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ABSTRACT:

The Coquille Watershed contains the largest coastal river organizing within the coastal range of Oregon. The Coquille River presently supports over 57 species of fish including; coho, spring and fall chinook salmon, resident and sea run cutthroat trout, winter steelhead and a remnant population of chum salmon. Coho salmon have been listed as threatened under the Endangered Species Act.

Many factors including habitat alterations, harvests, hatchery introductions, and ocean conditions have led to the decline of many Coquille River fish stocks. Habitat changes since European settlement began in the mid 1800s including logging and log transport, road building draining and diking for agriculture and urbanization have all contributed to the decline of fish stocks and water quality within the watershed.

The recognition of habitat problems as a key limiting factor for fish production and water quality led to the formation of the Coquille Watershed Association (CWA) in early 1994. The formation of the CWA was another step in a 20-year local effort to address habitat problems through restoration of natural processes.

The CWA is organized as a non profit corporation and is governed by a 28 member executive council representing landowners and stakeholders within the watershed and works by consensus.

The goals of the CWA include creating water quality conditions that will meet Clean Water Act standards and enhancing native fish survival and production through public and private partnerships.

To reach those goals the CWA has organized a technical advisory group, developed a Action Plan which address limiting factors and sets priorities for identifying, prioritizing, coordinating, accomplishing, and monitoring restoration projects and educational efforts. To date the CWA has generated over $3.5 million in public and private funding to implement projects. Some key projects are riparian restoration through fencing and planting, wetland development, the addition of large channel wood and rock, off-channel livestock watering and over 60 educational tours.

INTRODUCTION:

The early 1990s brought some serious watershed management issues directly to the people who live, work and recreate on the Coquille watershed and adjacent basins in Coos and Curry Counties of Oregon (Figure 1). Five years of court challenges to the management of the northern spotted owl and other species dependent on old growth reduced logging to a fraction of the 1980s level on federal land that comprised one-third of the watershed. Because of concerns similar to those for the spotted owl, legislators proposed changes to the Oregon Forest Practices law in 1993 that would further protect fish and wildlife habitat. For the first time, local ocean commercial and recreational

salmon fisheries were closed, and in river recreational salmon and trout fisheries were severely restricted. In addition, analysis in the early 1990's had revealed serious water quality problems on the Coquille both from point and nonpoint sources. Agricultural and urban interests were being challenged to help resolve the problems.

On a positive note, a number of watershed restoration demonstration projects were being conducted on the Coquille and adjacent watersheds with notable success. Several local *ad hoc* groups had formed to address issues including; changes in the Oregon Forest Practices law, obstacles to improving fish production, and problems with water quality. The 1993 Oregon legislature also recognized growing watershed problems with declining salmon resources and water quality and passed the Watershed Health Program, a demonstration program that allocated U.S. $7 million for watershed restoration projects in northeastern and southwestern Oregon, including the Coquille watershed. The legislature also established a framework for the formation of local watershed councils (associations). With the issues, leadership, and resources in place, the Coquille Watershed Association (CWA) and similar groups were formed.

SITUATION:

Pacific Northwest and Oregon issues, including water quality, loss of anadromous fish, and management of species dependent on old-growth forests, have had a major impact on management in the Coquille River watershed. Recent studies of factors limiting natural production of native anadromous fish in Oregon coastal streams (USFWS 1992, ODFW 1992, USFS 1992, BLM 1992, HSU 1992) indicate that spawning and rearing habitat within a watershed are moderately to highly limiting. The tidally influenced main stem Coquille river historically functioned as a rearing area for juvenile fish, but current conditions have severely reduced rearing in this zone (Benner, 1992; US Corps of Engineers, 1972; ODEQ, 1992; ODFW, 1992). These limiting factors reflect conditions resulting from long-term natural events and land management practices from post-European settlement to the present, including timber harvest development of cities and associated transportation plus draining and filling for agriculture.

In 1993 the Forest Ecosystem Management Team (FEMAT) a group of six scientist appointed by the Clinton administration, identified six "key watersheds" within the Coquille watershed that became part of the aquatic conservation strategy in the Northwest Forest Plan, the product of the FEMAT group. The six key watersheds are on U.S. Forest Service and U.S. Bureau of Land Management lands within the system and are mostly in higher gradient areas of the south and north forks (See Figure 1). Key watersheds serve as a refuge, areas critical to the maintenance and recovery of potential at-risk stocks of salmonids.

In July 1995 the National Marine Fisheries Service (NMFS) published a proposed rule that identified six evolutionary significant units (ESUs) of coho salmon *Oncorhynchus kisutch*. The NMFS also proposed to list three ESUs as threatened under the federal Endangered Species Act (ESA). Coquille coho fall in the northern Oregon coast ESU, which includes the entire coastal coho population from the mouth of the Columbia River south to Cape Blanco, Oregon.

In 1996 the Oregon Department of Environmental Quality (ODEQ) submitted its biannual water quality report to the Environmental Protection Agency (EPA). The

biannual water quality report lists rivers, streams and reaches of streams where parameters do not meet water quality standards under Section 303(d) of the Clean Water Act. Also listed are rivers and streams for which supporting data are needed to make a listing determination. There are 37 total streams or stream segments in the Coquille watershed with current or potential water quality problems.

In February 1997, an updated draft of the Oregon Coastal Salmon Restoration Initiative (which became known as the Oregon Plan) was presented to the Oregon legislature. Over a four-month period, the legislature addressed concerns (including funding) related to the Oregon Plan, made needed changes, and completed a final draft in March 1997. That draft was submitted to NMFS for consideration. The Oregon Plan targeted the development of public and private partnerships through watershed associations (councils) as a key tool in improving salmon habitat and water quality.

