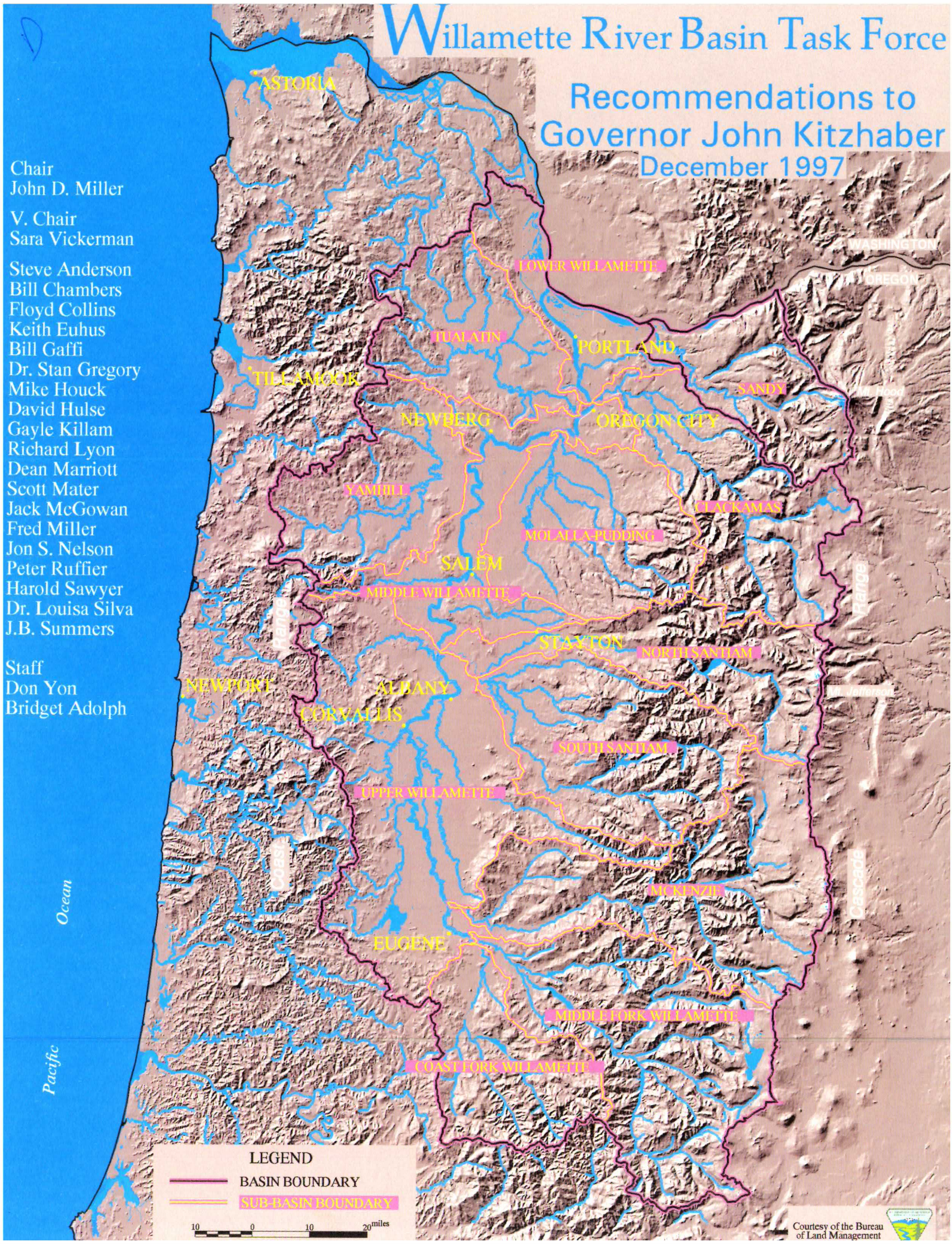
Willamette River Basin Task Force

Recommendations to Governor John Kitzhaber

December 1997



EXCERPTS FROM A SPEECH GIVEN BY GOVERNOR JOHN KITZHABER:

"Building a Consensus for Environmental Innovation"
Forum for Business and the Environment
September 23, 1997

Today, I'd like to spend my time with you talking about the Oregon Plan -- sometimes known as the Salmon Plan -- and how the lessons learned in creating it might help us with another major environmental challenge: The Willamette River and its watershed.

As many of you know, the federal government was considering listing several runs of coho salmon on our coastal streams as endangered. What I feared, and what many others feared, was that if these salmon were listed as endangered, we would be right back in the type of pitched battle over the environment that we saw in the listing of the spotted owl. I did not believe then, and I do not believe now, that we can afford this type of conflict over our salmon runs.

We cannot afford it, because the fish do not have the time for us to litigate. Already, stock of Willamette winter steelhead, for example, which numbered 10 to 15 thousand in the 1980s have declined to as few as two thousand today. They will disappear entirely from the Willamette if we continue to argue about who is responsible for recovery.

That's why I started, two years ago, to put together a voluntary, collaborative effort, based on sound science, that would address salmon recovery from a watershed perspective. It had all the hallmarks of success. Neither environmentalists nor business interests liked it. I am hopeful that we can use this same approach of collective, voluntary action to move ahead on what I see as one of the major environmental challenges before the state: the Willamette River Watershed. Nowhere are the challenges of a healthy environment as complex as they are in the Willamette Basin.

The watershed of the Willamette includes some of the most fertile land in the United States, and produces a broad range of high-value agricultural products. The Valley is also the hub of the state's population and economy, accounting for 69 percent of the state's population and 75 percent of the state's employment.

In the 1930s, the lack of oxygen in the Willamette River could kill fish in a matter of minutes and long stretches of the river were virtually lifeless, leading to a public outcry and the first major steps to improve water quality and protect public health. By 1970, however, growth pressures again threatened water quality in the Valley. Once more, an initiative to clean the Willamette River energized the state and served as the centerpiece of a major civic movement toward greater environmental sensitivity. Led by Governor Tom McCall, Oregonians came together to reduce pollution from cities and large industries, to manage and plan for growth in the Valley and to establish a "greenway" along the Willamette.

The images of twenty or forty years ago -- pipes dumping industrial waste and municipal sewage directly into the river, fish dying within minutes of exposure -- are, thankfully, behind us. However, protecting our environment is not something we can simply do and walk away from; it requires constant vigilance. Today, the Willamette faces threats every bit as serious as it did in Tom McCall's day. These new threats are far more complex, but every bit as serious.

(continued on back page)

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THANKS!

As Chairman of the Task Force, I want to thank all the members for the tenacity and talent they have given to this effort the past eighteen months. My thanks also to Governor John Kitzhaber for the opportunity to work with this wonderful group of people on such a vital issue. This report represents an amazing collaboration by a group whose diversity reflects the Willamette Basin's complexity: agriculture, timber, food processing, mining and other industries; public utilities, cities, environmental groups; scientists, physicians, engineers and citizens. In a short time and with few resources, we were able to review a large amount of information and develop specific recommendations. The job of protecting our watershed is certainly not complete - we have simply provided a blueprint to help guide the actions that must follow.

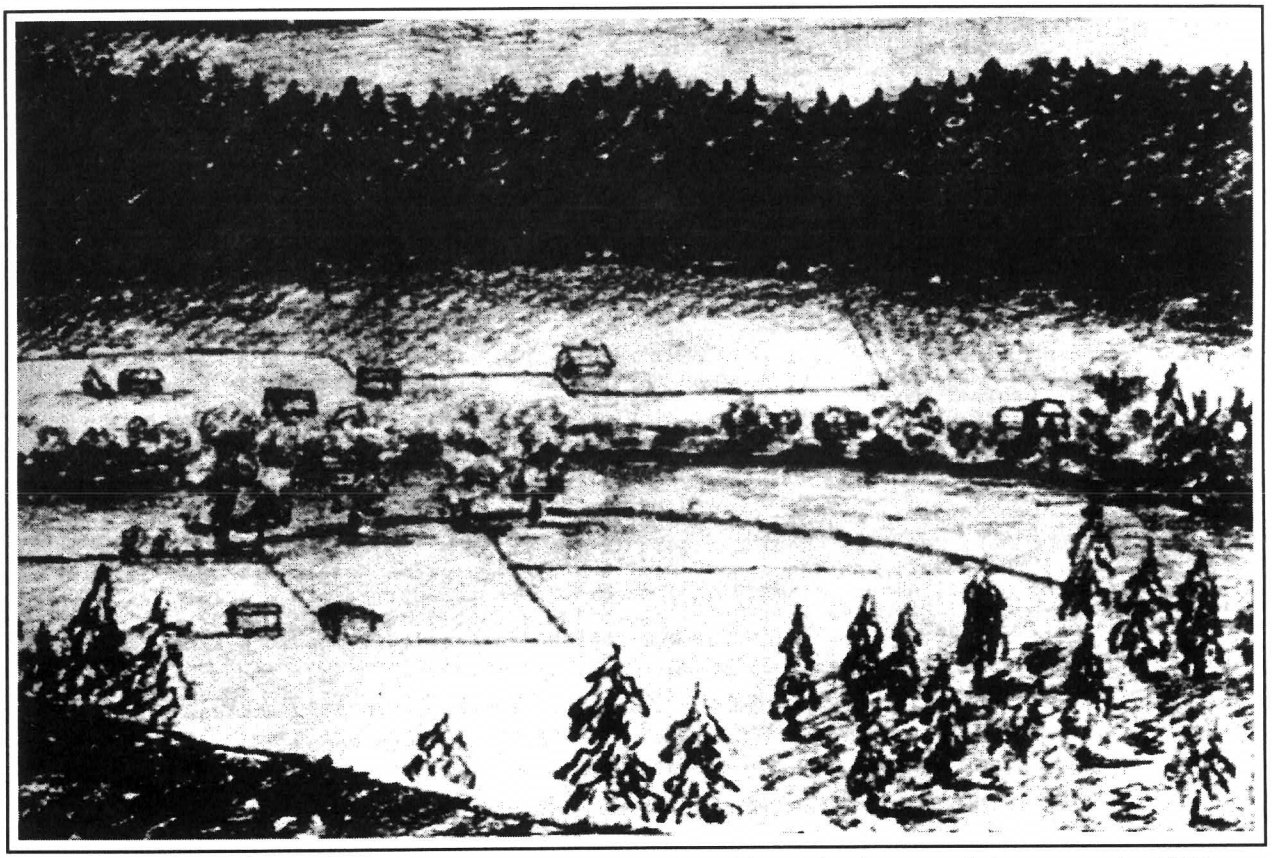
On behalf of the Task Force I want to acknowledge some of the contributors to our work: DEQ Director Langdon Marsh provided us with lead staffer Don Yon and the resources to print our report; Paula Burgess, the Governor's Natural Resources Advisor, provided advice and the multi-talented Curtis Robinhold; Agriculture Department Director Bruce Andrews provided essential input through Mike Wolf; and Water Resources Director Martha Pagel lent us Tom Kline. The Willamette Valley Livability Forum (staffed by Peter Watt and Rick Bastasch) has partnered with the Task Force in several arenas, including an Environmental Protection Agency-funded watershed indicator project created with the help of Mike Rylko of EPA Region X. The Bureau of Land Management and Denis Williamson's staff helped extensively with maps; and the USGS and Chauncey Anderson provided critical data and suggestions. Vice-Chair Sara Vickerman brought her time, staff and remarkable abilities to the table, and Bridget Adolph of my staff made sure that the table was there, published the final reports and generally kept us in line.

A partial list of other collaborating individuals and groups is extensive and is one of the reasons this process worked so well. In no particular order, thanks to:

Dr. Steve Ellis, EVS Consultants, Inc.; Ken Bierly, GWEB; Duncan Gilroy, Oregon Health Division; Bill Young and Deborah Marriott, LCREP; Dr. Chuck Henny, USGS; Donna Silverberg, Louise Solliday and Greg Wolf, Governor's Office; Annette Lalka, DSL; Don Francis and Joe Coffman, Willamette Riverkeeper; Joni Low, League of Oregon Cities; Mark Radabaugh, DLCD; Greg Robart, ODF&W; Charlie Stone, ODF; Kathryn Van Natta, N.W. Pulp and Paper Assoc.; Jeff Tryens, Oregon Progress Bd.; Kathleen Gardipee, City of Portland; Joan Rothlein, CROET/OHSU; Don Sterling, TASC; Pete Test, Oregon Farm Bureau; Patricia Benner, OSU; Rich Sumner, EPA; Frank Mauldin, Diane Taniguchi Dennis and Tim Gerling, City of Salem; Kevin Hanway, Tualatin Valley Water District; Carie Fox, Fox Mediation; Ward Armstrong, Oregon Forest Industry Council; Mike Niss and Dennis Wiley, OP&R; Jacqueline Dingfelter, Wendy Kroger and Tina Schweickert WSC's; John Jackson, USA; Russ Peterson and Patrick Wright, USF&W; Mike Posovich and Matthew Rea, USACE; Bill Hutchinson, Chair WRSTF; Peggy Vogue, ODA; Russell Harding and Avis Newell, DEQ; DEQ Interns: Steve Curtis, Cathy Tilton, Kyna Powers, Catherine Koehn and Richard Collins.

John D. Miller

John D. Miller, Chair
Willamette River Basin Task Force



Champoeg in 1851, as drawn by George Gibbs. A flood in 1861 destroyed the town. In 1892 those buildings that had been rebuilt were again swept away and the town was never rebuilt.

David Newsom, an early settler wrote in 1858:

"We have room and employment in Oregon for five hundred thousand persons, in addition to our present population. . . Oregon, in her soil, climate, timber, grass, health, water, navigation and local position, is unsurpassed by any portion of North America."

"Its regular, gentle current, the depth, smoothness and uniformity with which it rolls its vast body of water, prove that its supplies are at once distant and regular; nor, judging from its appearance and courses, is it rash to believe that the Multnomah [Willamette] and its tributary streams water the vast extent of country between the western mountains and those of the sea coast . . ."

Journals of Lewis & Clark

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"The river rolls and leaps.
It curls and sleeps.
The river is beyond our naming
and central to everything we do.
The river gathers it all,
carries it away,
and brings it all back."

Charles Goodrich

1 INTRODUCTION

MISSION

The Willamette River Basin Task Force was charged by Governor John Kitzhaber to assess the current status of Willamette Basin waters, gather information on water quality problems, determine the need for further study, build consensus among the many groups whose activities affect the river, and deliver recommendations in December 1997. The Task Force approached the issue by considering all watershed-related activities along the Willamette and its tributaries. Within the uplands, wetlands, floodplains, and water bodies of the basin, a complex set of human and natural interactions occurs that affects water quality and quantity, as well as the healthy functioning of the ecosystem. The Governor concurred with this "watershed" approach as presented by the Task Force in a December 1996 interim report. The group, comprised of representatives of urban, agricultural, environmental, educational, mining, forestry, utilities and other interests, delivered their recommendations to the Governor and Legislators in December 1997.

Three focal points for action:

1 The health of the Willamette watershed, including human health, is at risk. Past decades of damaging practices, current detrimental activities, and their continuation into the future by a vastly increased population cannot be sustained. Salmon and steelhead populations have declined, and the Western Meadowlark, Oregon's state bird, is rarely seen in the valley.

2 The lack of a coordinated, basin-wide strategy for watershed management often prevents cost-effective solutions to watershed problems. Likewise, our failure to take a community approach to basin watershed issues leads to an avoidance of both individual and collective responsibility for watershed health.

3 We are in danger of economic and environmental bankruptcy if we continue to spend billions and waste decades on uncoordinated, ineffective measures. More importantly, we will lose local control of our economic and environmental futures if we fail to find effective solutions.

A VISION FOR THE FUTURE

The Willamette Basin will attain a dynamic balance between diverse human and ecological needs. People will live in healthy watersheds with functioning floodplains and habitats supporting a diversity of native species. Opportunities will exist for people to connect with the wildness of a restored, healthy river system. Valley residents will be part of a basin community, connected by a system of rivers and streams providing healthy aquatic life, clean drinking water, safe places for recreation, and supporting a vibrant economy. Residents will accept individual and collective responsibility for this vision, and provide leaders with a mandate and the resources necessary to achieve it.

THE WILLAMETTE RIVER BASIN

The Willamette River Basin is located in northwestern Oregon between the Cascade Mountains and the Coast Range. The basin is approximately 150 miles in length and 75 miles wide. It contains the highest density of lakes and ponds in the state and nearly 12 percent of the state's area. The basin comprises 11,500 square miles and is bordered by foothills and mountains up to 10,000 feet high to the south, east, and west. Its northern boundary is the Columbia River. The two rivers join just ten feet above sea level.

Watersheds are geographic areas in which water, sediments, and dissolved materials flow to a common outlet — a point on a larger stream, river, lake, or aquifer. Watersheds extend from ridge-top to ridge-top and are a network of aquatic and associated upland habitats upon which all plants, animals, and humans depend. Improving watershed health is an essential step in addressing water quality and quantity issues.

Precipitation in the basin consists mostly of heavy, intermittent rain, generally from November to June. Little rainfall occurs in the summer months and winter snowfall is minimal at lower elevations. Current policy guiding reservoir levels seeks to achieve minimum flows of 6,500 cubic feet per second (cfs) and 7,000 cfs at Salem during the critical months of August and September in most years. In low-flow years, the August-September targets drop to 6,000 and 6,500 cfs respectively. Winter flow is typically around 190,000 cfs at Salem. Occasional rain or snow events create high flows and even flooding, which is a natural aspect of all healthy river and stream systems. As measured at Salem, the 1861 (pre-dam) flood was 530,000 cfs, the 1964 flood was 310,000 cfs, and the 1996 flood peaked at 243,000 cfs.

