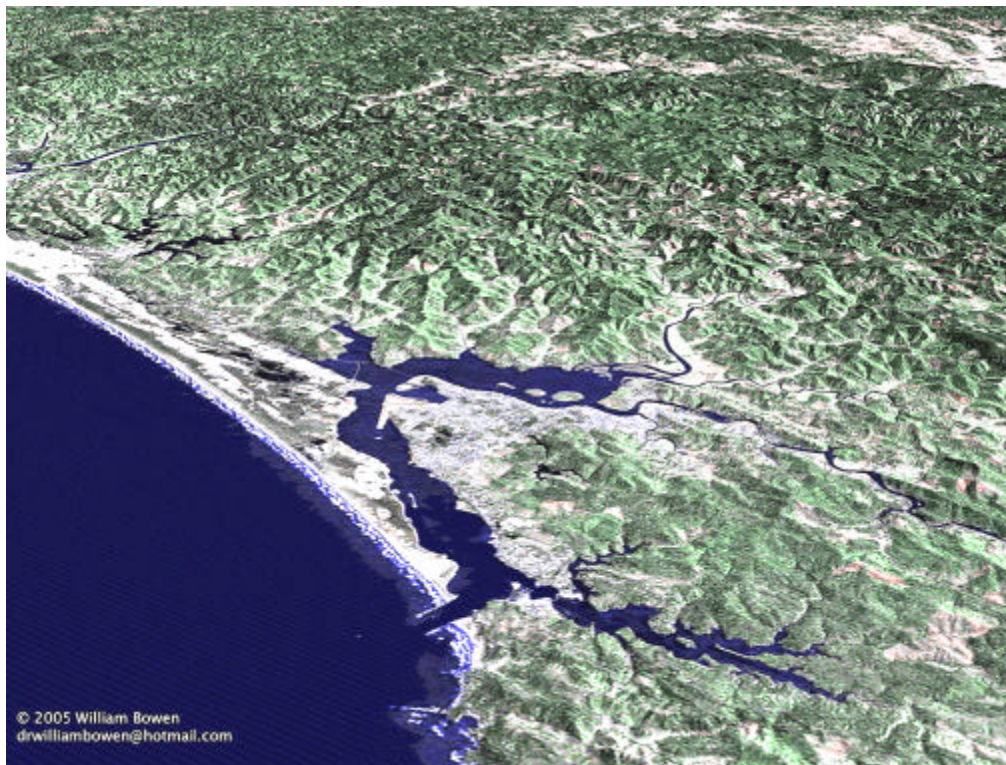


Coos Bay Lowland Assessment and Restoration Plan

February 15, 2006 DRAFT



Coos Watershed Association
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The **Coos Watershed Association** is a 501(c)(3) non-profit organization whose mission is “to provide a framework to coordinate and implement proven management practices, and test promising new management practices, designed to support environmental integrity and economic stability for communities of the Coos watershed.” The Association, founded in 1994, works through a unanimous consensus process to support the goals of the Oregon Plan for Salmon and Watersheds. Our 21 member Board of Director includes representatives from agricultural, small woodland, waterfront industries, fisheries, aquaculture, local government, environmental organizations, industrial timberland managers, and state and Federal land managers.

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Table of Contents

Acronyms	1
CHAPTER 1	2
Introduction	2
Goals.....	2
Assessment and Restoration Plan Process	2
Oregon Coast Range	3
Geology.....	3
Coos Bay Lowlands	4
Fish	5
Wetlands	6
Estuary	9
Human Impacts	10
Native Americans	10
Settlement.....	10
Land Management Impacts.....	12

Acronyms

ACW	Active Channel Width
AUC	Area-Under-the-Curve
BLM	Bureau of Land Management
CFS	Cubic Foot per Second
CHT	Channel Habitat Types
CoosWA	Coos Watershed Association
CSIP	Coastal Salmonid Inventory Project
DEQ	(Oregon) Department of Environmental Quality
ESU	Evolutionarily Significant Unit
GIS	Geographical Information System
NOAA	National Oceanic and Atmospheric Association
ODF	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
OWEB	Oregon Watershed Enhancement Board
SRS	Stratified Random Sampling

CHAPTER 1

Introduction

Goals

The Coos Bay Lowland Assessment and Restoration Plan is based on condition assessments of lowland tributary streams of the Coos estuary along with input from affected landowners. The overall goal of the project is to develop and a strategically-planned watershed restoration program at the sub-basin level that aims to:

Restore and maintain watershed processes that allow for habitat connectivity, sustained populations of anadromous fish, and other ecological functions.

