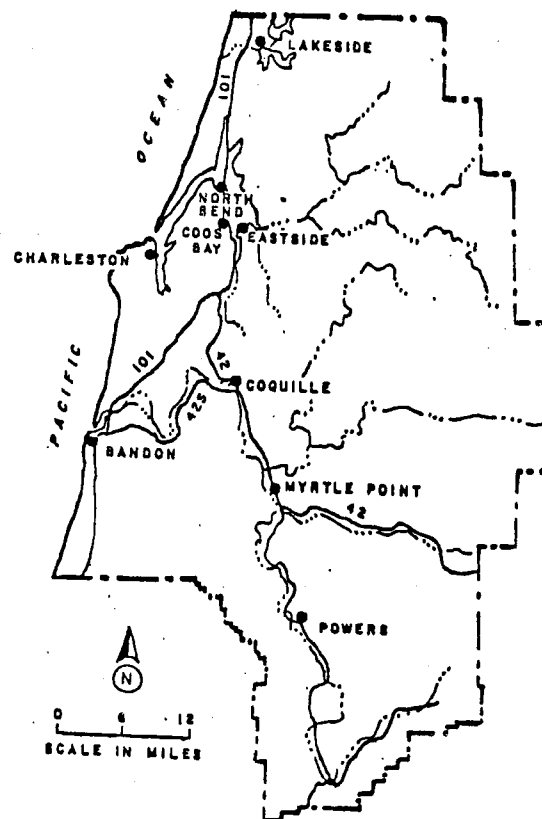


# COOS COUNTY COMPREHENSIVE PLAN

VOLUME II. COOS BAY ESTUARY MANAGEMENT PLAN

PART 2. INVENTORIES AND FACTUAL BASE



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July, 1984

**COOS BAY ESTUARY MANAGEMENT PLAN**

**Part 2 - Inventory and Factual Base**

by:

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- C.C.D. - Business Development Corp.
- Oregon Economic Development Department
- Oregon International Port of Coos Bay
- Coos-Curry Council of Governments
- Wilsey and Ham
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## 1. INTRODUCTION

This document constitutes Part 2 of the Coos Bay Estuary Management Plan. It contains inventories of data and other factual information used to support the plan management decisions that are presented in Part 1 of the Plan. The Coos Bay Estuary Management Plan is set forth in three separate but related documents:

Part 1: Plan Provisions

This document contains the policies and site-specific management decisions that comprise the Estuary Management Plan.

Part 3: Linkage/Statewide Goal Exceptions/Cumulative Effects

Part 2: Inventory and Factual Base

The Coos Bay Estuary Management Plan has been developed to serve as the basis of land and water use and community development regulations for lands lying within the Coos Bay estuary and its shorelands, as designated in this document. The authority, purpose and scope of the Plan are explained in the "Introduction" to the Plan Provisions document (Part 1), which also explains how the Plan was developed, together with related information about citizen participation and the role of state and federal agencies in producing the document.

The remainder of this Inventory and Factual Base document is organized into nine sections:

Section 2 presents an overview of the physical, environmental and socio-economic characteristics of the Coos Bay estuary region.

Section 3 delineates and justifies the "Coastal Shorelands Boundary", based upon the seven criteria of LCDC Goal 17.

Section 4 addresses the nature, location and extent of the physical characteristics and biological resources of the estuary and its shorelands, based primarily upon LCDC Goals 16, 17 and 18.

Section 5 addresses the social characteristics and economic resources of the Coos Bay estuary region and quantitative and qualitative judgments about commercial-industrial development needs, based upon the requirements and considerations of LCDC Goals 9, 16 and 17.

Section 6 presents a special moorage element that sets forth considerations related to long-range commercial-recreational moorage development on Coos Bay.

Section 7 presents special considerations about dredged-material disposal sites that lead to the development of management recommendations which are detailed in Section 6 of Part 1.

Section 8 presents special considerations about potential mitigation/restoration sites that lead to the development of management recommendations which are detailed in Section 7 of Part 1.

Section 9 presents a bibliography of pertinent references, including brief annotations.

Section 10 is an appendix which contains supplemental materials that support Part 2.

As Section 9 indicates, a wealth of information is available about the resources, economic characteristics and potentials of the Coos Bay Estuary and its functionally related shorelands. As should be expected, many contradictions are contained in the numerous studies written about Coos Bay. Although the inventory document presents little new information, since the objective was not to plow new ground, it is perhaps the most comprehensive collection and analysis of existing data performed for the Coos Bay Estuary and shorelands.

This document was prepared to provide a factual basis for establishing a management plan for the Coos Bay Estuary and its shorelands. To that end, the inventory document sorts through the myriad of information available about the Coos Bay Estuary and formulates a factual summary of environmental, social and economic considerations which, in turn, provide a basis for the rational decisions that constitute the Coos Bay Estuary Management Plan.

2. THE SETTING

## 2. SETTING

### 2.1 Physical Aspects

The Coos Bay estuary is a drowned river mouth with 30 tributaries surrounded by steep, mostly forested hillsides. The small amount of relatively level land occurs either as diked agricultural land (usually former saltmarsh) or as filled land on which development has already taken place (such as downtown Coos Bay, a former saltmarsh).

At Mean High Water (MHW), the estimated surface area of the estuary is 12,300 acres, second only to the Columbia River estuary, and is comprised of roughly equal proportions of tidelands and submerged areas. The drainage basin encompasses 605 square miles, with tidal influence extending 34 miles up the forks of the Coos River, the main tributary.

North Spit, one of the most prominent features of the bay area, defines the width and length of the lower bay; it formed from sand deposited by "long shore drift", ocean currents running parallel to the shore. Jetty construction near the turn of the century stabilized the mouth; since then the channel at the entrance has been deepened to 47 feet and widened to 700 feet. The main shipping channel has been deepened to 37 feet at 300 to 400 feet in width for 15 miles.

### 2.2 Resources

As an estuary, Coos Bay provides for a tremendous variety of plant and animal species that thrive in the rich nutrient mix. 66 species of fish and shellfish are found in the estuary, nine of which are anadromous including salmon, steelhead, and striped bass. Several varieties of clams are harvested recreationally and commercially, as is dungeness crab. Oysters are commercially raised and harvested in Joe Ney Slough and South Slough.

Much of the agricultural land in the area was created by the diking and tidegating of narrow tributaries, primarily around saltmarshes; correspondingly, the resulting agricultural soils are often Class IVw, with substantial wetness problems. Undeveloped portions of the uplands are generally coniferous forest, notably Douglas fir and Sitka Spruce.

### 2.3 Population

In 1980 the population of Coos County was 64,047; an earlier estimate by Portland State University for 1978 was 63,200. By the year 2020, the estimated population for Coos county is anticipated to be 69,513 (Office of Economic Analysis, Oregon Department of Administrative Services). Between 1995 and 2020 the projected population is expected to increase by an average of 1.77%, due to the influx of people within the retirement age group.

Between 1980 and 1994 the population of coos County decreased by 1.95%. During this 14 year period, areas of the county which were economically dependent on timber alone, showed a decrease in population.

The Cities of Coos Bay and North Bend which are the largest in Coos County did not show a decline in population during this 14 year period; nor did they exhibit an outstanding increase in population.

## 2.4 Economy

Coos County has experienced some significant changes in its economy since 1980. Some of the changes include: decline in household size; increase in proportion of older persons; decline in the manufacturing sector and the resulting loss of high-paying manufacturing jobs; and growth in trade, services, and government sectors.

These shifts indicate the general trend of the region's economy away from a resource- and manufacturing-based economy to one with growing retail and service sectors.

The Bay Area economy comprises a number of key industries, including an active visitor industry, a major fishing and seafood-processing center in Charleston harbor, the wood products industry, and the Bay's shipping industry enhanced by its deep-draft navigation channel. Shifts in employment are expected to continue, but the shift is expected to slow with the industry mix stabilizing somewhat. A growing economy requires new construction and development, with growth expected in the construction sector.

Development patterns appear positive due to changes in land and real estate markets, fiscal and policy environments, and national and international economic conditions. Two examples include the potential entry of a steel mill and the potential development of a natural gas pipeline in the Bay Area. The steel mill is currently considering three possible locations, including Coos County. With a direct impact of 250 manufacturing jobs at full buildout, development of a steel mill would serve to slow the loss of manufacturing-sector employment in the county. In the long term, a steel mill would have direct, indirect, and induced impacts estimated as an increase in 563 jobs and 283 persons to the county, and 313 jobs and 565 persons statewide.

## 2.5 Land and Water Use

Most land uses are confined to the urban areas of North Bend and Coos Bay, although some industrial development has occurred across the bay on North Spit as has rural residential development along East Bay Drive. The shorelands areas of the three incorporated cities are generally devoted to water-dependent and water-related industrial uses, although residential use occurs along occasional steep bluffs that present easy access to the bay.

The estuary provides for a multitude of uses, including shipping activity, log transportation and storage, marinas, fishing, and recreational clamming and crabbing. Public access is provided to the estuary at a number of locations.



**3. COASTAL SHORELANDS BOUNDARY**

**IDENTIFICATION AND FINDINGS**

### 3. COASTAL SHORELAND BOUNDARY IDENTIFICATION AND FINDINGS

#### 3.1 INTRODUCTION

Statewide Planning Goal #17 (Coastal Shorelands) defines "coastal shorelands" as "those areas immediately adjacent to the ocean, all estuaries and associated wetlands, and all coastal lakes." Goal #17 requires identification of shoreland areas in accordance with seven criteria. These criteria are applicable within the "Planning Area," which is an area for inventory and study, to determine the location of the "Coastal Shorelands Boundary".

#### 3.2 "PLANNING AREA"

According to Goal #17, the "Planning Area" for the Coos Bay Estuary system encompasses the following area:

"all lands west of the Oregon Coast Highway" except "the lands west of a line formed by connecting the western boundaries of the following described roadways; Oregon State 240, Cape Arago Secondary (FAS263) southerly from its junction with the Oregon Coast Highway to Charleston;"

Also included to the east of Highway 101 and Cape Arago Highway are:

"all lands within an area defined by a line measured horizontally; 1,000 feet from the shoreline of estuaries" (Statewide Planning Goal #17). According to these criteria, the "Planning Area" extends a maximum of 1,000 ft. from the estuary shoreline in the entire upper bay (above McCullough Bridge), in the upper slough and riverine systems, and in South Slough above Charleston Bridge.

#### 3.3 SHORELAND IDENTIFICATION CRITERIA AND BOUNDARY MAPS (Findings)

The seven criteria of Goal #17 and the way in which they were interpreted and applied are detailed below. The criteria are mapped in detail within the planning area on a set of maps at a scale of 1" = 800'. Property lines are shown on all maps. The head of tide for sloughs and rivers was determined by use of: (i) "Heads of Tide for Coastal Streams," Division of State Lands, and (ii) Coos County Planning Staff field surveys of tidegates on July 16 and 21, 1981 for those areas not surveyed by DSL. Working tidegates are deemed to be the effective head of tide, and therefore the furthest extent of the estuarine area, wherever they occur. It is recognized that many working tidegates are not

completely water-tight, and limited saline intrusion often occurs upstream. However, upstream areas above tidegates are not considered estuarine, because of the lack of direct tidal influence.

