has nowhere to go but down, washing away spawning gravels, and scouring the streambed down to bedrock.

Examples in our area abound: *Morton Creek* (near the Coos-Curry line) west of Highway 101 was straightened and ditched all the way from west of Highway 101 until it empties into New Lake. This has severely reduced the number of coho in the creek. The lower parts of *Floras Creek, Elk River, and Sixes River*, including some low gradient tributaries, were all ditched and straightened. Historic records show these areas were once swampy bottomlands, covered with huge old growth spruce and other conifers, with multiple braided river channels. This was ideal coho habitat, with winter refugia in high water, broad floodplains and excellent rearing areas for juvenile fish. Ditching and straightening basically flushes all the eggs and fish out during high water events. *Crook Creek* on Pistol River used to meander through a willow swamp and supported large numbers of coho. It has been straightened and now goes in a straight line into the river, with high velocities in winter flows.

Mining – County rivers that have had the most mining activity include the Elk, Sixes, and Chetco Rivers. Gold was discovered at the mouth of Elk River near Port Orford in 1853. This discovery touched off a brief mining boom in Curry County. Following that discovery, there was extensive hydraulic mining in the Elk and Sixes area in the late 1800's. The largest operations were at the mouth of Dry Creek and on the South Fork of the Sixes. Orville O. Dodge wrote in 1898**:** "The placer mines on Sixes River have been working continuously for the past 35 years, and it is safe to say that more gold has been taken out of (the Sixes) than any other stream in Western Oregon." (Peterson and Powers: *A Century of Coos & Curry*). At one time there were five large hydraulic mining operations running simultaneously on the Sixes River.

On the Chetco River, gold was discovered high in the Kalmiopsis Wilderness in the late 1800's by settlers from the Applegate and Cave Junction areas. Miners worked

the Chetco and little Chetco Rivers periodically for the next 100 years. As late as the 1990's there were active mining claims being worked on the Chetco and little Chetco Rivers.

The impacts of mining on fisheries vary. Hydraulic mining of streambanks and river gravel disrupts salmon spawning areas, and, in large operations, can deliver tons of sediment and "fines" into the river system. Smaller operations that do not disturb as much gravel probably have little impact on fisheries. "Industrial" mining, as practiced in the late 1800's and up until about 1950, had far more impact on fisheries than "recreational" mining, which is still practiced in some watersheds (*Sixes, Chetco*) today.

Hatcheries -- There have been numerous attempts to improve declining fish runs by constructing hatcheries on Curry County rivers. The idea behind the series of hatcheries was to artificially propagate fish to make up for the losses caused by habitat destruction and commercial fishing. The first hatchery in our area was built on the Rogue River, by R.D. Hume, in 1876. There were many other small hatcheries constructed during the next 125 years: Brush Creek (near Humbug Mountain); Bald Mountain Creek (tributary of the Elk); Burnt Hill Salmon Ranch (south of Pistol River); Ismert Creek (Pistol River); and Indian Creek (lower Rogue), plus several others. The Elk River hatchery at River Mile 8 was constructed in 1968. The Elk River hatchery and Indian Creek (Lower Rogue) hatchery are the only hatcheries in operation today (2001) in Curry County. The Elk River Hatchery supplies about 300,000 smolts annually to the Elk River system, and Indian Creek supplies about 75,000 smolts annually to lower Rogue tributaries. Curry Anadromous Fishermen man the Indian Creek hatchery. ODFW manages the Elk River fish hatchery.

After extensive research and nearly 100 years of experiments with hatcheries, ODFW in the 1980's adopted its "Wild Fish Policy," which emphasizes the importance of wild fish and habitat protection. Hatcheries are now used only to supplement wild fish, and there are increasing concerns among fish biologists about hatchery fish interbreeding with wild fish, their genetic fitness, and their lack of adaptations to fluctuating ocean and stream conditions. The scientific consensus at this time is that we shouldn't be pumping thousands of hatchery fish into river systems, especially when wild fish are at risk.

Harvest – Throughout the Pacific Northwest, the common phrase that early Euro-American settlers used to describe salmon abundance was "You could walk across the rivers on the backs of the salmon." Early Curry County accounts confirm that abundance. There are also numerous historical reports of horses refusing to wade across the rivers because they were frightened by the masses of salmon that schooled in the rivers. By the turn of the century (1899-1900) there were extensive gill net fisheries on virtually every river and stream in the county. Salmon were caught in broad nets; they were speared or pitchforked into wagons for delivery to town; they were caught and salted and canned by the millions. There are few, if any, records of commercial harvest on Curry County's smaller streams, but coast-wide in Oregon, the records show that commercial canning of

salmon peaked in 1911, and went into steep decline in the following years. (Lichatowich, J. : *Salmon without Rivers*, Chapter 5).

After World War II, the commercial fishing industry extended its reach to the offshore waters. Aided by improved technology and larger, more efficient nets and other fishing gear, trollers, trawlers, factory ships, and foreign ships all harvested salmon from the Pacific in increasing numbers. The National Marine Fisheries Services (NMFS) manages the ocean fishery, and ODFW sets freshwater harvest levels. There is general agreement that harvest levels were set too high at times during the past century, allowing stocks to be severely depleted. It is hoped that favorable ocean conditions, along with improvements in freshwater habitat, and more conservative harvest rates, will allow salmon populations to rebuild to the point where there can be sustainable fisheries once again.

Urban development: The Brookings-Harbor area is the largest "metropolitan" or urban area in Curry County. The City of Brookings is currently (2001) conducting a water study to determine the best and highest use of Chetco River water. The city has some rights to Chetco River water for municipal drinking water and domestic uses (watering lawns, gardens etc.) Urban run-off (when rain hits impervious surfaces such as pavement and asphalt) is an increasing problem. Oil, gas, toxic chemicals and other pollutants can be carried into streams and creeks by urban run-off. These chemicals and pollutants have been shown to interfere with salmonids' ability to reproduce, even in small amounts. Urban development through most of the 20th century was not extensive enough in other areas of the county to severely impact fish populations.

Summary: It was certainly not the intent of Euro-Americans to kill off all the salmon by destroying their habitat. Each incremental change during the past 150 years had a small, even negligible effect on the freshwater habitat for these anadromous fish. Taken together, however, the *cumulative effects* of extensive logging, ditching, clearing, grazing, and over-fishing, have been devastating to fish populations. Oregon Governor John Kitzhaber has said we are in danger of losing salmon not from any one big catastrophe, but rather "from a thousand small nicks and scratches."

This brief summary is an overview of some of the cumulative effects. Specific remedies to mitigate the damage, or restore habitat, are included in the South Coast Action Plan 2001, and the accompanying action plans for all of Curry Co. rivers and streams.

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U. S. Forest Service. Various watershed analyses (WA) contain valuable information about the upper reaches of Curry watersheds: Sixes River WA 1997; Elk River WA 1998; Hunter Creek WA 1998; Chetco River WA 1996; Winchuck River WA 1999.

The Curry County Historical Society in Gold Beach also has many other publications on fish history in the area.

CURRY ACTION PLAN 2001

PART 1: INTRODUCTION:

This document is a living document. It cannot, and does not, prescribe every possible stream restoration project in Curry County. What the Curry Action Plan 2001 does do is to outline broad areas and types of restoration possibilities. In some areas, it makes site-specific recommendations, based on our assessment of the watershed condition. In other areas, it takes a more broadbrush approach – noting areas in the landscape that need improvement or could use restoration.

The emphasis of restoration work in Curry County is to restore and enhance ecological functions and processes. This Action Plan specifically targets the limiting factors for salmonid production on private lands in Curry County, and outlines possible actions.