Based on average annual flow, the Willamette River is the tenth largest river in the United States. Thirteen major tributaries feed the mainstem. These are the Calapooia, Clackamas, Coast Fork Willamette, Long Tom, Luckiamute, McKenzie, Mary's, Middle Fork Willamette, Molalla, Pudding, Santiam, Tualatin and Yamhill rivers. Thirteen reservoirs, 11 of which have flood control functions, are located on six of the river's major tributaries. The mainstem of the river is typically divided into four distinct sections, based on hydrologic and physical characteristics: *Tidal*, mouth to Willamette Falls; *Newberg Pool,* Willamette Falls to above Newberg; *Mid-Valley*, from above Newberg to Corvallis; and, *Upper River*, upstream of Corvallis. The basin is further divided into seven sub-basins.

The basin is home to 75 percent of Oregon's economy. Nearly 70 percent of Oregon's population lives within 20 miles of the river, within 128 political jurisdictions, guided by 110 land use plans in nine counties and many cities. The basin includes some of the most productive agricultural and forest lands in the state. Land use by area is 62 percent forestry, 21 percent agricultural, 11 percent mixed farm and forest, and six percent urban. Approximately 41 percent of the basin is publicly owned, managed primarily by the U.S. Forest Service and the U.S. Bureau of Land Management.

"Rivers which had been tame and small
grew full and dangerous beside me,
but I went in a dream like a maiden aunt
who remembers only the pretty infant at the christening
and doesn't recognize
the deep and dangerous giant he's become."

Barbara Drake

History

The Willamette River Basin has been inhabited by humans for at least 10,000 years. Most of the Native American inhabitants shared a common dialect and were of the Kalapuyan family, including the Calapooia, Luckiamute, Tualatin, and Yamhill tribes. The Clackamas, who occupied the lower Willamette River area below the falls, were of the Chinook family. Salmon, mussels, and other sustenance came from local rivers and lakes; native plants and game from the fields and forests provided additional sources of nourishment. The Kalapuyans burned the valley prairies annually to maintain prairie vegetation, especially camas, tarweed, and other edible plants. Epidemics associated with the arrival of Europeans decimated as much as 80 percent of the Native American residents of the valley.

The first Euro-Americans in Oregon were explorers, followed by Hudson Bay Company fur trappers. Settlers — mostly farmers — followed in the early nineteenth century and located on the fertile land near the mainstem and major tributaries. The waterways were vital transportation routes for people and goods. From the 1850's to the early 1900's the steamboat was king of the Willamette, sometimes traveling as far upriver as Eugene. The falls at Oregon City were harnessed to provide water and electric power for industry, and locks were built to facilitate navigation.

During the nineteenth century, major population and industrial centers developed along the Willamette River. In the name of public health and sanitation, sewage was piped into the river instead of dumped on the ground or in the street. As population increased, however, the capability of the river to absorb waste from the cities and industries was compromised, resulting in serious pollution of the mainstem river. Throughout the 1920's and 1930's, citizens voiced growing concern about the river's highly visible pollution. Numerous public meetings were organized and many studies were initiated documenting waste disposal practices, water quality, and the effects of pollution on fish populations.

By 1936, Oregon had 48 separate laws relating to water pollution, yet the confusion of laws resulted in scant compliance and enforcement. Efforts to obtain legislative approval of comprehensive water pollution control legislation finally succeeded in 1937, but the bill was vetoed by the governor. Outraged, citizens launched an initiative for the November 1938 General Election ballot. The "Water Purification and Prevention of Pollution Bill" passed in a statewide vote by a three-to-one margin. The new law enacted a comprehensive water pollution control law and created the State Sanitary Authority (renamed the Department of Environmental Quality in 1969) to administer the program. Since 1953, nearly every legislative session has made additions and modifications to the 1938 law.

The initial water pollution control strategy of the Sanitary Authority was guided by two major objectives: to protect public health and to use the "full waste assimilative capacity" of the river (the river's ability to dilute pollution to a reasonable level). Actual cleanup efforts commenced in 1947, when public health concerns over sewage were given the highest priority. Cities were required to provide primary treatment and disinfection of sewage during summer months. Pulp mills were the largest industrial sources of pollution and were required to reduce discharges during low stream flow months. Summer mill-waste was stored, then released during high stream flows in the winter. Unfortunately, while waste management improved during this period, population and industrial growth increased waste loads faster than treatment could reduce them. Thus, clean-up standards were not achieved and little improvement in water quality was noticeable. The imposition of more stringent pollution controls on major cities and pulp mills did little to improve the situation.

In the mid-1960s, a new approach to water pollution control evolved, born out of a realization that reliance on the assimilative capacity of the river was not practical. Unprecedented growth, delays in financing and constructing facilities, and lack of basic scientific information related to pollution guaranteed that the old approach would never keep up. The new strategy required all sources to provide the "highest and best practicable treatment and control of wastes" to minimize waste discharges and provide the best possible water quality.

Another initiative was launched in the 1960's to clean up the river. Led by Governor Tom McCall, the initiative energized the state and ushered in a major civic movement toward greater environmental sensitivity. Citizens united to reduce pollution from cities and large industries, to manage and plan for growth in the valley, and to establish a "greenway" along the river. Ultimately, the cleanup of the Willamette River became a national model of what could be accomplished with clear vision and determination.

Under the new approach, "point sources of pollution" (readily identifiable sources such as pipes and sewers) were the first to be controlled. By the late 1960's, state regulators turned their attention to the more dispersed sources of pollution, or "nonpoint sources." Controls were placed on the discharge to streams of animal wastes from confined animal feeding operations; efforts were undertaken to reduce woody debris in streams resulting from log handling and transportation operations, and studies were initiated to look at the water quality impact of irrigation return flows.

Between 1941 and 1969, thirteen water storage reservoirs were constructed by the Corps of Engineers in the Willamette Basin. Release of stored water from these reservoirs during the summer low stream flow periods significantly improved the flow and water quality of the river. By 1970, combined efforts to treat and control wastewater as well as to augment stream flow at last produced the desired cleanup. Neither effort would have been sufficient alone. In almost all cases, this nationally acclaimed cleanup was achieved without court action. Influenced in part by the Oregon model, Congress adopted in 1972 the federal Clean Water Act, requiring secondary treatment of sewage and best practicable treatment of industrial waste throughout the nation by mid-1977. The water quality improvement was primarily due to implementation of the National Pollutant Discharge Elimination System (NPDES) and flow augmentation from upstream reservoirs. Pollution abatement was recognized in the authorization documents for the Willamette Basin projects dating back to 1938 and 1953. By 1972, Oregon had already achieved in the Willamette River Basin what Congress required the rest of the nation to achieve by 1977.

The Clean Water Act also required states to adopt water quality standards to achieve "fishable/swimmable" water quality and provided that state standards would be accepted as federal standards upon approval by the Environmental Protection Agency (EPA). Oregon had already adopted extensive water quality regulations in 1967 and 1969 to protect all recognized beneficial uses in the Willamette Basin — not just fishing and swimming. In many cases, Oregon's standards were more stringent than the federal guidelines. Oregon maintained these high standards to protect existing high quality waters and provide additional leverage for minimizing degradation as growth occurred. The EPA approved Oregon's standards as meeting federal requirements shortly after the Clean Water Act was passed.

Despite continued population growth, some measures of watershed health have improved since the 1970's. Additionally, improvements in waste treatment and control technology have resulted in continued reductions in many types of municipal waste. Closure of two pulp mills has reduced waste loads, and removal of food processing wastes from some municipal sewage treatment plants has aided in point source waste load reduction. Water quality, measured by compliance with dissolved oxygen standards in the Portland harbor, is better today than it was in 1970 when the so called "clean-up" was completed.

Current Conditions

Most experts agree that the Willamette River is probably in better health today than it has been for more than a century. But serious problems persist, and with population and development pressures continuing to rise, the need to remain proactive and vigilant is paramount. A recent report released by the Oregon Department of Environmental Quality combined previous study results to issue an overall assessment of the river's health. The study reveals a steady decline in the river's health from the headwaters to the mouth at the Columbia. It rates the river's overall health as "marginally healthy," indicating common exceedences of available standards or guidance values (Tetra Tech, August 1995). Below is a brief discussion of some of the issues facing today's river system.

Human Health

A recent DEQ study in the mainstem Willamette found concentrations of toxic chemicals (dioxins and furans) in the tissues of fish (DEQ, July 1994). These and other contaminants found (PCBs, metals , and several pesticides) have the potential to adversely impact human health. In February 1997, the Oregon Health Division (OHD) issued an advisory to anglers along the length of the river associated with the consumption of bass and squawfish, which had been found to contain high levels of mercury in their tissues (OHD, February 1997). In addition, OHD has issued an advisory in the Columbia Slough at the mouth of the Willamette River for fish consumption due to risk of exposure to toxics (OHD, November 1993). The DEQ also reports that many segments of the river and its tributaries exceed acceptable levels for bacterial contamination (Tetra Tech, August 1995; DEQ, May 1997; DEQ, April 1997). Oregon does not have a state program for monitoring water quality specifically in swimming areas.

Water Supply

Oregon follows the "Doctrine of Prior Appropriation" in the allocation of water. As in other western states, the oldest water right has the highest or first priority for available supplies. The system was extended to statewide groundwater resources in 1955. Authority to establish and protect instream flows was also enacted in 1955, although actual issuance of instream water rights was not authorized until 1987.

Surface water supplies are generally abundant throughout the basin except during portions of the irrigation season. In the late summer months, many streams drop to levels protected by instream water rights and availability limits new appropriations on most tributaries during those periods. The quality and quantity of groundwater supplies vary significantly throughout the basin. To the west of the river, groundwater resources are typically limited. One "Critical Groundwater Area" and eleven "Groundwater-Limited Areas" have been designated in the valley. These designations cover approximately 555 square miles and represent areas where groundwater declines have been documented or are likely to occur under increased use.

Water quality standards have historically been used as a tool in managing water quality, especially when related to public health. Water quality standards are typically set for the following parameters: nutrients, suspended solids, fecal coliform, toxic organic chemicals, and trace metals. Although the basin's water is generally within water quality standards for most conventional pollutants, 96 basin water segments currently fail to meet Oregon's existing water quality standards (DEQ, July 1996). This translates to 1,436 stream miles or 11% of the basin's estimated 13,253 stream miles. Some examples include dissolved oxygen levels that are below standards for some sections and tributaries of the river, especially during summer low-flow periods; stream temperatures that are above state-adopted prescribed standards throughout the basin; a few stream segments that have been found to exceed pH standards in summer months; and several potentially toxic organic chemicals and trace metals that have been detected in the water column and in sediment at many sites throughout the river.

Fish and Wildlife

Extensive habitat conversions throughout the valley have had serious impacts on fish and wildlife. Oregon's State Bird, the Western Meadowlark, has disappeared from the valley where it was once abundant. Other valley animal species now considered rare include the Oregon chub and western pond turtle. Aquatic species at risk include the upper Willamette steelhead, Willamette spring chinook, and several amphibians (Oregon Biodiversity Project 1997). Two species of native fish have been proposed for listing as threatened under the federal Endangered Species Act: lower Columbia steelhead (up to Willamette Falls) and bull trout in the river's upper tributaries. If enacted, these listings, and potential future listings, will have profound impacts on human activities throughout the basin.

Land use and population growth

In 1970 the basin's population was approximately 1.49 million people. By 1990 the population had grown to 1.94 million, an average overall annual growth rate of 1.5 percent, with notable variations by county and year. Growth projections for the basin as a whole anticipate a doubling of population within the next 25 to 30 years (University of Oregon, December 1994; DAS, January 1997). This increase in basin population will result in greater demands upon water and other resources. It will also accelerate negative impacts on riparian and wetland habitats and on natural floodplain functions.

Land uses are often given precedence over watershed health and biodiversity in development along the river. This results in the continued alteration of stream and river channels, banks, and floodplains. The relationships between various land uses and watershed health are not well established.

Current Efforts to Address Problems

Many state, federal, and private programs are in place to address the problems affecting the health of the Willamette River Basin. Fully addressing these problems will require coordination of all basin stakeholders and policy makers. Some current efforts to protect basin health are described below:

Watershed Councils and the Governor's Watershed Enhancement Board (GWEB)

Watershed Councils are local voluntary organizations that have been formed in Oregon to identify common goals for watershed improvement. Watershed councils now exist for nearly all of the tributary basins in the Willamette. The use of watershed councils to identify existing conditions and bring stakeholders together to restore and enhance watershed conditions is an important strategy for improving Oregon's water quality and watershed function.

The Governor's Watershed Enhancement Board (GWEB) was established by the 1987 Legislature to: 1) create a forum for agency members to discuss watershed scale issues, 2) fund local demonstration projects, 3) fund watershed education, and 4) provide a forum for landowners and other groups to discuss watershed enhancement efforts. The 1997 Legislature placed $20,000,000 in a watershed enhancement fund to be administered by GWEB. The Legislature directed that funds be used to support watershed councils, soil and water conservation districts, monitoring, and watershed improvement.

The Oregon Plan, the Healthy Streams Partnership and the Steelhead Supplement

The goal of the Oregon Plan is to create healthy watersheds with sustainable habitats and clean water to support people, industry, fish, and wildlife. The Oregon Plan is designed to address issues related to the Endangered Species Act and the Clean Water Act. The Healthy Streams Partnership is part of the Oregon Plan and focuses on integrating public and private efforts to restore watershed health.

The Steelhead Supplement to the Oregon Plan is being prepared to address the causes of decline of steelhead in Oregon and to assist in their recovery. The Supplement will be submitted to the National Marine Fisheries Service (NMFS) as Oregon's conservation plan for threatened steelhead populations. It covers the Klamath Mountains region, Oregon coast, lower Columbia, and Snake River Basin habitat areas where NMFS is considering listing, or has already listed, steelhead as threatened under the Endangered Species Act (ESA).

The Upper Willamette habitat area is also included in the Steelhead Supplement even though NMFS isn't currently proposing to list steelhead there. The state included the Willamette Basin because the Oregon Department of Fish and Wildlife believes that basin steelhead are in serious trouble, and that the state needs to address the factors causing their decline.

Water quality has been identified as one of the key factors affecting the decline of steelhead in the Willamette and other basin areas. Other factors include loss of habitat, water supply, fish passage, screening, impact of hydroelectric facilities, and fish harvest and hatcheries.

The Willamette Valley Livability Forum

Created by the Governor in 1996, the Forum's charge is to share information about valley trends and issues; build cooperative partnerships among valley residents and decision-makers; and help develop a shared 50-year vision for the future of the valley. The Forum has identified water as one of the top livability concerns to be addressed. It is committed to help integrate water issues with land use, transportation, economic, and community issues. The Forum and the Willamette Basin Task Force are currently collaborating in several arenas, including; the development of a Willamette Watershed Report Card, a "Confluence Conference", and implementation of Willamette Basin elements of the Oregon Plan and Steelhead Supplement.

Water Supply

Management of Willamette Basin water resources is guided by the legal concept of "beneficial use." Oregon law recognizes and identifies ten specific beneficial uses for water: agricultural, industrial, recreational, power, fish, livestock, municipal, mining, wildlife, and miscellaneous (Tetra Tech, August 1995). The Oregon Department of Water Resources develops basin water management plans to recognize and balance the competing water quantity demands of these uses. The Water Resources Department administers water allocation programs under polices and management plans adopted by the Water Resources Commission. Streamflows in the tributaries and mainstem of the Willamette are controlled by a number of structures designed to provide multiple benefits, including irrigation and flood control. In response to concerns about endangered fish, agencies are beginning to work together to determine optimum flows necessary for all beneficial uses and identify structural barriers to fish migration.

Water Quality Programs

The basis for most water pollution control programs and requirements is the federal Clean Water Act, first passed by Congress in 1972 . The purpose of the statute, which was amended in 1977 and 1987, is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." To achieve this purpose the Act established a permit program and technology-based requirements for wastewater treatment, as well as water quality standards for toxic pollutants intended to protect aquatic life, human health, and wildlife. All point source discharges of treated wastewater in the basin are regulated by a National Pollutant Discharge Elimination System (NPDES) permit, which dictates the quality and quantity of effluent that may be discharged safely into the environment.

Most water quality regulations in Oregon are administered in Oregon by the Department of Environmental Quality (DEQ). Its focus has been primarily on point source discharges, which have been significantly reduced over the years. More recently, attention has shifted to nonpoint sources. Agencies have established priorities and started working with landowners in developing management plans to control erosion and reduce contaminants entering streams. Authorities to address nonpoint sources through a variety of state and federal programs exist. Current efforts emphasize educational efforts to support voluntary compliance.

For water quality-limited stream segments, federal regulations require DEQ to determine how much of a waste load a water body can accept and still maintain its prescribed beneficial uses. Once this "Total Maximum Daily Load" (TMDL) is determined, the various waste discharges to the stream (from both point and nonpoint sources) are then reduced as necessary so that they do not exceed the maximum acceptable loading. This is a major undertaking that will require the systematic identification of the causes of water quality problems, linkage to watershed characteristics and management practices, establishment of objectives for water quality improvement, and implementation of measures necessary to meet the objectives.

DEQ has developed water quality standards to protect the designated beneficial uses of each waterway. In many cases, standards still do not exist for pollutants that affect the health of the river. The DEQ has prioritized the 870 stream segments (1,436 stream miles) that do not meet at least one water quality standard and has begun evaluating those segments to prepare guidelines and requirements to restore those areas (DEQ, July 1996).