On April 25, 1997, NMFS decided not to list the northern Oregon coast coho (ESU), which included the Coquille coho. The NMFS agreed to a three-year trial of the Oregon Plan. The development and effectiveness of the Coquille Watershed Association (CWA) and similar groups strongly influenced that decision. The NMFS listed Oregon coast Coho ESU August 1998 after a ruling by U.S. Magistrate Janice Stewart.

WATERSHED DESCRIPTION

The 1,059-square mile Coquille River watershed is the third largest river system on the Oregon coast, surpassed only by the Umpqua and Rogue Rivers. The Coquille is the largest river system that originates in the Coast Range. (The Umpqua and Rogue Rivers have their origin as in the Cascade Mountains.) The majority of the Coquille watershed lies in Coos County, Oregon, with a small amount in Douglas County. (See Figure 1.) The Coquille's three major tributaries include the north (which in turn includes the east fork), middle, and south forks. These branches converge with the main stem within a few miles of the town of Myrtle Point and flow through a 36-mile-long tidal reach to the Pacific Ocean at Bandon, Oregon, (BLM, 1993).

Although the watershed is large, the estuary of the Coquille River is one of the smallest in Oregon. The lower bay is long and narrow, measuring about 763 acres, about half of which are tide lands and half permanently submerged eel grass beds, wetlands, and tidal flats. Over 100 years of diking and filling have reduced or modified many acres of wetlands, tidal creeks, and sloughs, although the tidal reach areas still continue to be a very important rearing environment for anadromous fish such as shad, juvenile chinook salmon *O. tshawytscha*, and cutthroat trout *O. clarki*.

From the confluence with the south fork to the ocean, the main stem stretches 36 miles and drains 172 square miles. It has a very low gradient of about one foot per mile. Though the main stem is tidally influenced for 38 miles, river mile 25 marks the observed limit of saltwater intrusion. The main stem almost always annually floods after winter storm events. The south fork of the Coquille River is the longest, with a reach of 62.8 miles and an average gradient of 47 feet per mile. The south fork drains 288 square miles. The middle fork of the Coquille River is a tributary of the south fork and it drains an area of 310 square miles. The north fork of the Coquille River drains 154 square miles and joins the main stem at river mile 36. The east fork of the Coquille River is a tributary

to the north fork and joins approximately nine miles from the mouth of the north fork. The east fork of the Coquille River has a drainage area of 135 square miles.

The climate is humid with a strong marine influence and moderate year-round temperatures. Rainfall ranges from a low of 45 inches per year in the Camas Valley region, a rain-shadowed region of the Coast Range, to approximately 120 inches at the headwaters of the south fork. Seventy-five percent of the annual rainfall occurs between November and March, often in heavy storm events. April through October usually produces less than 6 inches of rain.

The Coquille watershed drains a geologically complex region of the Klamath and Coast Range Mountains, characterized by narrow coastal plain and narrow alluvial valleys that extend into the mountainous interior. Elevations range from sea level at Bandon to 4,075 feet at Ophir Mountain on the headwaters of the south fork. (See Figure 1) The watershed naturally produces sediment because of the interplay of terrain, geology, and rain (ODEQ, 1992). The heavy winter rainfall, combined with steep, thinly soiled slopes on unstable bedrock, leave the drainage highly susceptible to earth flows, debris slides, erosion, and flooding. Fluctuating sea levels, continuing uplifting and infilling of the river channel have deposited marine and alluvial sediment forming terraces through the lower river drainage. The unconsolidated to semiconsolidated deposits that form these terraces are subject to severe stream bank erosion during high winter flows (ODEQ 1989-1991).

The population within the watershed is estimated at 16,800 people, concentrated in the valley area, with the majority clustered around the incorporated towns of Bandon, Coquille, Myrtle Point, and Powers. Land uses are predominantly residential, industrial, commercial and agriculture. Some of the pasturelands extend into the hills above the floodplain, particularly along the south fork.

The steep slopes above the valley areas are very sparsely populated. Timber production, agriculture, and some mining are the predominate land uses. Approximately 70% of the watershed is forested. Upper reaches of all four forks and most tidewater streams are commercial forests. Approximately 40% of the watershed is private industrial forestland, with federal, state, and county lands occupying about 30% of the watershed. The Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) administer the largest of these holdings. Another 30% of the basin consist of smaller, nonindustrial private holdings (Interrain Pacific, 1997).

FISHERY RESOURCES/BIOLOGY

Though the Coquille ranks high compared to other Oregon coast watersheds, for fisheries production and diversity (ODFW, 1997), the present populations of some species including coho, chum *O. keta*, spring chinook, sea-run cutthroat trout are only a small fraction of stock sizes before 1900. Only fall chinook has increased in the last 50 years. The system currently supports at least 57 species of fish including, economically and socially important coho, chinook, and chum salmon, plus sea-run and resident cutthroat trout, resident rainbow trout, and steelhead *O. mykiss*.

OVERVIEW OF REASONS FOR WILD POPULATION DECLINES

The decline of the wild population of anadromous salmonids in Oregon, including the Coquille, is due to a combination of many factors. These factors, which have affected different species to varying degrees, include the degradation of rearing and spawning habitat, the reduction in summer stream flows, passage problems, a decrease in ocean productivity, and excessive fishing. Impacts caused by hatchery programs have also been implicated in most of the declines and in some extinction of coho salmon populations in the lower Columbia River in Oregon.

Salmon evolved in freshwater ecosystems that were historically characterized by a high degree of structural complexity, including large wood in streams, floodplains, side channels, beaver ponds, wetlands, and in some cases, lakes. Human activities since the 1850s--including timber harvesting, mining, water withdrawals, livestock grazing, road construction, stream channelization, wetland diking, waste disposal, gravel removal, farming, urbanization, and historic splash-damn logging--have intensively altered most Oregon coastal freshwater ecosystems, including the Coquille. The combination of these factors has left many salmonid populations, especially coho, in a depressed state. Coho, spring chinook, steelhead, and sea-run cutthroat populations within the Coquille watershed have all declined over the last 50 years, with coho has receiving the most attention.