Criterion #1 "Lands which limit, control, or are directly affected by the hydraulic action of the coastal water body, including floodways." These include:

- (a) Land subject to flooding by the estuarine portion of coastal rivers and sloughs. [Source: HUD Flood Hazard Boundary Maps]. Rivers are the Coos and the Millicoma. Sloughs are the following: North, Palouse, Larson, Kentuck, Willanch, Catching, Ross, Isthmus, Coalbank, Joe Ney and South.

Criterion #2. "Adjacent Areas of Geologic Instability".  
These include:

- (a) Areas of slump topography [There are none within the Coos Bay Coastal Shoreland Boundary.] (Source: Environmental Geology of Western Coos and Douglas Counties, DGMI, 1975)
- (b) Areas of unstable open dune sand. (Source: "Beaches and Dunes of the Oregon Coast" OCCDC and SCS, 1974).

Criterion #3. "Natural or man-made riparian resources, especially vegetation necessary to stabilize the shoreline and to maintain water quality and temperature necessary for the maintenance of fish habitat and spawning areas":

- (a) Vegetation was mapped schematically using aerial photos, along estuarine shorelines and coastal rivers and sloughs, as a riparian strip which stabilizes banks and maintains water temperature. Without the necessary field surveys it is not possible to exactly determine the boundary between riparian vegetation and non-riparian vegetation. On-site field checks would be necessary to determine precisely the exact location of riparian vegetation for site specific development proposals.

Criterion #4. "Areas of significant shoreland and wetland biological habitats". These include:

- (a) "Significant wetland habitats" are identified by Oregon Department of Fish and Wildlife, using the USFWS National Wetlands Inventory as a basic source. Not all wetland areas inventoried by USFWS are considered "significant". Many are small isolated areas or wet meadows under agricultural

use, which ODFW determined were not significant wildlife habitats. [See Section 4.3, "Coastal Shoreland Values Requiring Mandatory Protection" for further discussion].

- (b) Other non-wetland (upland) habitat areas within the planning area include such significant habitats as heron rookeries, snowy plover nesting sites. [See Section 4.3]

Criterion #5. "Areas necessary for water-dependent and water-related uses, including areas of recreational importance which utilize coastal water or riparian resources, areas appropriate for navigation and port facilities, and areas having characteristics suitable for aquaculture.

These areas include sites that are potential candidates for water-dependent and water-related uses. Because it is not possible to determine the needed land area at this stage they are not necessarily those sites that will finally be designated for these uses in the plan. [Source: Coos County Planning Dept.] Coastal recreation sites include boat ramps, waysides and parks. (Source: Coos County Comprehensive Plan Background Document, 1979.)

Criterion #6. "Areas of exceptional aesthetic or scenic quality, where the quality is primarily derived from or related to the association with coastal water areas. [emphasis added]

- a) There are no areas of exceptional aesthetic or scenic quality within the Planning Area [See Section 4.3].

Criterion #7. "Coastal headlands:"

- a) Headlands were identified on the basis of typical landform; promontory with steep sides. There is only one coastal headland (Coos Head) within the Coos Bay Estuary planning area.

The Coastal Shorelands Planning Area was initially established to provide a framework within which to map the shorelands boundary. The shoreland boundary itself follows the outline of the feature which extends furthest upland, but still within the planning area boundary. The boundary is delineated schematically on the 1"=800' scale maps so as to show its relationship to the shoreline and to property boundaries. However, it may be necessary to make on-site determinations of the precise location of the boundary in many cases, particularly regarding riparian vegetation or flood hazard.

### 3.4 GEOGRAPHIC AREAS WITHIN THE COASTAL SHORELANDS BOUNDARY

The following narrative gives a brief description of the geographic areas within the Coos Bay Estuary Coastal Shorelands Boundary, going from north to south.

#### Area 1 - Haynes Inlet

This area includes North Slough, Palouse Slough and Larson Slough. There is scattered residential use around Haynes Inlet but mainly along the south side. The Conde B. McCullough Bridgehead Wayside and Boatramp is along this southerly shoreline. There are a few significant wetlands within the area. For the most part, the shoreline coincides with the 100 year floodplain. Head of tide on North Slough is at the tidegate where Hwy. 101 crosses it; on Palouse and Larson Slough it is at the tidegates where North Bay Drive crosses them. The division is bounded on the west by the Oregon Dunes National Recreation Area and the Siuslaw National Forest.

#### Area 2 - East Bay

This division extends from Glasgow to Graveyard Point and includes Kentuck and Willanch Sloughs. There is scattered to light density residential use from Glasgow to Graveyard Pt. There are significant wetlands around the sloughs with some of these under agricultural use. The shoreland boundary follows the 100 year floodplain to the head of tide at Kentuck and Willanch Sloughs. Head of tide is at the tidegate where East Bay Drive crosses the sloughs. There is a fairly continuous strip of riparian vegetation throughout.

#### Area 3 - Coos River

This area extends from Graveyard Pt. east up Coos River to the fork of the Coos and Millicoma Rivers. The north side of the river is mainly characterized by forested shoreline with a narrow strip under agricultural use. The shoreland boundary follows the 100 year floodplain, which mostly coincides with the Hwy. 241, dike.

On the south side, the shorelands boundary follows the 100 year floodplain or the 1,000 foot planning area boundary, whichever is the lesser, through the agricultural lands. It follows the riparian vegetation line where forested uplands extend to the river's edge.

The Dora's Place Boat Ramp is located close to the fork of the rivers.

#### Area 4 - Millicoma River

This area extends up-river along the Millicoma River to the head of tide near Allegany. The floodplain is occupied by agricultural lands. There is an almost continuous strip of riparian vegetation along the river.

The shorelands boundary follows the 100 year floodplain up to the 1,000 foot planning area boundary for the most part. It also includes a potential site for water-dependent use located at Allegany, a log-transfer site.

At the lower end of the area is the Millicoma Boat Ramp and about mid-way is Rooke-Higgins Park (County).

#### Area 5 - South Fork Coos River

This area extends along the South Fork Coos River to head of tide near Dellwood. It also includes a small reach of Daniels Creek to head of tide. It is similar to Division 4 in that the dominant use in the floodplain is agriculture. There are areas of dense riparian vegetation throughout the river's shoreline.

The shorelands boundary runs along the 100 year floodplain up to the 1,000 foot planning area boundary and includes a potential site for water-dependent use at Dellwood log transfer site.

Along Daniels Creek the shorelands boundary follows the 100 year floodplain.

#### Area 7 - Eastside/Coalbank Slough

This area includes the city of Eastside and Coalbank Slough. There is a large section of potential sites for water-dependent or water-related use along the western edge of Eastside.

The north-western shorelands boundary follows the shoreline of the slough while the south-eastern edge follows the 100 year floodplain and includes some significant wetland wildlife habitat.

The urban area within the City of Coos Bay on the north shoreline of the slough is committed to non-water-dependent/related uses, and is not, for the most part, considered an area of potential sites for water-dependent/related uses.

#### Area 8 - Isthmus Slough

This division takes in Isthmus Slough from Eastside to head of tide near Greenacres, Shinglehouse Slough and Davis

Slough to their heads of tide. Isthmus Slough has certain areas of significant wetland wildlife habitat in the vicinity within the Planning Area.

The shorelands boundary follows the 100 year floodplain and wetlands. In places, the boundary coincides with the railroad, Highway 101 or Olive Barber Road, where they mark the edge of the floodplain.

A significant freshwater wetland lies to the north of Davis Slough. Shinglehouse slough is closely confined by uplands and a narrow riparian strip. On these sloughs, the shoreland boundary follows the 100 year floodplain to the heads of tide and includes the wetlands.

The Shinglehouse Slough Boat Ramp is located where Highway 101 crosses the slough.

#### Area 9 - Coos Bay - North Bend

This area includes the waterfront of Coos Bay and North Bend, including Pony Slough from Coalbank Slough to Empire. The waterfront of Coos Bay and North Bend has been cited as having many potential sites for water-dependent/related uses. The main activity in this area is industrial and commercial use with water-dependent uses predominating. There are also major ship docking facilities.

The shoreland boundary includes a number of potential water-dependent/related sites near the shoreline from downtown Coos Bay to McCullough Bridge at Empire waterfront. Simpson Wayside is located just west of the McCullough Bridge.

Adjacent to Pony Slough is the North Bend Airport. The shoreland area between the airport and Empire is mostly undeveloped, and the boundary is defined by riparian vegetation and the steep shoreline.

Offshore from the city of Coos Bay, west of the airport and south of Empire are dredge spoil disposal islands.

#### Area 10 - North Spit

This division extends from the railroad crossing at Jordan Cove to the north jetty. It is bounded on the north by the Siuslaw National Forest and on the west by the Ocean Shorelands Boundary. The Menasha industrial complex including a docking facility, is in the Jordan Cove area, as is Ore-Aqua, an aquaculture facility. An industrial wasteholding pond lies immediately east of the beach at the point where the North Spit proper begins. Port of Coos Bay land to the south of the waste pond is a potential site for water-dependent use. There is also a potential site at the

southern tip of the spit.

There are numerous areas of significant wetland wildlife habitat throughout this area, most prominent being Henderson Marsh and the area south of the holding pond. There are also large segments of active dune sand. The shoreland boundary follows the 100 year floodplain, wetlands and/or areas of geologic instability to the Ocean Shoreland boundary on the west.

#### Area 11 - Empire/Charleston

This area runs from Empire to, and inclusive of, Charleston. Residential usage is frequent along the shoreline of this area with scattered industrial and commercial use. However, riparian vegetation remains unbroken along large portions of the shoreline from Empire to the Charleston Bridge.

There are a number of potential sites for water dependent use along the Empire waterfront, at Sitka Dock and in and around Charleston.

Charleston is dominated by the boat basin and related enterprises, e.g. boat repair and seafood processing.

The shoreland boundary generally follows the 100 year floodplain or riparian vegetation from Empire south to the Charleston Bridge. The recreational sites are Empire Boat Ramp, Barview Wayside and Charleston Boat Basin.

#### Area 12 - South Slough

This area encompasses South Slough and Joe Ney Slough. A major portion of South Slough comprises the South Slough Estuarine Sanctuary. There are scattered areas of significant wetlands, particularly at the head of the sloughs.

The shoreland boundary follows the 100 year floodplain or riparian vegetation to the head of tide on South Slough, Elliott Creek, Talbot Creek and John B. Creek.

Joe Ney Slough has a unit of significant wetlands in a diked area at its head. At the mouth of the slough and on a part of the northern shoreline are potential sites for water-dependent use.

The shoreland boundary generally follows the 100 year floodplain or riparian vegetation the head of tide.



### 3.5 IDENTIFICATION OF AGRICULTURAL AND FOREST LANDS

Certain areas within the Coastal Shorelands Boundary contain soil classes which, by goal definition, require their protection as agricultural and forest lands. The process used to identify these lands, and the detailed maps describing these areas, are contained within Volume 1 of the Coos County Comprehensive Plan.

4. PHYSICAL CHARACTERISTICS AND BIOLOGICAL RESOURCES

## 4. PHYSICAL CHARACTERISTICS AND BIOLOGICAL RESOURCES

### 4.1 Physical Characteristics

#### 4.1.1 Introduction

This part of the Coos Bay Estuary Plan Inventory summarizes existing knowledge on physical characteristics of the Coos Bay Estuary: physiography, hydrology (including tidal action, salinity and freshwater inflow), sedimentation, water quality parameters and physical alterations. There is an abundance of basic data and technical research available on several of these physical characteristics. This inventory covers only the fundamental principles involved and the most important conclusions drawn from existing research, relying heavily on Oregon Department of Fish and Wildlife (ODFW) summary report "Natural Resources of Coos Bay Estuary" (1979). Special reference is made to the information contained in the mapped inventories. An annotated bibliography lists selected research materials as compiled by ODFW as background for their report.