This document is arranged to provide the following pieces of information. Chapter 1 is an introduction to the development and purpose of the Coos Bay Lowland Assessment and a general description of the Coos Watershed area Chapter 2 is a discussion of each of the survey components that were used to inform the assessment. Chapter 3 is broken into sections for each sub-basin containing the assessment data. Chapter 4 is an introduction to the restoration strategy and Chapter 5 contains restoration plans for each of the six sub-basins. The sub-basin sections in chapters 3 and 5 are intended to be independent from the other sub-basins. Appendices include supplemental information about survey methods, data and notes used in calculations, standards and protocols, and other information useful in understanding watershed conditions.

Assessment and Restoration Plan Process

This assessment process is a unique and important opportunity to engage public and private property owners in the Coos Bay Lowland sub-basins to provide input into the development of a plan to improve water quality and habitat important to many marine and freshwater species, as well as human quality of life. The identification of current watershed conditions, potentials, and priorities will improve chances for successful restoration. The restoration of watershed processes, and habitat connectivity, in particular among freshwater and estuarine habitats, is central to improving salmonid habitat quality, diversity and quantity, thereby increasing the availability of fishery resources in the region. Improved water quality will also benefit the local shellfish growing industry.

The Lowlands Assessment and Restoration Plan is consistent with, and complements the Oregon Plan for Salmon and Watersheds goals to protect and restore marine resources and recover species under the Endangered Species Act (ESA). The development of the watershed assessment and identification of restoration priorities is consistent with the approaches utilized in the Oregon Watershed Assessment Manual. The Lowlands Assessment Advisory Committee has provided guidance in the process of prioritization, and intensive outreach to Lowland landowners has supplemented the Assessment with a suite of landowner concerns and goals.

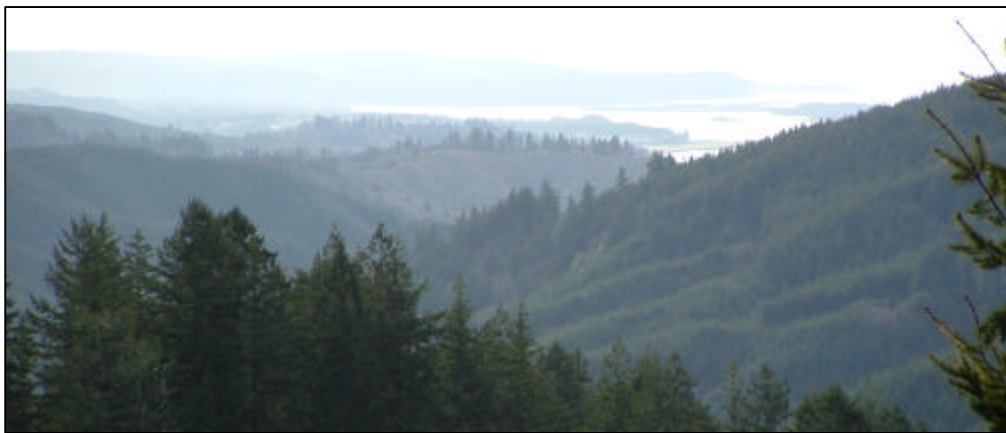


Figure 1-1
Haynes Inlet
and Coos Bay
from upper
Palouse (photo
CoosWA)

Oregon Coast Range

Spanning 200 miles along the Pacific Ocean, the Oregon Coast Range is defined by a 30-40 mile wide swath of moderately high mountains average 1,500 feet in elevation. Slopes and drainage basins are consistently steep through the range, approaching 50° in many localities. Pacific storms buffet the range in the wet, winter months and support thick forests of Douglas fir and hardwood species. The average annual rainfall in the range is over 100 inches per year. Once home to an abundance of trout, salmon, and other fish, rivers and streams in the Coast Range now harbor a small fraction of the original aquatic population.