The cumulative impacts of natural and human events on the Coquille watershed has changed salmon habitat, resulting in a long-term decline in wild salmon populations. Oregon coastal watersheds are dynamic systems affected annually by drought, freezing, and floods, and by long-term trends such as cooling, warming, low rainfall, high rainfall, and high or low oceanic productivity. Contemporary salmon habitats in the Coquille are characterized by a combination of problems:

- Stream channels generally lack complexity, and there is insufficient wood in stream channels.
- Off-channel wetland and slough habitat is isolated and uncommon compared to historic levels.
- Water temperatures are higher in some areas because riparian vegetation has been reduced.
- Channel depth has decreased and width has increased, thus increasing water temperatures and sedimentation.
- Summer flows are lower in many areas because of withdrawals for irrigation, animal and domestic use.

HISTORY OF HABITAT ALTERATION

Limited information is available regarding the condition of the Coquille River during the late 1800's and early 1900's. However, based on available information it is apparent that the last 100 years have brought major alterations to the Coquille watershed. Historically, most dramatic habitat changes to the Coquille River were on the tidal reaches and low-gradient sections of the main tributaries. Early settlers were attracted to the lower sections of coastal rivers where natural ports and protection were available. At the beginning of the European settlements in the early 1850s, the Coquille not only provided a navigable harbor, but also offered over 40 miles of navigable river. Only the Columbia River is longer. The Coquille River initially lacked a safe river entrance, but

beginning in 1881 the U.S. Army Corps of Engineers dredged the bar and constructed jetty's that narrowed, deepened, and stabilized the river mouth. Early steamboat records describe the lower tidal reaches as being up to 300 feet wide for nearly 20 miles and navigational for that distance by vessels drafting 14 - 15 feet of water. Vessels of lesser draft are able to reach another 10 miles or more above the town of Myrtle Point.

At the time of Euro-American settlement, the valleys landscape features included vegetation communities associated with annual winter flooding from surface channel overflows and upland subsurface runoff. Original notes from Coquille Valley Government Land Office surveys between 1857 and 1872 give detailed information on historic features (Benner 1992). The tidal section of the Coquille River at that time was linked with over 20,500 acres of floodplain, 70% of which was described as marshy and 14,350 acres were densely covered in trees, shrubs sedges, grasses and salt marsh.

Even before 1900, diking, filling, and draining were encouraged, and those activities were carried out widely on the lower Coquille. Alterations were necessary to make the valley habitable and allow agricultural development. By the turn of the century, up to 60% of the native wetlands had been converted to pasture and other farm uses through filling and diking. Beaver dams, which were part of the landscape, created excellent habitat for anadromous fish, were removed. Early riparian areas along the alluvial valley streams were cleared for fuel and lumber, causing bank failure, erosion, and sedimentation in many areas of the lower Coquille. Another major change to the watershed was the removal of large wood, not only from the tidal reaches of the river but throughout the system. Wood removal became common soon after settlement because of navigation problems for commercial boat traffic and a hazard for the commercial gill net fishery that operated in the tidal reach. By the 1880s natural navigation channels had begun to widen and shallow, causing navigation problems. The U.S. Army Corp of Engineers started channel maintenance projects but by 1924 had abandoned efforts except for in the lower two miles.

The Port of Coquille River was formed in 1911 to assume responsibility for maintaining the channels above the city of Coquille, because, at that time the channels were not regularly maintained by the federal government. The port worked intensely to maintain navigable channels up to Myrtle Point between 1915 and 1923. Between the Port of Coquille River and the U.S. Army Corps of Engineers, an average of eight snags per mile per year were being removed from the tidal reach below Myrtle Point. The Port of Bandon, which was formed later to maintain the area from Coquille to the river mouth, also periodically dredged and cleared the channel of large wood. (Benner, 1992)

As recently as the 1970s, the Oregon Department of Fish and Wildlife, federal agencies, and private timber companies have also removed log jams and other wood structures from many miles of coastal streams, including the Coquille. The belief at that time was that these materials affected the passage of salmonids up and down streams. Although many of the jams did impair fish passage, at some flows, eliminating wood structure greatly reduced winter and summer rearing habitat for juveniles.

The upland areas above the flood plains at the time of European settlement were heavily forested with Douglas fir, Port Orford and western red cedar, hemlock, Sitka spruce, and some pine. Fire was part of the landscape and historically had burned sections of the watershed. The heavily forested hills of the Coquille watershed, like many

other coastal basins in Oregon, attracted large investments in timber harvesting. Standard logging practices prior to 1972 included splash dams, downhill logging, storage of logs in streams, roads and railroads built along stream courses, and elimination of hundreds of miles of riparian vegetation along streams.

Before forest road construction, the forks and their tributaries of the Coquille were the only viable option for logging companies to transport logs downriver to the mills, except for the south fork, where a railroad was built for log transportation. Prior to 1900, the transport of logs down the tributaries could occur only during winter with high flows. A more convenient method of log transport was to augment streamflows by the construction of wooden splash dams. Splash dams spanned the forks and stored water and logs through the fall. The dam boards were pulled during high flows, releasing thousands of logs to float the flows to the mills at tidewater. At least 25 splash dams operated in the Coquille system (Beckham 1990).

The Port of Coquille River, which was created at about the same time that the first major splash dams were being built, worked with log transport companies to improve transport and navigation. This usually involved removing riparian trees and brush to open channels, blasting channel boulders, and removing instream snags. These actions, combined with the erosive nature of thousands of large conifer logs floated down the tributaries, had major stream channel impacts. Removing riparian vegetation and instream structures streamlined the transportation of logs. The Port of Coquille River reported, "that on three miles of the east fork it normally took about three days of work to drive 1000 logs through the segment, but after channel work it took about one and one half hours for the equal amount logs to pass through" (Benner, 1992). River transport and widespread splash damming continued through at least 1946, with the last dams being removed from the middle fork of the Coquille in the 1950s.