Municipal Actions

Municipalities, operating under the a National Pollutant Discharge Elimination System (NPDES) permit program administered by the State of Oregon, have achieved significant reductions in the discharges of pollutants to the Willamette River and its tributaries. These reductions, coupled with the flow management practices of the reservoir system, are largely responsible for the improvements in the river's water quality over the past several decades.

The federal Clean Water Act requires Oregon's municipalities to upgrade combined sanitary and stormwater sewer overflow systems to reduce the bacteria entering the river during winter rains. The Oregon Health Division administers the Federal Safe Drinking Water Act in Oregon. Nearly two billion dollars will be spent over the next few years by Portland, Salem, and Corvallis, and other basin communities to address overflow problems.

In addition, many cities have responsibilities for pollution prevention activities under the NPDES's pretreatment program for stormwater control, water quality-related public education, wetlands management, and development standards with water quality protection elements. Other approaches include a program promoted by several cities encouraging homeowners to disconnect downspouts to reduce the amount of stormwater entering the system.

Municipal organizations such as the League of Oregon Cities and the Association of Clean Water Agencies actively promote clean water programs and have participated in the state's review and upgrading of water quality standards, the development of the policies and procedures for the Total Maximum Daily Load (TMDL) requirements, the establishment of the stormwater program, and technical transfer and assistance for small communities.

Agricultural Management

One strategy for addressing water quality issues in the Willamette and its tributaries is to develop and implement localized plans for managing natural resources. To that end, as part of the Oregon Plan, the Oregon Department of Agriculture has recently stepped up activities to develop Agricultural Water Quality Management Area Plans in Willamette River sub-basins that fail to meet water quality standards. The goal of these plans is to meet water quality standards adopted by the Environmental Quality Commission. These plans, based on 1993 Senate Bill 1010, depend on the cooperation and initiative of private landowners and farmers. Department of Agriculture staff will work with local soil and water conservation districts, watershed councils, and affected communities during plan development and implementation. It is anticipated that the program will reduce agricultural contributions to water quality problems, as well as improve habitat and protect instream corridors in targeted geographic areas. Key building blocks for the program include water assessments, monitoring programs, education and outreach strategies and technical assistance.

Another strategy for addressing water quality issues in the Willamette and its tributaries is to continue investing in research and development of techniques to reduce groundwater pollution. Significant resources (mainly from the Oregon departments of Agriculture and Environmental Quality and the U.S. Environmental Protection Agency) have been expended over the past eight years to study agricultural impacts to groundwater contamination and to develop techniques for reducing contaminant loads and to promote these techniques among landowners. In the Willamette Valley, the primary study emphasis has been on reducing fertilization and irrigation use to reduce nitrate leaching. Valuable information has been generated by these studies. The current challenge is to deliver this information to growers in the most effective manner. The Extension Service, fertilizer dealer associations, agricultural service businesses, crop advisors, private consultants, and food processors can all in providing information to growers.

Forestry Management

Water quality concerns related to forest practices are generally limited to water temperature and sedimentation. Pesticide and fertilizer use on forest land is minimal relative to such uses on other resource lands. Oregon law requires forest operations to comply with the rules and standards of the Environmental Quality Commission (EQC) relating to air and water pollution. Oregon law further requires the Board of Forestry to establish best management practices and other rules to assure that nonpoint source discharge of pollutants from forest operations do not impair the achievement and maintenance of water quality standards. This statute also creates a formal procedure whereby the EQC can petition the Board of Forestry to modify its rules if existing rules impair the achievement or maintenance of water quality standards.

The Oregon Department of Forestry and Oregon State University Extension Service work with forest landowners to implement best management practices. The Oregon Forest Practices Act has been revised several times to address the need for protective riparian buffers, encourage prompt reforestation, control activity on steep unstable slopes, and permit watershed-based rule development. The new rules are effective in maintaining desired stream temperatures. Sedimentation problems on forest lands occur primarily as a result of forest roads, particularly those constructed prior to the development of new engineering standards that reduce runoff and erosion.

Forest landowners recently agreed to undertake a $130 million program to fix older roads and stream crossings as part of Oregon's salmon conservation plan. The President's Forest Plan restricts timber harvest on selected forest lands in the basin. Certification is available for forest stewardship which is based on sustainable ecosystem management, thereby allowing them to market forest products with "green labels."

Recreation Lands

Much of the public land adjacent to the Willamette River is owned and operated by the Oregon Parks and Recreation Department (OPRD) under the Willamette River Greenway Program. These lands constitute the majority of the natural and recreation areas along the Willamette River. The Greenway Program began in the early 1970's with the mission to purchase and set aside land in the riparian zone of the river for park and open space purposes. The program was unfunded in the late 1970's due primarily to landowner resistance to public acquisition of lands from unwilling sellers. Portland, Eugene, Corvallis, and other local jurisdictions have established parks and natural areas in their localities. However, existing sites are unlikely to meet future demands of a growing population.

Oregon Biodiversity Project

The Oregon Biodiversity Project is a public-private partnership working to develop and implement a statewide strategy to conserve biological resources within the context of human activities. The project, administered by Defenders of Wildlife, provides information and technical assistance to policy-makers, educators, landowners, planners, conservation groups, and others interested in protecting Oregon's biodiversity.

Private Non-Profits

Literally hundreds of private stream, watershed councils (both informal and formal), conservation organizations and neighborhood associations throughout the Willamette Basin are making significant contributions to natural resource conservation and are integrating land use planning with natural resource protection. In the Portland metropolitan region, for example, the Coalition For A Livable Future which consists of over 40 local nonprofit organizations, is working to ensure that sound floodplain management, fish and wildlife habitat protection, and water quality protection in the Willamette and its tributaries is integrated into Metro's Region 2040 planning process. At the neighborhood level, urban stream groups and watershed councils are working with many of the 24 cities and three counties to pursue similar integration.

While it is impossible to list all of these groups in this document, it is important to recognize that grassroots citizen groups and conservation organizations are working with local and regional government, federal and state agencies, and other non-profits to improve natural resource protection, enhancement, restoration, and management throughout the basin. These groups represent an important part of the basin's "civic infrastructure," which the Task Force feels should be recognized and supported as an essential element in implementing its recommendations.

Oregon Emergency Management (OEM) and Federal Emergency Management Agency (FEMA)

As a result of the recent flood disasters and subsequent Federal Emergency Management Agency (FEMA) disaster assistance, the Public Assistance and Hazard Mitigation Grant Programs are restoring damaged public facilities and implementing mitigation measures to reduce the impact of future flood events. In the Willamette River Basin (WRB) this would include eligible projects in all counties that border the Willamette River or have tributaries thereto. As the state agency responsible for administering FEMA disaster assistance, Oregon Emergency Management (OEM) works closely with counties, cities, special districts and eligible non-profit organizations by ensuring their projects conform with the program requirements. High priority flood mitigation projects are intended to reduce the impact of future flood events to insurable structures, public facilities and other infrastructure items that receive federal disaster assistance, particularly on a repetitive basis. Recognizing the emphasis on improving and restoring aquatic habitats, there is every opportunity to include these multi-objective goals into the natural hazard mitigation planning process.

U.S. Environmental Protection Agency (EPA)

The EPA has the responsibility to ensure the implementation of a broad range of environmental statutes. In addition to being the regulatory backbone, EPA is also strongly committed to building the technical and management capacity of both state and local interests through non-regulatory support mechanisms, including funding and technical support. To accomplish this, the EPA has adopted a number of strategic themes to guide its efforts related to support and regulation. These strategic themes include ecosystem- and community-based environmental protection approaches, pollution prevention to ensure long-term environmental sustainability, and environmental justice.

U.S. Fish and Wildlife Service (USF&W)

Service programs involve a variety of technical and financial partners, including local watershed councils. Under its Partners for Wildlife program, the Service provides technical and financial assistance to help private landowners restore fish and wildlife habitat on their lands. Although funds are not provided for conservation easements or fee title acquisitions, funds are available for restoration work. Landowners are required to commit their lands to the restoration effort for at least ten years and often longer. Through its Jobs-in-the-Woods program, the Service provides technical and financial assistance to implement locally identified watershed restoration projects on non-federal lands in western Oregon. In addition to restoration, employment and training of displaced workers from timber-dependent communities is emphasized. Under the Metro Greenspaces program, the Service works in partnership with Metro, 25 municipalities, four counties, and private entities to restore fish and wildlife habitat on public lands and provide environmental education and public outreach in the Portland/Vancouver metropolitan area. In addition to the above three programs, the Service participates in a number of local, regional, and statewide policy, planning, and land use management issues to ensure that federally protected fish and wildlife resources are adequately considered.

U.S. Bureau of Land Management and U.S. Forest Service (BLM & USFS)

The majority of public lands managed by these agencies can be categorized as upper tributary. Management direction for these lands is found in the Northwest Forest Plan (Record of Decision, June 1994). This document directs federal agencies to, among other things, address land use allocations to maintain healthy aquatic, riparian, and forest ecosystems, as well as to protect and enhance habitat for late-successional and old growth forest-related species. Extensive water quality protection is provided for through the plan's comprehensive watershed-based approach. An integral part of this plan is the Aquatic Conservation Strategy, developed to restore and maintain the ecological health of watersheds and aquatic ecosystems. Further, it requires these agencies to mimic natural disturbances as part of their overall management. Riparian areas are protected through a system of riparian reserves, intended to limit bank erosion, ensure an adequate and continuous supply of coarse woody debris in streams, and provide shade and microclimate protection along streams.

U.S. Army Corps of Engineers (USACE)

The Corps is currently conducting two studies of interest to the basin. The first, the Willamette Basin Reservoir Study, is being conducted in partnership with the Oregon Water Resources Department and a number of other stakeholders. Its primary goal is to authorize a full range of beneficial uses of water storage in Willamette reservoirs. The short-term and long-term future conditions for the Willamette system will be identified and additional important purposes fully recognized in storage allocations and reservoir operations such as water supply, recreation, water quality, fish and wildlife, and possibly other unquantified future needs.

The other study, the Willamette River Floodplain Restoration Study, assesses opportunities to modify existing floodplain features in the valley to reduce flood damage while restoring natural wetlands and promoting ecosystem restoration. The 1996 flood emphasizes the urgent need for additional flood damage reduction measures for the basin. The proposed floodplain restoration project assesses opportunities to modify existing floodplain features in the valley to reduce flood damages while restoring natural wetlands and promoting ecosystem restoration.

Other Resource Agency Efforts

Many state and federal agencies offer assistance to landowners interested in improving the management of their lands. For example, the Natural Resource Conservation Service administers the Conservation Reserve Program, Wetlands Reserve Program, and several other programs intended to remove sensitive lands from agricultural production and improve management of remaining farmed areas. The Oregon Department of Fish and Wildlife also provides technical assistance and has the authority to certify wildlife management plans so that landowners will qualify for property tax benefits when they protect habitat. A riparian tax credit program was recently reauthorized by the legislature.

Department of Land Conservation and Development (DLCD)

Since 1973 Oregon has maintained a strong statewide land use program based upon a set of 19 statewide goals and associated guidelines. The Department of Land Conservation and Development (DLCD) is the lead agency in this arena, through such efforts as the Community Solutions Team, agencies (utilizing the Quality Development Objectives) can help lessen development impacts upon watershed health. Several goals relate directly to watershed health: goal 5 - natural resources: goal 6 - air, water, and land quality. Other goals are indirectly related protecting agricultural lands (goal 3) and forest lands (goal 4); transportation (goal 12); public facilities efficiency (goal 11); housing (goal 10); and economic development (goal 9).

Oregon Progress Board/Oregon Benchmarks

The Oregon Benchmarks provide an overall framework for the state to assess progress toward the vision expressed in the state's strategic plan, *Oregon Shines*. Benchmark targets are set by the Oregon Progress Board, an independent state planning board, which also collects information and reports on progress toward the goals. The Willamette Basin Task Force is working with the Progress Board to ensure compatibility with watershed-related goals.

"The Wallama soothes Kalapuya
souls in the water,
bathes resting feet,
refreshes these camas-gathering,
story-telling people in snowmelt.
This valley holds Kalapuya ways in trust."
Stephen R. Jones

2

HEALTH OF THE WILLAMETTE WATERSHED

"Dark now, the fishermen pack up their gear and single file back to the shore and the city, to clean their catch in apartment kitchens, tapwater running cold over careful, bloodstained hands; tonight their children will eat this river."

Jim Shugrue

HUMAN HEALTH

The Task Force identified three human health issues of concern in the Willamette River Basin: 1) drinking water, 2) fish consumption, and 3) water contact recreation. Each is discussed briefly below with objectives and actions listed for each.

1 Drinking Water

Groundwater underlying the basin supplies one-third of the basin's population with drinking water. The groundwater is shallow, under the influence of surface water, and not protected by an impervious layer of rock. The majority of the land overlaying the vulnerable groundwater is in agricultural use, the rest is mostly urban. In rural areas, groundwater is showing multiple areas of nitrogen contamination above levels considered safe for drinking water (USGS, 1995a). Oregon has an excellent Groundwater Protection Act, but it is currently not fully funded for the basin.

Five tributaries (Bull Run, North Santiam River, Clackamas River, Upper McKenzie River, and Rock Creek) in municipal watersheds have stringent laws to protect drinking water sources from contamination. These rivers supply high-quality water to water treatment facilities in Portland, Clackamas, Salem, and Eugene, although the February 1996 flood and resulting sediment input into Detroit Reservoir caused problems with municipal water supplies on the Santiam River. Unprotected tributaries show evidence of mild to severe water quality degradation and the presence of contaminants such as pesticides in the water and sediment (DEQ, July 1994; DEQ, July 1996; Tetra Tech, August 1995).

On the mainstem Willamette, only the upper reaches of the Willamette are currently used, after treatment, as public drinking water sources (Corvallis and Adair Village). Below the upper reaches, river health deteriorates from marginal to poor. Communities downstream of Corvallis have historically drawn their municipal water supplies from sources other than the Willamette River (GEM Consulting, Inc., March 1995; Tualatin Valley Water District, March 1997). In light of the quality and quantity issues facing the river, municipal water suppliers in the lower reaches of the Willamette are concerned with the river's continued viability as an economically feasible drinking water source.

All of the basin's municipal water suppliers and the majority of community water suppliers currently produce water that meets drinking water standards. However, the current drinking water supply is insufficient to meet the needs of projected urban growth in the basin, forcing municipalities — particularly the fast-growing Portland suburbs — to search for additional sources. Serious discussions have been underway since 1992 regarding the desirability, feasibility, and cost of developing the lower Willamette as a source of drinking water. Municipal water suppliers have demonstrated that lower Willamette water can be treated with conventional water treatment to produce water that meets all current drinking water standards.

Objective

- The Willamette River, its tributaries, and its hydrologically connected groundwater should be managed and protected so that all are safe and economically viable sources of public drinking water.

Actions

- Fully fund and implement the Groundwater Protection Act as soon as possible. Implementation would allow designation of critical management areas where contaminants exceed warning levels.
- Strengthen groundwater protection efforts with land use planning tools. Promote Oregon's Wellhead Protection Program throughout the basin.
- Maintain current operational minimal flows in the lower Willamette during low-flow months to reduce the impacts of point and nonpoint source pollution and turbidity on drinking water sources. Affected agencies (Oregon Water Resources Department, Oregon Department of Fish and Wildlife, U.S. Army Corps of Engineers, Bureau of Reclamation, DEQ, U.S. Fish and Wildlife Service) should coordinate activities in establishing this flow level as a "priority use" and also consider potential effects on fish populations. Priority should be placed on continued funding of the Willamette Basin Reservoir Study to develop a coordinated flow augmentation plan.
- The Drinking Water Section of the Oregon Health Division should assist communities in developing and implementing source water protection programs.
- Ensure that drinking water source watersheds are adequately protected through diligent implementation of the federal Northwest Forest Plan, state Forest Practices Act, Agricultural Water Quality Management plans, and local land use plans.

2 Fish Consumption

Fish tissue samples taken from the length of the mainstem Willamette River have been found to have elevated levels of mercury. The Oregon Health Division (OHD) has issued an advisory regarding frequent consumption of bass and squawfish from the river due to the risk of mercury toxicity (OHD, February 1997). For example, the advisory states that children age six and under should eat no more than one four-ounce fish meal every seven weeks. Similarly, the Columbia Slough, at the mouth of the Willamette River, carries an advisory against frequent fish consumption because of the risk of exposure to toxics (OHD, November 1993). A recent DEQ study throughout the mainstem found a number of toxic chemicals and metals in fish tissue above recommended levels. Fish from the industrial harbor of Portland contain significantly greater concentrations of dioxins and furans than those at up river sites (DEQ, May 1997). Clusters of fish with skeletal deformities and other abnormalities have been found at a number of sites along the river, especially in the Newberg Pool. The cause of these abnormalities is unknown; research is needed to investigate whether a relationship exists between these fish abnormalities and human health risks (Tetra Tech, August 1995). The level of public awareness of these advisories is quite low.

Objectives

- Fish in the Willamette River Basin should be safe to eat.
- The risks associated with fish consumption should be researched and communicated to citizens.