#### 4.1.2 Dimensions of the Estuary

The surface area of the Coos Bay Estuary has been estimated in various ways, using different tidal datum levels as basis for measurement; see Table 4.1.1.

It should be noted that even the DSL figure does not cover all areas of tideland. Intertidal areas are normally defined as those areas between mean lower low water and mean higher high water (MHHW). Extensive areas of high salt marsh lie between mean high water (MHW) and mean higher high water; It is estimated (Hoffnagle and Olson, 1974) that there are at least 1,000 acres of high marshes in the Coos Bay Estuary. As the figures show, approximately half of the surface area is subtidal and half is intertidal, though the addition of high marshes alters the proportion somewhat.

Coos Bay ranks second in surface area in Oregon estuaries, after the Columbia River Estuary. However, its ratio of tideland to submerged land is much greater (ODFW, (1979), estimated from DSL (1973)). Coos Bay is similar to Tillamook Bay in that both have roughly equal proportions of subtidal and intertidal area, though Tillamook Bay in that both have roughly equal proportions of subtidal and intertidal area, though Tillamook Bay is somewhat less in area. (ibid.) Six estuaries have higher proportions of tideland, but all are much smaller than Coos Bay. This data suggests the relatively great importance of Coos Bay compared to other Oregon estuaries in terms both of total extent and intertidal area.

Other dimensions of the Coos Bay Estuary are shown in Table 4.1.2.

Table 4.1.2: Dimensions of Coos Bay (Source: Johnson (1972))

--distance from throat to farthest estuary shore - 13.4 miles	
--Inlet dimensions at throat (at MSL)	
- width	- 2,060 ft.
- avg. depth	- 29 ft.
- cross sectional area	- 56,500 sq.ft.
- avg. lagoon depth below MSL	- 5 ft.

Table 4.1.1

Estimated surface area of Coos Bay Estuary

Source: percy et al (1974)

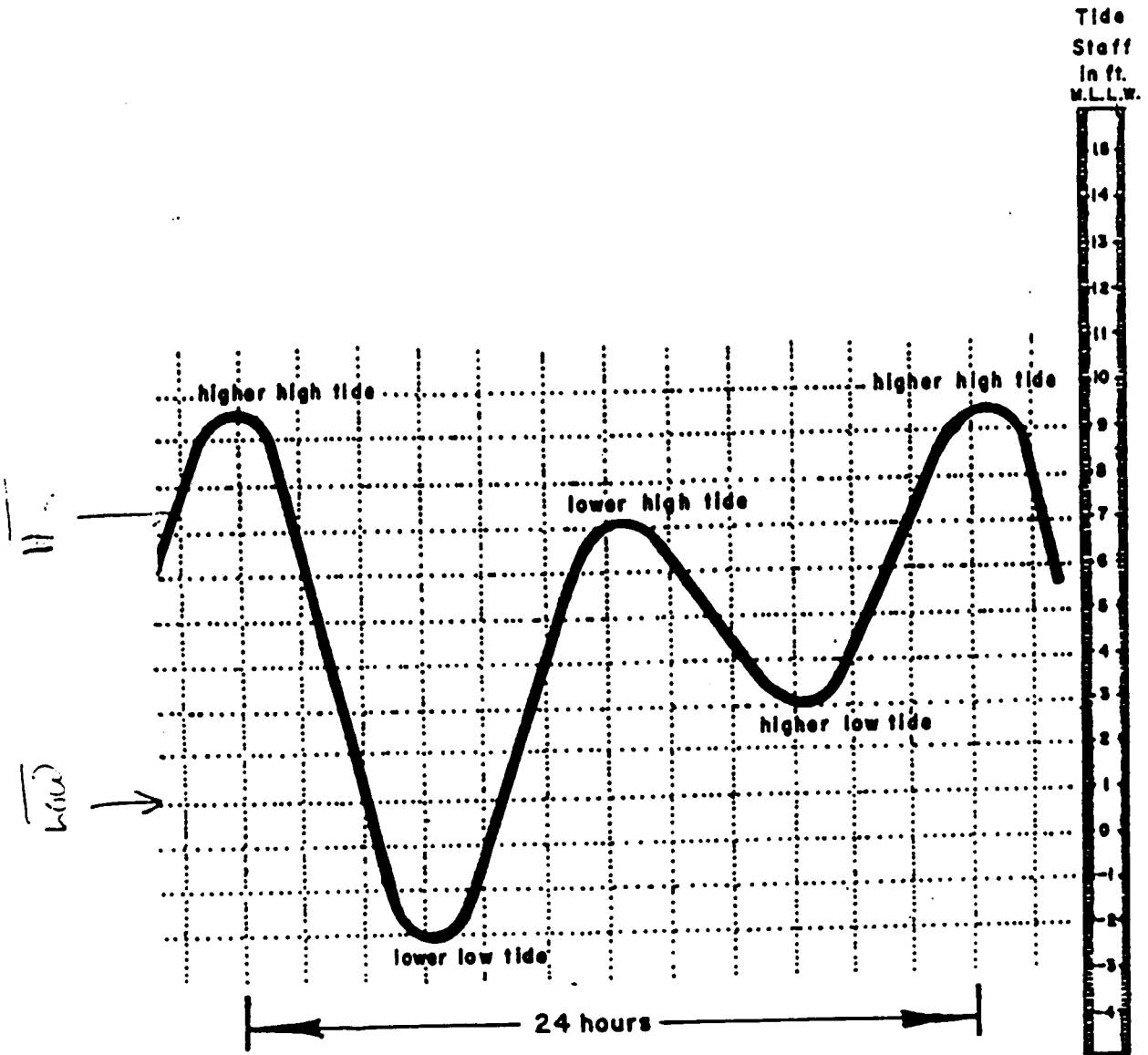
Surface area (ac.)	Measured at	Tidelands		Submerged	
		Ac.	% of total	Ac.	% of total
10,973 *	High water (HW)				
8,242 *	Mean sea level (MSL)				
5,810 *	Low water (LW)				
9,543 +	"area affected by tidal action"	4,569	48%	4,974	52%
12,380~	Mean high water (MHW)	6,200	50%	6,180	50%

Original sources: \* Johnson (1972), + Marriage (1958), ~ division of State Lands

FIGURE 4.1.1

TYPICAL DAILY TIDAL CYCLE FOR MIXED SEMI-DIURNAL TIDE

(Source: DSL 1973)



#### 4.1.3 Dimensions of the Drainage Basin

About 30 tributaries of varying sizes enter the Coos Bay Estuary, from a drainage basin totaling 605 square miles (Percy et al, (1974)). The main tributary, Coos River, is formed by the confluence of South Fork Coos River and the Millicoma River, which in turn has two major forks, the West and East Forks (See Table 4.1.3). Tidal influence extends 32 miles up South Fork Coos River from the estuary mouth, to above Dellwood, and 34 miles up the Millicoma River, to above Allegany on both East and West Forks.

Other small coastal streams enter the estuary through several sloughs, and contribute a much lesser amount of freshwater to the estuary. True heads of tide have been recorded on small tributaries of South Slough, on Catching Slough and several small tributaries of Isthmus Slough. In the other tributaries, saltwater inflow and direct tidal influence have been limited by tidegates, which act as an effective head of tide (See Table 4.1.3). A large number of smaller sub-tributaries are also tidegated, usually at the confluence with the tidal body, particularly on Catching Slough and the Coos/Millicoma system. See "Physical Alterations" map for the location of major tidegates. The extensive system of tidegating and diking for agricultural purposes around various tributaries has greatly reduced the historic extent of tidelands and tidal influence on the estuary, which in turn has profoundly affected the biologic productivity and physical characteristics of tidal action, salinity and sedimentation. The magnitude of the effect on physical processes can only be estimated, as most of these changes occurred before any scientific studies were undertaken.

#### 4.1.4 Physiography

The Coos Bay Estuary resembles an inverted horseshoe in shape. This form has resulted from historical geologic changes. Following the end of the last Ice Age there was a general rise in sea level which drowned existing river valleys. Coos Bay is classified as a "drowned river valley estuary", and exhibits the physical form characteristic of this type: main channel with a "v"-shaped cross section, relatively shallow and gently-sloping bottom and a fairly uniform increase in depth toward the mouth (ODFW (1979) citing Shubel (1971)). The rise in sea level also led to a great increase in sedimentation which has produced the broad expanse of tidal flats and marshes typical of a drowned river valley estuary. The North Spit was formed from sand deposited by "long shore drift" or ocean currents running parallel to the shore.

The mouth of the estuary was subject to changes in form until it was stabilized by early jetty building. Prior to this, the entrance channel was only 10 ft. deep and 200 ft. wide (Army Corps of Engineers, 1975). Currently, the U.S. Army Corps of Engineers maintains a channel entrance which is 47 ft. deep and 700 ft. wide at the bar and decreases to 37 ft. deep and 2300 ft. wide at River Mile 1 (RM 1). Historically, the natural channel had a depth of about 11 ft. depth and 60 ft. width, at Marshfield. There were numerous shoals (ODFW, 1979). The maintained channel is now 37 ft. deep and 300 ft. wide to RM 9, and the same depth and 400 ft. wide to RM 15 (on Isthmus Slough). There are two wide turning basins at North Bend and near the mouth of Coalbank Slough (downtown Coos Bay), and an anchorage basin at RM 5.5. Shallow draft channels are maintained by the Corps on Coos River, South Fork Coos River, and the Millicoma River (for log transportation) and into the Small Boat Basin at Charleston on the South Slough. A shallow draft channel is also privately maintained to RM 17 on Isthmus Slough for log transportation, and above the Charleston Bridge to Hansen's Landing.

Table 4.1.3:

Drainage area, length and head of tide for major  
Coos Bay tributaries [Source: ODFW (1979) and  
Percy et.al. (1974)]

Tributary	Drainage area (sq.mi.)	Length (miles)	Head of tide [See Maps] (miles above estuary mouth)
-Coos River (Mainstream)	10	5.5	-
-S. Fork Coos River	254	31.3+	32
-Millicoma R. (Mainstream)	17	8.7~	-
-E. fork Millicoma R.	79	23.9	34
-W. fork Millicoma R.	55	34.9	34
<b>TOTAL DRAINAGE</b>	<b>415</b>		
-Catching Slough		12	12
	109.2		
-Isthmus Slough		10	10 (at tidegate)
-Coalbank Slough	6.2	n.a.	n.a. (at tidegate)
-Haynes Inlet	11	n.a.	n.a. (at tidegate)
-Kentuck Inlet	17	n.a.	n.a. (at tidegate)
-North Slough	12.8	n.a.	n.a. (at tidegate)
-Willanch Slough	7.8	n.a.	n.a. (at tidegate)
-South Slough	26	n.a.	n.a.
<b>TOTAL DRAINAGE</b>	<b>605</b>		

\*To confluence of South Coos and Millicoma River.

+ To confluence of Williams R. and Tioga Creek.

~To confluence of East and West Forks.

Other major alterations on the bay include the north and south jetties, and the Charleston breakwater and Small Boat Basin. Extensive diking, tidegating and filling have caused major changes in the shape of the estuary and this has had secondary effects on physical processes. In particular, there have been changes in patterns of erosion and deposition of sediment, and channel shifts (see Section 4.1.6).