Floods and other natural events are an important process to build and maintain the Coquille watershed. Floods form and reform channels and distribute large wood throughout the system. Since European settlement, large floods have been reported in 1861, 1881, 1890, 1964, and 1996. Some of these events have had major impacts, including the 1861 flood that was responsible for relocating the mouth of the river. The storm and persistent rainfall of 1890 created a large landslide on Salmon Creek, a tributary of the south fork, that persisted for several days, building a reservoir behind the debris dam that broke sending tons of sediment and debris throughout the south fork and lower reaches of the river.

HABITAT - RELATED LIMITING FACTORS

The accumulative effects of over 150 years of human alteration of fish habitat, fishing pressure, and out-of-system hatchery releases have left a number of Coquille anadromous fish stocks at low levels. The last 20-year reduction in ocean productivity has exacerbated the problem. Although natural events may cause large variations in salmonid populations, continued human-induced habitat changes have limited the ability of many stocks to recover. (Reeves, et al, 1992)

Key factors limiting anadromous fish production on the Coquille watershed are water quality, including low dissolved oxygen, sedimentation and erosion; nonpoint source pollution, including increased chlorophyll production; point source pollution; and

elevated temperature. Also threatening water quality within the basin are past and present major habitat alterations, including draining and filling of wetlands, removal of woody debris, channeling, isolation of the floodplain, and lack of riparian vegetation. Twenty-two streams or stream segments of the Coquille River have been identified as not meeting the water quality standards under Section 303(d) of the Clean Water Act for fisheries and other beneficial uses. Many other areas within the system have yet to be analyzed. (ODEQ, 1995).

Fish passage is a serious limiting factor in the basin. During the last 70 years, roads have been constructed on many areas of the Coquille basin and in the process numerous culverts have been installed for drainage on both annual and intermittent streams. Most of the culverts were installed before adult and juvenile fish passage or other wildlife passage problems were considered. A recent survey of 200 culverts on private and public roads indicated that nearly 50% were incapable of passing fish, especially juveniles, during some flow periods (Coquille Watershed Assoc., 1994). Culverts block many miles of small-stream summer and winter rearing habitat for coho, steelhead and cutthroat.

Tide gates, which are designed to block the flood tide from pastureland and allow drainage during the ebb, can also create habitat problems. Tide gates not only may block fish passage but also reduce water quality in a variety of ways, including reducing available salt marsh transition zones and constricting and obstructing flows from flooded wetlands. In these ways, tide gates interrupt historical tidal fluctuation. A tide gate can also present a physical barrier either from poor maintenance or improper design (although this issue is poorly understood) and water quality often suffers behind tide gates as an artificial head of tide is formed, leaving behind the closed tide gate water that has elevated temperatures and low levels of dissolved oxygen levels (Jay Charland, Oregon State University, personal communication). Although small dams and diversions do exist in the watershed, they don't represent a major limiting factor within the system.

Spawning gravel availability within the system maybe a limiting factor in some of the forks, including the north and east forks, primarily because of the historic loss of large channel wood that captured and retained gravel. The removal of structural complexity, which began shortly after European settlement, resulted in a significant loss of instream habitat during elevated flows, loss of sediment and gravel deposition areas, and loss of channel diversity, including deepwater pool habitat. Lack of large wood recruitment is also a future problem in all forks of the Coquille.

Although the riparian areas of the Coquille have been highly modified, the current Oregon Forest Practices Act specifies riparian buffers on private timberlands, and riparian buffers are also heavily used on public timberlands. Many of the historic riparian areas in the low and midgradient reaches of the river were removed over 60 years ago, increasing bank width and erosion deposition within the system. Currently, Coos County has an ordinance to provide some protection, including a 50-foot riparian buffer along the agricultural and urban areas of the river.

Another limiting factor in fish production is floodplain connectivity. The main stem of the Coquille River remains connected to its historic flood plain and floods yearly, although the connectivity is affected by diking from roads and agriculture. However, many tributary floodplains have been disconnected and no longer function during 5, 10,

15, and 100-year storm events. Much of the connectivity has been lost through the building of roads and bridges and laying inadequate culverts. The loss of connectivity to floodplains and wetlands has resulted in accelerated sedimentation, loss of overflow channels, and decreased natural application of upland sediments to wetland areas through floods.

Many parts of this system have been channelized to remove meander and maximize agricultural production. Dike and drainage ditches are alterations that were employed for flood control and typically ran parallel to the streams. Flood control dikes, tide gates, and channel maintenance practices that promote rapid drainage have decoupled side channel tributaries in the low-gradient portions of the Coquille River and its tributaries. These changes have resulted in corresponding fish habitat losses and a problem for coho salmon and cutthroat trout attempting to access winter rearing areas.

ORGANIZATIONAL DEVELOPMENT OF THE CWA

Growing awareness of the decline in anadromous fish stocks, (particularly coho salmon), driven by freshwater habitat alterations and other human actions, plus many water quality problems caused by human alterations and a fear of federal intervention through the ESA and the Clean Water Act led to the organization of the Coquille Watershed Association (CWA) in February 1994. The formation of the CWA and similar organizations on the Coos watershed and on smaller watersheds in Curry County, Oregon to the south, was a major step in a 20-year local effort to address fish habitat and water quality issues by the restoring of natural watershed processes through public and private partnerships.

During the 1970s, the BLM and the USFS initiated a number of restoration projects on their lands. Many of these early efforts involved trying to replace large woody debris lost through splash damming and other actions. Although many of the projects did not meet their intended goals, many did, and 20 years later some of the projects are still furnishing fish habitat in the Coquille and Coos watersheds.