Actions

- Obtain sufficient information about fish and consumption patterns within the basin to identify human health risks and develop solutions.
- Collect and analyze sufficient sediment contaminant data throughout the basin, with an emphasis on the Newberg Pool area. Research the causes of fish abnormalities in the Newberg Pool.
- Undertake tagging studies to track the migratory habits of suckers and squawfish to lend precision to studies of these two fish species.
- Coordinate the communication of existing fish consumption warnings to the public, with the Oregon Health Division taking the lead in cooperation with the Oregon Department of Fish and Wildlife, DEQ, and local health officials.
- Report information about current fish advisories in the Willamette Basin Report Card.

3 Water Contact Recreation

The DEQ considers many segments of the Willamette and its tributaries to be below water quality standards due to the presence of fecal coliform or other bacterial contaminants (DEQ, July 1996). The main sources of fecal coliform in surface waters of the Willamette River and its tributaries are overflows from sewage treatment plants, surface runoff, feed lots, stormwater, and combined stormwater/sewage overflows (CSOs) from urban areas (Tetra Tech, July 1992). Other possible sources of bacteria in certain locations may include direct fecal waste from swimmers and diaper waste.

The DEQ mandates that areas around sewage overflow pipes be posted to inform the public of health risks. Oregon lacks a comprehensive approach to public health swimming safety, although some have questioned the reliability of water quality indicators, such as bacteria tests, to identify public health swimming risks.

Objective

- The Willamette River and its tributaries should be safe for water contact recreation. If an area is found to be unsafe, the public should be informed quickly and effectively.

Actions

- Establish a functioning system that protects public health in the arena of water contact recreation. The Oregon Health Division should provide leadership in requesting funding for and implementation of this system.
- Encourage cooperation between the Oregon Health Division and county health authorities to identify swimming areas, characterize sanitary hazards impacting those sites, and develop site-specific warning systems to notify the public when dangers exist.
- Report the segments of the river with historic exceedances of bacterial standards in the Willamette Basin Report Card.

How does a river look high in the mountains?

"High in the mountains
the river is electric,
and the rocks ensconced
there are frantic."
John R. Campbell

ECOSYSTEM HEALTH

The Task Force identified seven ecosystem health issues of concern in the Willamette River Basin: 1) water quality and pollution sources; 2) water supply; 3) sedimentation processes; 4) instream flows and flood management; 5) fish and wildlife habitat; 6) health of aquatic species; and, 7) exotic organisms. Each is discussed briefly below with objectives and actions listed for each.

1 Water Quality and Pollution Sources

Many streams throughout the valley fail to meet water quality standards because of the presence of pesticides, heavy metals, dioxins, and other pollutants in the water column and sediments. The pollutants originate from industrial and municipal waste (point) sources and a variety of dispersed (nonpoint) sources associated with agricultural, forestry, industrial, and urban activities. More than 90 percent of the total suspended solids are from nonpoint sources (DEQ, July 1996; DEQ, April 1997; DEQ, July 1994; Tetra Tech, August 1995). Through regulation, the state has successfully reduced the amount of point source pollution entering the river. However, nonpoint sources do not lend themselves easily to regulatory control due to their diffuse and often intermittent nature. Oregon lacks a coherent system to track contaminants, identify their sources, determine when dangers exist, and address problems in a consistent and timely way.

As previously mentioned, Willamette River water quality is well within the standards for most conventional (e.g., dissolved oxygen, temperature, pH etc.) pollutants. However, many contaminants of concern have been identified throughout the basin, including potentially toxic trace elements and organic compounds for which no standards exist. These pollutants are found in all areas of the Willamette River with pollutant levels increasing as the river moves north toward the Columbia River.

Data are lacking for many of the important indicators of river health in the Willamette Basin. Areas in need of improvement include assessment of contaminants in the water, streambed sediment, and aquatic life of basin rivers and tributaries; assessment of overall ecological health and hydrologic functions; and, identification and remedy of adverse impacts of human activities upon human and environmental health.

Water quality standards have historically been used as a tool in managing water quality. Standards applied in Oregon include:

Dissolved oxygen levels are below standard in some sections of the river, especially during summer months, potentially jeopardizing fish (USGS, 1995a).

Stream temperatures exceed state adopted standards in many segments throughout the basin, causing fish mortality. Water quality management plans are currently being developmed to address the high temperatures found in these areas (USGS, 1995a; Tetra Tech, August 1995).

Nutrients include nitrogen and phosphorus from fertilizers, human and animal waste, and other organic matter that enters streams during rainy seasons and concentrates during low flow periods. Excess nutrients can threaten the survival of many aquatic species.

Suspended solids (soil erosion) damage stream habitats. Agriculture sites (40 percent of the land) contribute the greatest amount. Urban sites (6 percent of the land) contribute the highest levels per acre (TetraTech, August 1995; Ellis, August 1997). Approximately 90 percent of the annual surface runoff occurring in tributaries is during major winter and spring storm events (DEQ, April 1997; USGS, 1995a).

Fecal coliform (bacteria) can cause human illness. It is found in elevated levels at numerous sites throughout the basin, especially during winter storm events. These bacteria increase in concentration from upstream to downstream (Tetra Tech, July 1992; USGS, 1995a).

Toxic organic chemicals include pesticides and other compounds found in stream segments throughout the basin, especially in agricultural areas (USGS 1996; USGS, 1997). Some pesticides are believed to cause cancer and other serious health problems.

Trace metals found in basin waters include lead, arsenic, mercury, chromium and cadmium that can affect human health, and zinc and copper for aquatic species health (USGS, 1997). Most enter waterways in urban areas.

Pollution Sources

Point sources of pollution are regulated by DEQ under a permit system to ensure protection of human health and the environment. Nonpoint sources, because of their diffuse and often intermittent nature, are much more difficult to evaluate and regulate. Efforts to control these diffuse sources have typically focused on trying to modify activities or land uses that result in increased pollutants entering the river via nonpoint sources. In the Willamette River Basin, efforts have been undertaken to reduce pollutant loading from point and nonpoint sources through the use of more effective wastewater treatment technologies, the establishment of riparian buffer zones, and improved land use practices.

Nonpoint Sources. When examined on an annual basis, nonpoint source contamination far exceeds that of point source contamination for example, more than 90 percent of the total suspended solids entering the mainstem are from nonpoint sources. Most nonpoint source pollution enters the basin during the winter and spring in conjunction with heavy rains. Urban areas, which comprise approximately six percent of the land use in the basin, contribute higher pollutant loads per acre than rural lands (USGS, 1995a; Tetra Tech, August 1995; USGS, 1995b). However, due to the much smaller area covered by urban areas, they contribute a lower quantity of nonpoint pollutants than rural areas. In a watershed context, urban areas often occupy critical tributary and estuary locations, while agricultural land uses dominate floodplain areas, and forest uses dominate upslope portions of the watershed. Some of these land uses have the potential to affect critical watershed processes.

Erosion causes loss of productive soil and degrades water quality and aquatic life. It can also decrease the storage capacity of reservoirs, interfere with navigation, and increase risks of flooding. Without proper controls at construction sites, sediment loads can reach 35 to 45 tons per acre per year. Sediment can be deposited in streams and wetlands, causing severe water quality problems. The Natural Resources Conservation Service estimates that 1.8 million tons of soil per year are lost from erosion by water on agricultural lands in the basin (Metro 1997).

The type of nonpoint pollutants from urban and rural areas are generally different. Where urban sources tend to contribute more metals, petroleum products, and industrial toxic chemicals, rural areas tend to contribute pesticides, eroded soils, and nutrients.

Objectives

- Reduce adverse impacts of pesticides and fertilizers.
- Nonpoint sources of contaminants that adversely impact the health or beneficial uses of the river should be effectively controlled including soil erosion from urban construction sites, farms, and forestlands.
- Create vegetative buffers along streams and wetlands throughout the valley that are wide enough to effectively filter nutrients, chemicals, bacteria and sediment, while providing flood control, fish and wildlife habitat and recreation opportunities.
- Contaminant reduction and control programs should apply the greatest resources to the most significant sources of the contaminants.
- Reduce sedimentation and landslide hazards that might adversely impact watersheds.

Actions

Reducing Contamination

- A combination of incentives and regulation should be used, focused on reducing inputs as well as reducing offsite migration. Support ODA in developing incentives for Integrated Pest Management and low-impact alternatives.
- Develop and implement a program for gathering point-of-sale data on pesticides sold within the basin for both urban and rural use. The data should be sufficient to determine the quantity, location of purchase, and type of pesticide sold, as well as type of use (e.g., agriculture, residential, commercial, industrial). Prioritize efforts according to the most serious chemicals in areas of known problems.
- Fund research linked to the use and reduction of pesticides and fertilizer use in both agriculture and urban landscaping.
- Develop and implement a pollution prevention strategy throughout the basin to prevent toxic contamination and reduce current risks to human and ecosystem health.
- Inspect for oil and transmission leaks at DEQ vehicle exhaust emissions test sites.
- Fund effective programs for disseminating known reduction techniques to users.

Tracking Pollution Sources

- Identify sources of pollution and determine the cumulative impact and effectiveness of clean-up efforts.

Improving Land Management Practices

- Implement the Phase II requirements of the federal stormwater program related to expanding the stormwater requirements of the Clean Water Act to smaller communities. Provide the necessary funds and staffing for the DEQ to effectively administer the program requirements.
- Improve management of nonpoint source runoff and erosion. Avoid or reduce pollution from existing urban areas, areas of new development, forestry, and agriculture. This can be accomplished through expanding current stormwater permitting and through improving agricultural management practices.
- Work with the agricultural community to address agricultural runoff. Target practices that contribute pesticide contamination. Secure funding for increased support of Soil and Water Conservation District assistance to individual farmers to help apply the menu of best management practices.
- Address erosion and sedimentation in the basin. Use recommendations from the Portland Stormwater Advisory Committee and the DEQ Erosion and Sedimentation Control Committee where applicable.
- Emphasize erosion prevention rather than sediment control on all construction sites.
- Use cover crops and establish vegetative buffers on agricultural lands to control sediment.
- Address the need for vegetative buffers in a basin-wide conservation strategy. Develop guidelines for appropriate width and composition by considering the level of existing development, cost, soil type, slope, and other relevant factors. Provide a range of options for protection and restoration including incentives, cost-sharing, easements, acquisition, and other tools.
- Implement and integrate watershed-based approaches for federal and non-federal lands.

Prioritizing Expenditures

- Recommend and prioritize improvements to Willamette River water quality to make efficient use of limited resources. Examine the authority of the DEQ to prioritize clean-up efforts and to defer or delay lower priority activities.

How does the river look low in the valleys?

"Ordinary, low in the valleys.
Curly, maybe lined with maples.
Secretive in the warm months,
scooping its mud into promising banks."

John R. Campbell

Point Sources. Most point sources are associated with urban areas and discharge year round. Urban areas may also have a greater impact on water quality during summer low-flow water periods. According to 1991 DEQ data, 33 major and 320 minor permitted municipal and industrial facilities exist within the basin (Tetra Tech, June 1993; Tetra Tech, November 1992). Twenty of the 33 major facilities discharge directly into the Willamette River.

Based on study results from the DEQ Willamette River Water Quality Study (Tetra Tech, August 1995), point source pollutant load contribution to the river has decreased dramatically over the last 50 years. However, growth in the basin threatens to increase both industrial and municipal point source discharges and nonpoint source pollution.

Some of the more toxic pollutants, such as dioxin, furans, semi-volatile organics and trace metals, can be traced to point sources in the basin. Based on data collected in the Willamette Harbor (lower Willamette River), there is concern that point source discharges of trace metals, although within permit limits, may be too high when measured cumulatively and, therefore, may need further reduction (DEQ, June 1996).

Objectives

- The current level of treatment and effluent quality for point sources of contaminants should be maintained or improved to achieve beneficial uses.
- Monitoring of point source discharge of contaminants should be comprehensive and basin-wide to determine for each discharge the need for additional treatment or control strategies to promote pollution prevention and to eliminate any adverse impact.
- Meet, or exceed, all existing water quality standards in all Willamette Basin water bodies.

Actions

- Identify relative amounts of point sources of pollution and the equity of clean-up efforts to mitigate impacts by dischargers.
- Evaluate alternatives to the use of chlorine as a disinfectant for the design of new wastewater treatment facilities or during major upgrades of existing facilities.
- Coordinate activity between DEQ and permittees of point source discharges to ensure comparable analysis of water quality parameters.
- Examine non-engineered and non-structural solutions in conjunction with efforts to control sewage overflows.
- Develop and implement a pollution prevention strategy throughout the basin to prevent toxic contamination and reduce current risks to human and ecosystem health.
- Raise the priority of the basin in the allocation of DEQ resources, specifically in the Department's effort to calculate the relative contributions of pollutants from point sources and to develop accurate total maximum daily pollutant loads for both point and nonpoint sources to achieve compliance with water quality standards. Calculate loads for all minor facilities above Willamette Falls.
- Review DEQ policy on granting exceptions to water quality standards and impact on aquatic health.

And what happens when a river floods?

"It's easy to say that hope is suspended,
and is spread like silt over acres
of ground. I've looked more closely,
though, and seen hope obliterated
by forces as simple as gravity and clouds."

John R. Campbell

2 Sedimentation Processes

River sediment plays a vital role in health of aquatic ecosystems and is home to organisms that fish depend upon for food. Sediments trap nutrients and contaminants alike and, when disturbed, can release both into the water column. Most contaminants of concern in the Willamette River Basin attach themselves to sediment particles and are transported wherever and whenever the sediment is moved. Human activities that involve disturbing soil or streambed sediment, such as construction, instream gravel mining, tilling, and dredging, all affect water turbidity, sediment movement and deposition. These activities contribute to the release of dissolved toxic substances into the water (Tetra Tech, August 1995; Ellis, August 1997).

Objectives

- Streambed sediments should be of sufficient quality, characteristics, and distribution to support a healthy aquatic ecosystem.
- Human activities that disturb streambed sediments or result in sediment deposition should be managed in a way that minimizes disturbance of contaminated areas and is sensitive to seasonal patterns and processes (precipitation, flooding, spawning/rearing).

Actions

- Continue and broaden the collection of sediment data throughout the basin to comprehensively map contaminated areas. Agencies reviewing applications for permits to disturb sediment should use the map to prevent disturbance of contaminated areas.
- Identify and evaluate risks of known areas of sediment contamination, sites down river of known point source discharges, known areas of significant land disturbance and down river of known sediment contamination.
- Develop a sediment "budget" for the basin.
- Inventory what sediments are loaded and understand where they are deposited in the Willamette River and its tributaries to develop a strategy to reduce loading, disturbance, and contamination.
- Protect drinking water source areas from excessive sedimentation.
- Coordinate implementation of the federal Northwest Forest Plan with state, local, and watershed council efforts to ensure protection of watershed sedimentation processes.

3 Water Supply

In summer months, some streams run dry because virtually all of the natural flows have been diverted for out-of-stream uses. As instream flows dwindle, pressure on groundwater supplies will increase. The Army Corps of Engineers' Willamette Basin Reservoir Study is currently looking at issues of water supply and storage. Current efforts to address water supply issues have focused on the need for a balance of uses and an increase in water conservation efforts. Methods for water conservation include: education, low-use fixture exchanges, metering and rate structures, and rationing in drought years.

Objectives

- Manage existing basin water supplies efficiently and cost-effectively to accommodate existing uses and future growth.
- Increase awareness of the need for water conservation.
- Make major decisions concerning basin water allocation only after all interested parties have been involved in a process that considers the full range of options and the probable impact of various options on the economy, quality of life, and ecosystems of the basin.

Actions

- Work toward obtaining adequate instream flows for fish, habitat, recreation, and pollution control.
- Determine appropriate institutional arrangements for meeting future demands from all uses on the reservoir system. Some institutional changes may be important for making future allocation decisions and operating the reservoirs to meet changing needs.
- Develop and promote incentives for efficient water use, including tiered rate structures, special customer rates, metering, and use of low-flow fixtures.
- Review existing programs and regulations that encourage wasteful water use, such as the "use it or lose it" policies in water rights regulations. Encourage the development of programs such as "water rights banking," which allows rights holders to not use water without forfeiting their rights.
- Promote residential, business, and industry conservation investment and education throughout the basin, including use of low-flow fixtures and metering.
- All relevant reports, recommendations, and actions concerning the management of water and watersheds within the basin should be considered by the proposed Willamette Basin Council. Every effort should be made to coordinate these efforts early in the process to avoid duplication of effort and the development of inconsistent strategies.

"Drinking from the hose,
Waiting for the cold water from the civil underground
Where water comes commanded past arrow heads,
Past digging sticks lost 400 years ago in the camas swale,
Past small square medicine bottles corked up in the pioneer dump."

Michael Strelow

4 Instream Flows and Flood Management

Flooding is a natural process and is essential to the long-term health of rivers and streams. Naturally functioning floodplains provide can flood water storage, enhanced water quality, fish and wildlife habitat, open space, parks, and increased property values.

Following the floods of 1943 and 1945, the U.S. Army Corps of Engineers constructed 13 reservoirs, 11 of which have flood control functions. These reservoirs reduce peak flows in the mainstem Willamette by 30-50 percent and augment summer low flows to approximately double historical low flows. These dams are also used for irrigation, navigation, and recreation. In addition, several federal agencies have constructed bank stabilization projects along the river and its tributaries to maintain the recent position of the river channel.

Flood-control dams in the Willamette River system modify river flow in approximately 30 percent of the basin. Direct contributions of the flood control dams to industrial and domestic water supplies have been relatively minor, providing 60,000 acre-feet for irrigation and none for non-agricultural uses. On the other hand, low-flow augmentation makes pump irrigation in river channels possible in areas where water withdrawals would create adverse conditions without augmented flow.