Geology

The Oregon Coast Range is a belt of uplifted land overlying the subducted Juan de Fuca plate. The land is composed of accreted oceanic sediments - mostly older marine sediments and sands, clays, and muds eroded from ancient mountains to the south and east. Deposited on the ocean floor in a great trough from the Klamath Mountains to Vancouver Island, these sediments were uplifted by the force of colliding continents and eroded once again creating relatively wide river mouths. This

regionally extensive marine sandstone and siltstone is commonly referred to as the Tye formation, and is vulnerable to soil erosion processes. The Lowlands Assessment area lies entirely within the Tye unit.

Upland topography in the Coast Range consists of convex ridge tops characterized by small soil slips and landslides (Roering et al., 1999). At the base of these steep sideslopes, in unchanneled valleys, soils accumulate and thicken over long periods and become saturated during rainfall events. The combination of thick soil and frequent saturation lends itself to episodic shallow landsliding (Heimsath et al., 2001).

Coos Bay Lowlands

Three Hydrologic Unit Code (HUC) fifth field watersheds drain into the Coos estuary: the Millicoma River, South Fork Coos River, and Coos Bay Lowland tributaries. It is the Coos Bay lowland streams, six in total, that are the focus of this Assessment and Restoration Plan. Figure 1-2 outlines the stream sub-basins in red. The average sub-basin size is 6,415 acres, and the mainstem streams are typically 10 to 25 kilometers in length, drain into either an embayment or tidal slough, and are frequently tide gated. These stream systems have urban or rural residential land uses at their intersection with the estuary, agricultural uses in the valleys upstream, and non-industrial or industrial logging in the hills above their valleys. In their natural state, before settlement, these Lowland streams were sinuous and marshy, and providing highly productive rearing areas for juvenile coho.