Beginning in 1981 there was a coastwide and later a statewide effort to involve local communities in the restoration of salmon and trout stocks. In 1983 the Oregon legislature formalized the effort in the Oregon Salmon Trout Enhancement Program (STEP). Early efforts by STEP primarily involved rearing juvenile fish, but a number of projects addressed long-term habitat issues, encouraging strategies such as riparian tree planting on private lands.

Two other key projects were initiated during the late 1980s. One was the Near Coastal Waters Program administered by the Oregon Department of Environmental Quality (ODEQ). This effort, which was funded by EPA, began to analyze and address some of the water quality issues on the tidal reaches of the Coquille. Both point sources such as sewage treatment plants, and nonpoint sources, such as agriculture run off, were addressed in this project. The effort also produced a videotape targeting the cooperative public and private actions to address water quality problems. The second effort during the late 1980s was the development of a Winter Habitat Project by the Oregon Department of Fish and Wildlife (ODFW). This program was a cooperative effort to address winter habitat needs for salmon through the addition of off-channel ponds and the addition of large wood through a joint program with ODFW and private timber operators.

Most of the early efforts in this program were with industrial timber operators, but some small woodland owners were also involved.

As a follow up to both the Near Coastal Waters program and the Winter Habitat Project, an agency-driven group was organized to build a larger-scale demonstration project that would address limiting factors on a watershed basis. The group, which included the Natural Resource Conservation Service (NRCS), ODFW, ODEQ, and Oregon State University Extension/Sea Grant, began to work with both large industrial landowners and small agricultural landowners on Palouse Creek, a tributary of Coos Bay. During a two-year period, a number of restoration projects were initiated on Palouse Creek, including fencing and planting the lower tidal reaches of the creek, adding large wood in appropriate areas on both public and private lands, and adding off-channel rearing areas in natural wetlands and tributaries. This project has been successful, with a dramatic increase in coho salmon production in Palouse Creek. (Muck, personal communication)

Another key action was the development of local public private partnership called Bring Back the Natives (BBN). This organization provided funding through USFS, BLM and private sources to address limiting factors and brings public and private interests together. The group was successful in receiving funding for projects that included some major restoration efforts on industrial and nonindustrial private forestlands. The partnership has continued to be one of the key funding sources and forums for subsequent development of the Coquille Watershed Association and other groups.

These community-based organizations were not the only forces important to the development of watershed associations. Several events, including the initial filing to place Oregon coastal coho on the federal endangered species list, the listing of the lower Coquille as a "water quality limited stream," by ODEQ under the Clean Water Act, and 1993 Oregon legislation titled the Watershed Health Program helped jump start the development of the CWA. The water quality problems and potential species listings may have given impetus to form the organization, but the Watershed Health Program was the catalyst. The legislation included $10 million for on-the-ground watershed demonstration projects in southwestern Oregon (which included the Coquille watershed) and northeastern Oregon. An organizational structure was required to manage the legislation's funding which was $3.5 million for each region after administrative costs. The early organizational structure in Coos County, Oregon was the Coos Watershed Coordinating Authority (CWCA). This group, which was appointed by the Coos County Commissioners, was made up of over 80 large and small landowners and others interested in watershed restoration within the county. It was important that the Coos County Board of Commissioners appoint the people to the organization, not only because the Watershed Health Program legislation required such appointments, but because this process would demonstrate the political will to do the job.

It became apparent after three meetings of the CWCA that to effectively initiate watershed restoration, it would be necessary to break the group into three watershed councils encompassing the Coos, the Tenmile, and the Coquille watersheds. (The Coquille is the largest of the three major watersheds within the county.) Under legislative direction and local interpretation, a watershed council is defined as a "locally organized, voluntary, nonregulatory group established to assess the watershed condition

and build a work plan to implement, enhance, and protect the processes within the watershed." (CWA Action Plan, 1997) Watershed councils bring together diverse interests around a common goal of watershed health and offer local residents the opportunity to be involved in the decision making that affects their own watershed. Under these guidelines the Coquille Watershed Association was formed in February 1994 as an Oregon nonprofit corporation. The organization consists of a general membership made up of landowners, stakeholders, agency representatives, and other interested parties. The general membership elects a 28-member executive council (originally 13) that governs the organization. The general membership also sets the size and makeup of the executive council with recommendations from the stakeholders. Executive council members serve two-year terms. The membership of the executive council is shown in Table 1.

The executive council operates by consensus. The CWA defines consensus as finding a proposal acceptable enough that all members can support it and no member opposes it. Under the executive council is a seven-member board of directors that advises the day-to-day operation of the organization. From its initiation CWA has also hired a watershed coordinator whose job has been to administer the organization, develop and implement projects, perform reporting and monitoring duties, and carry out all other necessary actions.

The CWA has created a mission statement, goals, policies and a set of operating objectives. The mission statement states that the association is composed of a broad array of participants with interest, livelihoods, or land ownership found in the Coquille Watershed.

The Coquille Watershed Association has a vision of the Coquille system in which commercial activities occur in a way that interrogates resource values. This includes the following:

- Create water quality conditions that will meet the Clean Water Act standards.
- Enhance native fish survival and production; increase salmonid production within the basin.
- Create understanding and acceptance of the need for sustainable economic activities representing long-term resource conservation.
- Respect and protect private property rights during implementation of projects designed to improve watershed productivity and health. The association will engage in a project only with written permission of the landowner. Any commitment the landowner makes will be clearly defined and will be strictly on a volunteer basis. Adequate language will be added to agreements to ensure property owners that no hidden claim to their land will result from implementation of the project.