While these reservoirs have provided many social benefits (e.g., flood control, irrigation, navigation, low flow augmentation, recreation), they reduce the periodic flooding necessary to maintain side channels, sloughs, floodplain areas, wetlands, and riparian vegetation. Seasonal flooding and changing currents play an important role in shaping the aquatic environment, providing gravel bars, deep channel pools, in-channel wood, and additional characteristics that create diverse aquatic habitats.

Since adoption of the federal Flood Insurance Program in 1968, FEMA and the Corps have been directed to map the floodway and floodplain. Under current FEMA rules, development in the floodway is prohibited while development in the floodplain is permitted but regulated. Federal agencies are legally required to develop the maps based on existing conditions and are prevented from considering future changes. The result is a system that is continually under revision and progressively consumes more property. Previously, most attention to flood issues has focused on flows within the river's channels and has not considered related land use issues.

Effective watershed enhancement efforts include consideration of the entire watershed, not just the water between the stream banks. Flooding has historically been addressed through attempts at prevention and control rather than management. Disaster relief efforts have often permitted reconstruction in areas subject to repeated flooding. New construction in floodplains continues to occur. Nearly half the original primary and secondary river channels have been eliminated by channel straightening and slough cut-offs. One-quarter of the remaining channel banks have been stripped of riparian vegetation and stabilized with rock rip-rap (River Network, February 1996)

Flood risks are increasing in the valley due to floodplain development and loss of natural floodplain wetlands (River Network, February 1996). Channelizing river banks with rock and concrete structures does not fully eliminate flooding and actually increases the erosive power of the river on downstream reaches.

Land use policies often encourage routing water off the land as fast as possible, which inevitably lead to increased peak flows and flooding. In many areas, floodplains can be restored to unobstructed and well-

vegetated conditions so that flood flows are spread out, flood waters are retained, and water velocities are reduced. Rather than attempting to concentrate flows during storms, land management along the river and its tributaries should expect flooding at some level and encourage floodable lands to retain floodplain functions. Flood inundation of 20,000-50,000 acres would be equivalent to an 18 percent reduction in peak flow in some areas of the basin (River Network, February 1996).

Objective

- Attain a balance between human and ecosystem needs for instream flows and flood management.

Actions

State leadership and action

- Take a leadership role in managing public floodplains to maintain natural values and ecological integrity, setting an example for private landowners.
- Develop explicit policies for managing all state-owned floodplains along the Willamette River and its tributaries to achieve the goals of the Willamette Greenway. Particular attention should be directed toward designs of state facilities and roads that mimic, to the extent possible, natural run-off conditions.
- Evaluate the priority of floodplain restoration in the basin. Oregon Parks and Recreation Department should sponsor the reconnaissance study to be undertaken by the Army Corps of Engineers. Other agencies (ODFW, DOGAMI, DSL) should be active partners, along with the proposed Willamette Basin Council and local governments.
- Establish water quality, fish, and wildlife as "priority uses."
- Manage flood control structures and water impoundments to provide minimum base flows in the Willamette and its tributaries to support the natural ecosystem.
- Develop criteria and procedures for a State and Corps agreement to be applied to the operation of the Willamette system during low-flow periods.

Floodplain processes and strategies

- Develop a coordinated strategy for federal, state, and local programs to restore floodplains that increases ecological, aesthetic, educational, and recreational benefits while protecting lives and property in the basin.
- Protect and restore defined floodplains to contain and convey the flows safely and reduce dependence on expensive and often inadequate structural measures.

Flood and floodplain information

- Produce flood hazard information that is accurate and reflects current and anticipated future flood conditions and risks.
- Improve public access to floodplain information. Make floodplain maps and geographical information system databases readily available, have maps at all planning entities, and have multiple locations where basin-wide floodplain information is available.
- Establish criteria for lands to be preserved within adopted Urban Growth Boundaries, including such lands as floodways, significant wetlands, riparian zones, steep and unstable slopes, and areas of seismic vulnerability.

Public awareness and education

- Create a public awareness that flooding is a natural part of the ecosystem and essential to sustain a healthy river system. Flooding is a fact of life in Oregon and must be accommodated as the valley population grows.
- Recognize the different needs, impacts, and benefits of urban versus rural floodplain and riparian areas in land use, design standards, and regulations. Provide guidance to local jurisdictions and individuals on floodplain-and riparian-friendly design standards. Standards should emphasize meeting human needs for the land without compromising floodplain or riparian dynamics.
- Provide training for Extension personnel and encourage state and university Extension Services to promote appropriate riparian and floodplain management on farm lands. Encourage demonstration projects that illustrate proper management techniques and document the benefits.

Floodplain development

- Consider a policy to allow future development in floodplains only if the proposed use is compatible with periodic inundation and does not compromise the natural function of the floodplain as a floodwater storage area.
- Convene a stakeholder dialogue to consider floodplain management issues: e.g., floodplain development, non-buildable lands within urban and rural areas, areas most suitable for restoration in the short-term, areas suitable for restoration in the future, and public policies concerning the use of flood insurance to encourage development in floodplains.

Restoration and incentives

- Encourage willing property owners, through the use of incentives, to restore degraded floodplains. Remove disincentives to restoration. In future floods, state agencies should encourage relocating incompatible uses that represent a recurring risk.
- Collaborate and expand existing incentive programs (e.g., tax, loans, assistance programs) for the conversion of marginal or prior-converted floodplain or wetlands into protected riparian, wetland, and flood storage areas. Adopt incentives, both financial and regulatory, for the creation of new or restored wetlands useful for water quality improvement purposes.
- Streamline permitting processes to encourage restoration of floodplains and wetlands.
- Explore options to assist landowners adversely affected by floodplain restrictions.

Pilot studies

- Encourage pilot projects and small-scale innovative approaches to floodplain management and restoration efforts. Innovative approaches should be identified and the state should expedite exploratory projects that offer new and potentially more successful practices in riparian areas and floodplains.

Bring people together to increase awareness of information and successes

- Develop strong and visible education programs to focus the public's attention on the costs and impacts of development within floodplains. Emphasize the basic concept of "living with and managing floods," rather than "controlling floods."
- Convene a workshop to facilitate improved connection among various research and restoration efforts. Review existing and ongoing ecosystem research in the basin. Synthesize the information in a manner that can lead to the selection of floodplain restoration areas where the ecological function of the floodplain can be restored and flood risks reduced.

5 Fish and Wildlife Habitat

Wetland and riparian areas provide extensive habitat for plants, fish, and wildlife. Yet, in the basin, these habitats have been dramatically altered by human activities. Settlement of the Willamette Valley by European-Americans brought dramatic changes to the landscape as it was first cleared for pasture and drained for agriculture and later for urban development. Side channels, backwaters, and oxbows in the river have been altered for bank stabilization and navigational and flood control purposes. Development in the floodplain has drastically reduced habitat and the potential for floodwater retention (River Network, February 1996; Titus et al., November 1996).

Although wetland protection programs have reduced the rate of loss, effects of previous losses are still evident; and wetland losses continue. In the last decade more than 11 square miles of basin wetland have been converted to other uses (Dagget et al., 1997). Today, more than 87 percent of the valley's original wetland and riparian communities have been converted to other uses (Oregon Biodiversity Project, 1997). Losses have also occurred in native grasslands (99 percent), followed by oak savannas (80 percent), bottomland hardwood forest (72 percent), and marsh and open water (58 percent) (Titus, et. al., November 1996). Non-native plant and animal invasions disrupt native communities and diminish populations of many at-risk species (Oregon Biodiversity Project, 1997).

Originally ranging from one to seven miles wide, most riparian forests along the Willamette River have decreased to only a few hundred feet in width (Titus et al., November 1996). Additionally, approximately 75 percent of the original shoreline has been lost to channelization (ODFW, March 1992). In 1854, the 15 miles between Harrisburg and the McKenzie River confluence had over 155 miles of shoreline. By 1967, only 40 miles of shoreline remained. This represents a four-fold decrease in surface water volume in this section of the river and an equivalent reduction in organic inputs including leaf litter and wood (OSU, Sedell and Froggat, 1984). Today, approximately 400 miles of fisheries' habitat along the river remain out of nearly 1,400 miles of presettlement habitat (River Network, February 1996).

These changes have impacted wetland functions and the living communities dependent on them. While most of the floodplain still exists as farmland and can help intercept and retain floodwater, the removal of woody vegetation from these areas has vastly diminished the surfaces' ability to slow flows, retain water, and trap and retain sediment and nutrients. Restoration of wetlands in the basin will restore both floodwater and water quality functions and habitat values. Restoration of bottomland forest will have the most immediate impact on reducing floodwaters and trapping sediments and nutrients and will enhance recovery of rare plant communities and wildlife. Restoration of marsh and open water habitat, particularly reconnection of sloughs and backwaters with mainstem rivers, will benefit fish and amphibian populations.

The Task Force has concluded that the conservation and restoration of degraded riparian, wetland, and floodplain areas is critical to the overall health of the basin. Maintaining these communities and their ecological processes is important for environmental, aesthetic, recreational, and economic reasons. Enhancing the ecological and hydrologic integrity of this system should be given a high priority by individuals, businesses, and state, federal, and local governments because it will contribute to cleaner water, reduced property damage from flooding, and increased habitat for fish and wildlife.

Objectives

- Provide sufficient high quality habitat to support healthy populations of native fish and wildlife by protecting existing natural communities and restoring damaged landscapes.

- Conserve, restore, and manage riparian, floodplain, and wetland areas in the basin to provide clean water, improved fish and wildlife habitat, flood mitigation benefits, and recreational opportunities, while integrating social and economic needs.
- Coordinate riparian policies of agencies and organizations, where appropriate, to maximize ecological benefits and reduce procedural obstacles.

Actions

Planning and Coordination

- Address habitat needs in the basin in a comprehensive way as a part of the larger basin strategy outlined in the Task Force recommendations. Identify historic conditions and priority riparian, wetland, and floodplain areas for targeted conservation and restoration projects. Focus on areas in which benefits to fish and wildlife, water quality, flood control, and recreation will be maximized and disruption to human activities will be minimized. Address the need for conserving and restoring these areas in both rural and urban areas and involve all relevant agencies and organizations.
- Improve coordination and cooperation among public agencies and private interests. Encourage continuing coordination of wetland and riparian restoration efforts through the Oregon Wetlands Joint Venture. Direct the proposed Basin Council to develop and implement mechanisms for coordinating with other programs, such as the Oregon Plan.

Habitat Mapping

- Develop more comprehensive and consistent maps of habitats within the basin using existing information from a variety of sources. Develop a system to track changes in habitat.
- Update and digitize National Wetland Inventory quad maps within the basin, initiate more detailed local wetland inventories, identify potential restoration sites, and establish an effective system to track wetland gain and loss trends in the basin (Division of State Lands and Governor's Watershed Enhancement Board). Focus wetland mitigation efforts on regional priorities.

Conservation Strategies

- Implement a broad range of approaches to conserve habitat, including conservation easements, incentives for private landowners, public information campaigns, innovative voluntary measures, regulations, and targeted acquisition of priority lands. For example, incentives should be offered to willing property owners to reclaim alluvial sand and gravel sites as diverse wetland, fish and wildlife habitats. Such sites offer the opportunity to restore some of the basin's historic complexity.
- Remove regulatory, land use, and tax impediments to voluntary floodplain, wetland, and riparian restoration (state agencies and local governments). For example, agricultural standards for tree plantations on farm and pasture land can encourage longer harvest rotations (e.g., 15 years).
- Implement goals of Willamette Greenway program. Evaluate Goal 15 to determine its potential to protect and restore riparian forests along the Willamette and tributaries. Future conservation efforts on the Willamette River should evaluate previous efforts to conserve the greenway and build a program with a variety of land conservation tools that facilitate good river resource management.
- Support local efforts such as Metro's Greenspace restoration grants program and Portland's Bureau of Environmental Services floodplain acquisition program.
- State and federal agencies should take a leadership role in managing public lands to maintain natural values and ecological integrity, thereby setting an example for other landowners. State agencies should initiate cooperative agreements with private landowners to help manage small tracts of public land that are currently unmanaged. This could help control undesirable exotic weeds and encourage the restoration of native plant communities and healthy riparian, floodplain, and wetlands areas.
- When feasible, require native vegetation cover to be maintained and restored.

6 Health of Aquatic Species

The overall health of aquatic species in the Willamette Valley is in jeopardy because of many factors. However, it is generally agreed that loss and degradation of habitat are the primary factors affecting the survival of fish and wildlife in the basin.

Of immediate concern are Willamette spring chinook, upper Willamette steelhead, lower Columbia steelhead, and bull trout. These species have been the subject of intense debate because of the potential for listing under the Endangered Species Act. The state has committed substantial resources to the implementation of voluntary measures to restore salmon in watersheds along the south coast. However, recovery efforts elsewhere, including in the Willamette Basin, have not been fully developed or funded.

Changes in water quality, water temperature, and instream flows within the basin have significantly impacted the health and population of native fish species. Bacterial infections, diseases, and disruption of native fish spawning cycles are just some of the effects that native fish populations have experienced as a result of changes in the water column. A recent study showed negative effects of PCB's and DDT in river otters (*Lutra canadensis*) near the mouth of the Willamette. These otters were observed with enlarged spleens, lack of testes, and reproductive tract disorders (NBS, Henny et al., February 1996).

Two techniques have been used to assess the health of fish communities. The first examines the abundance and diversity of fish species collected at several locations throughout the Willamette River. The data show a decline in the health of fish communities in the river as one moves downstream from Eugene/Springfield to Portland. However, longer term trends in the river show stronger declines in fish community health in the upper river in recent years when compared with the lower river (Tetra Tech, August 1995).

The second technique used to assess fish communities evaluates the incidence of skeletal defects in juvenile fish. Skeletal defects have been shown to be caused by a wide variety of chemical, physical, and biological factors. This approach identified a 30-mile stretch of river below Newberg where fish have an elevated incidence of skeletal defects. The percentages of fish at a given location with skeletal defects range from 22 percent to 74 percent in this stretch of the river, known as the "Newberg Pool," compared to a normal three percent incidence rate. Elevated incidences of skeletal deformities were also observed downstream of the cities of Albany and Salem. Presently, the causes of these skeletal defects are unknown (Tetra Tech, August 1995).

Bottom-dwelling organism communities reflect localized water quality conditions. These benthic organisms have a very limited range, and pollutants tend to accumulate in the sediments in which they live (Ellis, August 1997). Aside from their use as an indicator of habitat and water quality, these organisms provide an important food resource for other aquatic organisms and serve to break down and process leaf litter and other organic matter in the river. Data on the abundance and diversity of these organisms show that they are healthiest in the upper river, but community health worsens further downstream (Tetra Tech, August 1995).

Objectives

- Recover populations of endangered aquatic organisms to self-sustaining levels.
- Provide high quality stream habitat in the basin to minimize the incidence of adverse effects on wildlife (skeletal deformities, reproductive disorders, etc.).

Actions

- Develop a coordinated Willamette Basin strategy to address the conservation of remaining high quality fish and wildlife habitat. Identify priority areas for restoration to begin recovering species and habitats known to be declining and to prevent the decline of currently healthy habitats.
- The basin strategy should address the requirements of the FEMA to ensure that Oregon will qualify for federal funds to cover the costs of relocating structures from hazard-prone and ecologically sensitive areas, and to help finance ecological restoration activities. The plan should also be consistent with activities undertaken by the Natural Resource Conservation Service to ensure that federal disaster relief funds are effectively used in the Basin to achieve wildlife and habitat goals.
- Relevant state agencies should work with public and private stakeholders to develop appropriate action steps to implement aquatic health elements of the overall basin strategy. Such state agencies include the departments of Forestry, Agriculture, Geology and Mineral Industries, Land Conservation and Development, Transportation, State Lands, Fish and Wildlife, Water Resources, Environmental Quality, and Parks and Recreation.
- Relevant state agencies should increase their focus upon implementing the Oregon Plan in the Willamette Basin in light of growing concerns about steelhead, salmon, and bull trout.
- The State should encourage public-private partnerships with industry to develop ways to improve basin habitat; e.g., current OSU and EPA research assessing the function of reclaimed sand and gravel pits as connected and disconnected off-channel habitat for native fish and wildlife species.
- Protect aquatic health by maintaining minimum flows during summer months to dilute the effects of point and nonpoint sources on aquatic species. Balance flows and water temperature to reflect the needs of different phases of aquatic species' life cycles. Reduce impacts of pesticides and other toxics on the waterways. Include measures to protect and increase the productivity of fish and wildlife species, particularly those that are threatened or endangered, in basin management.
- Assess local sources of pollution (landfills, creek discharges) in the upper Newberg Pool to assist in evaluating the skeletal deformity data collected in Tetra Tech's 1995 study on fish skeletal deformities. Simultaneous measurements of water quality parameters and sediment contaminants are recommended to be included with any additional measurements of skeletal deformities.
- Support continued funding for the Army Corps of Engineers, Division of State Lands, and DEQ to assess the impacts of downstream effects including those caused by dredging, in-stream mining or other activities likely to jeopardize aquatic health in the river.

7 Exotic Organisms

The deliberate and accidental introduction of invasive exotic plants and animals has caused adverse impacts to the native flora and fauna of the valley. Introduced warm water game fish like bass, carp, bluegill, and crappie now populate the waters once home to Oregon's native chub, salmon, trout, and steelhead. Nutria, opossum, and Norway rats now invade areas that once provided more favorable habitats for otter, mink, and other native animals. Invasive exotic plants like Himalayan blackberry and Scotch broom now occupy many acres of once productive wildlife habitat (ODFW, January 1996; USFWS, July 1997).

