4.2 Willamette Valley Ecoregion

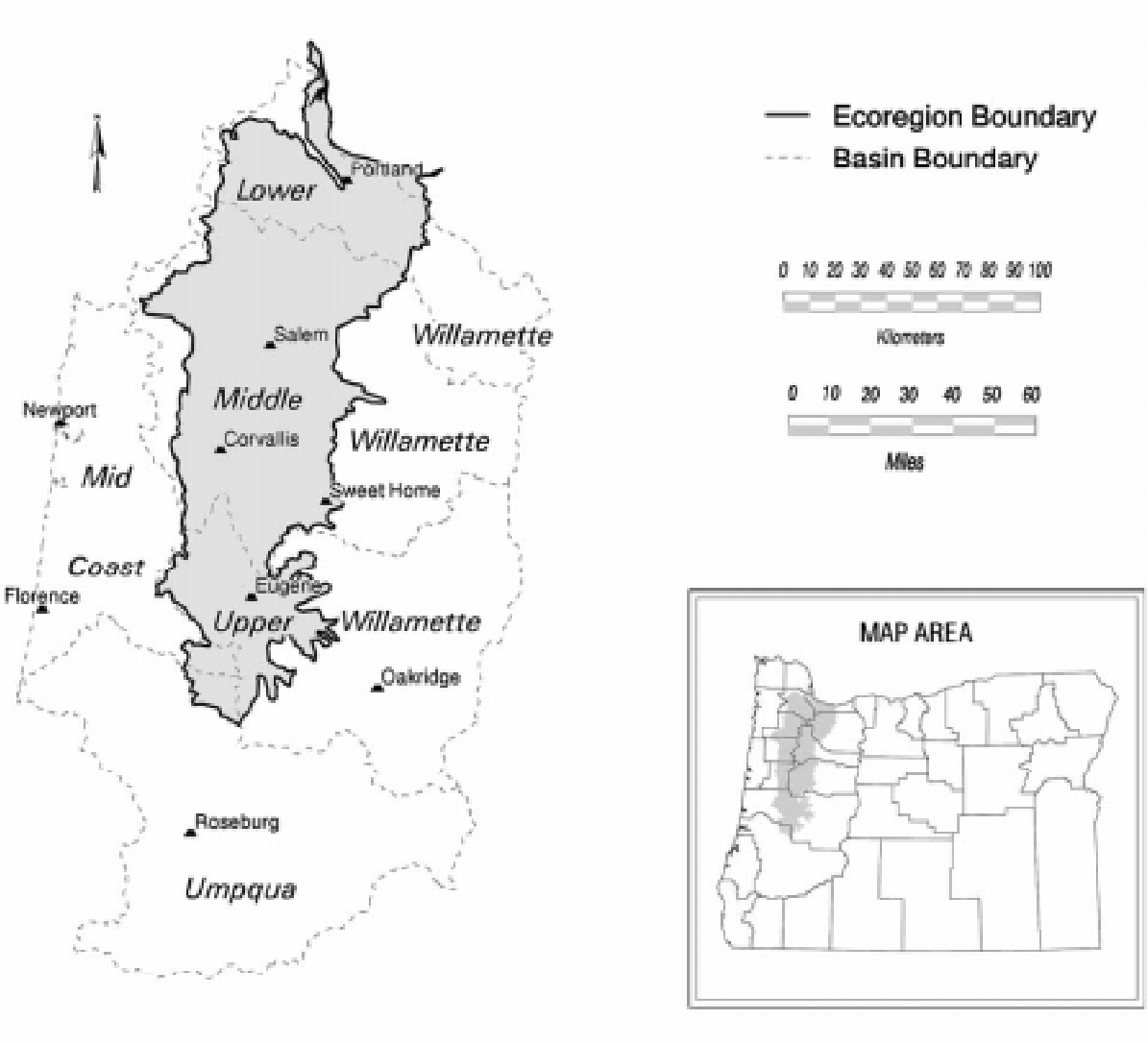
Description

The Willamette Valley ecoregion is defined by the Willamette River and Oregon's largest river valley. The river's upper reaches and much of its watershed lie in the Cascade Mountains and Coast Range beyond the ecoregion borders. The ecoregion itself is characterized by broad, alluvial flats and low basalt hills, with soils of deep alluvial silts from river deposits and dense heavy clays from pluvial deposits in the valley bottom's numerous oxbow lakes and ponds (**Figure 4.2-1**). This is home to 70 percent of the state's population, the majority of its industry, and almost half of its farmland. As a result, the Willamette Valley has seen many changes .