The goal of the CWA is to provide an organizational framework to coordinate the assessment of the watershed, implement and monitor proven management practices, and test new management practices that are designed to support environmental integrity and economic stability for the communities of the Coquille watershed and adjacent areas. The objectives of the CWA are to:

- facilitate communication between affected landowners, citizens, political organizations, associations, and agencies within the Coquille watershed;

- provide a framework to coordinate projects and management practices within the Coquille watershed that will improve its overall health;
- coordinate comprehensive programs for the strategic management of the Coquille watershed;
- provide for opportunities to resolve problems and conflicts arising over the management of and management practices within the Coquille watershed;
- provide opportunities for community-based education on the values and functions of the Coquille watershed;
- enhance and restore salmonids within the Coquille basin;
- monitor and evaluate activities accomplished through the CWA; and
- solicit funding and other resources necessary to implement the objectives of the CWA.

In developing these goals the CWA executive council, has also defined those areas that are not appropriate for action by the CWA including (CWA 1997):

- factors relating to the directed and incidental harvest of fish by recreational and commercial fisheries:
- factors related to the management of hatcheries; including brood stock selection, numbers and locations of releases, and expansion or reduction of hatchery programs;
- large-scale factors that influence overall environmental conditions, such as large climatic changes within the northeast Pacific Ocean; and
- predication by birds and marine mammals.

The CWA is also advised by a technical advisory committee made up of more than 20 individuals affiliated with public and private organizations who have expertise in a variety of areas such as fisheries, forestry, agriculture, hydrology, silverculture, land use planning, and political science. The technical advisory committee is a key component that helps the CWA to advise on the technical soundness of projects and the possibility of cooperative projects and funding, particularly with federal and state agencies. The CWA executive council has required that two of its members should be members of the technical advisory committee. A member of the technical advisory committee also serves on the board of directors.

Soon after the CWA was organized, it became apparent that a plan was needed to effectively develop a strategy for addressing the goals and objectives of the CWA and involving private landowners. A number of members of the technical committee and the executive council completed the initial Action Plan for the CWA in 1994. This was a working document that allowed for additions and modifications in the future. The Action Plan was rewritten in 1996 by a steering committee of representatives from the technical team. Throughout its development the Action Plan was reviewed by the CWA executive council, federal and state agencies, and landowners. The action plan reviews legacy actions within the basin that have affected fish production and water quality. The plan lays out a set of strategies that address the condition of the watershed, limiting factors for fish and water quality, and ways in which the goals and objectives of the CWA might be met. The plan also establishes priorities for action, including a conceptual framework for identifying, prioritizing, coordinating, and accomplishing short-term and long-term restoration activities. Monitoring is an important part of the plan, which includes guidelines for implementation monitoring and project effectiveness monitoring. Due to

the effectiveness monitoring, strategies can be modified to better address the limiting factors.

ACCOMPLISHMENTS

Since the initial organization of the CWA, accomplishments have been measured in three areas: the growth and management of the organization, the development and implementation of projects (including funding) that address limiting factors, and the extent of internal and external educational programs.

Growth

The CWA started with approximately 30 dedicated members representing a diversity of interests. Industrial timber groups, small woodland owners, agricultural owners, fisheries interests, local government representatives, environmental groups, and state and federal agency representatives were all part of the initial membership. The initial group established and elected a 13-member executive council, which represented all the interests, and elected a 7-member board of directors.

The original executive council developed the following set of first-year tasks:

- Develop articles of incorporation and incorporate the CWA as a nonprofit Oregon corporation.
- Develop a set of bylaws that establish the operating structure of the organization. (The bylaws went through both legal and organizational review.)
- Organize an administrative structure to dispense funds for CWA activities. The key to developing an effective administrative structure was the partnership with the Coos Soil and Water Conservation District (SWCD).
- Hire an intern watershed coordinator to develop and initiate projects.
- In cooperation with the technical advisory committee and the watershed coordinator, organize and approve CWA Action Plan.
- Expand a growing list of partners for cooperative projects.

After five years of existence, the CWA general membership has grown from the original 30 to over 250 members. The size of the executive council doubled to 28 members. New executive council positions were recruited and included representatives from the small rural communities located on the forks and from stakeholder groups. In five years the CWA has organized and implemented over $3.5 million in projects on mostly private lands, and has carried out surveys and monitoring efforts. The number of partners involved in projects has grown from the initial six small landowners, two industrial timber owners, and four state and federal agencies to over 250 small landowners, five industrial timber owners and over 15 state and federal agencies.

Funding for the CWA has come from a variety of sources. The following are some of the key contributors:

- The Bring Back the Natives (BBN) project, sponsored by the USFS and the BLM.
- The State of Oregon, first through the Watershed Health Program funded by the 1993 legislature and then through the Governor's Watershed Enhancement Board (GWEB), which was recognized by the 1997 legislature to be the key funding source for watershed councils (statewide funding is $30 million for two years).

- In 1998 the voters passed measure 66 which put a percentage of lottery funding into watershed restoration ($70 million for two years). GWEB evolved into Oregon Watershed Enhancement Board OWEB, a new state agency.
- Funds provided by the EPA, distributed through ODEQ, as well as other Federal disaster funding, due to the reduction of the commercial salmon fishery. Disaster funding enabled the hiring of displaced salmon fishers to do restoration work. ODEQ and ODFW had direct grants for a variety of projects and in-kind services.
- Bureau of Land Management and USFS grants and joint projects, including contracting with the CWA for a Jobs in the Woods crew (a federal sponsored training program for unemployed timber workers) and large in-kind contributions. NW Economic Adjustment Act funds, are primarily used for fund restoration crews. This federal act is designed to help communities adjust to the loss of revenues from the downturn in federal timber harvest.
- For the Sake of the Salmon, a regional public and private partnership that solicits and distributes federal funding for watershed coordinator positions and other watershed improvement junctions has been important.
- The U.S. Fish and Wildlife, which provided matching grants for a number of projects.
- Cash and in-kind services from timber companies, Coos County, and all the landowners involved in projects.

The rapid expansion of the CWA led the organization to rewrite the Action Plan. Version 2.0 was organized by a subcommittee of the executive council and the Technical Advisory Committee. The executive council hired a technical writer to finish the Action Plan. The new Action Plan clearly stated that to improve water quality and fish production, limiting factors should be seriously addressed through restoration projects that target the private landowners who own over 60% of the watershed. To be effective, the projects should mimic natural processes; be appropriate for the gradient zone of the river; site specific, and based on watershed analysis and include a monitoring program.