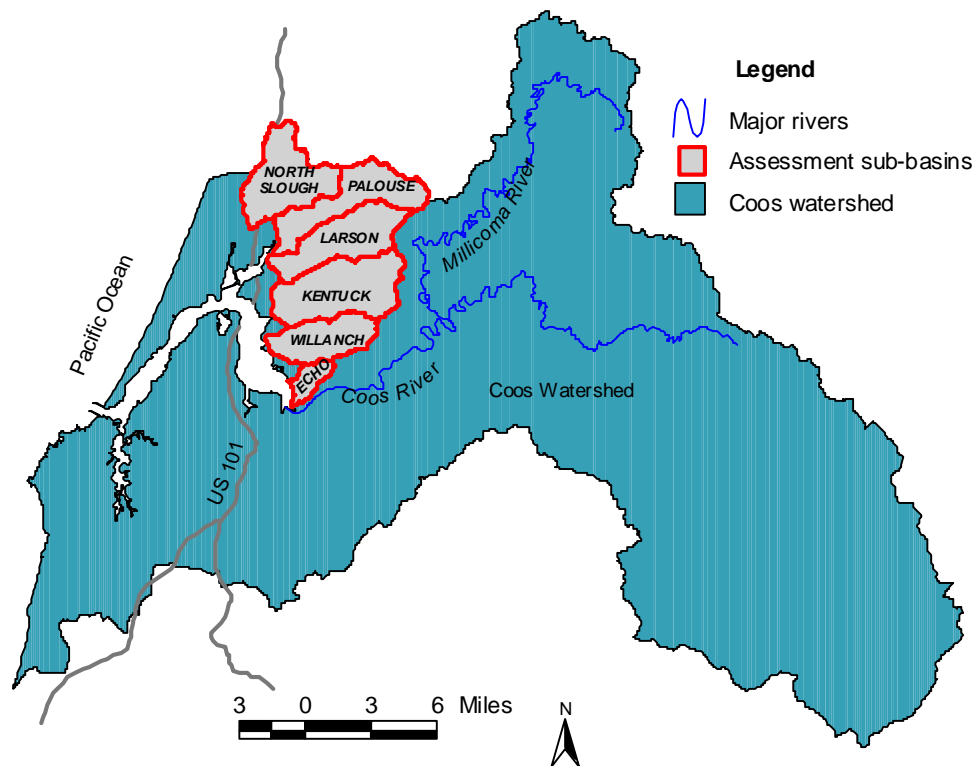


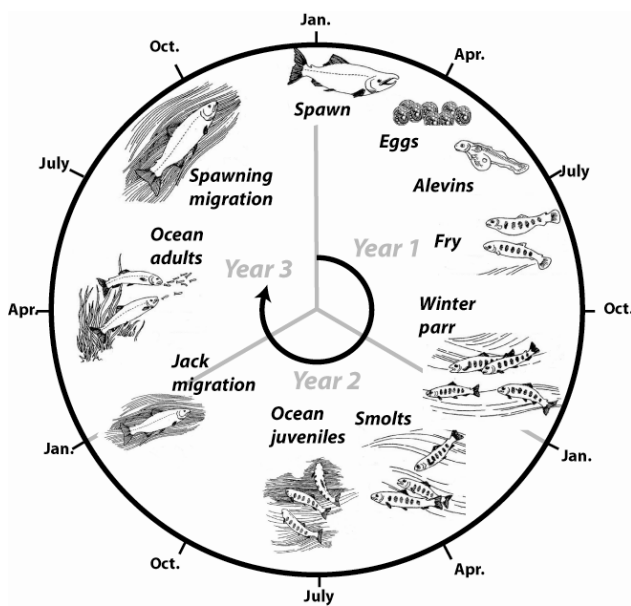
Figure 1-2
Assessment Area

Fish

The Coos estuary supports important fishery resources. Five anadromous species of salmon and trout, (i.e., coho, Chinook, steelhead, sea-run cutthroat trout, and chum) Pacific lamprey and a wide range of coastal species use its various habitats.

This assessment focuses primarily on coho spawning, rearing and migratory habitat conditions and factors influencing those conditions. The coho life history cycle, summarized below and illustrated in Figure 1-3, is a key backdrop to assessment data analysis and planning watershed management.

Figure 1-3
Coho life cycle



Coho smolts typically migrate to sea in the spring of their second year, spend 16-20 months rearing in the ocean, and then return to freshwater in the Fall (October to January) to spawn as three-year-old adults. Returning coho typically seek small, relatively low-gradient tributary streams for spawning and juvenile rearing. Ideal spawning gravels are generally pea to orange-sized, and maintain cool, clean

interstitial spaces for eggs and emerging young. Over-wintering habitat is primarily in off-channel alcoves and beaver ponds where juveniles can find protection from high-velocity flows. In general, coho prefer complex instream structure, i.e. large wood, and shaded streams for rearing.

A returning adult coho may measure more than two feet in length and weigh an average of eight pounds. After the first summer at sea, a small proportion of the males reach early sexual maturity and return that fall as two-year-old “jacks.” These jack returns have proven to be a fairly accurate predictor of adult abundance the following year, and serve as a key component for setting ocean coho fishing regulations.

On average about one-fifth (see Figure 1-4), and as much as 43%, of coho salmon on the Oregon Coast Evolutionarily Significant Unit (ESU) pass through the Coos estuary during their coastal migration (ODFW, 2005), and one Lowland tributary stream, Palouse Creek, often has the

highest coho spawning densities in Oregon. Although the Oregon Coast coho ESU has been listed in the past as threatened under the Endangered Species Act, it is currently not listed. A factor in the delisting decision was the demonstrated willingness of the state of Oregon and its citizens to implement land management actions that help to rehabilitate freshwater salmon habitat.