National Ocean Survey (NOS) charts (1972) show soundings in the navigable part of the estuary plus the smaller tidal channels. [See Map "Water Contours, Selected Channel Depths, and Maintained Channel."] The Army Corps of Engineers have charts available showing soundings in the authorized channel following the Deep Draft Navigational Project. The South Slough bottom topography is separately mapped by the Corps from soundings made in 1977. Bottom topography in the shallow mud flat areas and the tidal rivers is less well-known.

The Estuarine Resources Goal #16 requires that plans identify "deep water areas adjacent or in proximity to the shoreline," for designation as Development Management units. On the Coos Bay Estuary, these areas are generally found where the maintained channel passes close to shore. [See Map "Estuarine Areas Qualifying as Development Management Units."] The main area lies between McCullough Bridge (RM 9.7) and the end of the authorized channel (RM 15), and includes the entire North Bend/Coos Bay waterfront, currently the area of most intense water-dependent development. However, the channel also passes close to shore on the west side of the estuary between RM 5.5 (opposite the anchorage basin) and the Roseburg Lumber chip-loading facility at RM 8. At RM 5.5, the estuary narrows and Empire Docks are also close to the maintained channel. The area between the channel and Sitka Dock is also considered "deep water adjacent or in proximity to the shoreline". Smaller areas which fit this criterion are found between Hanson's Landing and the private channel south of Charleston Bridge, on both sides of the channel on Isthmus Slough north of Eastside Bridge, and adjacent to the Sause Brothers barge building site near Eastside [see Map].

#### 4.1.5 Hydrologic Characteristics

##### 4.1.5.1 Introduction - Tidal Cycle and Tidal Range

The technical terms for tidal levels need to be explained in order to discuss tidal processes in Coos Bay. Like all estuaries on the West Coast, Coos Bay's tides are of the "mixed, semi-diurnal" type [See Figure 4.1.1 for typical daily tide]. This means that there are two high and two low tides during each "tidal day" (about 24.8 hours). There is a marked variation in height between the two high tides and the two low tides. The tidal cycle is governed primarily by the phases of the moon, and to a much lesser extent by those of the sun and planets. The shortest cycle is the 28 day "lunar month". However, there is a complex interaction of other lunar cycles of much greater length. The entire tidal cycle used by the National Ocean Survey to calculate all the subtler variations in tidal levels is 18.6 years in length. Over this entire tidal cycle, there are considerable variations in the "strength" of gravitational forces which bring about higher and lower tidal extremes.

Tidal terms are defined in Table 4.1.4:



TABLE 4.1.4 Definitions of Tidal Terms (Source: DSL 1973)

**Extreme High Tide** - The highest projected tide that can occur. It is the sum of the highest predicted tide that can occur. It is the sum of the highest predicted tide and the highest recorded storm surge. Such an event would be expected to have a very long recurrence interval. In some locations, the effect of a rain-induced freshet must also be taken under consideration. The extreme high tide level is used by engineers for the design of harbor structures.

**Highest Measured Tide** - the highest tide actually observed on the tide staff.

**Highest Predicted Tide** - Highest tide predicted by the Tide Tables.

**Mean Higher High Water** - The average height of the higher high tides observed over a specific time interval. The intervals are related to the moon's many cycles which range from 28 days to 18.6 years. The time length chosen depends upon the refinement required. The datum plane of MHHW is used on National Ocean Survey charts to reference rocks awash and navigational clearances.

**Mean High Water** - The average of all observed high tides. The average is of both the higher high and of the lower high tide recorded each day over a specific time period. The datum of MHW is the boundary between upland and tideland. It is used on navigational charts to reference topographical features.

**Mean Tide Level** - Also called half-tide level. A level midway between mean high water and mean low water. The difference between mean tide level and local mean sea level reflects the asymmetry between local high and low tides.

**Local Mean Sea Level** - The average height of the water surface for all stages of the tide at a particular observation point. The level is usually determined from hourly height readings.

**Mean Sea Level** - A datum based upon observations taken over a number of years at various tide stations along the west coast of the United States and Canada. It is officially known as the Sea Level Datum of 1929, 1947 adj. and is the most common datum used by engineers. MSL is the reference for elevations on U.S. Geological Survey Quadrangles. The difference between MSL and Local MSL reflects numerous factors ranging from the location of the tide staff within an estuary to global weather patterns.

**Mean Low Water** - The average of all observed low tides. The average is of both the lower low and of the higher low tides recorded each day over a specific time period. The datum of MLW is the boundary between tideland and submerged land.

**Mean Lower Low Water** - the average height of the lower low tides observed over a specific time interval. The datum plane is used on Pacific coast nautical charts to reference soundings.

**Lowest Predicted Tide** - The lowest tide predicted by the tide Tables.

**Lowest Measured Tide** - The lowest tide actually observed on the tide staff.

Extreme Low Tide - The lowest estimated tide that can occur. Used by navigational and harbor interests.

The Corps of Engineers calculates that the mean tidal range (to Mean High Water) is 6.7 ft. above MLLW at the Coos Bay entrance and 6.9 ft. at the City of Coos Bay. The Highest Predicted Tide is 10.5 ft. above MLLW. Extreme Low Water (ELW) is predicted to be - 3.0 ft. below MLLW.

Tidal range predictions are based on data taken over 40 years ago. Arneson (1976) found that measured tidal ranges at the channel entrance were consistently greater than predicted ranges, though the error was usually less than 15%. This means that high tides were higher and low tides, lower. The same results were found at City of Coos Bay. He hypothesized that extensive spoil islands and fills which have reduced the surface area of the bay since the original calculations were made, are the cause of the greater tidal ranges. Although the channel has been deepened, which might be expected to offset the effect of the fills, Arneson theorized that this has produced a more "hydraulically efficient" cross-section, so that there is less "drag" or "dampening" exerted on the tidal wave as it sweeps through the bay. Since Arneson's measurements, the channel has been further dredged to its present 37 ft. depth, but the effects of this work on tidal range have not been assessed.

The rate of progress of the tidal wave means that the high and low tides occur progressively later the further from the mouth. Arneson (1976) found that lag times are variable and difficult to predict for any given location on the estuary, but that seasonal variations in river flow seem to affect lag times. For instance, a high freshwater inflow will tend to counteract the tidal flow and cause a greater than normal lag time. Arneson also compared his measurements of timing of high and low tides to those predicted by the National Ocean survey. At the mouth, actual tides were generally a little earlier than predicted but within 20 minutes of predicted times 80% of the time. However, tides were considerably earlier than predicted at the City of Coos Bay, with only 25% falling within 20 minutes. The Corps of Engineers (1973) stated the official predicted time of high tide is 1 ½ hours later at downtown Coos Bay than the mouth. Arneson again suggests that channel deepening may be responsible for this change, as 'shallow wave theory' predicts that tidal waves move more rapidly at increased depth due to decreased frictional "drag". Measurements have not been made since completion of the Deep Drat Navigational Project. The significance of the discrepancy between measured and predicted tidal ranges and timing cannot be entirely ignored, particularly for future substantial deepening of the channel. It means that navigators negotiating the channel with fully loaded ships, relying on high tide for sufficient clearance, may have to allow a wider margin of error when using the official tidal charts.

#### 4.1.5.2 Tidal prism and circulation

The "tidal prism" is an expression of the volume of water which fills the entire estuary between high and low tide. It is an important indicator of the amount of tidal mixing of fresh and saline water that occurs and of the resultant biological production. Johnson (1972) calculated the tidal prism for Coos Bay based on a mean surface area between "high water" and "low water" of 10,973 acres and a mean tidal range of 5.2 ft., as  $1.86 \times 10^9$  cu. ft. While other figures could be calculated based on different tidal levels (e.g. between MLLW and MHHW), it is significant that Coos Bay has the second largest tidal prism (next to Tillamook Bay) of 12 Oregon estuaries. (ODFW 1979) The Columbia River is excluded.

The tidal flow generates substantial tidal currents in the Bay. The Corps of Engineers (1975) states that the average tidal current at City of Coos Bay is 3.4 ft. per sec. (fps) and that flood tide currents as high as 5.7 fps have been measured.

Arneson (1976) studied the relationships of flow and velocity to tidal heights to determine the type of tidal wave exhibited by the Coos Bay Estuary. All estuaries have both 'standing wave' and "progressive wave" components of the tidal wave. However, one may be dominant. These terms may be explained in simplified terms as follows;

'Progressive wave' - This wave is produced up the estuary. The highest velocity of the currents it produces occur at the peak of the flood tide and the trough of the ebb tide. Tidal range decreases up-stream where this type of wave is dominant, because of the effects of friction. The progressive wave is usually dominant in a riverine type of estuary like the Coquille River, or the Coos River section of Coos Bay.

'Standing wave' - the 'standing wave' is found where the tidal wave energy is reflected off the estuary shore; and the reflected wave is of the same strength and period as the wave moving upstream. Reflected waves occur in all estuaries, but the true standing wave is normally found only in bays. Often, as in Coos Bay, a standing wave increases the tidal range up-bay from the mouth, because it adds energy to that of the tide. Coos Bay also exhibits a progressive wave. A third type, exists, the "co-oscillating wave", in which the tidal wave is reflected at the head of the estuary on its various tributaries. The tidal wave is a combination of the incoming tidal force and the reflected wave similar in theory to the standing wave. However, Arneson concluded that even co-oscillation theory does not fully explain the motions he observed in Coos Bay. The complex geometry of the bay, including the effect of its several major tributaries, probably explain why Coos Bay cannot be defined according to conventional models of wave forms.

#### 4.1.5.3 Tidal Mixing and Salinity Characteristics

Ocean tides provide the principal source of energy for the mixing of saline and freshwater which gives rise to the patterns of salinity typical of an estuary. The tributaries provide freshwater inflow and the seasonal variations in rates of flow greatly affect mixing patterns and salinity levels. The most important physical principle to bear in mind is that saltwater is denser than freshwater: there is, therefore, a natural tendency for salinity to be higher at the bottom than at the surface in the absence of other influences.

There are three basic types of mixing patterns in Oregon estuaries, each of which may be exhibited in the same estuary at different times of the year (Burt and McAllister, 1958). These are as follows:

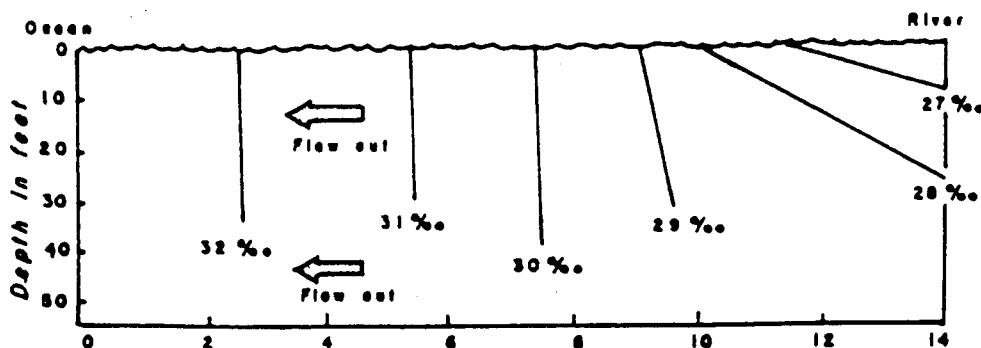
- 'Stratified' or "Two layered" system - In this type of pattern, there is a pronounced layer of undiluted saline water at the base, which moves up and down the estuary with the tide like a "salt wedge". Little mixing occurs between this layer and the practically freshwater upper layer. This condition occurs normally where the freshwater inflow is great compared to saltwater inflow: the classic example of a vertically stratified estuary is the Mississippi system, where the tidal range, and consequently the tidal energy, is very small compared with the vast inflow.