It is recognized that this document cannot anticipate every opportunity, or identify every need in Curry County watersheds. Therefore, it is permissive and flexible, rather than limiting and narrow. If a project, an idea, or a priority becomes apparent in the future, it should be incorporated into this Plan, and if possible and feasible, implemented without delay.

We find ten broad categories of projects to be appropriate for watershed restoration, though there may be others. A listing of the categories is included here, followed by a more detailed description of the opportunities in each category.

1. **Surveys and assessments**
2. **Upslope activities, including roads**
3. **Fish passage**
4. **Riparian and wetland restoration**
5. **In-stream enhancement**
6. **Education and Outreach**
7. **Acquisition**
8. **Noxious Weeds**
9. **Water Quality**
10. **Science and Research**

PART 2: PROJECTS

SURVEYS AND ASSESSMENTS:

The South Coast Assessment of individual watersheds (2001) includes the following drainages: Floras Creek; Elk & Sixes Rivers; Port Orford watersheds; Euchre Creek; Hunter Creek; Pistol River; Chetco River; and Winchuck River. These assessments constitute an overview of existing conditions across the landscape, and bring together into one document a wide variety of information about watershed processes.

However, there are many data gaps in this assessment. In short, there is a lot we still don't know. There is a great deal more to be learned about water temperatures, the effects of shade and sun on salmonids, large wood and its functions, hydrology of small creeks and rivers, riparian diversity, salmonid biology in freshwater streams, estuarine functions, sediment delivery, and a hundred other variables and disciplines.

Therefore, it is appropriate to continue to do surveys and assessments, based on specific needs, in specific areas. One example would be: Big Wood Timber Company decides that it would like to do a comprehensive assessment of its road system in Curry County to determine potential failure, and the condition of its culverts and stream crossings. Another example would be: The Oregon DEQ would like extensive stream temperature and water quality information from the private lands in the Elk and Sixes watersheds. A third example: A private foundation would like to do a thorough survey of all salmonids in Pistol River and a summary of their life histories.

All of these examples would provide valuable information for salmon restoration. Therefore, we recognize and acknowledge that more information is needed in a number of areas, and we encourage the responsible and targeted collection of appropriate data.

Based on our assessment of Curry watersheds, these are some of the high priority areas where we need more information, along with some key questions for research:

Estuaries: Are Curry's estuaries functioning at their highest level? What could be done to enhance estuary function? Is the water quality in our estuaries good? What are the immediate and long-term threats to our estuaries? How can we preserve them?

Cutthroat trout: How do cutthroat trout interact with other salmonids? Are their populations stable or in decline? Is their habitat stable?

Road surveys: Where in the county are the most serious threats to water quality from road failures, landslides, and plugged culverts? Are they fixable?

Water Quality: What are the threats to the water quality in Curry County rivers and streams? What can be done to limit the discharges of wastes and pollutants into our river systems? Can water quality be improved in our drainages? If so, how?

Suggestions:

- Conduct water quality testing throughout watershed for assessment and monitoring purposes.
- Conduct functional assessments of stream and wetland habitats.
- Conduct ODFW stream surveys on all fish bearing streams.
- Identify present sediment sources, as well as future ones.

- Determine impact of road drainage patterns and channel/flood plain modifications on the hydrograph.

UPSLOPE ACTIVITIES, INCLUDING ROADS:

The upland areas of Curry County rivers are at higher elevation than the coastal plains. Streams in the uplands have a higher gradient; they are more confined; and some of these areas are in public ownership. The major focus of work in the uplands is maintaining and improving the quality of the water that flows from these areas, and keeping healthy and diverse riparian areas alongside streams.

The following are some goals and guidelines:

Reducing sediment: Where possible, look for fixes that will reduce sediment delivery into streams and rivers. This can include fixing or replacing undersized culverts; decommissioning roads that are no longer used; improving stream and road crossings to provide better drainage and lessen the chance of road failures and slides; and other appropriate techniques.

Plantings: Upland plantings can stabilize soil, reduce erosion, and eventually contribute wood to riverine systems. Planting of native species in all watersheds should be encouraged. A mixture of hardwoods and conifers will provide for the most riparian diversity.

Specific locations exist for projects in every one of Curry's rivers.

Suggestions:

- Inventory private roads and driveways for their potential sediment contributions.
- Work with BLM, USFS, and Curry County to reduce sediment problems related to roads.
- Encourage land managers to minimize annual maintenance (i.e. grading), and inspect culverts as often as possible.
- Decommission roads deemed unused or unnecessary.
- Determine, if possible, road drainage impact on interception of rain and changes in hydrograph.
- Stabilize or de-commission roads deemed high risk.
- Identify and characterize sediment source types (mass wasting, surface erosion, forest harvest, bank erosion, non-point source, agricultural runoff, road development) and map erosion potential in the watershed.
- Monitor turbidity, especially in high flow months, to identify the most active sediment sources.
- Educate residents and/or landowners about erosion causing activities and erosion reduction.

- ♦ Work with BLM, USFS, Curry County, and private landowners to determine possible sediment problems/sources, and develop strategies to reduce risk.
- ♦ Consider adding large wood to stabilize sediment store and encourage vegetation growth, where appropriate.
- ♦ Establish sediment monitoring sites to identify trends in critical areas.
- ♦ Identify critical headwater habitats for protection.

FISH PASSAGE:

Wherever possible, we should do projects to help fish gain access to freshwater spawning and rearing habitat. From 1995 to 2000, the watershed councils repaired 25 fish passage barriers in the county. This work was done in conjunction with Curry County Road Dept., ODFW, OWEB, and private landowners.

Fish passage barriers are usually culverts that are installed for road crossings. Over time, culverts often form a barrier and fish cannot pass through them. Sometimes, access to upstream habitat is completely blocked by these barriers.

There are two principal remedies for fish barriers: replace the culvert with a larger, more fish-friendly culvert – or replace the culvert with a bridge. The recent fixes in Curry County have included a mix of bridges and new culverts, depending on cost and site-specific needs. Sometimes, a culvert can just be removed completely (and not replaced, allowing a natural stream channel to re-establish itself).

For the next decade, we see a continuing need to fix passage barriers, and have identified some specific sites. Others will be addressed as needed.

Locations:

- Trib of Boulder Creek above Sea Wind Farms (north county): East of Highway 101. (South of KOA) Two culverts need to be removed or replaced. Landowner: Ellis Foster. (ODFW Restoration Guide p. 50 *)
- Pea Creek (trib of Euchre Creek): where the county road crosses Pea Creek. Culvert is functioning well now. It bears watching.
- S. Fork Hubbard Creek (5 miles inland from Highway 101)
- Riley Creek (Wally Hyde)
- Hubbard Creek Reservoir, City of Port Orford outlet. Existing fish ladder needs modification and improvement.
- Bagley Creek (Elk River)
- Turner Creek (Hunter)
- Hamilton Creek (Chetco/Jack) near entrance to the golf course.
- Mountain Drive subdivision (N. Bank Chetco River)
- Blackberry Creek on Elk River (USFS property)

Suggestions:

- ♦ Identify any/all unnatural barriers to upstream or downstream fish migration.

- ♦ Work with landowners on correcting fish passage problems, including potential funding sources.
- ♦ Collaborate with USFS, BLM, Curry County, and private landowners to identify road crossings that are barriers or have unknown status.
- ♦ Prioritize crossings for replacement/improvement based on habitat loss, watershed position, and cooperation of owner.
- ♦ Inspect, install and/or upgrade fish screens on all significant irrigation diversions in the watershed.

RIPARIAN AND WETLAND RESTORATION:

This is a key area of work in the decade ahead. It has a number of different components:

Off-stream watering: Wherever possible, provide off-stream watering for cattle, sheep, and other livestock. Off-stream watering draws livestock away from creeks, rivers, and other riparian areas. It is often a necessary component of any riparian work.