The CWA Action Plan 2.0 also established initial project screening criteria. In addition the Action Plan also established other screening criteria, depending on the project. Once projects make it through the screening process, they are reviewed by the technical advisory committee and executive council. If approved, a landowner agreement is developed, which clearly states the objectives of the project and the responsibilities of the landowner and the CWA. Major CWA projects from 1994 to 1999 are summarized in Table 2.

SURVEYS/MONITORING

All CWA projects have monitoring components to track effectiveness and implementation and these components are designed to ensure that projects are completed according to design guidelines. In addition, all CWA projects have follow-up monitoring procedures to measure project effectiveness against the objectives of the project. Surveys are performed to add to the information base for watershed analysis and to provide pre project baseline information.

All surveys and monitoring have been conducted after training by CWA crew members, and trained student crews. Training is conducted by cooperating agencies.

Monitoring and surveying information is shared among and between the CWA and cooperating agencies. The CWA has also developed a GIS database.

EDUCATION

Educating CWA membership, agency representatives, politicians, environmental groups, and the broader community on the issues facing the Coquille watershed, has been a priority with the CWA since its beginning. The major educational activities sponsored or cosponsored by the CWA have included the following:

- Eighteen evening workshops for CWA members and the general public, covering subjects ranging from ocean factors affecting fish survival to landslides
- The production of monthly newsletters
- The coproduction of two videotapes, one in cooperation with the Coos Watershed Association and a second, entitled *The Coquille Project* with the BBN group. Both tapes were widely distributed, throughout Oregon and regionally.
- Over 60 field tours, which are designed to inform people on the cooperative projects the CWA and others are doing and the strategies that organization uses. Target audiences have included agencies, legislators, environmental groups, timber and agriculture interests, and the membership of the CWA.
- The CWA has help support two Oregon State University graduate student project including: engineering designs for improved fish passage at tide gates and a masters project addressing sustainable long term funding for the CWA.

Conclusion

Watershed protection and restoration through the CWA is a dynamic, continuing process with solid membership developed goals and objectives as a guide. The CWA has been recognized at a number of levels for cooperative community based watershed work. The CWA received the Oregon Private Industries Council "Distinguished Performance Award" in 1997 and a nation wide joint award from Mike Dombeck, Chief, USFA and Pat Shea, Director, USBLM "for exemplary work in cooperative watershed restoration" in 1998. The organization is also in the finals for the US Dept. of Interior "Caring for the Land Award."

With recognition comes the responsibility to help duplicate the effort in other watershed. The educational efforts for outside groups by the CWA and other southwestern Oregon watershed associations (councils) has been key in convincing legislatures and other policy makers to develop the Oregon Plan for Salmon and Watersheds (or Oregon Plan) and developed a organizational structure that can be adopted to other watersheds. Since the formation of the CWA over 85 Oregon watershed councils have formed, most since 1997. Many of the groups were formed to take advantage of the funding available through the Oregon Plan for Salmon and Watersheds and some are struggling to find goals and a direction.

As new watershed groups are formed and longer term councils mature it is apparent that a number of critical issue areas need to be addressed, including:

- Clear goals and varied means to address the goals. Policy makers must respect that every watershed is different. Councils need to set shared, specific and clearly defined goals and have the flexibility to choose how they will achieve these objectives. The

CWA has tried to address this issue through: (1) Before and during the formation of the organization, there was a community-based education effort to inform the watershed community about these issues and problems. (2) During the formation of the CWA there was a strong attempt to be inclusive by including representatives from landowners (large and small), diverse stakeholders groups, and state and federal agencies. The combination of growing awareness through education and a diverse organization help the group set goals that target water quality and declining salmonid production.

- Watershed councils have difficulty getting organized, developing plans, and implementing projects without local paid staff. The CWA recognized this need early in its development and within three months of incorporating hired a watershed coordinator. The CWA presently has a coordinator, monitoring person and five-person restoration crew. To manage up to one-million dollars annually, 6 - 12 grants and 30 projects annually takes people.
- To be successful, watershed groups need access to the best available science. The CWA addressed this need by forming a technical team early in the development of the association. The twenty member technical team, with its diverse membership, has been instrumental in developing the Action Plan, monitoring and project development.
- Watershed councils need to monitor and evaluate projects, strategies and report their results. The CWA has addressed this issue by; organizing a monitoring committee, dedicated a person to monitoring and reporting, built in monitoring funding for all projects and worked with three local high schools to do appropriate monitoring. The CWA also helped develop and follows the standardized monitoring and reporting format developed by the Oregon Watershed Enhancement Board.
- Finally to be successful watershed councils need adequate financial support. CWA staff and members have spent countless hours raising operational and project funding through federal and state agencies, private timber companies, foundations and individual contributions of cash, equipment and time. With an annual operating budget approaching one million dollars the group has been very successful.

With local commitment watershed councils can be key, but not the only, factor to help restore and protect watersheds.

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Table 1 -- Membership of the Coquille Watershed Association executive council 1999, (USFS = U.S. Forest Service; BLM = U.S. Bureau of Land Management; PAC = Provincial Advisory Committee; SWCD = Soil and Water Conservation District; ODFW

= Oregon Department of Fish & Wildlife; ODEQ = Oregon Department of Environmental Quality; OSU = Oregon State University.)