- 'Partly mixed' system - In a 'partly mixed' estuary, there is a degree of mixing of salt and freshwater, but there is still a marked difference in salinity between surface and bottom. In this type of system, tides provide enough energy to cause turbulence and mixing within the water column. The different densities of the salt and freshwater contribute to the turbulence. However, freshwater inflow is sufficiently great compared with tidal inflow to maintain a distinct salinity gradient from top to bottom.
- 'Well-mixed' or 'Vertically homogenous' system - In a 'well-mixed' estuary, conditions are the reverse of the 'vertically stratified' estuary. Fresh-water inflow is relatively small compared to the tidal inflow. Tides provide enough energy to cause turbulent mixing throughout the entire water column, together with the effect of density. Salinity levels are within a few parts per thousand at top and bottom.

As pointed out by Burt and McAllister (1958) one of the factors which determines the type of mixing pattern is the 'flow ratio', which is the ratio of the volume of freshwater inflow during a half-tidal cycle to the tidal prism. Where the ratio is 1.0 or more, with a high fresh water run-off, a two-layered system results. Where the run-off is smaller (flow ratio of 0.2 - 0.5) the estuary is likely to be partly mixed. Where run-off is low (flow ratio of 0.1 or less) the estuary is probably 'well-mixed'. The energy provided by the tides for mixing is approximately proportional to the square of the tidal range. There is, therefore, about 108 times more energy in the Coos Bay Estuary (mean tidal range 5.2 ft) than in the Mississippi system (tidal range 0.5 ft.) available for mixing. Thus, completely stratified conditions are rarely found to occur in Coos Bay.

Burt and McAllister (1958) characterize Coos Bay as essentially a 'well-mixed' estuary for all months except November, when it was 'partly-mixed'. They define 'well-mixed' on the basis of a vertical salinity change from top to bottom of 3 parts per thousand (ppt) or less, and partly mixed as 4-19 ppt. These measurements were taken at the point where mean salinity was 17 ppt or half fresh and half saltwater. However, a longitudinal study showed that in October the estuary was well mixed up to RM 10 and tending to be partly mixed above RM 10, in spite of a low river flow. [See Figure 4.1.2]

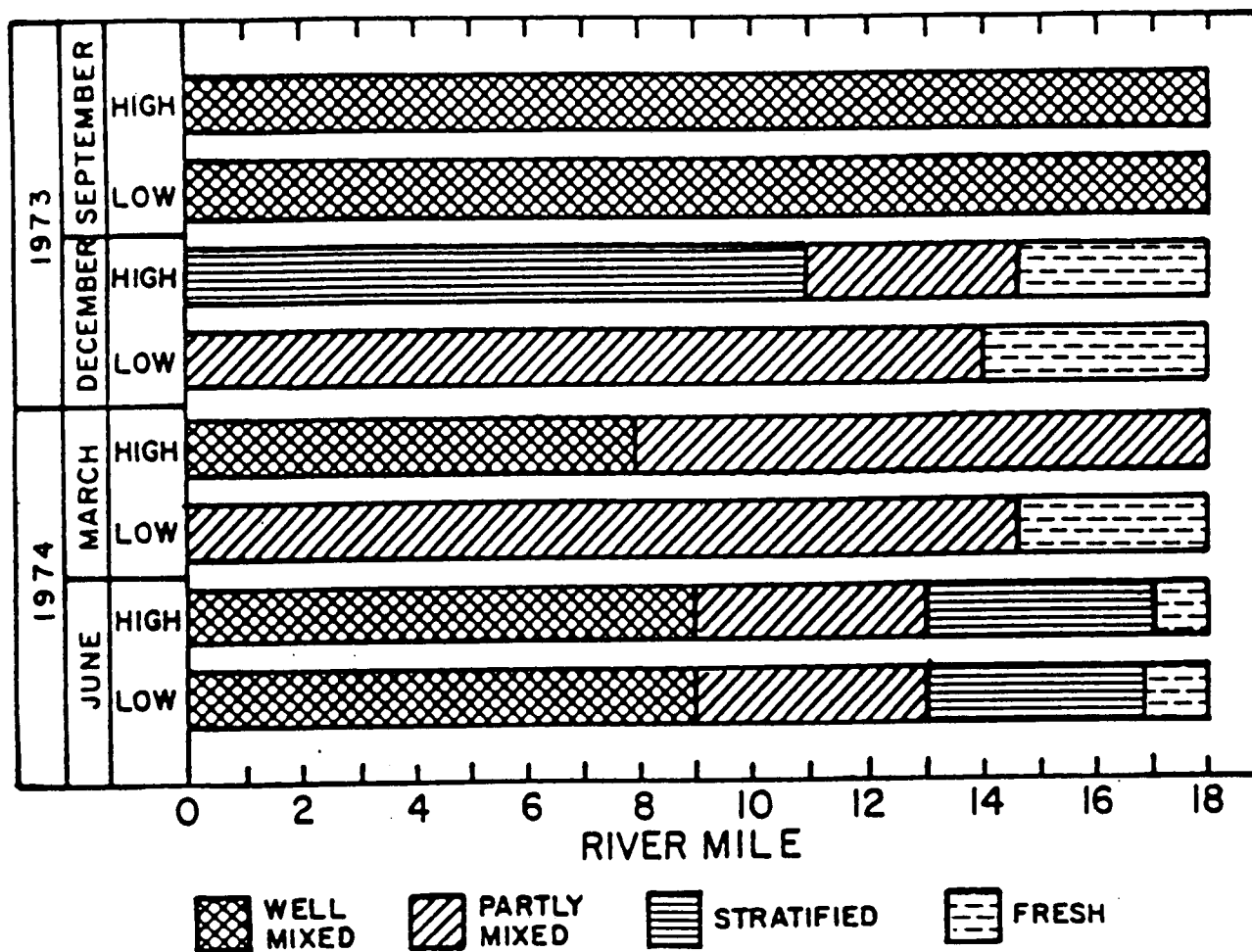
FIGURE 4.1.2  
Vertical distribution of salinity in Coos Bay Estuary: Cross section from ocean to river, October 5, 1957



Nautical miles upstream. Source: Burt and McAllister (1958)

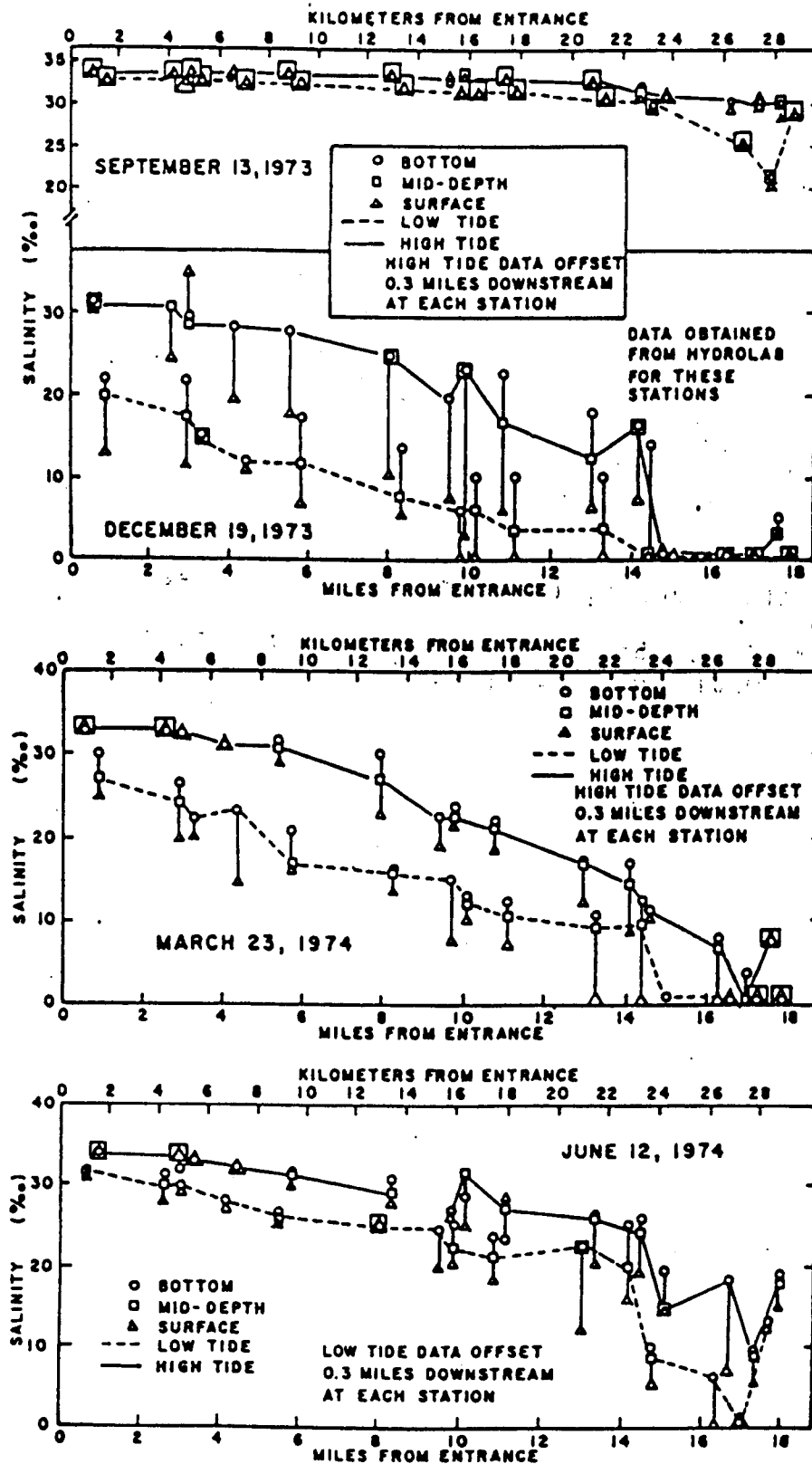
Arneson (1976) used both 'flow-ratio' and salinity gradient methods and classified the entire estuary as one mixing type. However, his studies of mixing characteristics from the mouth to River Mile 18 for September and December, 1973 and March and June 1974 show some variations from the broad classifications of Coos Bay as a 'well-mixed' estuary. [See Figure 4.1-3]. There is a consistent change in mixing patterns between RM 14 and RM 15, in the Marshfield Channel near where Coos River enters the bay. There is also an apparent zone of change at RM 8-9. This may be related to changes in estuary shape at these points (ODFW, 1979).

FIGURE 4.1.3  
Coos Bay mixing characteristics 1973-74, at high and low tide



Source: Arneson, 1976

FIGURE 4.1.4  
 Salinity versus distance from entrance and depth, Coos Bay (Source: Arneson, 1976)



As Figure 4.1.3 shows, in December at high tide the estuary was stratified, probably due to unusually high fresh-water inflow and relatively weak tides. However, the estuary was either well-mixed or partly-mixed up to at least RM 13. Freshwater intrusion occurred beyond the mouth of Coos River in December and March. Figure 4.1.4 shows basic salinity data on which Arneson's determination of mixing characteristics was based.