Locations:
- Puhls (Elk River).
- Morton Creek below Highway 101
- Willow Creek
- Pistol River
- Others

Fencing: Fencing is another key component of restoration in our county. Since land and river topography vary greatly across the county, the preference is to choose a type of fence that the landowner can maintain easily, and one that can be easily replaced or fixed in case of flooding. Electric, solar, barbed wire, woven wire, polywire, and combinations of these types of fencing have all been utilized for riparian projects. Our goal is to keep livestock out of rivers and creeks, in order to allow diverse riparian vegetation to flourish.

Locations:
- Marsh Ranch (Elk River)
- Puhls (Elk River)
- Dan Creek, Forty Creek (Elk R)
- Mainstem Sixes
- Far upstream Sixes
- Crystal Creek (Sixes)
- Floras and Tibutaries
- Euchre Creek & tribs
- Lower Pistol River inc. Crook Creek
- Hunter Creek (Leith's & others)

- Bethel, Butte and Morton Creek (north County)

Planting: The goal is to promote and develop a robust, diverse, riparian community, with a healthy mix of hardwoods and conifers. Native conifer species include: redwoods, Douglas fir, Sitka spruce, western red cedar, hemlock, grand fir, and shore pine. Riparian hardwoods include willow (several species), Oregon ash, black cottonwood, myrtlewood, alder, hawthorne, big leaf and vine maple, and others. Some native shrubs include elderberry, twinberry, huckleberry, azalea, coyote brush, and others.

Locations:
- Willow Creek (Floras tributary)
- Elk and Sixes
- Lower Pistol River
- Floras Creek
- Others

Sinuosity and channel morphology: Many of the creeks and rivers, especially in the north part of Curry County, have been channelized, ditched and straightened. This results in degraded fish habitat (see Curry County historical overview). Part of riparian restoration is allowing these "ditches" to meander and attain some of their former sinuosity. Increased meandering allows energy in high water events to dissipate more easily, and provides more fish habitat. Sinuosity also increases stream complexity, and provides a wider mosaic of fish habitats throughout the river system.

Locations:
- Morton Creek
- Butte Creek
- Langlois Creek
- Jenny Creek (Floras tributary)
- Crystal Creek
- Crook Creek (Pistol tributary)

Suggestions:
- ♦ Identify and prioritize stream reaches for restoration of function through planting, protection, wood, fencing, etc.
- ♦ Assist landowners in developing grazing and ranch management plans that address riparian concerns.
- ♦ Determine most successful planting strategies, for this area.
- ♦ Develop/continue outreach activities to landowners that educate about riparian functions, how to protect them, and how management activities affect them.
- ♦ Protect standing and fallen streamside trees from removal, including jams and accumulations.
- ♦ Identify stream reaches where weeds are present and plan for control measures.
- ♦ Plant or promote native conifers and hardwoods in riparian areas, where appropriate.

- Monitor stream temperatures, turbidity and water quality to help identify problems with shade, bank erosion, non-point pollution, as well as provide feedback on restoration efforts.
- Collect stream habitat information for use in prioritizing restoration and protection.
- Collect water contaminant information for presence of toxins, metals, and/or excessive nutrients.
- Identify active management reaches (gravel harvest, road fords, livestock or recreational use, etc.) and design use to minimize impacts.
- Field assess wetlands to identify and prioritize for protection and restoration.
- Identify drained wetlands, especially in mid and upper watershed areas, where permanent or temporary restoration is possible.
- Explore possibility of using impoundments as both water storage and wetland habitat.
- Assess potential/historic beaver complex areas relative to present.
- Explore potential of using constructed wetlands for treating runoff.

IN-STREAM:

Large Wood: Large wood is considered a key component of freshwater salmonid habitat. The Independent Multidisciplinary Science Team (IMST) has stated that most coastal streams are deficient in large wood, and recommends that large wood be added (or recruited) to most riverine systems west of the Cascades. The watershed councils and ODFW have added more than 750 pieces of large wood throughout the county over the past five years. There are additional opportunities, as outlined in the "Guide to Project Selection --- South Coast Fish Management District" (1995) published by ODFW and the Oregon Wildlife Heritage Foundation.

Locations:

- Morton Creek
- Floras tributaries including Willow Creek
- Edson, Crystal & Dry Creeks (Sixes)
- Cedar, Rock, Champman & Bagley Creeks (Elk)
- S. Fork Hubbard
- Euchre tributaries
- N. Fork Hunter and Hunter Tributaries
- Deep Creek and Farmer Creek (Pistol)

* These sites and others are developed in more detail in the "Guide to Project Selection --- South Coast Fish Management District" – 1995, published by the Oregon Wildlife Heritage Foundation, and ODFW. In the text above, this document is called the ODFW Restoration Guide. More watershed specific restoration projects are listed by watershed in the sections that follow.

Estuaries: Estuaries in Curry County are critical habitat for salmonids. Projects that increase the size of our estuaries, increase or enhance their function, or that can reduce pollution of estuaries, are encouraged. Some of these projects include the placement of large wood to provide hiding and rearing cover for juvenile salmonids, and surveys to learn more about estuarine function, water chemistry, and other factors.

Water rights and irrigation: Water rights are the legal authority of users to withdraw water from streams in the county for agricultural, mining, irrigation, domestic, or other beneficial uses. Some farmers and ranchers can voluntarily cede their water rights to the state for a year or two – while still retaining their long-term water rights. Projects that encourage conservation of water, good pasture maintenance, and other best management practices on the land are all beneficial for water quality and salmonids. Screening on all irrigation withdrawals (to protect fish) is encouraged. Water rights can be purchased with OWEB funds from willing landowners. In Curry County, the largest discrepancy between obligated water rights and real available water in summer time is in Floras Creek.

In Floras Creek, **105** cubic feet per second (cfs) of in-stream water rights have been allocated by the Water Resources Department for the summer season. In the summer of 2000, however, the *actual* measurements in Floras Creek were as follows: July (two measurements): 15.6 cfs and 11.3 cfs (2 measurements); August: 8.9 cfs and 4.8 cfs; and September: 7.1 and 5.28 cfs. Opportunities to keep water in Floras Creek through voluntary purchases should be pursued.

Suggestions:

- Identify, restore, and protect wetlands and floodplains.
- Discourage excessive timber harvest, which may disrupt natural recharge of ground and surface water.
- When possible, rehabilitate or decommission roads and ditches that accelerate surface runoff
- Encourage more efficient irrigation techniques
- Determine what impact roads and ditches have on hydrology in the basin.
- Work closely with the Watermaster on stream flow restoration possibilities and in-stream flow requirements.
- Discourage ground water pumping in near off-channel habitats
- Develop strategies with OWEB/ODFW and local water users to acquire/lease water rights.
- Work with landowners/operators on fish-friendly irrigation practices, minimizing withdrawals at critical times, and maximizing efficiency of use.
- Explore other water source possibilities for cranberry farmers.
- Work with landowners on maintaining floodplain connection, relative to gravel extraction, ditch cleaning, and other management activities.
- Protect beaver populations where possible.
- Acquire "old" water rights for in-stream flow when possible.
- Encourage conservation of water.

- Protect (assess for risks), remaining high response channel habitat types, i.e. intact floodplains.
- Conserve, protect, enhance estuary habitat.
- Determine the level of stream modification (number of reaches/miles affected and degree) by dams, roads, bridges, rip-rap, dredging, ditches, culverts, in-stream mining, levees, and other bank stabilization/confinement efforts.
- Determine the effects of stream modifications on fish habitat and water quality.
- Develop/extend outreach efforts to landowners relative to stream diversions, wetland ditches, drains, and fish friendly alternatives.
- Explore historic impacts of beaver populations, relative to present.
- Identify culverts and bridges placed within or below level of potential floodplain.