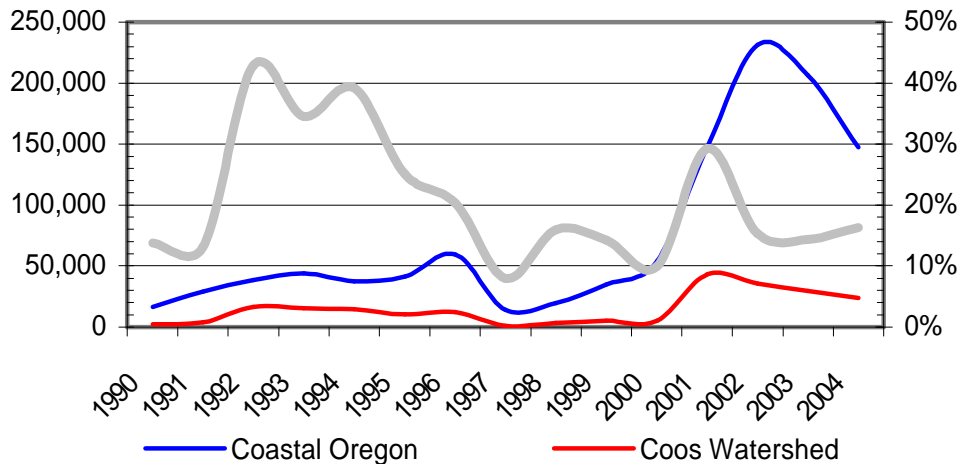


Figure 1-4
Oregon Coastal
ESU wild coho
spawner abundance 1990-2004
(ODFW, 2005)

In the past, many coastal waterbodies were stocked with hatchery releases to bolster ocean fisheries. Most releases in the Lowland area, ending in the late 1980's to 1990's, were smolts released from small acclimation sites. The later years of hatchery releases were locally founded broodstocks.

Although not directly associated with the Lowland Assessment surveys, CoosWA has installed live fish traps on Larson Creek and, later, Palouse Creek. The purpose of the traps is to study, post tide gate replacement, the productivity of these streams and effects to the coho life cycle. During the 2004 – 2005 season, the Larson trap caught 27 coho, with a final estimate of 273 adults and jacks per kilometer. Estimates of smolt populations, based on 2005 trap data, are 2700 coho, 678 steelhead, and 850 cutthroat.

Wetlands

Wetlands are usually connected to a riparian zone, but sometimes occur in higher elevation areas with no obvious surface connection to a stream. Wetlands provide many important functions in a watershed, including water quality improvement, flood water attenuation, groundwater recharge and discharge, and fish and wildlife habitat.

Water quality is improved by wetlands' ability to trap sediment and contaminants. Dense wetland vegetation acts to decrease rate of flow -

allowing sediments to settle. Wetland vegetation can also take up certain nutrients and some toxins, thereby improving downstream water quality. The anaerobic environment of many wetland soils breaks down nitrogen compounds and keeps other compounds in a non-reactive form. However, the ability of a wetland to provide this function is limited.

Wetlands alleviate downstream flooding by storing, intercepting, or delaying surface runoff. Wetlands within the floodplain of a river can hold water that has overtopped river banks. Floodwater desynchronization occurs when wetlands higher in the watershed temporarily store water - reducing peak flows. The most effective wetlands at providing desynchronization are generally located in the middle elevations of the watershed; these wetland locations are far enough away from the receiving water to create delay, but are low enough in the watershed to collect significant amounts of water.

Note: Floods help shape aquatic habitat by impacting channel morphology, sediment transport and deposition, and adjacent stream vegetation. Habitat quality for fish and other aquatic organisms also is formed by the interaction of these elements.