Before the 1840s, the landscape of the Willamette Valley was sculpted by floods and fire. Rivers flooded through braided channels across the valley floor in winter. Native Americans regularly burned prairies and woodlands, creating a mosaic of gallery riparian forests and wetlands, open white oak savannas and prairie, with valley margins of oak, ponderosa pine and Douglas-fir woodlands. These areas supported a number of endemic plants and animals, including the Oregon chub, Willamette daisy, Fender's blue butterfly, and the Oregon giant earthworm (which grows up to 33 inches long).

Early settlers drained floodplains for agriculture and cleared river channels for transportation. Subsequent urban and residential development further reduced the once extensive riparian and wetland areas to fragmented patches. Much of the open oak savannas and oak-conifer woodlands have been logged or become closed canopy forests. Remnants of natural communities are today interspersed among the valley's farms, suburbs, and cities.

Figure 4.2-1. Willamette Valley Ecoregion and Associated River Drainage Basins



Current condition

The Willamette Valley ecoregion is largely in private ownership; agriculture, urban, and forestland dominate the landscape (**Figure 4.2-2**).Fertile soil and abundant rainfall make the Willamette Valley one of Oregon's most productive agricultural areas. Major crops include fruit, nuts, wine grapes, grass seed, and nursery crops.

Engineering of the region's hydrologic system has made much of this agricultural and urban development possible. Water development projects have reduced the frequency of extremely high and low flows, and moderated the once dynamic hydrologic pattern of floods and dry spells. They have provided flood control, irrigation, hydroelectric power, and recreation. These changes have altered the nature of the Willamette River in an effort to reduce flooding and store water against drought, and in the bargain, altered the natural structure and function of the landscape.

Over the past 150 years, the prairies have been largely converted to farmland, as have most of the riparian forests and wetlands. The rivers have been dammed and channelized to reduce flooding. Open oak savannas and oak-conifer woodlands have been logged or become closed canopy forests. A growing urban population has replaced agriculture in many areas, and rural residential development continues to encroach on remaining woodlands. Due to the pattern of development, the Willamette Valley is the most altered ecoregion, with the most significant natural processes, fire and flooding, almost entirely excluded.

Key Resource Issues

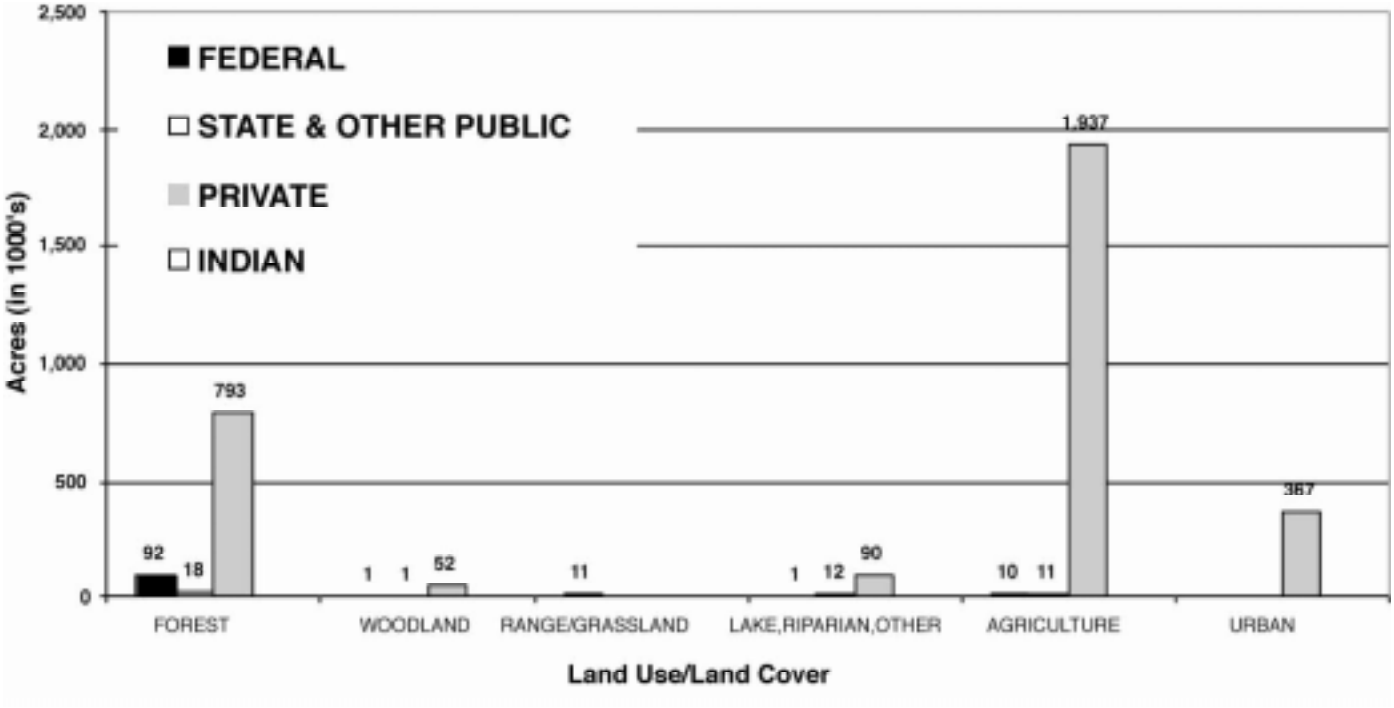
Changes in landscape structure and function