EDUCATION AND OUTREACH:

A strong education program is a vital part of a salmon recovery plan. Education should include programs for all levels, including children and adults. Programs should also be tailored specifically to local needs, issues, and watersheds. Components include:

Suggestions:

- Publishing and distributing Curry Currents – our quarterly newsletter mailed to Watershed Council members and landowners.
- Periodic watershed council meetings to bring people together.
- Adult education classes, such as Watershed Stewards
- Curriculum packages on salmon biology, water quality, and related topics, relevant for different ages and levels.
- Sponsoring the annual watershed symposium for science research projects.
- Presentations on salmon at service clubs throughout the county, such as Rotary, etc.

ACQUISITION:

Acquiring land or water rights ensures that the resources will be used for fish enhancement, water quality, and resource protection over the long term. We have listed some possibilities for land and water acquisition. ***Purchases are only done with willing landowners on a voluntary basis.*** There is no attempt to "take over" or condemn any lands. We respect and honor the existing "working landscape" of private property and its uses within existing Oregon law.

Locations:

- **Dry Creek Conservation easement**: Vital migration corridor between Sixes River mainstem and Grassy Knob Wilderness.
- **Estuaries**. "The most biologically productive areas on the planet – more productive than even the rain forest."

- **Pistol River Area**: A conservation area in Pistol River would provide a secure refuge for south county salmonids.
- **N. County wetlands/marshes**: Historically, many north Curry County streams emerged from the Coast Range onto the coastal lowland plains, entering braided wetlands and spruce-filled swamps that provided ideal rearing habitat for coho. A small refuge that could gradually acquire these characteristics would be valuable to preserving biodiversity in the north county area.
- **Water rights**: Where feasible, acquire in-stream water rights to enhance fish habitat. Prime candidates include north county streams, especially Floras Creek, Willow Creek, Morton Creek, and Butte Creek.

WATER QUALITY:

Water quality is a key indicator of the health of our overall environment, and a vital component of this action plan. In many ways, most of the projects described here are designed to maintain or improve water quality. Water quality includes a number of different parameters, including temperature, dissolved oxygen, pH, conductivity, nitrates, turbidity, bacterial content, biological oxygen demand, and more.

Locations and opportunities for water quality testing and improvement exist in every South Coast watershed.

Suggestions:

- Constructing wetlands to absorb and uptake "waste-water," thereby reducing any chemical run-off (fertilizers, pesticides, and herbicides) into streams and rivers.
- Analyzing and improving pasture management to ensure that chemicals applied on the ground do not enter surface water streams.
- Designing appropriate-width "buffer strips" along streams to absorb any harmful chemicals before they reach waterways (see Riparian projects, above).
- Investigating ways to reduce pollution to waterways, from any source.
- Expand water quality testing into all major tributaries and high priority reaches.
- Determine the number of septic tanks in the watershed, and their proximity to the creek.
- Encourage landowners to monitor streams for algal blooms, possible nutrient sources, and ways to prevent nutrient pollution.
- Work with farmers/ranchers with high-density animal operations to control and adequately treat waste runoff.
- Work with cranberry growers to minimize fertilizer applications for possible impacts especially in Floras Creek, Floras Lake, and New River.
- Determine all potential sources of nutrients in the watershed, (i.e. forestry fertilization, agricultural fertilization and animal wastes, septic systems, golf course and residential fertilizer use.)

NOXIOUS WEEDS:

The following are the most prominent and widely distributed "noxious weeds" in Curry County:

Canada thistle	*Cirsium vulgare*
Gorse	*Ulex europaeus*
Himalayan blackberry	*Rubus discolor*
Scotch broom	*Cytisus scoparius*
Tansy ragwort	*Senecio jacobaea*

Many of these plants invade riparian areas and displace native species. Native species usually can provide better habitat for fish and wildlife, and often have more economic value for landowners. One example, picture 20 acres of gorse vs. 20 acres of Douglas fir or commercial Christmas trees.

Appropriate strategies to replace noxious weeds with native species should be explored and encouraged. Blackberries are a particularly "thorny" problem in riparian areas.

SCIENCE AND RESEARCH:

Science, research, and monitoring provide valuable "feedback loops" for restoration activities. Project effectiveness monitoring to measure if objectives are being met is an important component of our work. Experiments can also be designed to make restoration more effective. One example of an effective research project is the current (2001) riparian planting experiment (DEQ grant 148-00). This project will help determine effective riparian planting strategies and techniques in different areas of the county, and how much maintenance is required to ensure that young conifers and hardwoods survive through the first three years.

Suggestions:

- Explore estuarine functions and conditions.
- Explore stream shading and functioning condition with relation to stream temperatures.
- Water quality and how it relates to fish habitat
- Investigate the role of salmon carcasses and the delivery of marine derived nutrients (MDN) in South Coast streams.
- Determine locations of specific land uses (i.e. gravel removal operations) and how they might affect salmon habitat.

PART 3: TOP TEN PRIORITIES:

Based on our research, these are the top 10 biologically productive areas for salmonids in Curry County. The focus is on areas for restoration on ***private*** lands. (Rogue River & its tributaries are covered under separate Action Plan).

Dry Creek (Sixes): Has the highest spawning counts for chinook on the Oregon Coast (334 spawners in 1.6 miles; 1998). Vital connection between mainstem Sixes River, and Grassy Knob Wilderness. Dry Creek provides some of the best quality spawning habitat in the Sixes River watershed, and in the entire county.

Morton Creek (New River): Historically productive coho stream. Vital habitat between the falls above Jack Smith's and New Lake.

Lower Elk River: Potential coho and chum habitat. Close access to ocean; few ranches, huge potential for restoration of floodplains. Elk River water quality is high.

Winchuck River: Has consistently high water quality ratings from DEQ. Relatively undisturbed watershed. 4th of July Creek and Wheeler Creek have very high fish counts.

Estuaries (county-wide): Vital, highly productive parts of the salmon life cycle. Because they are small, their importance is magnified. Critical rearing areas for chinook.

Deep Creek (Pistol): Excellent runs of chinook and steelhead for many decades. Recent bridge ensures good fish passage. "Fish just like this creek," as old-timers say --- and they continue to use it. Probably no big timber harvest planned for the next 30 years. One ownership (South Coast Lumber).

Crystal Creek / Edson Creek (Sixes): High productivity for salmonids. Relatively intact watersheds. Good mosaic of habitat.

Jack Creek (Chetco): Highest fish counts of lower Chetco tributaries. High productivity historically. Habitat mosaic now includes golf course, with some exposed riparian areas and some diverse vegetated areas. Over 100 large logs in place above the golf course.

Floras Creek (mainstem): Intact fish runs that appear to tolerate some high summer temperatures. Potential and historic coho abundance. Also supports chinook and steelhead.

Willow Creek (Floras): Intact watershed. Potential for coho, chinook and steelhead. Possible potential for restoration of historic connection to floodplain, lowland swamp/spruce/wetland complex.

Five other favorites:

Euchre / Hunter: Smaller streams closest to the Rogue. Important for "Rogue River overflow" and strays. Genetic storehouse for South Coast fish.

Port Orford streams (Brush Creek and Hubbard Creek): Potential for fish presence. Wetlands are abundant.

Crook (Pistol): Large wood abundant; first tributary of Pistol in from the ocean. Historic willow swamp on lower reaches. Potential high quality rearing habitat.