Objectives

- Reduce the spread of harmful exotic plants and animals to protect native species and maintain ecological integrity and to restore native vegetation where practical, especially in natural areas, parks, and vegetative buffers along streams.
- Avoid the introduction and spread of new exotic organisms that threaten native species.

Actions

- Address the ecological problems caused by invasive exotic organisms in an overall basin management strategy. Target areas where problems are most serious and can be solved
- Establish policies to prohibit the deliberate introduction of invasive exotic organisms where they may compete with native species.
- Incorporate information about harmful exotic organisms into outreach materials provided by the Basin Council and other basin governmental and community organizations.
- Develop guidance that leads to use of native plants in restoration and landscaping programs.

"Crossing the Willamette going south,
eyes shooting forward
I saw a cemetery
on a hill over the river,
hiding in the trees.
But as I crossed the river
the tombstones were not tombstones
but chimneys
and houses all alike had grown beneath them.
It was not the death I had expected."

Scott Poole

HUMAN ACTIVITIES

The Task Force identified four human activities that play a major role in the health of the Willamette River Basin: 1) population growth, 2) land use and land management, 3) transportation systems, and 4) recreation resources. Each is discussed briefly below with objectives and actions listed for each.

1 Population Growth

Many of the challenges and opportunities identified in this report are directly or indirectly related to population growth in the basin. In 1970, the basin's population was approximately 1.49 million people. By 1990 the population had grown to 1.94 million — an average overall annual growth rate of 1.5 percent. In 1995, the basin's population was approximately 2.2 million people. Growth projections for the basin anticipate close to a doubling of the human population over the next 25-30 years (University of Oregon, December 1994; DAS, January 1997). This increase in population has resulted in greater demands on land, water, air, and transportation resources. Oregon's existing land use regulations mandate the accommodation of growth, with little consideration of carrying capacity.

Objective

- Manage the effects of Oregon's population growth to protect watershed health.

Actions

- Develop a better understanding of the relationship between population growth and the basin ecosystem.
- Ensure that all state agencies are using a common and consistent set of population projections in forecasting and planning.
- Support efforts to develop models displaying alternative growth scenarios and use them to aid policy decisions.

2 Land Use and Land Management

Urban and Urbanizing Lands

Most of the population increase from 1970 to 1990 occurred in relatively low residential densities at the periphery of the major metropolitan areas in the Willamette Valley. Original Urban Growth Boundaries, set in the late 1970's and 1980's, have accommodated the increased urbanization with very modest expansion (totaling 1,828 acres) during the 1970-1990 period. Low-density residential development occurring in the basin since 1990 has increased pressure on urban growth boundaries, prompting further debate about the need for boundary expansions.

Residential development has brought an increase in the percentage of the basin covered by roofs, roads, and other surfaces impervious to water infiltration. While information is unavailable for the basin as a whole, research indicates that without proper management, increasing amounts of impervious surfaces above 10-20 percent can cause significant shifts in stream health and biota as well as changes in flooding patterns. Some zoning standards and lending practices support conventional, low density residential land use and design. Such activities may be incompatible with ecologically oriented values such as narrower streets, reduced impervious cover, and better stormwater management, treatment, and control.

Land Use Within the Willamette River Basin

(Acres do not equal the total acres within the basin)

Land Use Types	1970 Total Acres	1970 Percent	1990 Total Acres	1990 Percent
Agricultural Lands	1,498,443	21	1,453,390	20
Mixed Farm & Forest	1,346,893	19	777,333	11
Forest Lands	3,920,634	56	4,485,391	62
Urban Lands	239,364	3	461, 124	6

Source: Willamette Valley Futures: An examination of factors affecting livability in the Willamette River Basin. (University of Oregon, December 1994).

Since 1973, Oregon has maintained a strong statewide land use planning program based on a set of 19 statewide planning goals and developed guidelines. These goals express the state's policies on land use. Larger and fast growing cities are required to maintain a 20-year buildable land supply within urban growth boundaries (Goal 10 — housing; and indirectly, Goal 9 — economic development). Although the amount of urban growth boundary expansion has appeared to be slower in the valley than in other parts of the state, urban expansion in the valley often involves conversion of higher quality agricultural lands to urban uses (DLCD, February 1995; DLCD, March 1997).

Concern has increased in recent years that future urbanization in the valley should be more efficient and compact than past development; many recognize mixed use community centers and neighborhoods as building blocks that support a pattern of urban form that emphasizes transportation (Goal 12) and public facilities (Goal 11) efficiency. More efficient and compact urbanization also requires that greater attention be given within urban areas to protecting sensitive ecological systems that traverse or are found exclusively within urban areas. Public facility planning must recognize and mitigate impacts on urban area riparian, wetland, and wildlife habitat (Goal 5 — natural resources) and instream water quality (Goal 6 — air, water, land quality). For example, planning for urban drainage systems should use best management practices to protect natural water courses and wetlands from nonpoint contaminants.

Presently, the federal Clean Water Act requires urban areas with populations larger than 100,000 to develop best management practices to protect waterways from urban nonpoint water quality impacts. Basin watershed health could be protected by greater emphasis on efforts to solve nonpoint water quality problems in the planning and designing of individual development projects. Many other urban initiatives can be undertaken to further objectives to protect and improve basin watershed health.

Agricultural and Forestry Resource Land Activities

The intent of the statewide land use program is to protect agricultural lands (Goal 3) and forest lands (Goal 4) from encroachment from other non-resource uses, as well as to maintain them over the long term for continued resource production. The land use program does not regulate farm or forestry practices under either land resources goal, Goal 5 (natural resources), or Goal 6 (air, water, land quality).

The amount of land in the valley in forest has increased over the last century, due mainly to fire suppression in the forests and cessation of intentional burning on the valley floor. Timber harvesting on both public and private lands has lowered the average age of standing forests basin-wide. Other trends include an increase in road density throughout basin forests. Research indicates that road density and associated culvert maintenance can be an important variable in soil erosion, thereby increasing slope failure and affecting water quality and increasing runoff and flooding (OSU, Adams et al., April 1994).

Agricultural land use remains a major economic activity in the basin, but natural plant communities of many riparian areas in these agricultural lands have been altered or eliminated to accommodate additional cropland. The combination of drainage measures, stream channel alteration, cessation of valley floor fires, and introduction of non-native plants and animals has significantly changed these riparian zones. Ecologically appropriate income-producing activities need to be promoted in altered riparian zones.

Exception (Rural Residential) Lands

Exception lands are typically rural residential lands outside urban growth boundaries that have been subdivided and developed to the extent that agricultural, forestry, and natural resource uses have become limited. Numerous unincorporated communities exist in the valley.

Rural residential and other exception lands present special infrastructure problems since they are not serviced by urban service providers and typically are not resource producing or protected natural resource areas. Sewering of unincorporated communities is typically cost-prohibitive, but numerous on-site residential wastewater disposal systems can adversely impact local water quality. Water systems are expensive to build and maintain in most unincorporated communities, thus wells are the general rule. Since most rural residential families are supported by outside income, most households commute to employment centers.

Groundwater in the basin is often hydraulically connected to the river. Land uses above aquifers can affect the quality and availability of groundwater whether used for drinking or simply contributing to tributaries or the mainstem. Rapid development in the watershed has resulted in 11 areas being designated as groundwater-limited areas. This designation signals the excessive pumping of existing groundwater supplies and requires more careful scrutiny of additional groundwater appropriations in the area. Nitrate contamination is prevalent in several areas in the basin as well.

Objective

- It is critical that local, regional and basin-wide land use planning programs be integrated with watershed health objectives. For too long land use planning has been disconnected from stormwater management, fish and wildlife habitat protection, groundwater protection, and floodplain management. Statewide land use planning Goals 5, 6, and 7 must be better integrated into land use planning at all levels within the basin to protect watershed health.

Actions

- Develop a prioritized list of actions and a coordinated implementation strategy within each major land use category in the basin (urbanization, agriculture, forestry) as part of the larger basin strategy for improving water quality and native aquatic health.
- Develop and implement an outreach program targeted at private agricultural landowners to improve long-term economic and ecological viability of riparian zone activity through a partnership between the Oregon State System of Higher Education and Oregon State University Extension.
- Promote ecologically appropriate income-producing activities in altered riparian zones.
- Continue support from the Governor's Office for symposiums on "smart development." Consider convening a working group from planning agencies of major metropolitan areas in the basin to review and refine subdivision and zoning codes to lower obstacles to smart development.
- Support reducing nonpoint water pollution resulting from urban activities throughout the basin. This should be accomplished by the Community Solution Team agencies, based on the Quality Development Objectives. Periodic review work programs and other revisions of land use ordinances and development standards should be used as a primary vehicle to gaining longer term nonpoint water quality improvements in urban areas.
- Develop a "desired industry profile" regarding water needs and consumption, waste production and handling, infrastructure needs and land requirements, in addition to the information currently gathered by the Oregon Economic Development Department.
- Monitor the effect of land use changes on watershed health.
- Consider enabling DEQ and county health departments to form special districts to assure that on-site wastewater disposal systems are properly maintained and that individual wells meet water quality standards.

- Develop a detailed map of impervious cover for the basin and create a new Oregon Benchmark for impervious cover. Establish targets for each major land use category.
- Support efforts, such as Metro's Region 2040 growth management process, which seek to better integrate Goals 5, 6, and 7 into the regional planning process.
- Encourage evaluation of groundwater quality and quantity in areas of concern (including groundwater-limited areas and DEQ-identified nitrate contamination areas) during planning review of new or additional development in the basin.

3 Transportation Systems

The network of vehicular roads in the basin is commonly seen as background infrastructure for transporting people, goods and services. The spatial pattern of roads and their interactions with ecological and hydrological patterns and processes are also potential influences on resources such as surface water and ground water.

Transportation networks link land uses to one another and affect hydrological processes. Because of their pervasiveness, roads also facilitate flows of materials, including pollutants, in ways which directly and indirectly affect aquatic conditions.

Preliminary estimates of road densities in the basin (Pacific Northwest Ecosystem Research Consortium) range from virtually no road miles per square mile of land in wilderness areas to as high as 14 road miles per square mile in major metropolitan areas. These estimates, when considered in the aggregate, show an area covered by road surface in the basin equal to more than half the land area of present-day Benton County. These impervious road surfaces are significant contributors of pollutants and rapid runoff into the waters of the basin.

In upper elevation headwater areas, the network of roads tends to run perpendicular to streams, thus requiring frequent stream crossings. The resulting bridges and culverts, depending on how and when they were constructed, may affect road failure rates and major debris flows in some portions of the basin. Available research indicates that the position of the roads on the hill slope is also an influence on surface water infiltration and the connection between surface and groundwater flows. As upper elevation road networks attain denser patterns, large contiguous blocks of wildlife habitat are fragmented into smaller tracts, with the associated interruption of migratory patterns (OSU, Adams, P.W. et al., April 1994).

In lower elevation portions of the basin, larger roads tend to parallel the larger streams and rivers, with less frequent river crossings. In these portions of the basin, where human population densities are higher, vehicle miles traveled per person are useful indicators of trends in road use. Between 1970 and 1990 daily vehicle miles traveled per person increased at an annual rate of 3.8 percent — more than twice the annual growth rate of human population for the same period. The effects of this on-road congestion and travel times are well known. Less well understood are the pollutant loading and overall water quality effects of this increase in vehicular use of basin roadways.

Objectives

- Integrate watershed impacts into transportation planning programs and standards.
- Transportation-related stormwater management programs should include watershed impacts assessment.

Actions

- Monitor changes in transportation-related impacts on the watershed, such as miles of road or square miles of impervious surfaces.
- Support efforts to inventory and map forest road density versus slope and soil type and identify problem culverts in municipal supply watersheds.
- Better understand the relationship between transportation and watershed health.
- Evaluate the potential of closing and decommissioning roads causing ecological damage.

4 Recreation Resources

Valley residents enjoy a variety of outdoor recreational opportunities provided by federal and state agencies, local jurisdictions, and private organizations. Although the concept of a "Willamette Greenway" was introduced nearly 20 years ago, the vision has not yet been realized. Increasing concern about water quality, flooding, and loss of fish and wildlife habitat may generate renewed enthusiasm for the Greenway concept, which might be extended to tributaries within the basin.

As Oregon's urban population grows, conflicts among recreationists, riverside residents, fish and wildlife are increasing. Efforts to curtail disruptive recreational activities have met with limited success.

Objectives

- Provide a diversity of outdoor recreational opportunities in the basin.
- Provide more natural sites within easy access of urban areas.

Actions

- Address long-term outdoor recreational needs as part of an overall basin management strategy.
- Coordinate efforts of federal, state, local government and private interests to connect natural areas into "greenways" throughout the basin.
- Use parks and natural areas as demonstration sites for best management practices and interpret restoration efforts for the public.
- Address conflicts among river users, including river safety, speed and noise issues (Oregon State Marine Board and Oregon Parks and Recreation Department).

"A lone canoe
cuts the surface
like a paperknife
scattering moonlight;
and downstream
the Ferris wheel
in the park slowly
mills the night."

Vern Rutsala

"Finally, cresting, the river
carries round the bend
an armada of houses,
a street of dreams, with folks
dining on the upper floors
by candlelight! We wave
at every one. A passenger,
an elderly man in a navy
jacket cocks his head at us.
'How far to Salem? I need
to stop off at the Capitol
where I intend by God
to get this river fixed!'"

Erik Muller

3

OPPORTUNITIES FOR IMPROVED WATERSHED MANAGEMENT

ONGOING, COORDINATED STRUCTURE

Many activities having profound influence on the health of the Willamette River watershed are fragmented and do not currently benefit from an integrated or collaborative focus. These activities are being managed at the local, state, and federal levels with the involvement of many public and private interests. The uncoordinated management of point and nonpoint pollution sources, flood management, irrigation, riparian areas, wetlands, floodplains, aquatic health and water supply is not in the larger public interest, nor is it in the interest of maintaining or restoring watershed health. A stakeholder-guided, integrated strategy is needed to more cost-effectively address the emerging needs of the basin. This will aid in creating an inventory of financial commitments to improve watershed health and better align watershed programs to yield increased environmental return. This proactive approach will also promote continued Oregon control of strategies to meet federal water quality and endangered species laws.

Critical to this effort is the establishment of an appropriately constituted structure that can promote collaboration and communication among key stakeholders and provide information and educational opportunities on watershed health. Therefore, the Task Force recommends the creation of an ongoing framework to advance a coordinated and integrated watershed management strategy within the basin:

1 Willamette Basin Council

This Council would promote and advance the ongoing implementation of the Governor's Willamette River Basin Task Force recommendations and integrate these recommendations into the Willamette Basin elements of the Oregon Plan and Steelhead Supplement. This will occur through the creation of a basin-wide watershed health strategy and improved communication among basin stakeholders, including decision makers, agencies, formal and informal watershed councils and other citizen groups. The council should exist as a stand-alone body, reporting directly to the Governor and Legislature.

Objectives

- Improve coordination of efforts currently being undertaken by different federal, state and local entities.
- Help provide leadership, resources and information for efforts to improve overall watershed health in the Willamette Basin.
- Maintain close cooperation and coordination with the Willamette Valley Livability Forum consistent with Council objectives, including, as appropriate, the integration of the two entities' work program elements.

Actions

- Implement the Willamette Basin Task Force recommendations and associated Oregon Plan elements by developing a basin-wide watershed management strategy.
- Provide a forum for consideration of basin-wide watershed health issues and opportunities.
- Work with local governments and watershed councils to advance a shared vision for the future of the basin to guide state, local, and private initiatives.
- Promote shared understanding among policy makers regarding watershed issues.
- Direct state agencies to coordinate their relevant budgets, plans and priorities with the Willamette River Basin Council.
- Develop benchmarks for basin watershed health and a monitoring report card in cooperation with the Oregon Progress Board.
- Work with the Livability Forum in integrating basin watershed issues with other basin concerns by improving program alignment among land use, transportation, economic, environmental, community, and watershed management initiatives within the basin.
- Promote improved stakeholder access to and sharing of basin information.
- Promote cooperation among the Governor's Office, Forum, Council, local governments, and watershed councils.
- Work with GWEB as a clearinghouse to get local perspectives on watershed issues and develop support for watershed council efforts.
- Maintain close coordination with the Lower Columbia River Estuary Program.

<u>Council Responsibilities</u>

- Develop and implement an effective management strategy to guide and coordinate all activities in the basin to maintain and restore the health of the basin and all its beneficial uses. This should be done through the development of both a short- and long-term management plan for the watershed. Use existing data to identify the sources of pollution in the basin and identify gaps in data that require attention.
- Advise the Governor, Legislature, and other policy makers on watershed issues within the basin.
- Participate, as appropriate, in implementing the Oregon Plan and related efforts such as the Steelhead Supplement.
- Assist, as appropriate, formal and informal watershed councils and the Governor's Watershed Enhancement Board in matters relating to the basin.
- Provide stakeholder guidance for the development and implementation of an integrated watershed management strategy, addressing basin-wide watershed issues.
- Interact with responsible agencies, watershed councils, the public, and Legislature to promote funding and implementation of the basin plan.

- Function as the water/environment committee of the Willamette Valley Livability Forum.
- Conduct public meetings to gather public input on Task Force recommendations and to examine emerging basin issues and opportunities.
- Provide a neutral forum for communication, collaboration, and education on basin issues.
- Recommend priorities for action by federal, state and local agencies that would impact the basin.