Due to its famously wet winters, it is easy to assume that the Willamette Valley has plenty of water. It does not. It seems to have too much in winter, and too little in summer. In an attempt to even out the flows, hundreds of dams have been built throughout the basin to control floods in winter and keep water flowing in summer. Dams hold back winter water, supplementing early summer flows with cold water and late summer flows with warm water. Such flow and temperature disruptions have taken their toll on aquatic species.

Flood control modifications have largely disconnected the Willamette River from its braided channels, oxbows and sloughs—wetland types that characterized much of its historical floodplain. This fundamental change of the valley's hydrologic regime has changed the character of the valley's wetlands and greatly altered their functions.

Studies of the Willamette River channel show that the mainstem reaches have been greatly simplified and straightened as a result of dam construction, channelization, and drainage (see: Chapter 3.5 Riparian Areas). Loss of tributary and slough reaches along the river between Eugene and Corvallis is estimated at 84 percent. The loss of sloughs, islands, and side channels has not only destroyed habitat for fish and wildlife, but has also reduced the river's ability to absorb floodwaters.

Figure 4.1-2. Land Use/Land Cover by Owner for Willamette Valley Ecoregion



Land Use/Land Cover

An essential component of the work of the Science Panel is the development of indicators to measure the health of the environment, in order to facilitate performance-based planning. Such indicators should anticipate trends and changing conditions in key environmental systems. Forewarning of areas under stress can direct action in an informed, cost-effective and preemptive manner, as opposed to reacting to damage that has already occurred.

Even without human activities, natural disturbances can lead to changes in the landscape. However, human use of land can initiate and exacerbate environmental disturbance, leading to degradation and resource loss. Land use activities that are carried out carelessly without regard to best management practices or can damage sensitive lands. As use intensifies and spreads, there can be significant cumulative impact on valuable environmental resources.

Land use/land cover data offer a snapshot of the state of the land as influenced by human activities. It integrates actions made by people and responses of the land to these actions. By examining a series of these snapshots over time, the changes that occur on the land and the trend of those changes become evident. There are linkages between land use/land cover changes and specific environmental, economic, and social resource changes. Thus, land use/land cover can be viewed as a meta-indicator which can track trends, not only in the state of the environment but also in the state of environmental monitoring.

Several examples show how this tool can be used. ODFW has produced a land use/land cover database for the Willamette Valley from approximately 2,000 aerial photographs to serve as a baseline from which to track rates of change of vegetation types and wildlife habitat. The Coastal Landscape Analysis and Modeling Study (CLAMS) has used satellite imagery to characterize changes in forest conditions in the Coast Range during the last 25 years in order to model outcomes of future management practices. And, as part of the Willamette River Basin Futures Study, US EPA has funded the development of a land use/land cover database for the Willamette Valley to investigate alternative scenarios of growth and development within the Willamette River Basin over the next fifty years.

The adoption of land use/land cover as a meta-indicator will require considerable work within the community of scientists, managers, business leaders, and policy makers of the state. Recurrent data acquisition, analysis, storage, and access protocols will have to be resolved; scientific studies funded and undertaken; integration into planning and management strategies developed. However, it is expected that this innovative effort will be very valuable in the future as Oregon attempts to balance environmental quality, livability and economic productivity.