Mainstem Chetco: Fish migration corridor to tributaries. Large watershed with abundant habitat above private lands. Maintain access, water quality, and water availability.

Mainstem Elk & Sixes: Classic South Coast rivers with intact fish populations.

Priorities for spending:

Acquisitions (Dry Creek, estuaries, others)
Riparian restoration (especially fencing and planting)
Water quality, especially in upslope areas.
Large wood (crucial habitat component for salmonids)
Education and outreach (social component critical for long-term success).

SOUTH COAST WATERSHED SECTION

This portion of the document contains summaries of the individual Watershed Assessments conducted, as well as restoration activities (Action Items) identified in each of the nine watershed Action Plans. For more detailed information, those documents can be viewed at the South Coast Watershed Council office in Gold Beach.

The Action Items are products of a synthesis process by natural resource specialists with extensive experience on the South Coast, who reviewed and discussed each of the nine Watershed Assessments. Input from watershed councils is also incorporated. Actions are focused on addressing limiting factors and are listed in order of relative importance, based on the impressions of the resource specialists. All action items are voluntary, with complete respect for private property rights.

FLORAS CREEK WATERSHED SYNTHESIS

The Floras Creek watershed is mostly within the Southern Oregon Coastal Mountain ecoregion, with the most downstream quarter nearly all Coastal Lowlands. 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.

Risk of peak flow enhancement due to roads, forestry (rain-on-snow events), and urban development is low. The four sub-watersheds lowest in the system show a moderate risk of peak flow enhancement (increased stream power) due to agricultural use and potential runoff. Channel typing in the watershed shows a drastic change in stream function from floodplain controlled, unconfined, sediment collecting reaches, to low gradient confined, sediment transport reaches. Beaver complexes were once probably very common and stable in Floras Creek and New River, especially in the tributaries.

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 sub-watersheds 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 "self-regulating" and the level of un-permitted or non-compliance use is unknown. Eighty percent of all water rights in the Floras watershed are junior to the in-stream right.

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.

FLORAS CREEK ACTION ITEMS

1. **Assess the hydrologic functions of Floras watershed, including roads, ditches, floodplains, wetlands, and altered channels.**
   Determine trend and identify areas critical for restoration.

2. **Focus restoration activities on Willow Creek, as a model for improving the Floras watershed.**
   Add large wood where necessary for natural sediment storage or important for fish habitat.

   Restore hydrologic functioning including wetland and floodplain connections.

   Improve vegetative cover and composition for shade and large wood values.

3. **Complete a more detailed analysis of New River.**

4. **Riparian silviculture for Willow, Middle Mainstem, South Fork, East Fork and North Fork Floras, and the Lower Mainstem.**
   Plant riparian vegetation for shade and large wood values, where appropriate and with proper protection.

   Encourage natural conifer regeneration where possible.

   Convert alder dominated stands to conifer, where appropriate.

5. **Wetland restoration and reconnection.**
   Field check all wetlands listed in the Wetland Assessment and assess for functionality.

   Where possible, protect intact wetlands.

   Where possible, restore function, connection to a water body and potential vegetation in less than intact wetlands.

6. **Road surveys for Willow, North Fork, West Fork, East Fork and Upper Mainstem.**
   Assess roads and crossings in the above subwatersheds for suitability, design, and probability and consequences of failure. Focus on earthflow areas and road drainage.

7. **Broaden spectrum and do more frequent water quality monitoring.**
   Institute broad spectrum and more frequent water quality measurements, in addition to temperature, to identify limiting factors and provide feedback on restoration efforts. Include monitoring for nutrient inputs such as forestry fertilizer, septic tanks, etc.

8. **Protect mature riparian forests on the South Fork Floras for shade and large wood values.**

9. **Constructed wetlands.**
   Consider constructed wetlands for treating runoff.

   Work with landowners on feasibility and benefits of constructed wetlands.

10. **Controlling livestock.**
    Identify areas with uncontrolled livestock use.

    Work with landowners to restrict animal access, where possible.

    Encourage off-stream watering.

11. **Expand education/outreach efforts for all watershed issues, especially large landowners.**

12. **Acquire water rights through purchase, lease, and forfeiture, where possible.**

13. **Develop grazing management plans, especially in the upper watershed, that directly address fish habitat concerns.**

14. **Conservation easements.**
    Acquire conservation easements where possible, on critical and/or intact habitat.

15. **Stream surveys.**
    Assess in-stream and riparian conditions, especially in mainstem and large tributary reaches.

SIXES RIVER WATERSHED SYNTHESIS

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 southern half of the watershed has topography similar to the Elk watershed, with steep slopes and less stable sediments. The northern half is more like Floras/Coquille topography, with more moderate slopes.

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.

Risk of peak flow enhancement (PFE - increased stream power) due to agriculture in the Beaver Area, Crystal Creek, and the Lower Sixes Mainstem is rated as moderated to low. Risk is rated as moderate in Dry Creek due to rural roads, though it is only on 208 acres. Risk of PFE due to timber harvest, and forest roads is low in all sub-watersheds.

Channel habitat types were the most diverse of any South Coast watershed, with a high amount of low/moderate gradient moderately confined channels (the best for restoration). These high response channel types are located throughout the watershed.

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 use in the Sixes watershed is a concern. Crystal and Edson Creeks do not meet their in-stream water rights in July, August, and September. The Mainstem Sixes water right of 25 cfs is usually not met, either. Many out-of-stream rights are junior to the in-stream right or are storage/time limited rights. Cranberries are the largest users of water

in the system, and typically have storage rights. Two "mining" rights in the South Fork total 75 cfs.

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. Channel dimensions may be changing with present sediment load.

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.

SIXES RIVER ACTION ITEMS

1. **Wetland connectivity in lower watershed.**
   Field check wetlands for functionality and where possible, reconnect to another waterbody.

2. **Build partnerships among ranches, timber companies, cranberry farmers, artists, environmental groups, and other interested parties.**

3. **Water quality monitoring.**
   Institute broad spectrum water quality measurements, including mercury, to identify limiting factors and provide feedback on restoration efforts.

4. **Riparian silviculture.**
   Plant riparian vegetation for shade and large wood values, where appropriate and with proper protection.

   Encourage natural conifer regeneration where possible

5. **Outreach/education for water quality and sediment – small woodland, big ranches, cranberry farms.**
   Work with landowners and residents on protecting water quality and sediment issues.

6. **Road surveys for Big Otter, Dry Creek, Elephant Rock and North Fork Sixes.**
   Assess subwatershed roads and crossings for suitability, design, and risk of failure.

7. **Ranches – potential for coho habitat.**
   Explore wetlands/riparian improvement potential of agricultural areas in upper watershed for coho habitat.

8. **Protect/enhance/restore estuary habitat.**
   Obtain conservation easements or property ownership where possible.

   Expand estuary size and increase complexity, mimicking natural processes of saline water exchange and deposition as much as possible.

9. **Modified stream survey to document channel widening for riparian stabilization.**
   Identify stream reaches where sediment is stored.

   Use a simplified stream survey method to document channel changes, relative to riparian planting and sediment stabilization projects.

10. **Protect existing private riparian forests.**

Where possible, protect high reproduction, mature and old growth riparian conifer forests for shade and large wood values.

11. Forfeiture/enforcement of water rights.

12. Forage/range management plans in upper watershed.
Work with landowners in the upper watershed on fish friendly range and forage management plans, where necessary.

13. Uncontrolled livestock access.
Identify reaches where livestock have uncontrolled access to riparian vegetation.

Work with landowner/managers on alternatives, where needed.

Encourage off-stream watering wherever possible.

14. Add large wood on tributaries.
Identify reaches that are appropriate for large wood additions, considering sediment stabilization and fish habitat concerns.