Structure

- The following is offered as a suggestion, recognizing that the ultimate composition of the group is up to the Governor. If a large group is appointed, consideration should be given to designating an executive committee for increased efficiency. Membership should be balanced from geographic and stakeholder interest points of view. Representation should be sought from watershed councils, agriculture, business, environmental groups, tribes, forestry, local, state and federal government.
- We recommend that 15-30 members be appointed.

Funding

- The operation of the Council will require a reliable and dedicated source of money.
- Consideration should be given to establishing a public/private partnership to generate adequate funding.
- Local, state and federal agencies should contribute financial support to Council operations.

Staffing

- The Council should have an executive director and other staff as needed to provide support to the activities of the Council.
- Other staff support should be provided by relevant state agencies or partnerships with other agencies.
- Federal agencies should be approached to lend support to this effort.
- **Watershed Managers Group**- A Watershed Managers Group should coordinate funding and development of an integrated watershed management strategy to promote alignment of individual resource management plans.

  Responsibilities

  - Effect coordination and communication among implementing agencies.
  - Coordinate administrative activities in developing and implementing a watershed management strategy.

  Structure, Funding, and Staffing

  - The Group will be composed of managers of local, state, and federal agencies/departments responsible for managing flood control, irrigation, point and nonpoint pollution sources, riparian areas, wetlands, floodplains, and water supply. Decision-making will be ratified and implemented via interagency agreements when necessary or desirable.
  - Activities/projects undertaken by the Group will be funded primarily by member agencies.
  - Staffing will be provided by a team drawn from watershed management entities to conduct task specific work as needed.

The Task Force proposes the following process for establishing the Council and Managers Group:

- Governor's announcement in January 1998.
- Governor directs relevant state agency participation and support in January 1998.
- Governor convenes Watershed Managers Group February 1998.
- Governor requests Task Force members to act as an interim Basin Council through July 1998. Adjusts membership to reflect recommended structure.
- With direction from the Governor, Task Force formulates operating guidelines and structure for Basin Council in February 1998.
- Governor appoints Council members in July 1998
- Governor requests the Willamette Province Advisory Committee's participation in February 1998.
- Joint meetings of Council and Watershed Managers to review action agenda and integrated watershed management strategy scope in March 1998.
- Draft memorandum of agreement with the Willamette Livability Forum in March 1998, outlining processes to increase the effectiveness and efficiency of both organizations.
- Ongoing collaborative effort to develop a model watershed management strategy and action plan for the basin in FY 1999 through FY 2000.

"August held Grandpa to the wheel
of his tractor, hat clamped down
against the haying sun.
He loved the winter land, flattened
and resting, the river let off its leash,
fog so low it might be cloud-walking."

Elizabeth McLagan

RESOURCES FOR IMPROVED MANAGEMENT

The Task Force identified two major resources to facilitate improved management, use of incentives and adequate funding. Each is discussed below.

1 Incentives

The traditional approach to environmental protection is for government (federal, state, and local) to regulate specific activities and impose penalties for noncompliance. Regulations have been fairly effective in reducing point sources of air and water pollution and in limiting urban sprawl into farm and forest lands. An important component of the Oregon Plan is to improve compliance with existing regulations and enforce them where necessary to establish environmental baselines. Addressing nonpoint sources of pollution presents considerable challenges since so many people and activities contribute to the problem. Addressing habitat modification may be even more difficult. Some believe that society is reaching the limits of regulation and needs to look for ways to persuade people to change their behavior. Incentives are seen by many as important complements to a strong regulatory framework that will contribute to protecting quality of life in the Willamette Basin. The removal of disincentives is also essential in meeting these goals.

Federal and state agencies, local governments, and private organizations all administer many kinds of incentive programs. The private sector also manages a broad range of market incentives. Some of these incentives have been effective in encouraging people to adopt improved management strategies. For example, some municipal facilities have implemented "demand-side" water and wastewater management, much like electric utilities have done in financing energy conservation projects.

"Pollution trading" is another incentive option, but it has not been used in the valley due to the lack of a legal framework to facilitate it. Also, pollution trading involves complex technical determinations to evaluate loads and other parameters to determine what is "tradable" between point and nonpoint sources.

Incentives are particularly important for improving stewardship on agricultural lands in the basin. Cost-effective methods are currently available to decrease the use of pesticides and fertilizers, but more demonstration and education are needed so that these methods will be successfully adopted. If landowners are convinced that the methods are effective and cost less, they are more likely to accepted them.

While landowner participation is key to the success of watershed restoration efforts, past discussions of remedies have often raised fears of mandated public access to private lands. This concern has produced resistance and stymied otherwise acceptable changes. However, progress is being made in Oregon as agencies and the agricultural community begin working together to implement Senate Bill 1010, primarily through careful management of chemicals, soil testing, and protection of riparian areas.

The state can play an important role in assisting people to take advantage of various incentive programs, in some cases by providing the programs directly. Better coordination of existing programs, a thorough evaluation of incentives and disincentives, and more effective landowner contacts could make a considerable difference. Also, more resources are needed to implement outreach and education in the basin.

Objectives

- Offer incentives to protect and restore riparian, floodplain, and wetland areas. These incentives should enhance water quality, provide fish and wildlife habitat, reduce the adverse impact of flooding, enhance aesthetic and outdoor recreational opportunities, and reduce water pollution caused by sedimentation, pesticides, nutrients, and other pollutants.
- Incentives should be affordable, effective, equitable in availability to stakeholders, and balanced in the distribution of costs and benefits.

Actions

State and Local Government

- Increase assistance through Oregon State University Extension to landowners to implement sustainable practices in agriculture, forestry, and resource management. The Extension Service's emphasis on increasing production should be modified to place a higher priority on increasing profitability without causing adverse environmental impact. Special emphasis should be placed on developing and demonstrating techniques to reduce chemical use and provide further erosion control.
- Increase state support for research on sustainable agricultural and forestry practices. Research should be applied directly to the highest priority problems and focused on solutions with broad public benefits. Encouraging researchers to have partners to qualify for grants.

- Develop ways to support and reward faculty members who communicate with diverse audiences and assist communities in applying knowledge to real situations. For example, a dual-track promotion system for publishers and practitioners is appropriate.
- Willamette Basin landowners who make a special effort to protect riparian, wetland, and floodplain areas along rivers should not be required to allow public access to their lands for recreation purposes. A change in statute may be required.
- The Department of Fish and Wildlife should expedite guidelines for implementing Senate Bill 791, which allows certain landowners who develop habitat plans approved by the Department to receive property tax benefits. The Department should target landowners in priority areas.
- Conduct an analysis of existing incentives and disincentives that inadvertently promote unsustainable resource management activities. The study could be conducted by an Oregon university, and be used to determine changes necessary to encourage better management practices. Include an evaluation of the potential to offer more attractive tax incentives to promote improved stewardship.
- Create an "investment pool" and use it to finance stewardship projects through competitive grant applications. For example, funds could be used to provide low interest loans for new equipment, like no-till drills. Maximize the benefits by pursuing matching funds from federal programs.
- Improve stewardship practices within government agencies. Have agencies provide examples of best management practices at public sites (highways, parks, state forests, and wildlife areas) along with interpretive messages. Some options include use of integrated pest management techniques, erosion control, stormwater management, and native plant revegetation.
- Provide guidance and technical assistance from state agencies to the private sector by participating in the development, implementation, and promotion of "certification" programs designed to reward landowners and managers who improve management practices voluntarily.
- Develop an award (or awards) program from the Governor's office for particularly innovative pollution abatement or habitat enhancing projects.
- Promote the use of improved management practices by providing guidelines to landowners. For example, self-assessment devices could be provided as pre-audit tools for people who are interested in evaluating their own practices. Agencies can hold workshops, distribute videos, and use other communication tools.
- Develop incentives for reducing, beyond regulatory requirements, soil loss during construction, tillage, mining and dredging operations.
- Encourage businesses to improve their stewardship by establishing incentives for companies whose products, services, and management practices meet the highest environmental standards, and by informing the public about the process involved in selecting these businesses as partners.
- Offer financial and other incentives to municipalities to improve water management; e.g., using yard waste to filter stormwater and creative approaches in construction to improve water quality.
- Encourage municipal utilities to implement "demand-side" management programs for water and wastewater to reduce consumption, thereby providing more water for fish, wildlife, and recreation.
- Develop a legal mechanism to implement pollution-trading programs in the basin.
- Develop incentives to reduce point source discharges below permitted levels.
- Develop and promote incentives for efficient water use, including tiered-rate structures and special customer rates when water demand is flexible.
- Where feasible, priority should be given to agricultural projects having "on-farm" components. Give priority to projects that show support and participation of growers, OSU Extension, commodity organizations, and service delivery businesses (fertilizer dealers and consultants).

Private Sector

- Develop market-based incentives for "green products" that give environmentally sound products a competitive edge. Consumers, agencies, and private industries should support efforts.
- Create an insurance program to cover potential losses caused by the use of experimental methods undertaken to reduce environmental damage (like biological pest controls).
- Recommend that individual natural resource economic sectors initiate certification programs to encourage the adoption of improved management techniques.
- Encourage public/private collaboration in developing best environmental management practices for industry.
- Create public and private partnerships between private companies (e.g. agribusiness, sand and gravel industry) and public entities (e.g. agencies, universities) to develop business strategies that improve and create basin habitat.

2 Funding

Although significant investments are being made in programs designed to address water quality problems and associated efforts to improve land management, sufficient funding is not available to develop and implement a coordinated strategy to protect important resources in the valley. For example, municipalities will spend billions on combined sewer overflow systems to reduce bacteria, but adequate funds are not available to track and correct the more widespread nonpoint sources of pollution; the Metro Greenspaces program has funds for land acquisition, but other areas do not; Oregon Parks and Recreation Department owns numerous parcels along the Willamette Greenway but lacks the funding to manage them properly.

Objective

- Sufficient revenue will be available to protect and restore watershed health in the Willamette Basin according to a carefully designed strategy.

Actions

- Meet funding needs in the short-term by improving coordination and efficiency, undertaking public/private partnerships, allocating Oregon Plan funds to the basin, adjusting priorities to elevate the basin within state agencies' priority systems, and seeking federal funds.
- Secure a variety of long-term public and private funds, including full funding for the Steelhead Supplement to the Oregon Plan. State agency budgets should include funding for watershed health programs and actions as recommended by the Task Force and should be funded by the legislature in the 1999-2001 budget, if not before.
- Secure a long-term source of dedicated revenue to finance basin-wide planning, research, data collection and information management, incentives, technical assistance, land protection and watershed restoration programs.
- Implement water metering and fees based on net water use. Establish a conservation fund with the revenue. This system could increase awareness of water use and encourage conservation to improve in-stream flows for fish, wildlife, and other uses.
- Dedicate fines for violations levied by state agencies (DEQ, WRD, etc.) to related watershed improvements.
- Allocate a small portion of the "kicker" to watershed restoration efforts.

"In the Platonic Upstream, look down and the sky
goes pale green deeper than you can stand.
A world doubles. The speckled
or jasper stones are all river –
rounded and at home, and if
they know my name, they know yours."

Lex Runciman

MONITORING AND DATA MANAGEMENT

1 Monitoring

The establishment of a comprehensive, long-term monitoring program within the Willamette River Basin would provide several key benefits to future management of basin watershed health. Several special studies, such as the joint DEQ and U.S. Geological Survey basin water quality studies, have been completed since 1991. Some ongoing monitoring is being conducted, but many gaps exist in the data that will need to be addressed to answer concerns about the Willamette River and the mouths of major tributary rivers within the basin (Tetra Tech, August 1995; DEQ, April 1997). Most of the ongoing monitoring data collected has been water quality related. Very little data has been collected to develop trends on sediment quality, fish tissue quality, water contact recreation safety, fish and wildlife populations or habitat health.

The Oregon Plan includes a standardized set of monitoring protocols addressing water quality, including chemical, biological, and physical properties. It has the potential to improve consistency in monitoring watershed health in the basin. However, the monitoring program under the Oregon Plan does not address human health and terrestrial habitat issues.

Objectives

- Develop an integrated comprehensive and cost effective monitoring system that serves decision makers and addresses all major concerns in this report.
- Monitoring programs for the Willamette River Basin should produce accurate data and determine the current levels and trends of watershed health to allow for the quantitative identification of contaminants of concern and the sources of those contaminants.
- Link urban planning to the monitoring program. Long-term monitoring of the efficiency of local and regional planning efforts is needed to ascertain the effectiveness of wetland and riparian protection, wetland and riparian buffers and watershed management. Special emphasis should be placed on monitoring the results of Metro's Region 2040 Functional Plan and Regional Framework Plan to address urban stormwater management and ecosystem protection.
- All monitoring programs for water quality in the Willamette River Basin should be efficiently and effectively coordinated to provide for a common core of water quality parameters, standard levels of data quality, consistent data management principles, and the ability to group and sort databases for trend analysis.
- Increase monitoring of biological parameters.

Actions

- Implement a coordinated monitoring program that answers the following basic questions: Are rivers in the basin safe for swimming? Is it safe to eat fish caught in the basin? Are native fish and wildlife populations and habitats healthy?
- Implement all completed water quality models to determine the sources of pollution and the best management or control strategies. Establish long-term monitoring to allow detection of changes in watershed health over time resulting from changes in land uses or water management policies.
- Direct all applicable state agencies and request all applicable watershed councils, local, regional, federal agencies, and others to join together to develop and implement a long-term monitoring program. This program should measure the level and trend of pollution concentrations in water, sediment, and aquatic tissue; measure wildlife health; fish and wildlife habitat, riparian and floodplain health; and land use changes and their impact on basin health.
- Sign and implement a Memorandum of Understanding among all involved local, state, and federal agencies to identify the process for developing the Willamette River Basin Long-Term Monitoring Program and Plan. Requests for funding and implementation of the plan should be made immediately following the signing. The plan should also include mechanisms for scientifically based volunteer monitoring and inclusion of these data into the program. The use of completed models should be immediate.
- Provide funding to complete both the toxic pollutants and basin-wide nonpoint source pollutant models so they may be used by state and federal natural resource agencies as soon as possible.
- Complete federal agency analysis and summary of collected water quality and other watershed health parameters within the basin, or collect such data on an ongoing basis in cooperation with applicable state agencies.

2 Data Management

The public, state and federal agencies, watershed councils, and other interested individuals and entities do not have easy access to data that have been collected on the health of the Willamette River. Not all existing data in the basin are comparable, or easily understood by anyone but the most experienced scientist. No system exists to coordinate and integrate existing data to determine the overall health of the river.

Objectives

- Manage information about the basin so that it is easy to access, easy to understand, and relevant to policy issues of importance to decision-makers and the public.
- Provide data in a format and level of detail adequate for watershed council use.

Actions

- Coordinate data collection and evaluation among agencies to maximize utility. A basis for future trending should accompany the assessment of current conditions.
- Compile, analyze, and report data in both an annual (or semi-annual) report and electronic format. Data should be linked to a coordinated Geographic Information System (GIS) database to enable map displays of the mainstem Willamette and each of the tributary watersheds.

4

PUBLIC OUTREACH

"I saw the Breitenbush river where it poured
no larger than rain from the downspout
of my own house. The Clackamas
was a ribbon of clear water I could step across.
So many rivers, and each was just a thread of silver
slipping through deep moss--

Barbara Drake

An informed and involved public is essential for protecting and improving the watershed health of the Willamette River Basin. Citizens need to see themselves as part of a basin-wide community, sharing both the costs and the benefits of common efforts. To understand what actions need to be taken, a historical perspective must be gained, as well as a current picture and a vision for the future. Basin-wide policies should guide the development of a comprehensive public outreach program containing three specific elements: information, education, and involvement.

1 Information

Public information includes a broad range of tools and activities used to inform the public about the Willamette River Basin. These include media relations, publications, response to public inquiries, and correspondence. Typically, this communication is one-way, from agencies to the public or media. It is important to develop a set of key coordinated messages for a public information program that can be used by cities, counties, special districts, watershed councils, industry groups, and environmental advocacy groups.

The Task Force is now engaged in creating a "report card" for the basin. Identified early on as a high priority, the report card will describe in non-technical language the health of the basin. The Task Force and its partner on the project, the Willamette Valley Livability Forum, have received $30,000 from the Environmental Protection Agency, who recognized the effort as a promising regional approach to one of the prime objectives of its watershed program: the creation of basin-scale environmental indicators and management benchmarks.

Based on sound scientific data, the report card will regularly display for the public how the basin is faring by highlighting performance in specific categories, such as water quality, habitat, and human health. The report card will identify watershed successes as well as where more attention is needed to address specific problems. Just as importantly, it will call attention to where more data is needed to understand the basin. Thus, the report card will be the bridge between the Task Force's recommendations on monitoring and its public outreach objectives.

In crafting this long-term expression of basin health, the Task Force and Livability Forum are working closely with the Oregon Progress Board's Benchmark Program, the EPA, watershed councils, and other organizations concerned with basin monitoring. Ultimately, the report card is expected not only to profile the entire basin, but to provide a tool at the local level for motivated groups to assess their sub-basins and to target needed actions.

Objective

- A coordinated delivery system is needed for information on the condition of the Willamette River and its tributaries. This information should be easily and readily available to the public in plain language.