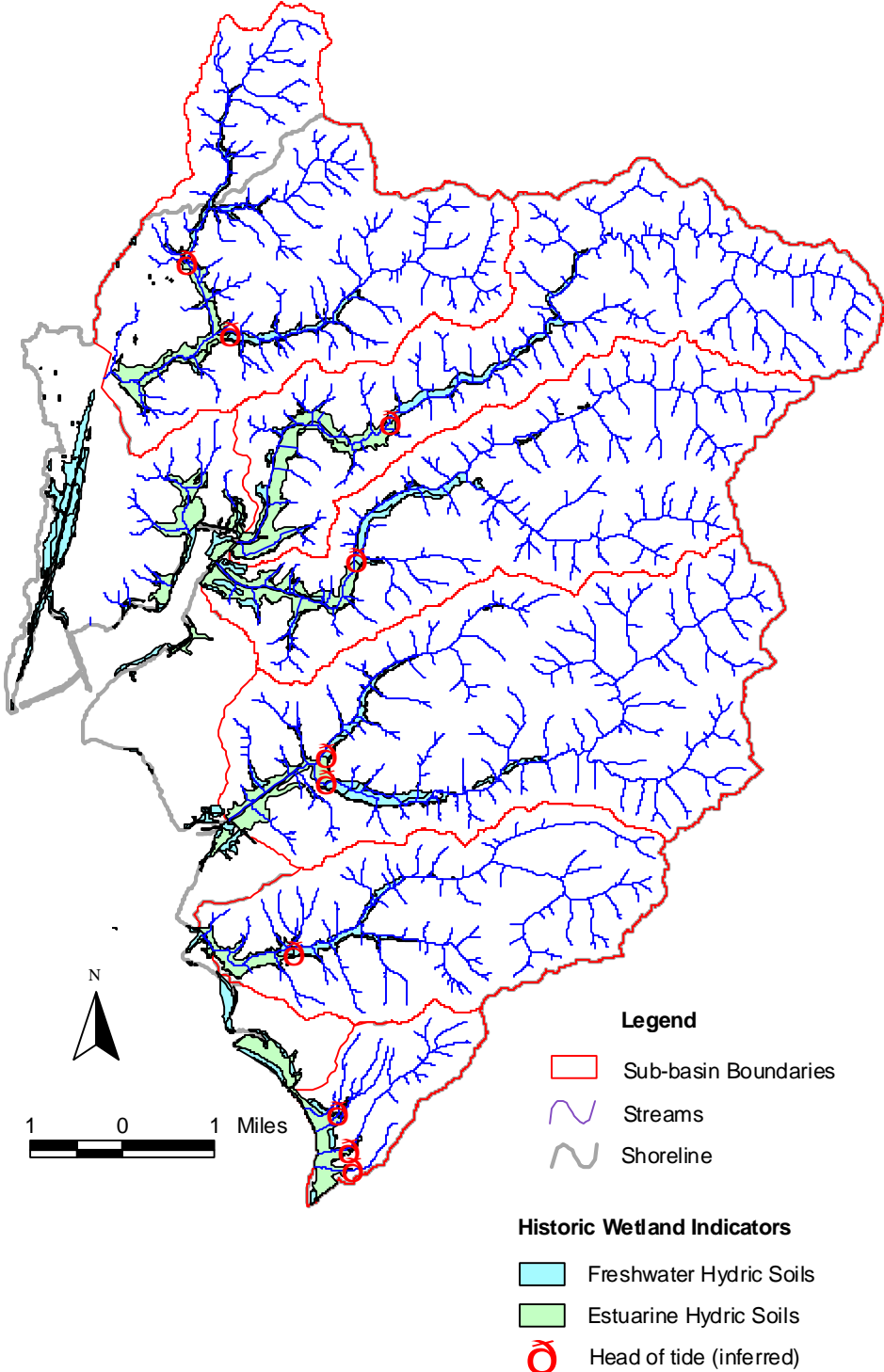
Wetlands, intimately associated with groundwater, can function to recharge the underlying aquifers. Wetlands are sources of groundwater discharge that may help extend streamflows into the drier summer months.

Wetlands support fish and other wildlife by the functions described above - water quality protection and channel stability, as well as providing habitat themselves. Estuarine wetlands provide important feeding and holding areas for outmigrating salmon smolts (OWAM, 1999).

Both tidally-influenced estuarine wetlands and river-sourced freshwater wetlands occur in and around the Lowlands area. Prior to Euro-American settlement in the 1800's (see Settlement on page 13), the Coos estuary, as shown in Figure 1-5, extended as fingers into the mouths of the six sub-basins covered by the Coos Bay Lowlands Watershed Assessment. Subsequent to settlement, these areas were diked, causeways were built for roads and railroads, and tidegates were installed at the stream mouths to prevent saltwater flooding during high tides while facilitating drainage during low tides. However, it is important to understand the historical extent of wetlands to understand underlying hydrological processes, to work with natural drainage patterns in restoration and infrastructure improvement projects, and to identify potential wetland restoration actions.