15. Fix fish passage problems.

ELK RIVER WATERSHED SYNTHESIS

The Elk River watershed is contained in the Southern Oregon Coastal Mountains. Natural erosion rates are high in the upper watershed and quite low in the lower watershed. A large percentage of the watershed is within National Forest management, and includes the southern portion of the Grassy Knob Wilderness Area. Gold was discovered in the Elk 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.

The US Forest Service has completed a thorough watershed analysis of the Elk River watershed within its management. Many surveys completed for this assessment, but stopped at the National Forest boundary, are available in that analysis.

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). Both of these areas have diorite soils, though they are less exposed in the Bald Mountain sub-watershed. 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.

The Elk River has a very high percentage of highly responsive/sensitive channel types including estuary, active floodplain, low gradient moderately confined and moderate gradient moderately confined channels. More than five miles are within the low gradient confined type, mostly in the Lower Elk Mainstem.

For hydrology issues, the risk of peak flow enhancement (increased stream power) due to agricultural use is rated as moderate to low for both the Lower Elk Mainstem and Elk Coastal Area. North Fork and South Fork Elk have moderate to moderate-high risks of peak flow enhancement due to forest roads, and an unknown risk due to timber harvest and rain on snow interactions. All other watersheds are low risk relative to timber harvest and forest roads. Risk of peak flow enhancement is low for rural roads throughout the watershed.

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 use issues in the watershed are minor, and the in-stream water right - though younger than most - is usually met. The largest user of water in the watershed is the Elk River Fish Hatchery.

Water quality is limited for temperature and habitat modifications in the mainstem as well as Bald Mountain Creek. Butler Creek is listed for temperature. Water quality is the best of any stream in Curry County. Temperatures in the mainstem are warm to very warm and tributaries are generally cool. Water in the Lower Elk Mainstem warms 3-4 degrees between the National Forest Boundary and Bagley Creek.

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. Bagley Creek is reported as possible coho habitat with restoration potential.

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.

ELK RIVER ACTION ITEMS

1. **Where possible, reconnect floodplain in Lower mainstem and Bagley Creek.**

2. **Where possible, reconnect wetlands and estuary habitat.**
   Expand estuary connection with wetlands - especially Swamp Creek.

   Protect intact and connected wetlands.

   Work with landowners for protection/improvement on Van Loo wetlands.

3. **Restore Bagley Creek (passage, wetlands, and conservation easements).**
   Where possible, remove or modify fish passage barriers.

   Improve or stabilize wetland functions.

   Explore conservation easements on Bagley Creek.

4. **Where possible, obtain conservation easements on floodplain reaches, lower tributaries, and wetlands.**

5. **Encourage protection of Copper/Salmon Area.**

6. **Riparian silviculture - continue efforts on Lower Mainstem, expand into watershed.**
   Plant/encourage riparian vegetation for shade and large wood values, where appropriate and with proper protection.

   Encourage natural conifer regeneration where possible.

   Convert alder dominated stands to conifer, where appropriate.

   Encourage off-stream watering of livestock.

7. **Water quality monitoring at hatchery and watershed wide.**
   Institute water quality measurements at the hatchery and watershed wide, in addition to temperature, to identify limiting factors and provide feedback on restoration efforts.

8. **Acquire water rights where possible.**

9. **Beaver - education and outreach**
   Work with landowners and residents to understand the relationship of beaver populations with wetlands, floodplains and coho habitat.

10. **Decommission roads, where possible, in areas with high risk of slope failure.**

11. **Gorse/noxious weeds plan.**
    Institute a noxious weed control plan in the watershed with priorities and action areas.

12. Restore tributaries and wetlands in coho areas, Lower Mainstem.
Direct restoration efforts to improving riparian and wetlands function and habitat quality in the Lower Mainstem.

Protect intact habitats, where possible

13. Road surveys.
Assess roads and crossings for suitability, design, and probability and consequences of failure, beginning in high sediment risk areas first.

14. Add large wood, particularly in tributaries to the mainstem including Indian Creek, Bagley Creek and Chapman Creek.
Identify reaches likely to respond to large wood addition.

Determine which reaches in Indian, Bagley and Chapman Creeks that would respond to addition of large wood for fish habitat and sediment stabilization

Re-create side channel log jams, where possible.

15. Support Elk River water gage.

16. Protect tributaries with cool water temperatures.

17. Stream surveys (needed on private land).
Assess stream habitat on private lands, where possible.

18. Use bio-engineering for unavoidable bank stabilization.

PORT ORFORD WATERSHED SYNTHESIS

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.

Risk to peak flow enhancement (PFE - increased stream power) due to forest roads and timber harvest is low. Urban roads in the Garrison Lake watershed have a high risk of PFE and rural roads moderate, though how that relates to lake levels in unknown. Rural roads in Hubbard Creek also pose moderate risk to PFE.

Of the 27 miles of stream channel assessed in these watersheds, little less than ten miles are reported as highly responsive/sensitive reach types. Three miles are in low gradient, confined channels. 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.

We have no data on shade or large wood in Hubbard, Brush or Garrison Lake. 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. Wetlands assessed (not including wetlands report for Port Orford), report two wetlands in Hubbard and two in Brush Creek. All have some potential for improvement through vegetation or connection to another water body.

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

PORT ORFORD ACTION ITEMS

1. **Acquire conservation easements in high quality or critical habitats.**
2. **Evaluate stormwater, septic and other urban water quality concerns.**
3. **Investigate community water distribution system.**
4. **Restore or improve mainstem Hubbard wetlands.**
5. **Assess wetlands and riparian areas above Garrison Lake for restoration or protection.**
   Enhance and prudently develop fishing and angling opportunities in Garrison Lake.
   Investigate impacts of rising and falling water levels on water quality.
6. **Explore feasibility of constructing a new reservoir in Gold Run Creek.**
   Investigate for watershed processes.
7. **Work with the community on water needs/concerns.**
   Inventory and address (treat) sediment sources.
   Work with the City of Port Orford and citizens for more watershed involvement, especially for water conservation.
   Develop and implement a vegetation management plan above the reservoir.
   Encourage off-stream watering of livestock where necessary.
8. **Fix fish migration barriers on Hubbard Creek.**
9. **Evaluate any agricultural runoff on water quality.**
10. **Assess and protect/stabilize 5 miles of responsive channels.**
11. **Assess status of riparian shade and large wood recruitment.**
12. **Water quality monitoring.**
    Institute water quality measurements in addition to temperature, to identify limiting factors and provide feedback on restoration efforts
13. **Add large wood to Hubbard Creek where appropriate.**
14. **Implement a noxious weed control plan.**
    Identify species and locations of noxious weeds.
    Prioritize control activities.
15. **Look into alternatives to surface water spill from reservoir (i.e. lower intake lever to cooler water).**
16. **Create education/outreach opportunities at the Humbug Mountain State Park.**

EUCHRE CREEK WATERSHED SYNTHESIS

The Euchre Creek watershed is within Coastal Uplands and Southern Oregon Coastal Mountain ecoregions. While natural erosion rates are high for both types, runoff is three times greater in the Coastal Mountains. 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. Approximately 22 percent of the Euchre Creek watershed is publicly owned.

Channel habitat types are mostly confined by hillslopes though nearly 16 miles of stream are identified as highly responsive/sensitive types. Large conifers are rare, riffle habitat is moderate to undesirable, pools are numerous but simple, and sediment loads seem to be affecting habitat quality. 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.

Risk of peak flow enhancement (increased stream power) is moderate to low due to agriculture/residential development in Cedar Creek and Lower Euchre. Risk is rated moderate due to rural roads on both Lower Euchre and Cedar Creek

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.