Tidal flushing is an important physical function to understand in relation to water quality, because it governs the duration of a pollutant within the estuary. The 'flushing time' may be defined as that time necessary to replace the freshwater flow (Arneson, 1976, quoting Dyer, 1973). River flow is not the only factor affecting the flushing time, however. The varying tidal range, as it affects the tidal prism, is also of major importance (Arneson, 1976). The higher the tidal range and freshwater inflow, the less the flushing time. Arneson calculated the flushing rate for several locations in the estuary for each season. He found that a "modified tidal - prism" method gives the most consistent results when the estuary is well-mixed. Results are shown in Table 4.1.5 below. Arneson considered the September results to be most accurate, because the estuary was well-mixed throughout at this time.

The June 12th flushing rates are probably unrealistically slow because the small tidal range measured on that date would not have been continuous for the duration of the flushing period. Arneson suggested using the most conservative flushing rate when calculating pollutant transfer. It is significant that flushing from the upper bay (17.3 miles) could take as long as 23 days during periods of low flow, even with a high tidal range, and longer with a low tidal range.

#### 4.1.5.4 Fresh-water Inflow

Measured data for fresh-water flow in the Coos Bay system is restricted to a U.S.G.S. gauging station on the West Fork of the Millcoma River. Estimates of freshwater inflow at the mouth of Coos River have been made by extrapolating these data to the entire drainage basin, correlating drainage area and rain fall statistics with observed rates of flow. Percy et al. (1974) have estimated average annual discharge at the mouth of Coos Bay at 2.2 million acre feet of water. [An acre/foot is the volume of water needed to cover an acre one foot deep.] This is the equivalent of approximately 300 cubic feet per second. According to ODFW (1979), using this figure as an average, an annual maximum flow at the mouth of 3.044 million ac/ft. and a minimum of 1.56 million cu.ft. may be estimated from the data in Percy et al. (1974). These figures are the equivalent of about 420 cu.ft./sec. and 215 cu. ft./sec. respectively.

Rainfall records for North Bend weather station show that January is the wettest month, averaging 9.9 inches, and July is the driest with an average of 0.38 inches. [Corps of Engineers, 1975]. Freshwater inflow extremes may range from as much as 100,000 cu. ft. per second in the winter during and after heavy storms to 100 cu. ft./sec. in September 1973. Watershed characteristics of the drainage basin dictate a pattern of high flow during the winter, and early spring, with a very low rate of flow in the late summer and early fall. There is no significant snow pack, so run-off follows the pattern of precipitation. Soil retention of rainfall is not great. Data compiled by ODFW (1979) comparing average monthly precipitation with average monthly discharge suggests approximately a one-month lag between peaks of precipitation and run-off. [See Figure 4.1.5] this is accounted for by the amount of precipitation which is retained in the soil rather than running off directly into streams.

FIGURE 4.1.5

Average monthly precipitation in North Bend and average monthly discharge of Coos River at the mouth. Sources: Corps of Engineers (1975) and Oregon State Water Resources Board (1963).

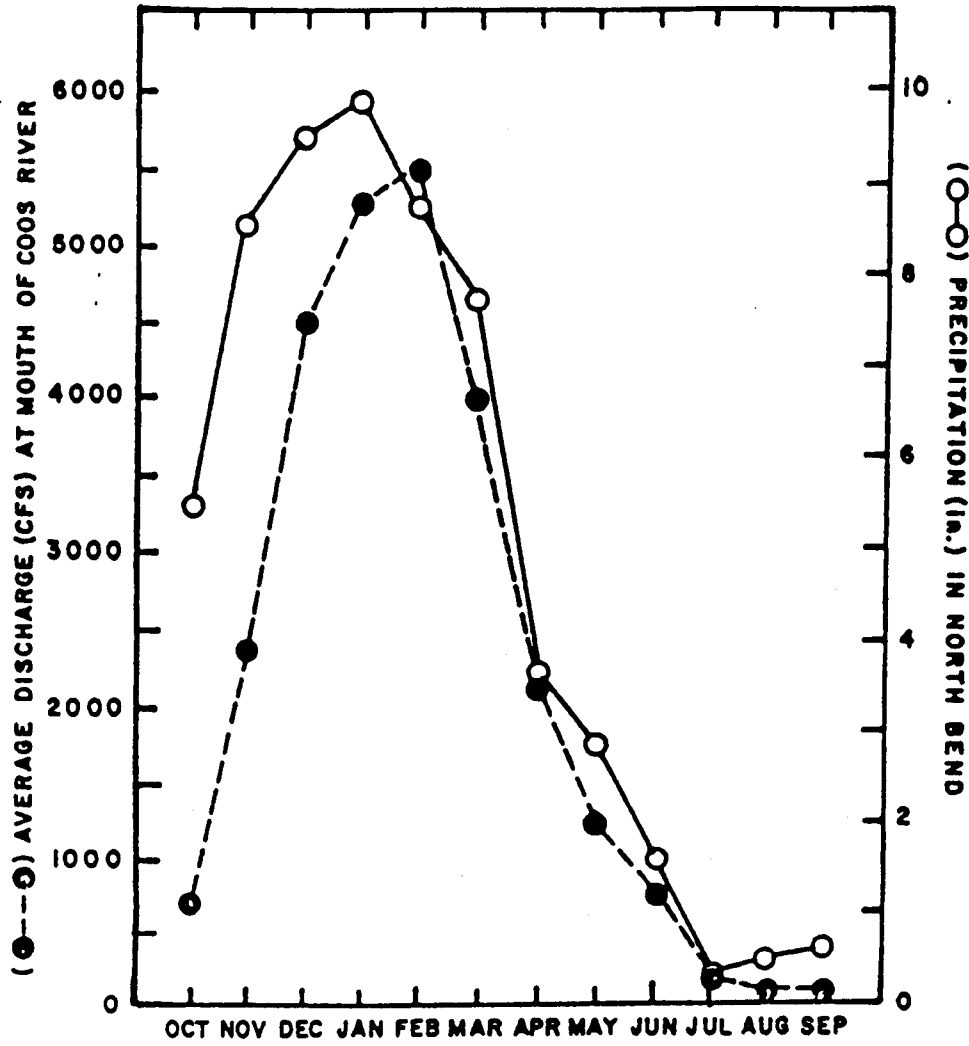




TABLE 4.1.5: Calculated flushing rates using the "modified tidal prism" method. [Arneson 1976]

Date	Tidal Range (ft.)	Flow (cfs)	Distance (miles)	Flushing Time in Days		
				7.6	17.3	27.
Sept. 13, 1973	7.9	27.9		9.7	22.9	40.
Dec. 19, 1973	5.9	3,814		6.2	11.8	13.
Mar. 23, 1974	7.2	1,074		8.2	14.4	15.
June 12, 1974	3.3	431		19.0	41.3	48.

As discussed in Section 4.1.5.3 above, the variations of freshwater inflow have a profound influence on the mixing and salinity patterns of the estuary. These patterns, in turn, influence the distribution of biological resources in the estuary.

#### 4.1.6 Sedimentation processes

The sedimentation process is controlled by hydrology. The basic principles of sediment erosion transport and deposition are governed by sediment grain size and the velocity of currents. The more rapid the velocity of the water the larger the size of sediment it is able to transport, and the more energy is available for erosion. At a given velocity, the currents may be capable of eroding and transporting finer material, while coarser material is deposited. Zones of deposition occur where a drop in current velocity regularly occurs. This will often occur on the inside edge of bends in a stream. In bays, this may occur where the cross-section suddenly becomes broader and shallower.

Coos Bay is an 'aggrading' system: that is, more sediment enters than is removed by natural transport. This is a common natural process in estuaries, where over geologic time the level of marshes is gradually rising due to inflow of naturally occurring sediments from the basin. However, this process has been accelerated in modern times by human activities in the watershed. In the early 1900's splash-damming in the Coos River system caused huge volumes of sediment to be transported and deposited in the base. (Aagard et al. 1971).

According to the Corps of Engineers (1970), prior to the Deep-Draft Navigation Project, channel maintenance dredging removed an annual average of 1.65 million cubic yards of material from Coos Bay. The channel between downtown Coos Bay and North Bend has historically required the largest volume of dredging, due to the deposition of river-borne sediments from the Coos River system. According to Aagard et al. (1971), dredging records between 1958 and 1970 show that an annual average of 500,103 cu. yds. were removed from the Coos Bay-North Bend reach, while only 135,064 cu. yds. were removed between the Upper Jarvis Range and North Bend, a similar length of channel.

Sediments entering the bay are as follows:

1. Sediment derived from stream erosion in the drainage basins of tributary streams, mainly silts.
2. Marine sand carried into the channel entrance by littoral draft and tidal currents.
3. Sand blown into the bay from unstabilized or semi-stabilized dunes on the North Spit.

4. Sand from erosion of sandstone cliffs in lower bay and South Slough (ODFW, 1979)

According to the Corps of Engineers (1975) from the channel entrance to approximately RM 12, sediments are predominantly fine sand. This corresponds in large part with the substrates of adjacent tidal flats as mapped by ODFW as part of their estuarine habitat study. (See Substrate Characteristics map). From RM 12 to RM 15, between North Bend and Coos Bay, sediments are mostly river-borne silts, clays and organic fines. Above RM 15 in the slough and river systems, sediments are silty.

Arneson (1976) has applied the concept of "realms of deposition" to Coos Bay, based on the above observations of the Corps of Engineers. He theorizes that a 'marine' and a "transition" realm extends to about RM 12, dominated by sediments brought in from the ocean. Above RM 12 a "fluvial" realm is dominated by river-borne sediments.

According to the Corps of Engineers (1976), sediment deposition is known to occur in the following locations: the entrance to the Charleston Channel, adjacent to the disposal islands west of North Bend airport, in Jordan Cove, east of the upper Coos Bay channel, and at the mouths of Pony Slough, North Slough and Haynes Inlet. As mentioned above, the upper channel itself also experiences heavier sedimentation than the lower channel. Aagard et al (1971) also noted deposition and shoaling in the Marshfield Channel. This, they suggest, has occurred because extensive diking in Catching Slough has decreased the tidal prism and flushing action in this area. Their study of historical changes in channel positions and depths in the Coos River mouth area shows changes in erosion and deposition patterns and suggests that the Coos Channel may be gradually sealing itself off by sediment accretion, and that the river channel adjacent to Bull Island is deepening and may be gradually changing course. This entire area is one of considerable dynamic changes, due to the amount of fresh water and sediment inflow occurring at a point of transition between the narrow river and the broad bay. They suggest that the river may one day change its course enough to direct much of its flow and deposit large volumes of sediment on the broad mud flats north of the Marshfield channel, with attendant biological impacts.

The Corps of Engineers (1976) theorizes that a semi-closed sediment transport system operates between RM 2 and RM 12. This is the area where dredged materials from channel maintenance have in the past been disposed of at in-bay sites. During recent years, the amount of material removed has been relatively stable, and shoals have recurred in the same locations. Thus, a continuous system has apparently been set up whereby dredged materials are gradually transported back into the channel. It is unknown what effect deepening of the channel or disposal of dredged materials in the ocean or on land would have on this system. Ocean sediments are thought to accumulate mostly below RM 2, with only minor input into the system upstream, while river sediments originating upstream of RM 15 appear to be trapped in the upper channel between RM 12 and RM 15 where the Corps have performed five foot over depth dredging (advance maintenance dredging) in the past.