Actions

- The Willamette River Basin Council should facilitate the development of a single contact point for information on the Willamette Basin. An 800-number should be established so that all residents have free access to the information.
- Staff the Council with a Public Information Officer who is able to speak on issues about the basin from a multi-agency perspective.
- Request that agencies, watershed councils, or other coalitions provide their public information brochures to the Council so that it can respond to sub-basin requests.
- Assign responsibility to develop a common message to the public about the health of the basin.
- The Council should support efforts of groups wanting to create informal or formal coalitions for Basin outreach purposes.
- The Governor should appoint a spokesperson who can provide a focus for Task Force efforts and assist the Governor in galvanizing basin community efforts to preserve basin health.
- Integrate monitoring data into the Willamette Basin Report Card that can be used to inform the public on the health of the basin. The "report card" will enumerate, in plain language, the status and trends of water quality and aquatic health in the basin, be released annually, and linked to the Progress Board's benchmarks.
- Develop a web page on the Internet for watershed management in the basin. Use the web page as a vehicle to help provide public information and clarify the confusing array of agency jurisdictions that overlap in the basin. Include items such as information about stream segments that have been found to contain high bacterial or other contaminants, information about special projects, maps, watershed councils, agency contacts, and other useful and relevant information.
- Develop a process, identify funding and assign Oregon Health Division (OHD) staff to better communicate the fish advisories in the Willamette Basin to the populations most at risk.
- Direct OHD to apply to the EPA for environmental justice grant dollars to improve communication of health risks to non-English speaking residents.

2 Education

Public education is focused primarily on increasing awareness and fostering long-term behavioral changes. The public must be able to understand and react appropriately to the information they are given. Sample activities include: school presentations, assembly programs, curriculum development, community events and workshops, and broader public service campaigns that use mass media.

Objective

- Provide the public with the information necessary to make informed decisions and to take appropriate actions related to the future of the basin. Create effective tools to get the information to the public and maintain those tools over time.

Actions

- Combine media and educational resources in a kick-off event focused on implementing the Task Force recommendations. This should include a display of bipartisan support, as well as the support of other prominent citizens and groups.
- Utilize the Governor's willingness to continue taking a prominent role in advocacy for the Willamette River. The Governor's interest and track record in this arena are well-established and can be used to foster the sense of basin-wide community.
- Support efforts to develop a documentary focused on the basin community, current efforts to protect the basin and efforts needed for the future. The documentary could be used as part of a basin curriculum to teach the human and ecological history of the basin and actions students can take to help it. Private entities could be potential funding partners. (The curriculum/documentary could be used as a supplement to the existing Project Wet curriculum.) Newspapers should be asked to do several features on the basin prior to the release of the documentary.
- Support efforts to develop targeted educational materials for basin residents outlining specific actions. These materials should have a common theme focused on a basin "umbrella image." Use professional media input with funding from water-related interests, both public and private.
- Inform people about basin issues using a coordinated strategy with an emphasis on activities of special relevance to rivers (restoration projects, riparian and floodplain functions, and wildlife habitat). Signs and other interpretive materials could be developed by municipalities and private organizations and placed at recreation sites along rivers. The program should be coordinated by the Oregon Parks and Recreation Department. Messages should focus on specific trends within the basin so recipients know how specific sites fit into the "big picture." The state should be the leader in this effort, starting with State Parks.
- Establish public education programs to explain how land uses around wells can pose risks to ground water quality.
- Supply educational flyers on how to remedy the problem of oil and transmission leaks.
- Develop an education program associated with existing and pending fish advisories. Discuss the locations of highest risk (where identifiable) and fish preparation/cooking methods for lowering contaminant levels, especially to high-risk populations.
- Increase public awareness of the need to conserve water.
- Encourage President Clinton to recognize the Willamette River as an American Heritage River. Not only would this assignment bring national attention, but it could also energize Oregonians to support a Willamette Basin Watershed Initiative.

"Blue herons fly through the frosted glass of evening,
back to their nests on Hardtack Island."

Jim Shugrue

3 Involvement

Public involvement is defined as shared power with the community. The public must be engaged in a way that fosters active citizen stewardship of the basin watershed resources. Sample activities include: workshops, presentations and work sessions with watershed councils, citizen committee development, restoration projects, survey and community questionnaires, and community events where dialogue can occur.

Objectives

- Valley residents should understand individual and community responsibilities for the condition of the basin, assist with problem solving, and have information about actions that maintain and improve the health of the basin.
- Coordinate outreach activities with watershed councils and agencies, implementing educational components of the Oregon Plan.

Actions

- Use existing studies and surveys, such as the Oregon Progress Board's *Values and Beliefs* survey, to determine what Oregonians currently think about the environment and watersheds. Use that information to better communicate the message for action within the basin.
- Feature the Governor in a public service announcement campaign challenging the basin community to change daily habits to protect watershed health.
- Foster opportunities for direct citizen involvement within the watershed. For example, encourage citizens to assist with comprehensive monitoring of selected ecological indicators in the basin. Agencies should develop frameworks to facilitate efficient reporting of data and data access, and provide training for volunteers.
- Sponsor an "outreach opportunities for agricultural management practices" meeting, involving representatives from major commodity groups, food processors, agencies, extensions, and agri-chemical dealers, to identify opportunities and strategies for disseminating existing information to growers on practices that are both economically viable and that protect water quality.
- Convene an annual two-day Willamette Basin Conference to provide opportunities for research and technical matters, as well as for public information and involvement beginning in June 1998. The synergy between research and public participation should include Governor's awards, spotlighting and celebrating academic, governmental, business, and citizen achievement in improving the health of the basin. This event could be a tool to share information, foster citizen involvement, and educate the public on actions they can take to keep the basin healthy. The Basin Council, in partnership with other entities such as The Livability Forum, GWEB and watershed councils, should coordinate these efforts.
- Hold a series of meetings throughout the basin to gather input and build consensus regarding the implementation of recommendations.

4 Public Input on Task Force Recommendations

Although the Task Force represents a broad cross section of Willamette Basin stakeholders and meetings have been attended by many interested citizens, additional public input on the report to the Governor is desirable. The Task Force recommends that this report be "taken on the road" for a period of 60 days (beginning in January 1998) by Task Force members to watershed councils and other interested organizations and community groups throughout the watershed to gather public input. Input resulting from this effort should be integrated into the Basin Council's watershed management strategy.

"Watersound woke me. Dark. I was ready
to live season by season, to die from human life
and wander as the river goes, to climb with salmon
and fall away from that final loving work
like rain, to tumble headlong, to be river's
tongue finding what it loved, to flicker
silver with light, powered by moon and sun."

Kim Stafford

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Glossary

Basin	The area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems.
Benthic	Occurring at the bottom of a body of water, as in benthic organism.
Biological diversity	The variety of life and its processes. Also, 'biodiversity.' Human-caused alterations to a stream channel—such as levees, dikes, and rip-rap—that cause it to be fixed in channelization place.
Contaminants	The introduction into water, soil or air of microorganisms, chemicals, waste or waste water in a concentration that makes water unfit for its intended use or does to protect beneficial uses.
Conventional Pollutants	Pollutants that have traditionally been monitored. Although they may be at concentrations toxic to organisms they are pollutants that are not generally considered in the list of toxic types of pollution. Examples include temperature, dissolved oxygen, nutrients, etc.
Ecological integrity	In general, the elements of biodiversity and the functions that link them together and sustain the entire system.
Ecological processes	The flow and cycling of energy, materials, and organisms in an ecosystem.
Ecosystem	A complete, interacting system of organisms and its non-living physical environment in a given area (e.g., watershed).
Ecosystem management	Any land management system that seeks to protect viable populations of all native species, perpetuate natural disturbance regimes, and promote sustainable uses.
Effluent	Wastewater or other liquid partially or completely treated which flows out of a treatment plant (municipal or industrial).
Erosion	The wearing away of the land surface by running water, wind, ice, gravity, and other geological activities. Erosion can be caused or intensified by human activities, as well.
Exotic Organisms	Any organism (plant or animal) that is not native to the area in which it occurs.
Fecal Coliform	A type of bacteria associated with fecal matter of warm-blooded animals.
Floodplain	The portion of a river valley or level lowland next to streams that is covered with water when the river or stream overflows its banks at flood stage.

Greenway	A river corridor maintained and protected for its natural riparian values.
Groundwater	Water that sinks into the soil and is stored in slowly flowing and slowly renewed underground reservoirs called aquifers.
Habitat	A place that provides seasonal or year-round food, water, shelter, and necessities for an organism, community, or population of plants and animals.
Headwaters	The beginning of a watershed; the unbranched tributaries of a stream.
Healthy landscapes	Landscapes whose processes are in balance. The balance is dynamic, not static. The landscapes show resiliency and have predictable responses to disturbance, while providing human values.
Hydrology	The science that examines the properties, distribution, and effects of water.
Hydrologic cycle	The ecological cycle that moves water from the air by precipitation to the earth and returns it to the atmosphere. A variety of processes are involved, including evaporation, run-off, storage, etc.
Instream flow	The flow of water in its natural setting, as opposed to waters diverted for 'offstream' purposes such as industry or agriculture.
Mainstem	The main channel of the river basin, as opposed to the streams and smaller rivers that feed into it. The Willamette River mainstem begins where the Coast and Middle forks of the Willamette merge, near Eugene. Twelve major tributary rivers flow into the mainstem Willamette River.
Mitigation	Measures designed to counteract or lessen environmental impacts.
Monitoring	A process of collecting information to evaluate whether or not objectives are being met.
Native species	Species that normally live and thrive in a particular ecosystem without having been introduced by humans.
Natural areas	Areas managed by various landowners that are essentially in a natural state.
Non-point Source	Any non-discrete (general rather than specific) source other than a point source, which discharges pollutants into air or water.
Nutrients	Chemical elements (e.g., nitrogen and phosphorous) essential to plant and animal nutrition, but in high concentrations, they can be contaminants in water.

Oregon Wellhead Protection Program	A Safe Drinking Water Act program designed to provide local water purveyors and concerned communities with tools, materials, and technical assistance to delineate a drinking water protection area around their drinking water sources.
Overflows	Wastewater that exceeds the ordinary limits of a treatment facility and is usually discharged untreated directly into a water body.
Oxbow pool	A u-shaped bend in a river.
Point source	Any pollutants or waste water discharged from a specific source such as a pipe.
Pollution	The addition to water, air or soil, of matter or energy that has a negative or injurious impact to human, plant or animal life.
Riparian	The vegetated area immediately adjacent to a river or stream; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegeta tion.
River basin	In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems.
Sediments	Solid materials, both mineral and organic, in suspension or transported by water, gravity, ice, or air. Eventually settles to the bottom.
Sewage	Household and commercial wastewater that contains human waste. Distinguished from industrial waste water.
State Land Use Goals	In 1973, Oregon established a statewide program for land use planning. The foundation of the program is a set of 19 statewide planning goals for each local jurisdiction to follow in establishing local land use plans and programs. The goals express the state's policies on land use and on related topics, such as citizen involvement, housing, and natural resources.
Stormwater	Surface water from rain, snow or ice melting and running off from the surface of a drainage area. It is normally collected in the sewers separate from the sanitary sewers and receives minimal if any treatment prior to receiving water.
Sub-basin	A portion of a river basin, generally with a drainage area of 800,000-1,000,000 acres.
Succession	The more or less predictable change in the composition of communities following a natural or human disturbance.
Surface runoff	Water that flows over the surface of the land as a result of rainfall or snowmelt; it enters streams and rivers to become part of the channel flow.

Sustainability	Meeting the needs of the present without compromising the future; emphasizing and maintaining underlying ecological processes for the long-term productivity of goods, services, and values, without impairing productivity of the land.
Toxics	Pollutants that kill or injure organisms through chemical, physical or biological action. Examples include pesticides, heavy metals, dioxin and furans, PCBs and others.
Turbidity	The condition of a body of water that contains suspended material such as clay or silt particles, dead organisms, or small living plants and animals.
Upland	The portion of the landscape above the valley floor or stream and beyond the riparian area.
Wastewater	The spent or used water of a community or industry which contains dissolved and suspended matter.
Water Quality Limited	A Clean Water Act classification for waters where application of best manage ment practices are not sufficient to achieve designated water quality standards.
Water Quality Standards	Requirements established by the State of Oregon to prevent or abate water pollution in order to maintain and protect designated beneficial uses.
Watershed	The land area drained by a stream or stream system. Uplands often comprise more than 99 percent of a watershed, with the floodplain and stream channel making up the remainder. The Willamette Watershed drains 11,500 square miles of land.
Watershed Council	A voluntary local organization designated by a local government group and convened by a county governing body to address the goal of sustaining natural resource and watershed protection and enhancement.
Wetlands	Areas that are either permanently wet, or intermittently water covered, such as swamps, marshes, bogs, swales and overflow land of river valleys. Standing surface water, may, or may not be present depending on the type of wetland and the season of the year.

Acronyms and Abbreviations

cfs	cubic feet per second
Corps	United States Army Corps of Engineers
DAS	Department of Administrative Services
DDT	An insecticide no longer produced. DDT was first synthesized in 1874 with peak production of 180 million pounds in 1963. It was banned in 1972.
DEQ	Department of Environmental Quality, State of Oregon
DSL	Division of State Lands, State of Oregon
EPA	United States Environmental Protection Agency
EQC	Oregon State Environmental Quality Commission
ESA	Federal Endangered Species Act
ESU	Evolutionary Significant Units designated by NMFS for Salmon and Steelhead populations under the ESA
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GIS	Geographic Information Systems
GWEB	Governor's Watershed Enhancement Board
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
ODA	Department of Agriculture, State of Oregon
ODFW	Department of Fish and Wildlife, State of Oregon
ODOT	Department of Transportation, State of Oregon
OHD	Oregon Health Division
OPRD	Parks and Recreation Department, State of Oregon
OSU	Oregon State University

PCBs	Polychlorinated Biphenyls. Banned in 1979, were used in electrical equipment. Still persistent in the environment and causing reproductive and other health effects on wildlife.
PSAs	Public Service Announcements
PSU	Portland State University
TMDLs	Total Maximum Daily Loads. The amount of a pollutant discharged in a water body that would not cause a water quality standard violation.
USFS	United States Forest Service
USGS	United States Geological Survey

CREDITS

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"River Questions" by John R. Campbell
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"A Night on the Island" by Kim Stafford
"When People Turned to Pebbles" by Stephen R. Jones
"Willamette Cresting" by Erik Muller
"Elegy with Mallards" by Elizabeth McLagan
"Floodplain: Oaks Bottom, Easter Sunday: The Riverfront" by Jim Shugrue

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"By the Willamette" in Selected Poems, StoryLine Press, 1991
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I am asking all Oregonians to renew their commitment to a clean Willamette River. Because the Willamette is not dying of a single grievous wound, rather, it is suffering the death of a thousand cuts. Some of you know it better as "non-point source pollution." If so, you've been in this business too long. This wide range of contaminants, from sediment to motor oil to fertilizers and pesticides, are carried to the river by stormwater or groundwater. These non-point source pollutants are often difficult to capture, monitor, and treat. And, increasingly, they appear to be the main source of the river's most dangerous pollutants.

We face the same challenge that I believe we faced on the coast: restoring watershed health by changing the habits and practices of literally thousands of people. Only, in this case, there are millions of people. I believe that Oregonians have the creative spirit, and the will, to surmount these challenges. If we bring Oregonians of different interests and backgrounds together, help them establish clear goals and a strong sense of purpose, I believe they will forge solutions to our most pressing problems.

That is in part why I appointed the Willamette River Basin Task Force, a 22-member task force representing many different interests in the Willamette basin such as agriculture, industry, local government, environmental groups, academics and utilities to address the problems identified by the Willamette Study and to propose policy changes that could help improve the health of the river.

I have been extremely impressed by the diligence of this group, chaired by John Miller, and the fact that this very diverse set of individuals will produce, by December, a set of clear and cogent recommendations for improving water quality in the Willamette River. It is my belief that their work will help lead us into a new era of restoration of the health of the Willamette River.

By this time I hope you are all asking: But what does that have to do with me? What can I do as a city dweller, Christmas tree grower, mill worker, grass seed farmer, board member of a utility, city councilor, angler or teacher?

First, I ask you to pledge yourselves to be part of the solution, not part of the problem. We do not have time -- the fish do not have time -- for protracted bickering and finger pointing. That will gain us nothing but endangered fish and federal control of our resource management decisions.

Second, I ask you to help me make sure that all Oregonians share responsibility for solving these problems. Each of us plays a vital role.

Third, I ask you to work with me and other concerned Oregonians to find creative solutions to our problems. I know that heavy-handed regulations are not the best way to restore the Willamette and protect our fish. Voluntary measures, economic incentives, flexibility and innovation can be far more effective. We need to implement the carefully developed recommendations of groups like the Willamette River Basin Task Force and the Livability Forum.

Let me conclude on a positive note. Consider this . . . In spite of the number of people in the Willamette Valley today, we still have:

- Cities that use the Willamette River as a source of drinking water.
- A native run of wild spring Chinook salmon that migrates through the Port of Portland, Oregon's busiest industrial shipping port.
- A native run of wild winter steelhead, unlike any other in the state, that migrates to traditional spawning areas in the Cascades east of Salem, Albany, and Corvallis.
- Individuals, groups and community leaders that are willing to sit down together and solve their problems.

That is a heritage worth protecting.

"Therefore, let us drink to the river. Let us sing to the river and talk story to the river. And then let us please listen to what the river says."
Charles Goodrich

"If we bring Oregonians of different interests and backgrounds together, establish clear goals and a strong sense of purpose, I believe we will forge solutions to our most pressing problems."
Governor John Kitzhaber

" We Oregonians have a special heritage: respect for and cultivation of a quality environment. We cherish the freshness of the air, the sparkle of the water, and the warmth and splendor of the land."
Harold Sawyer