A wetland rehabilitation project is located near the mouth of Larson Creek and smaller wetlands occur at the mouth of Willanch Creek. Other, marine sources wetlands, are found on the bay side of the Palouse tide gate, the Kentuck tide gate, along the shore north of Echo Creek, and extensively along North Inlet west of highway 101. See Chapter for more discussion of wetlands restoration.

**Figure 1-5
Lowland
historic
wetlands
and heads
of tide**



Estuary

The Coos Bay estuary is approximately 13348 acres. It is a drowned river mouth variety, where winter floods discharge high volumes of sediment into and through the estuary. In summer, seawater inflow dominates the estuary due to low streamflow. The Coos Bay estuary is designated as a Deep Draft Development estuary under the Oregon Estuary Classification system.

The bay portion of the estuary is characterized by broad mud flats which are exposed to the air at low tide and flooded by a mix of salt and fresh waters at high tide. Sediments carried from the mountains by the river are deposited in the upper bay and along the edges of main channels, while finer particles of silt and clay drift farther to the edges of the flats near the fringing marshes. Marine sand carried along the ocean front in the "longshore current" is swept into the estuary on incoming tides and may be deposited as far as several miles upstream. Coos Bay has a relatively large bay as part of its estuarine system.

Sloughs, of which the Coos estuary has many, are low-gradient tributaries to the main bay and river channels. They have little freshwater inflow. Tidal flushing may not be as complete as in parts of the estuary that are closer to the ocean or main channel. Generally, sloughs consist of meandering channels that wind through fringing marshes and across mud flats to the main bay. It is these small channels that, when unrestrained, brought the tide up into the marsh and to the edge of the forest. All mainstem streams in the assessment area display slough characteristics near their confluence with the estuary, however altered by land use practices such as tide gates, dredging and diking. In the past these sloughs and streams were generally deeper and navigable by boat.

Estuaries are important for adult salmon, providing the necessary transition and holding areas for the fish before they begin their upstream migration.

Human Impacts

Characterizing pre-European lifestyles and settlement patterns help to understand human impacts to the landscape, and how conditions have changed overtime.

Native Americans

Natives lived in numerous villages along the Coos River and estuary. Apart from marriages, these villages were largely independent of each other. Groups would migrate between more permanent winter homes along the river and estuary, and their seasonal camps farther upriver to follow the migration of salmon and lamprey and to harvest particular plants for food, tools, medicine and clothing. Fish and berries were dried and stored for other seasons of the year. The main staples of the Coos were fish, berries with occasional bear, venison or elk. Before significant trading with Europeans began in the early 1800's, everything the natives used was collected or developed from the local environment (although some trading between regions occurred, e.g. chert found in the lower Coquille area was sought after for arrowheads).

The Coos tribes were known to be more docile than their neighbors to the north and south, and it was noted that these natives enjoyed a surprising amount of leisure time. Their initial encounters with whites were generally non-combative, however, after the 1856 Rogue River War between the whites and the natives there, all south coast tribes including the Coos, were forced to move to a fort near the mouth of the Umpqua River, and later to Yachats. A small number of Coos eventually moved back to the Coos Bay area either marrying into non-native families, or hiding from authorities with relatives that were married (Douthit, 1999 and CTCLUSI, 2006). In her book of memoirs, Ines Nelson (1978) mentions that indians were still living in the Haynes (Palouse and Larson Creeks) area until the 1870's.

Settlement

European settlement had begun in the Coos Bay area by 1850, and in 1853 the Coos Bay Commercial Company was formed to promote white settlement of the area. Fueled by commercial interest in resource extraction and the potential for an excellent harbor, Coos Bay flourished rapidly. Initially, coal was the primary draw. The first coal mining in the watershed began in the 1850's and peaked in 1874 with 44, 857 tons shipped to San Francisco that year. The lumber industry, however, immediately surpassed coal mining in importance. Coos Bay lumber began shipments to California as early as 1854 (Case, 1983), and eventually

became the world's largest forest products shipper in world. As the port grew, ship building also became a major industry in Coos Bay.