Distinct differences in the chemical properties of the sediments are found, which correspond closely with the "realms of deposition" mentioned above. Stevens, Thompson and Runyan (1972) found that sediments below RM 10 met standards for in-water dredged material disposal, while those above RM 10 failed to meet those standards. The Corps of Engineers (1975) found that above RM 12, sediments exceeded EPA standards for in-bay disposal for grease and oil, volatile solids, nitrogen and phosphorus. However, they may be suitable for ocean disposal. This means

that upper bay dredging requires a continuing supply of upland dredged material disposal sites. (See Special Dredged Material Disposal Element, Section 7.)

#### 4.1.7 Physical Alterations

##### 4.1.7.1 Historical Overview

Changes to the Coos Bay Estuary by means of dredging, fill or diking, have occurred since the late 1800's. The first landfill was in the vicinity of Eastside. Most landfills are the result of dredging necessary to create and maintain channels.

In the 1890's part of the channel from Coos River turned north at Graveyard Pt. and up the east side of Bull Island along Cooston Channel. It intersected the main channel opposite the City of North Bend. The other Coos River channel joined Catching Slough to form Marshfield Channel. At the confluence of Coos River and Catching Slough, depths were from 18 to 20 feet and maintained by strong tidal flushing. By the 1940's, diking of Catching Slough was substantial enough to decrease both tidal transport and speed through Marshfield Channel. (Aagard et al, 1971)

Table 4.1.7 gives an overview of the major changes to the Coos Bay Estuary.

##### 4.1.7.2 Filled Lands

There are 1,259 acres of land fill in former submerged and submersible lands in the estuary. The following table shows changes resulting in loss of salt marshes between 1890 and 1970. Changes are the result of fill or diking.

In areas around Haynes Inlet, Palouse Slough, Larson Slough, North Slough and especially Catching Slough, extensive diking has been used for the creation of agricultural lands. Areas in South Slough and North Slough were also diked, but some of this land has reverted back to salt marsh habitat due to aging and disrepair dikes and tidegates allowing some tidal influence. This has also happened to a lesser extent in parts of Catching Slough and Isthmus/Davis Sloughs. There has been filling throughout the estuary for industrial, residential or commercial usage. See the inventory map "Historical Analysis of Bay Changes". This map has been updated through analysis of 1978 aerial photos.

##### 4.1.7.3 Jetty Construction

As outlined in Table 4.1.7, Jetty construction began in 1891 (North Jetty) and in 1899 (South Jetty). Between 1924-1929, both jetties were extended and between 1939-1942 both were restored. The outer portion of the North Jetty was repaired in 1957-1958 and the South Jetty was repaired in 1963-1964. The outer portion of the North Jetty was again repaired in 1970.

There is no available data to document any changes in sand transport, deposition or wave energy dissipation resulting from jetty construction. But by comparing the 1863 and 1971 shoreline, it is evident that sand deposition has increased behind each jetty, especially on the north side of the North Jetty.

Table 4.1.6  
**MAJOR HISTORICAL PHYSICAL ALTERATIONS TO COOS BAY ESTUARY**

1880-1899	Fossil point Jetty built.
1888-1926	Coalbank Slough used for spoils disposal.
1891	North Spit sand dunes planted with beach grass.
1891-1894	North Jetty constructed.
1894	Dredge entrance channel to -20 feet.
1899-1900	South Jetty constructed to length of 2,700 feet.
1900-1901	Outer 3,000 feet of North Jetty repaired.
1892-1905	North Spit high water line (HWL) moved west 2,700 feet; south tip moved south 1,500 feet; low water line (LWL) moved south 2,000 feet (250 feet/year).
1914	North Spit sand dunes planted with 720 acres grass
1917	Entrance channel dredged to -27 feet, the bar channel dredged -30 feet, and the navigation channel dredged to -22 feet to Smith's Mill.
1924-1928	South Jetty extended.
1924-1929	North Jetty extended.
1925	Between Coos Head and Tunnel Point, LWL advanced 200 feet.
1905-1935	North Spit moved west 1,300 feet in 1905-1935; LWL moved seaward 200 feet (43 feet/year).
1937	Entrance channel dredged to 24 feet.
1939	North western portion of Pony Slough filled for airport.
1939-1940	North Jetty restored.
1941-1942	South Jetty restored.
1946	Southern end of Pony Slough filled for commercial reclamation of eastern side of slough.
1949	Entrance channel to RM 4.5 dredged to 30 feet.
1952	Entrance dredged to 40 feet to Guano Rock (30 feet there).
1956	Connecting channel to Charleston dredged to -10 feet.
1956-1957	Charleston Boat Basin constructed.
1957-1958	Outer 2,940 feet of North Jetty repaired.
1960	Part of submerged jetty removed.
1963-1964	Outer 3,423 feet of South Jetty repaired.
1966	Addition to Charleston Boat Basin.
1970	Channel in So. Slough to Hwy Bridge dredged to -10 ft. Outer 2,940 feet of no. Jetty repaired.
1978	Coos Bay entrance dredged to -45 feet, channel to -35 feet (increase of 5 feet).
1998	Coos Bay entrance dredged to 47 feet, channel to 37 feet

SOURCE: Charleston Breakwater & Groin Structure Draft EIS.  
U.S. Army Corps of Engineers (1978)

Table 4.1.7 ACREAGE OF FILLED OR DIKED SALTMARSHES LOST TO ESTUARY

		1892	1970	LOST
1.	Pony Slough -	247 acres	55.9 acres	191.1 acres
2.	Coalbank Slough -	597 acres	63.9 acres	533.1 acres
3.	Kentuck Slough -	175.9 acres	27.1 acres	148.8 acres
4.	Willanch Slough -	109.5 acres	5.6 acres	103.9 acres
5.	Catching Slough -	943.9 acres	145. acres	798.9 acres
6.	Isthmus Slough -	334.5 acres	57. acres	277.5 acres
	TOTALS:		354.5 acres	2053.3 acres

SOURCE: Hoffnagle and Olson (1974)

#### 4.1.7.4 Channel Dredging [Source: Channel Maintenance Dredging, Coos Bay. Final EIS. U.S. Army Corps of Engineers, (1976)]

Dredging began in the late 1800's and has continued since. The entrance channel was initially dredged to a depth of 20 feet in 1894, to 24 feet in 1937, to 40 feet in 1952 and to 45 feet in 1978. Between 1978 and 1998 the depth has been dredged to 47 feet. The main channel was dredged to 24 feet in 1937, to 30 feet in 1951 and to 35 feet in 1978. Between 1978 and 1998 the depth has been dredged to 37 feet. There is a 5-foot over depth advanced dredging in the upper channel (RM 12.0-15.0) to assure proper depth between 3 to 4 year dredging intervals.

Isthmus Slough was dredged to a depth of 22 feet in 1951 and has been maintained since then by private parties. A channel depth of 5 feet on the Coos, Millicoma and South Fork Rivers was completed in 1966 and is maintained at that depth to Allegany and Dellwood respectively.

In 1956 the connection channel to Charleston was dredged to 10 feet and between 1956 and 1998 the depth has been dredged to 17 feet; and between 1956 and 1958 the Boat Basin was constructed with space for 244 boats. An additional 300 spaces were constructed in 1966 for a total of 544 available spaces. In 1970 the channel in South Slough to the highway bridge was dredged to 10 feet. Between 1977 and 1978 the sand spit located along the northern edge of the breakwater (Adams Point) disappeared, due to storm wave action.

The following is a listing of the annual average volume of material removed from different sections of the channels, before the 1978 project to increase the depth of the main shipping channel.

Entrance Channel - RM 0.0 - 0.8  
820,000 cu. yds.

Charleston Channel - RM 2.0  
30,000 cu. yds.

Lower Channel - RM 0.8 - 12.0  
350,000 cu. yds.

Upper Channel - RM 12.0 - 15.0  
450,000 cu. yds.

Isthmus Slough - Dredging done by private parties - no data

Coos & Millicoma Rivers - RM 0.0 - 5.5 to forks; RM 0.0 - 8.0  
22,000 cu. yds. on Millicoma and South fork Coos

#### 4.1.7.5 Other Alterations

Other alterations which have occurred throughout the Coos Bay Estuary include pilings, waste outfalls, bulkheads, docks and bridges. Pilings are most numerous around docking facilities on the Empire/North Bend and Coos Bay Waterfronts on Isthmus Slough, Catching Slough and the Coos and Millicoma Rivers. There are ten waste outfall sites located throughout the bay. Docks and associated bulkheads are mainly on the upper bay waterfront with others in the North Spit

and Empire areas. Bridges are along main highways and roads which cross the estuary, sloughs or rivers.

#### 4.1.7.6 Effects of Bay Alterations

There has been limited research to document changes that have occurred due to bay alteration. Most of the available information was speculation on probable changes.

Filling on submersible lands or the intertidal zone can have an indirect effect on the physical or estuarine characteristics. One indicator of such a change is the tidal prism, or the volume of water replaced between low and high tide. Reduction in tideland acreage due to filling has probably resulted in a significant alteration of the water circulation patterns. Shallow areas are especially susceptible, resulting in low velocity flow and subsequent pooling. At periods of low inflow, tidal circulation at Coalbank Slough, Isthmus Slough and Catching Slough is merely a pulsating or moving back and forth of the water mass.

There are three disposal islands located opposite the City of Coos Bay. They have been created by spoil disposal from channel maintenance in four year cycles since 1951. The largest is 115 acres and is 33 feet above sea level. Creation of the islands has probably reduced circulation patterns but at the same time, fringing marshes have also developed on the site and are important waterfowl habitat.

#### 4.1.7.7 "Partially Altered Areas"

The Estuarine Resources Goal #16 states under "Conservation Management Units" that: "Areas that are partially altered and adjacent to existing development of moderate intensity which do not possess the resource characteristics of natural or development units shall also be included in this classification".

This language permits some flexibility in cases where previous alteration is not extensive or substantial enough to fit the criteria allowing the area to be placed directly in a Development Management Unit (e.g. navigation channels and "areas of minimal biological significance").

According to ODFW personnel (Jim Lauman, personal communication, September 1981) areas which fit both these criteria are as follows:

- (i) Tidal flats west of Hansen's Landing, and on the east side of the South Slough immediately north of Charleston Bridge.
- (ii) The subtidal area between the North Bend Airport and the shipping channel which has been used for in-water dredged material disposal in the past.
- (iii) The intertidal/subtidal area between the log storage area at Millington and the shallow-draft channel.
- (iv) The area immediately adjacent to the Humbard boat works on Haynes Slough, used as a marine ways in the past.
- (v) The subtidal area immediately adjacent to the rock products fill on the north side of Kentuck Inlet, partially altered by the fill.

The following areas are also considered "partially altered" though they are not adjacent to other development at present.

(i) A narrow area between Graveyard Point and the shallow draft channel on Coos River, and

(ii) The Intertidal flat between the Eastside dredged material disposal site [formerly Eastside airport] and the deep-draft channel, at the mouth of Isthmus Slough.