The historic landscape worked like a sponge; it absorbed winter floods, and released water gradually during the extended dry periods of summer. Little remains of the sponge that was once the valley floor.

Mature forests hold and release water more slowly than cleared land or younger stands. Streamside vegetation filters contaminants and keeps water cleaner and cooler. Wetlands and floodplains store water. Simplification of streamsides has led to fewer side channels where aquatic organisms find refuge and food, less shade to cool the stream, and less buffer from upland runoff.

Naturally functioning riparian and wetland areas can provide water storage, filter contaminants from upland runoff, provide habitat for fish and wildlife and green space for urban areas. However, riparian areas and wetlands continue to be reduced and degraded.

Trends in riparian condition in the Willamette Valley have shown an 80 percent reduction in total riparian area since the 1850s (see: Chapter 3.5 Riparian Areas).

Throughout the ecoregion, changes in extent of native vegetation types indicates changes in the ecological health of natural systems. The Willamette Restoration Initiative reports an estimated 72 percent of the original riparian and bottomland forest is gone, as well as an estimated 99 percent of wet prairies, 88 percent of upland prairies, and 87 percent of upland forests at the margins of the valley. A recent study of land cover changes between 1982 and 1994 showed that 2.5 percent of valley's remaining wetlands were lost during that time, despite the state's policy of no net loss of wetlands (see: Chapter 3.4 Freshwater Wetlands).

Changes in biological communities

According to the Oregon Biodiversity Project, four major valley habitat types – oak savannas and woodlands, wetlands, bottomland hardwood forests, and native prairie grasslands – have been greatly reduced. Much of the valley's agricultural development converted native wet prairie; less than one percent of the original extent remains today and several wet prairie plants are rare or endangered.

Invasion of exotic species has greatly altered the composition of riparian plant communities, with introduced plants increasing from 10 percent in the headwaters to more than 50 percent of the number of species in the mainstem Willamette. Non-native plant and animal species–such as bullfrogs, Scots broom, and Himalayan blackberry– threaten the health of native species. Nearly 50 native plant and animal species are considered at risk in the Willamette Valley. The western meadowlark, Oregon's state bird, is now rarely seen in the valley, where it was once abundant.

Fish populations throughout the Willamette Valley ecoregion are healthy in selected areas, severely declining in others, and ranges are possibly changing because of habitat modification. Many species of wild salmon and trout, once the signature of Oregon's rivers, are now imperiled.

Production of environmental goods and services

Changes in the structure and function of native landscapes have paved the way for production of many goods and services in the Willamette Valley. In most cases, these changes are the outcome of conscious choices. These choices have resulted in land reclaimed from the effects of seasonal flooding and converted to agriculture, industry, and urban development.

There are many indicators of healthy agricultural systems that can be applied to the Willamette Valley, including the area of land in agricultural production, trends in soil quality and erosion rates, and the extent of sustainable practices. Additional indicators reflect the affects agricultural practices have on adjacent ecosystems, such as streams, riparian areas, and groundwater.

In a typical year, the Willamette Valley accounts for a little more than half of Oregon's $3 billion in agricultural sales. Over 100 commodities are grown in the valley, including nursery and greenhouse plants, grass seed, wine grapes, Christmas trees, poultry, dairy, vegetables, and small fruits and berries.

Agriculture, industry, and municipalities use large quantities of water. As the valley's population grows, conflicts will increase over the desire for additional water and the negative impacts of water storage on the environment.

Agriculture and industry water use has reduced already low summer flows. Low flows increase river temperature and con-

Socioeconomic Profile of the Willamette Valley Ecoregion

For the purposes of this economic analysis, the Willamette Valley ecoregion is composed of Benton, Clackamas, Lane, Linn, Marion, Multnomah, Polk, Washington, and Yamhill counties. Large urban areas are concentrated along the Interstate-5 corridor, which forms a spine down the center of the valley. Smaller rural communities lie to the west and east in the foothills of the Coast and Cascade ranges. The valley's human population is expected to continue to grow, doubling within the next 40 years.

The region has seen rapid population and job growth in the past decade, especially strong in the Portland metro area. High tech manufacturing, which includes computer equipment, electrical equipment, and instruments, is one of the primary reasons for this growth, and this region accounts for over 93 percent of the state's high tech manufacturing employment.

The Willamette Valley has had the highest per capita personal income of the state's regions, increasing throughout the 1990s and exceeding the per capita income of all other regions by more than 20 percent.