Workers in the mines, forests, mills and ship-building industries fanned out with their families to settle the fertile land surrounding the bay, sloughs and rivers. The Homestead Act of 1862 required settlers to show proof of farming activity in order to hold their homestead claim. As a result, the valleys, fertile with alluvial soil, were quickly cleared and cultivated for myriad crops. Fruit orchards, especially apples, were usually one of the first farming endeavors which laid claim to the land. Other crops included grains, roots, berries, and domestic grasses for pasture. Potatoes, if fields were rotated, were very lucrative, as well as dairies and creameries which flourished along the waterways. All farm products for market were transported by boat to Marshfield and Empire City, and many were shipped by the ton to San Francisco (Nelson, 1978).

Until a railroad was built that connected the Coos Bay area to the Coquille River, in 1893, easier access to the fast-growing markets of Coos Bay, gave Coos Bay farmers an advantage over their Coquille counterparts, and resulted in a relatively faster pace of land cultivation. The Coos Bay Lowlands area was especially known for its excellent farms and large amounts of produce shipped to market as a result of much labor and expense to bring these lands into cultivation. (Dodge, 1969)

Before automobile age most transportation in Coos County was by boat. The farmers who lived in the Coos Bay drainage journeyed to town by steamboat or by gasoline launch. Between 1901 and 1930 passenger travel on the Coos River averaged almost 30,000 people per year. Roosevelt Highway was approved in 1921, southwestern Oregon portion completed in 1927. The Roosevelt ferry was put into operation in 1924 for highway traffic across the bay. (Case, 1983)

A fire in 1868 burnt 300 thousand acres of forest in much of what is now the Elliot State forest. Many of the old pictures taken during the settlement days in the Lowlands area show tall snags towering over the undergrowth on the hills surrounding the bottom land – indicative of the fires. Besides the fires, most timber in the ridges remained the same until 1951 when it was bought by Weyerhaeuser Timber Company (Youst, 2003).

Surveyor's notes from 1919 provide some description of the Lowlands vegetation and land uses in the valley bottoms and lower slopes at that time. The bottom land was being drained for cultivation by means of dikes, ditches and tide gates – many still in use today. In many areas the surveyor labels a salt water marsh and adds that it will be "good for cultivation when dyked and drained". Some low-elevation meadows were described as "stumped" indicating tree stumps possibly left as a

result of logging, fire, or tree die-off due to hydrologic or tectonic changes. Other area streams were being straightened, especially in the lower valley regions, and occasional relic meanders are shown with dotted lines. Many of the lower slopes are described as “slashed and seeded” – brush cleared for pasture. The notes also indicate problems with the drainage structures, such as a leaking tide gate at the mouth of North Slough Creek, and a break in the dike near the mouth of Willanch Creek, which was also tide gated (Selande and Collier, 1919).

Land Management Impacts

A large proportion of the population settled in what became urban areas surrounding the estuary, sloughs and rivers. These urban areas are largely built on filled estuarine tidal marshes. Urban development has resulted in periodic storm water drainage and sewerage overflows into the estuary, which, combined with failing septic systems and agricultural run-off have caused high levels of fecal coliform bacteria in water. This has affected the use of parts of the estuary for recreation, fishing and oyster cultivation.

Farming and logging practices have affected these basins similar to other Coast Range drainages. Channelization, draining of wetlands, dredging, diking and tide gate placement on low-gradient reaches to create pasture and croplands have eliminated much of the riparian vegetation, decreased channel complexity and productivity, and interrupted the natural cycle of sediment flushing.

In addition, the cumulative effects of upland forestry activities, such as riparian tree removal, soil disturbance, and historical large wood removal have damaged salmonid spawning gravels, decreased stream complexity, increased sediment introductions, and raised water temperatures. Low-gradient reaches are affected by both the adjacent land use practices and the down-stream effects of upland land use practices.

Several waterbodies in the assessment area, mainly in the sloughs and lower reaches of streams, are currently listed by the Oregon Department of Environmental Quality as “water quality limited”. The listings are a result of fecal coliform levels exceeding standards for beneficial use. The Oregon DEQ will be completing Total Maximum Daily Loads, and Water Quality Management Plans for the Coos Watershed in 2006.

Other land uses in the Lowland area include a golf course, rock quarries, and wood treatment plants.