Membership of the CWA, 1999

Membership	Representation
Large Landowners	
Federal (2)	USFS-Powers District Ranger
	BLM-Coos Bay District
Private (2)	The Timber Company (formerly Georgia Pacific Corporation)
	Menasha Corporation
County	Coos County Forest
Small Landowners	
North, East Forks	Agriculture/timber landowner
Middle Fork	Agriculture/timber landowner
South Fork	Agriculture landowner
Middle, Lower Mainstem	Agriculture landowner
Stake Holders	
Salmon Trout Enhancement Program	Board member
Southwestern Oregon PAC	Board member
Friends of the Coquille (Environmental)	Board member
Livestock	Livestock Association Member
Small woodland owners	Board member
Coos SWCD	Elected director
Oregon Farm Bureau	Member
Ports, Cities, Other	
Port of Coquille	Representative
Port of Bandon	Elected commissioner
Bandon Area	City council member
Cities	City councilor
Technical Advisory Team (2)	Oregon Department of Fish & Wildlife
	Oregon Department of Environmental Quality
Coquille Tribe	Tribal Chairman
At Large (2)	Citizens
Resource Advisor	OSU extension staff
SW Coos Sub-Watershed Assoc.	Board member

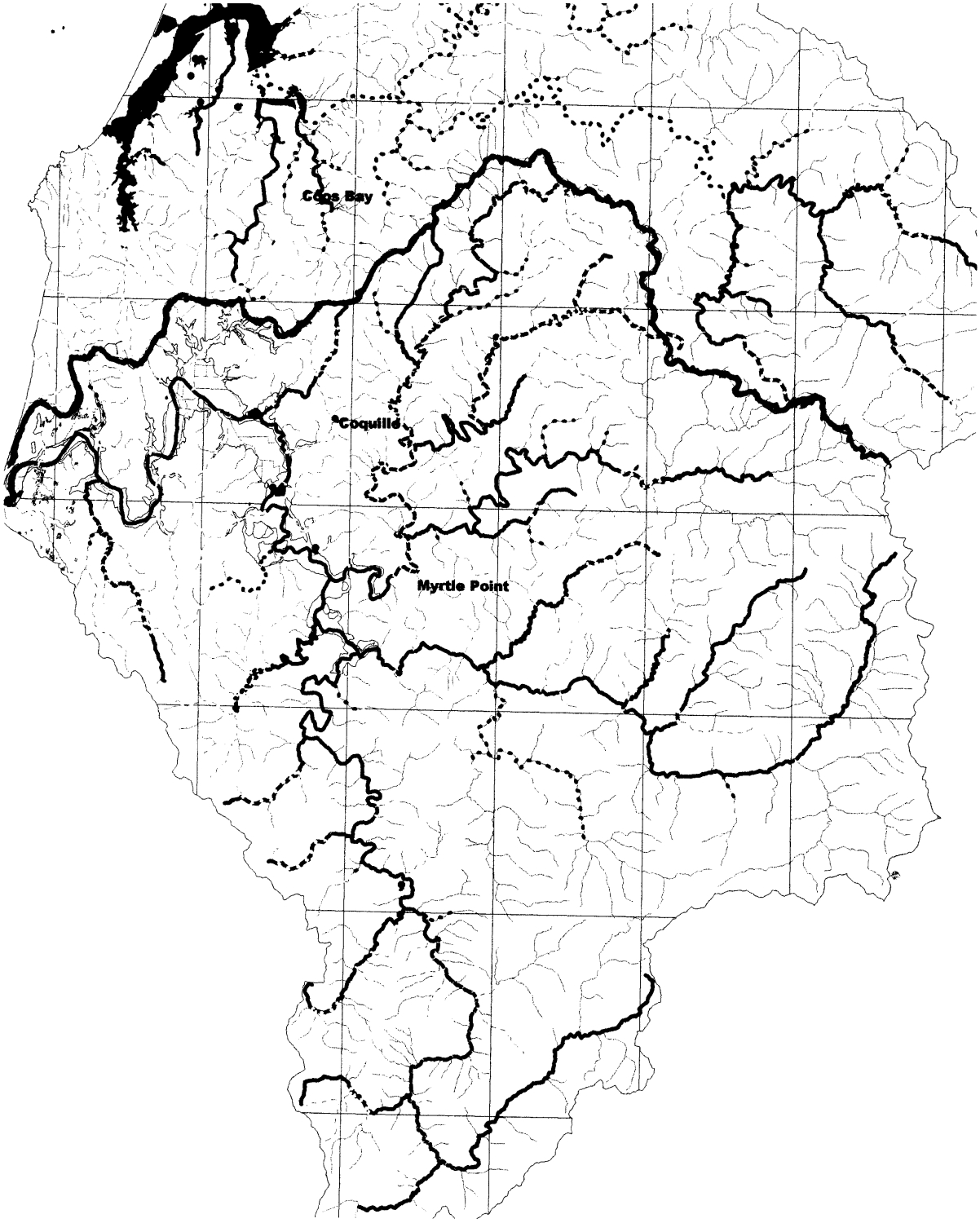
Education Teacher

Table 2. -- Major projects of the Coquille Watershed Association (1994 - 1999) (P. Slater, Coquille Watershed Association, personal communication).

CWA Major Projects 1994 - 1999

Projects	**Addressed**
Over 80 miles of riparian restoration through fencing and planting of over 60,000 native conifers and hardwoods and approximately 300,000 willows planted.	Water quality Erosion and turbidity Temperature (shade) Runoff buffers Future source of wood debris for channel structure
Developed 12 off-channel livestock watering sites.	Water quality Erosion and turbidity Nonpoint source pollution
Installed 165 instream structures consisting of large wood and boulders at 30 different reaches.	Provide interim large woody debris for channel complexity and for the retention of gravel's
Cooperatively developed 12 off-channel ponds	Wetland losses Winter salmon habitat
Replaced or retrofitted 22 culverts.	Adult and juvenile fish passage
Modified three tide gates for fish passage and restore low gradient tributraries to original channels and restore wetlands (in progress).	Wetland losses Fish passage

Figure 1 Coquille watershed and adjoining areas (CWA 2000)


Coos Bay
Coquille
Myrtle Point