Despite the rapid expansion of high technology industries in the Valley, it is important to note that many communities remain dependent on natural resource-related industries such as wood products and agriculture. Agriculture-related industries, such as food products manufacturing, still play a key role in the region's economy. The region is less dependent on lumber and wood products manufacturing than other regions, accounting for only 12 percent of total manufacturing employment compared to more than 20 percent statewide. Yet, many of the region's rural communities have struggled to overcome the loss of high-paying jobs in the lumber and wood products industry.

Diversification of the economy has been a critical element in the successful transformation of regional communities. For example, the Eugene-Springfield metro area, despite the loss of thousands of mill jobs since the late 1980s, has managed a net increase manufacturing employment with growth in newer industries like recreational vehicle makers and high tech equipment manufacturers. In contrast, smaller neighboring communities such as Oakridge have struggled to replace lost mill jobs.

centrate contaminants. Many streams in the Willamette Valley fail to meet state and federal water quality standards. Pesticides, heavy metals, dioxin, and other pollutants are present in the water and sediments of the lower river.

Regional resource planning and regulatory compliance

Efforts in the 1970s to clean up the river reduced pollution entering from industrial and sewage treatment plant discharge pipes. But not all the pollution sources were easy to pinpoint, and contaminants continue to seep into the river. Without the natural function of wetlands and riparian areas, much of what is sprayed on the ground ends up in the river. Today, most of the mainstem Willamette exceeds standards for bacteria, temperature, and toxics such as mercury, according to studies conducted by the Oregon Department of Environmental Quality.

Reduced water quality and habitat have had consequences for fish in the ecoregion. Recent listing of native fish species will bring new federal restrictions for city residents, farmers, foresters, and businesses of the Willamette Valley.

Strengths and threats

The massive ecological changes that have occurred in the Willamette Valley have allowed people to make valuable investments in the land, creating new urban and agricultural landscapes. Recently people have begun to consider the ecological cost of these investments, and the long-term productivity of these created landscapes. Beginning with a study commissioned by Gov. Tom McCall in 1972, the Willamette Valley has been the focus of a number of studies of the ecological effects of population growth and designs for alternate futures. Local restoration efforts focus on ways to replace some of the functions provided by a dynamic hydrologic system. Watershed councils involve valley residents in ways to help improve the condition of the region's watersheds. Increasingly, valley farmers have set aside conservation easements to protect and restore wetland and riparian areas.

In spite of the tremendous alterations in the landscape of the Willamette Valley, the region still contains significant elements of biodiversity. The Willamette Valley's location on the Pacific Flyway makes it an important area for migrating and wintering waterfowl. Geese and shorebirds benefit from flooded agricultural lands, and the Willamette River and tributaries support salmon and steelhead runs, mostly of hatchery origin due to the large number of dams in the system. The valley's few remaining fragments of native prairie still manage to support many special plant species and endemic invertebrates, although their fate is uncertain. Fender's blue butterfly and Kincaid's lupine are two of the most recent species to be added to the list of endangered species in this dwindling habitat. Remaining valley wetlands provide critical habitat to the Oregon chub, the western pond turtle and many other sensitive animal species. A few species (including yellow Indian paintbrush) have been extirpated from the Willamette Valley , and from Oregon. Restoration efforts are underway to try to protect and expand some of the small remnants of natural vegetation that remain, but there is question whether restoration can keep pace with the rate of loss.

Several state and national wildlife refuges contain large blocks of wetland habitats that are critical to the region's wildlife populations, particularly migratory birds. The state's Sauvie Island Wildlife Area, for example, attracts peak concentrations of more than 150,000 waterfowl in the fall and is used by more than 250 species of birds. In the past decade, attention has been directed at protecting and restoring remnant fragments of Willamette Valley wet prairie and associated species. The Nature Conservancy's 330-acre Willow Creek Preserve in West Eugene supports more than 200 species of native plants, 100 bird species and 25 species of butterfly. In addition to The Nature Conservancy, the U.S. Fish and Wildlife Service, Bureau of Land Management, and Corps of Engineers have played key roles.

Conclusion

Oregon's greatest environmental challenge for this century lies in the Willamette Valley. Transformation of prairies, woodlands, riparian areas, and rivers of the valley has fueled Oregon's economic growth and settlement for over 150 years. Yet this transformation has left a mark on the state's environment here and a debt to pay. Whether we can improve the ecological health of the valley, measured currently by recovery of salmon stocks, while continuing economic growth and development for homes and communities will be a stern environmental test.