In-stream water rights for fish habitat are rarely met, even in normal flow years. Less than a quarter of the water rights are junior to the 1964 in-stream right.

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.

EUCHRE CREEK ACTION ITEMS

1. **Improve wetland connectivity in the Lower Mainstem**
   Where possible, restore function, connection to a water body and potential vegetation in less than intact wetlands.

   Where possible, protect intact wetlands.

   Field check all wetlands listed in the Wetland Assessment and assess for functionality.

2. **Control sediment sources in the headwaters.**
   Assess all headwater roads and crossings for suitability, design and risk of failure.

   Replace undersized or faulty culverts.

   Treat road-fill failures.

   Treat poorly drained roads.

   Decommission roads where possible.

3. **Acquire conservation easements**
   Where possible, acquire conservation easements in the Lower Mainstem and Cedar Creek.

4. **Encourage Lower Mainstem and Cedar Creek citizen involvement in water quality, water quantity and riparian vegetation issues.**
   Work with landowners and residents on protecting riparian vegetation for shade and large wood.

   Work with landowners and residents on protecting water quality from non-point source and point source pollution.

   Work with landowners to investigate locations of wells and springs and other water quality and quantity concerns.

   Encourage off-stream watering.

5. **Riparian silviculture watershed wide.**
   Plant riparian vegetation for shade and large wood values, where appropriate and with proper protection.

   Encourage natural conifer regeneration where possible

   Convert alder dominated stands to conifer, where appropriate

6. **Water quality monitoring**

Institute water quality measurements in addition to temperature, to identify limiting factors and provide feedback on restoration efforts.

Encourage volunteer monitoring and assessment in Cedar Creek.

7. **Identify sediment sensitive reaches in the Upper and Lower Mainstem and monitor for changes.**

8. **Add large wood to mainstem and Cedar Creek.**
   Identify reaches most likely to respond to addition of large wood.

9. **Maintain or protect mature riparian forests for wood and shade values.**

10. **Initiate weed control plan.**
    Determine locations and species of noxious weeds.

    Prioritize control measures.

HUNTER CREEK WATERSHED SYNTHESIS

The Hunter Creek watershed is contained within the Southern Oregon Coastal Mountains, the Coastal Siskiyous, and a small portion of Coastal Lowlands. Gradient are steep to very steep, 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 is some portions of the watershed, indicating excessive and unstable sediment loads.

Risk of peak flow enhancement (increase in the most powerful and potentially destructive part of flood flow) is rated low for timber harvest and forest roads in all subwatersheds except Upper Hunter Mainstem, where more information is needed for rain-on-snow interactions. Risk due to agriculture/rural residential use is rated moderate in the Middle and Lower Hunter Mainstem. Risk due to density of rural roads is high in the Lower Hunter Mainstem.

Channel habitat typing of the private portions of the Hunter Creek watershed revealed more than 60 miles of stream confined by hillslopes, over eight miles in highly responsive/sensitive types, and just over three miles in low gradient confined channels.

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. Some barriers to migration are recorded, one in 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.

Water use issues are fairly minor in Hunter Creek, with just over 1 cfs allocated as out-of-stream rights, and 7 cfs as in-stream right. The in-stream right is senior to twenty percent of the out-of-stream rights. Wells are numerous in the rural residential areas.

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.

HUNTER CREEK ACTION ITEMS

1. **Estuary restoration.**

   Where possible, obtain conservation easements or property ownership.

   Expand estuary size and increase complexity, mimicking natural processes of saline water exchange and deposition as much as possible.

   Where possible, limit additional fill materials in the lower floodplain and estuary.

2. **Watershed wide sediment budget and channel morphology.**
   Determine present and potential sediment sources in the watershed.

   Identify transport and storage reaches and trends in channel width changes.

   Identify reaches where large wood is critical to stable sediment storage.

   Identify reaches/locations with possible "management caused" channel instability, i.e. gravel extraction, quarries, road fords, and work to reduce negative effects.

3 **Encourage citizen involvement in water quality, water quantity and riparian vegetation issues.**
   Work with landowners and residents on protecting riparian vegetation for shade and large wood.

   Work with landowners and residents on protecting water quality from non-point source and point source pollution.

   Work with landowners to investigate locations of wells and springs for water quality and quantity concerns.

4 **Mainstem silviculture.**
   Plant riparian vegetation for shade and large wood values, where appropriate and with proper protection.

   Encourage natural conifer regeneration where possible.

   Convert alder dominated stands to conifer, where appropriate.

   Encourage off-stream watering of livestock.

5. **Assess earthflow areas - road surveys.**
   Determine extent of earthflow areas and degree of stability.

   Determine number of roads and crossings in earthflow areas and assess risk of failure.

6. **Protect old growth riparian forests on the mainstem.**

Map and protect, where possible, mature and high reproduction forests within the riparian area, for large wood recruitment and high quality shade values.

7. **Monitor water quality.**
   Institute water quality measurements in addition to temperature, to identify limiting factors and provide feedback on restoration efforts.

8. **Big South Fork road survey.**
   Assess Big South Fork subwatershed roads and crossings for suitability, design, and risk of failure.

9. **Protect/maintain upper watershed wetland (from Wetland Assessment), and Hunter Creek Bog.**

9. **Riparian silviculture - upstream of North Fork Hunter confluence.**
   Plant riparian vegetation for shade and large wood values, where appropriate and with proper protection.

   Encourage natural conifer regeneration where possible.

   Convert alder dominated stands to conifer, where appropriate.

10. **Identify and restore wetlands.**
    Field check all wetlands listed in the Wetland Assessment and assess for functionality.

    Where possible, protect intact wetlands.

    Where possible, restore function, connection to a water body and potential vegetation in less than intact wetlands.

PISTOL RIVER WATERSHED SYNTHESIS

The Pistol River watershed has a mix of ecoregions including the Coastal Siskiyous, Southern Oregon Coastal Mountains, Coastal Uplands and Coastal Lowlands, with a very small portion of Serpentine Siskiyous in the East Fork. All but the Coastal Lowlands have steep hillslope gradients and high natural sediment loads. Over 55 percent of the Pistol watershed is publicly owned.

The lower end of the Pistol near Highway 101 crossing has been straightened and rip-rapped. 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 triggered in the upper mainstem and South Fork by the November 1996 storm.

The East Fork and Upper Mainstem Pistol have an unknown level of risk of peak flow enhancement (PFE) due to rain-on-snow events relative to timber harvest. Forest roads pose little risk of PFE, and risks due to agricultural use are moderate to low. Risk of PFE is high due to rural roads in the Glade and Deep Creek Area.

Channel habitat typing on non-USFS lands revealed a very high number of stream miles in hillslope confined channels (natural), over thirteen miles in highly sensitive stream types (to disturbance as well as restoration), and eleven miles of low gradient confined (LC) reaches. Most of the LC reaches are in the Glade and Deep Area, South Fork Pistol, and Sunrise Area.

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 (5 miles at 19%), Crook Creek in 1st, 2nd, and 4th order reaches (12-16%), and the South Fork 4th and 5th order reaches (11-15%).

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.

PISTOL RIVER ACTION ITEMS

1. **Restore/explore wetlands connections (Crook Creek, oxbows).**
   Field check all wetlands listed in the Wetland Assessment and assess for functionality.

   Where possible, protect intact wetlands.

   Where possible, restore function, connection to a water body and potential vegetation in less than intact wetlands.

2. **Determine impact of sediment on potential planting projects (South Fork and Mainstem).**
   Identify sediment transport and storage reaches on the South Fork and Mainstem Pistol.

   Determine channel stability relative to potential planting projects.

3. **Riparian silviculture for shade and large wood recruitment**
   Plant riparian vegetation for shade and large wood values, where appropriate and with proper protection.

   Encourage natural conifer regeneration where possible

   Convert alder dominated stands to conifer, where appropriate

4. **Large wood for sediment moderation**
   Identify reaches where wood is critical to stabilizing sediment, especially in tributaries and the upper South Fork.

5. **Propose an interpretive site at Pistol River School for education/outreach.**

6. **Water quality monitoring**
   Institute water quality measurements in addition to temperature, to identify limiting factors and provide feedback on restoration efforts.

7. **Explore road abandonment in the North Fork Pistol (access easements with Forest Service)**

8. **Road surveys in the South Fork**
   Assess South Fork subwatershed roads and crossings for suitability, design, and probability and consequences of failure.

9. **Conservation easements**
   Obtain riparian conservation easements where available.

10. **Re-examine current water quality data, including other sources if available.**

11. **Encourage off-stream watering for livestock wherever possible.**

CHETCO RIVER WATERSHED SYNTHESIS

The Chetco River watershed is dominated by the Coastal Siskiyous ecoregion, with some Serpentine Siskiyous, Southern Oregon Coastal Mountains, and a very small portion of Redwood Zone. 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. More than eighty percent of the watershed is publicly owned.

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 (Eagle Creek and Upper Chetco-1). 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.

Hydrology in the watershed is greatly affected by the high percentage of low infiltration soils, especially those in high altitudes with the potential for snowfall. Risk of peak flow enhancement (or increased stream power - PFE) is rated moderate due to rural roads in Jacks Creek, Lower Chetco (1), and the North Fork, and high in the Middle Chetco Mainstem. Risk of PFE is high in the Chetco Coastal Area due to urban roads. Risk of PFE is moderate to low in the four sub-watersheds with agricultural/residential areas.

The Chetco watershed has over 10 miles of highly responsive/sensitive channels that are fairly evenly distributed. Jacks Creek and the North Fork have an abundance of channels that are sensitive to disturbance and can migrate. Channels in the upper watershed are mostly confined by hillslopes or other features and are subject to "flashy" streamflows.

Steelhead and cutthroat trout use the entire watershed. Chinook use is mostly in the lower mainstem channels (below Mislatnah), 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 two areas; along nearly five miles on the lower reaches of the North Fork (5^{th} order streams) and along nearly five miles of smaller streams (2^{nd} and 3^{rd} order) 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.

Most of the 25 wetlands (93 acres) identified are within the Chetco Coastal Area, with some in the North Fork, Jacks Creek, and the Lower Chetco Mainstem.

Water use in the Chetco rarely exceeds the in-stream water right of 1964. Nearly three-quarters of the out-of-stream rights are junior to in-stream water rights. The largest percentage of use is municipal, where conservation measures could be very effective in restoring higher in-stream flows.

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.

CHETCO RIVER ACTION ITEMS

1. **Encourage citizen involvement for outreach and education in water quality and riparian vegetation issues on private sections of the mainstem (especially Wilderness Retreat subdivision).**
   Work with landowners and residents on protecting riparian vegetation for shade and large wood.

   Work with landowners and residents on protecting water quality from non-point source and point source pollution.

   Work with landowners to investigate locations of wells and springs for water quality and quantity concerns.

2. **Riparian Silviculture on high shade potential areas.**
   Plant riparian vegetation for shade and large wood values, where appropriate and with proper protection.

   Encourage natural conifer regeneration where possible.

   Convert alder-dominated stands to conifer, where appropriate.

3. **Restore connectivity in estuary.**

4. **Develop and implement water quality monitoring plans for private lands, especially in the estuary.**
   Institute water quality measurements in addition to temperature, to identify limiting factors and provide feedback on restoration efforts.

5. **Education/Outreach for water conservation (especially domestic).**
   Work with landowners and city residents on water conservation issues.

6. **Road surveys on all private lands.**
   Where possible, assess all roads and crossings for suitability, design, and risk of failure on private lands.

7. **Wetland restoration and protection.**
   Field check all wetlands listed in the Wetland Assessment and assess for functionality.

   Where possible, protect intact wetlands.

   Where possible, restore function, connection to a water body and potential vegetation in less than intact wetlands.

8. **Continue information exchange with golf course regarding watershed health and fish habitat issues.**

9. **Focus restoration efforts on the North Fork.**
   Identify and initiate any and all restoration opportunities for the North Fork, especially with shade and wood.

10. **Protect or restore high response stream channels.**
    Assess highly responsive/sensitive stream reaches. Where possible, protect where intact, stabilize if at risk.

11. **Address data gap for bedload.**
    Determine sediment sources and transport reaches.

    Identify stability of in-channel storage.

12. **Address barriers to fish migration.**

WINCHUCK RIVER WATERSHED SYNTHESIS

The Winchuck watershed is contained within three different ecoregions: Coastal Siskiyous (47%) and Southern Oregon Coastal Mountains (5%), with steep slopes and high sediment production, and the Redwood Zone (48%), with moderate gradients, potential for redwood forests, and more days of fog. Forestry use is dominant, with only the Lower Winchuck Mainstem (29%), South Fork Winchuck (7%) and the Middle Fork Winchuck (2%) showing agricultural/rural residential use. 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.

A hydrologic assessment of the Winchuck watershed rated the Lower and Middle Winchuck subwatersheds as moderate for risk of peak flow enhancement (increased stream power) due to agricultural use. The South Fork Winchuck rated moderate risk due to rural roads. All sub-watersheds rated low risk for peak flow enhancement due to timber harvest and forest roads.

Channel habitat typing was done only on non-USFS property and totaled just over 50 miles. Of this length, more than eleven miles are in high response reaches, and 6 miles in low gradient confined reaches. Low gradient channels within inner gorges are a common feature in this watershed, especially in the upper reaches.

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.

Water use is not a large issue in the Winchuck now, though it could be with continued development. A large in-stream right is in place, with 23 percent of the remaining rights junior.

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.

WINCHUCK RIVER ACTION ITEMS

1. **Expand estuary, restore complexity.**
   Expand estuary size and increase complexity, mimicking natural processes of saline water exchange and deposition as much as possible.

2. **Water quality monitoring.**
   Institute water quality measurements in addition to temperature, to identify limiting factors and provide feedback on restoration efforts, especially in the lower mainstem and estuary.

   Investigate phosphate/nitrate role in algal growth problem.

3. **Develop partnership with Simpson on South Fork.**

4. **Explore constructed wetlands for treatment of runoff.**
   Identify critical areas of runoff from residential, agricultural and rural areas.

   Investigate using constructed wetlands for water treatment.

5. **Riparian silviculture on mainstem and South Fork.**
   Plant riparian vegetation for shade and large wood values, where appropriate and with proper protection.

   Encourage natural conifer regeneration where possible.

   Convert alder-dominated stands to conifer, where appropriate.

6. **Encourage citizen involvement in water quality and riparian vegetation issues.**
   Work with landowners and residents on protecting riparian vegetation for shade and large wood.

   Work with landowners and residents on protecting water quality from non-point source and point source pollution.

   Offer rewards for good stewardship.

   Encourage off-stream watering.

7. **Stream surveys**
   Assess stream and riparian habitat on private lands.

   Convert and/or interpret US Forest Service stream survey data.

8. **Road surveys on Deer Creek, South Fork, Bear Creek.**
   Assess subwatershed roads and crossings for suitability, design, and risk of failure.

9. **Riparian easements; look for opportunities.**

10. **Address fish passage barriers.**
    Identify, field check and/or restore passage on unnatural barriers to fish migration.

11. **Large wood.**
    Determine need for large wood in tributaries and mainstem for sediment stabilization and fish habitat development.