These areas are shown on the map "Estuarine Areas Suitable for Development Management Units", on the understanding that a need for development must be shown through the planning process. [See Section 9.1, Aquatic "Linkage" analysis]

#### 4.1.8 Water quality

##### 4.1.8.1 Introduction

Water quality in the Coos Bay Estuary is affected by five basic factors:

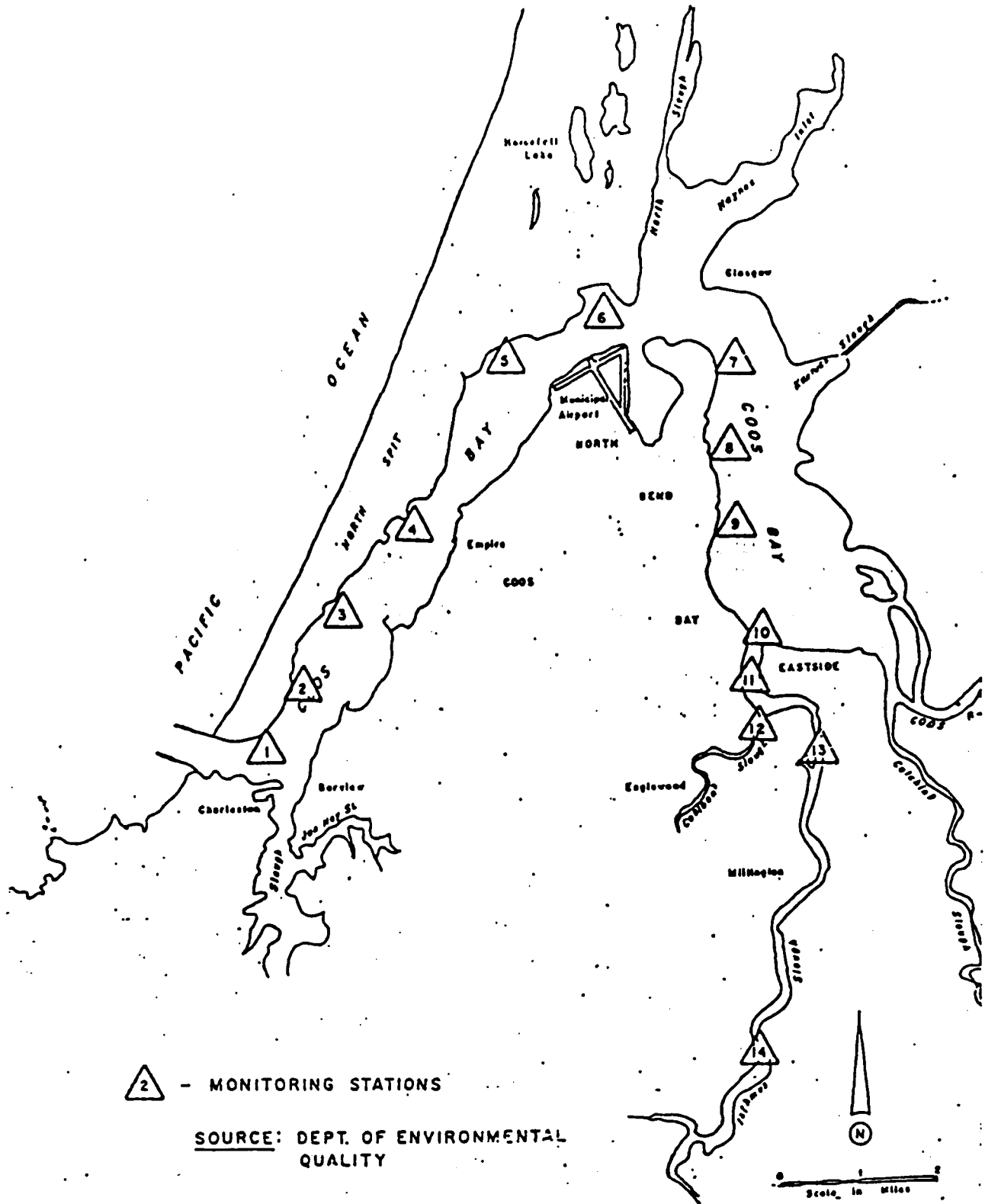
- (i) The volume of Inflow and quality of ocean water,
- (ii) The volume of inflow and quality of river water,
- (iii) The Introduction of pollutants into the bay from 'point' and 'non-point' sources.
- (iv) The degrees of tidal mixing and flushing that occur at different times, gradually removing these pollutants, and,
- (v) The degree to which the estuarine ecosystem is able to absorb or neutralize these pollutants.

The State Department of Environmental Quality administers the Federal Water Pollution Control Act (P.L. 92-500) by monitoring bay-wide water quality parameters, and controlling 'point-source' discharges through a permit system. DEQ operates under the State water pollution control statutes [ORS 468.005.000] and related administrative rules [OAR 340-11-005 to 340-51-080]. It is also investigating methods of reducing 'non-point source' pollution problems. See the map (Figure 4.1.6) showing the location of 14 water quality monitoring stations in Coos Bay.

"Point sources" are normally discharged at an identifiable location, like a pipe, allowing the strength of the effluent to be analyzed. Log storage is considered a point source, but is an atypical case. "Non-point sources" are either man-induced or natural: their effects cannot always be distinguished readily. They are numerous, almost impossible to monitor on a site-specific basis and means of control over their sources is still being investigated by DEQ. Broad monitoring of water quality parameters at the 14 stations to identify general geographic problem areas is being undertaken by DEQ at present.



FIGURE 4.1.6  
 Water Quality Monitoring Stations (Source: Department of Environmental Quality)



#### 4.1.8.2 Control over 'point source' pollution

Point source effluents are required to meet certain quantitative standards in order to be permitted to be discharged directly into a water body. If a particular effluent does not meet these standards, a "compliance schedule" requires that the "best practicable treatment" be achieved by a certain date. The principal types of point source found in the Coos Bay Estuary and specific types of discharge are listed below:

- (a) Fish Processing Plants - There are six fish processing plants within the Coos Bay Estuary shoreland area. Current regulations require fine screening of wastes. Solids go to land disposal and the liquids are returned to the estuary. According to DEQ records, all plants presently comply with the regulations and individual waste discharge permit conditions.
- (b) Oil storage - Two oil companies dispose of site drainage water and tank draw water directly into Coos Bay. These wastes are subject to oil and grease controls, and are presently complying with standards.
- (c) Lumber companies - Waste from lumber mills are cooling water and drainage water. The discharges are subject to controls on temperature, BOD, suspended solids, oil and grease. Not all companies are currently in compliance with the standards.
- (d) Meat packing plant - There is one packing plant currently operating under a DEQ permit. Treated waste-water and uncontaminated cooling water are discharged into Shinglehouse Slough, and are subject to regulations on BOD, suspended solids, oil and grease. The plant complies with the standards.
- (e) Sewage treatment plants - The City of Coos Bay operates two sewage treatment stations - Coos Bay #1, located two blocks west of Highway 101 between Coos Bay Boulevard and Ivy Avenue, and Coos Bay #2, located west of Highway 240 off Fulton Avenue in Empire. Coos Bay #1 serves the Coos Bay (Marshfield) area including the unincorporated areas of Bunker Hill and the City of Eastside; Coos Bay #2 services the Empire district and receives inflow from the new Charleston sewage interceptor trunk. The North Bend sewage treatment plant is adjacent to the airport and serves land within the city limits and parts of Coos Bay. Only the Coos Bay #1 station has experienced some problem with compliance.

Coos Bay #1 does not meet DEQ permit requirements periodically during the winter months and its effluent is below standards for biochemical oxygen demand (BOD) and suspended solids (SS) at these times. Several factors are responsible for this problem.. The system was designed originally to process the combined flow of sewage waste and storm water wastes, a practice which is no longer acceptable. The age of the collection system also contributes to the infiltration of storm waters even when separation has been achieved. During the winter months, heavy rains and extreme high tides increase the sewage inflow beyond the capacity of the treatment system.

The City of Coos Bay has received grant funds to separate the storm/sewer inflow systems and improve the existing collection system. However, not all of the system is repaired. Presently, the city is negotiating with the DEQ, the City of Eastside and Bunker Hill to proceed with a facilities plan which would address and solve these problems. The Coos Bay #2 station is meeting DEQ standards. Although infiltration of storm water occurs, it is within established limits. The North Bend station also meets DEQ standards.

(f) Dredging operations - Most of the water quality impacts from dredging are due to Corps of Engineers maintenance dredging or channel deepening projects. These impacts are addressed fully in the Channel Maintenance Dredging EIS (Corps of Engineers, 1976). One of the main impacts is a temporary increase in turbidity during dredging operations. The Corps report that below RM 12, the bottom material is clean sand and does not produce serious turbidity effects. However, turbidity was extremely high in the Upper Bay following dredging. Measurements recorded turbidity levels as high as 500 Jackson Turbidity Units (JTU)\*. Such levels are well within the range shown to be harmful to benthic species and fish. However, the effects are generally temporary and return to acceptable values within minutes (Corps of Engineers, 1976). Dredging in the Upper Bay can also bring about a temporary decrease in Dissolved Oxygen (DO) levels, due to the re-suspension of silty organic material in the channel sediments. This may cause DO levels to fall below the minimum necessary to sustain life in some benthic species and fish. However, results obtained by Slotta et al. (1973) from RM 13 - 13.4 indicated that DO levels did not change appreciably after dredging from background levels before dredging. (Cited by Corps of Engineers, 1976).

(g) Solid waste disposal sites - Solid waste disposal sites may be harmful to water quality due to the erosion of exposed soils and (particularly) the leaching of toxic materials, organic materials and bacteria from the buried waste by rain water into the groundwater and eventually into nearby surface water. DEQ regulates the operation of solid waste disposal sites by permit; location, drainage control and water table conditions are considered carefully.

There is now only one solid waste disposal site in operation in the Coos Bay area, at a privately owned site south of the Englewood neighborhood. The county-run site at Joe Ney Slough has been closed recently. It had not been meeting state and federal regulations while it was in operation. Another privately-owned site on Shinglehouse Slough was closed in 1978. The county now operates a central site at Beaver Hill to replace the sites that have been closed. It is on the edge of the Coos Bay watershed and due to its distance from any watercourse is not expected to have any measurable effect on water quality in the estuary.

(h) Log storage operations - The transport and storage of logs within waterways have been studied recently and are considered to adversely impact water quality of the receiving waters. (Jackson, 1979; Zegers, (DEQ) 1978). Sources of pollution can result from individual logs or their massing in rafts.

Leachate from the bark affects the chemical quality and water color. Water in the vicinity of the storage area becomes a yellow-brown. The chemical changes create an increased demand on dissolved oxygen which can be detrimental to benthic communities. Leachate also emanates from the log itself similarly demanding more oxygen and becoming toxic to some organisms. Therefore, debarking the logs before storage does not completely solve the problem. Raft storage of logs can change normal water flow. (Jackson, 1978). A recently completed study by DEQ documents the effects of grounding of log rafts during recurrent low tides. Although this study was directed toward the effect of grounding on biotic communities, DEQ has expressed concern over disturbance to the mudflats, which resuspends organic sediments and increases turbidity. (Zegers, 1978)

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\* \*A Jackson Turbidity Unit is equivalent to 1 milligram of silicon dioxide suspended in one liter of water.

Logs are stored in water throughout much of lower Isthmus Slough. Jackson (1979) has noted that the fish population has changed in the slough and there is an increase in species associated with polluted waters. The water quality conditions in Isthmus Slough are discussed in greater detail below under "Non-point Sources". However, it is a problem area and log storage is one of several contributing factors. Alternatives to water transport and storage of logs have been suggested. Logs could be transported by truck from the cutting area and stored on land at the mill.

This process would increase truck traffic within the urban area (location of primary lumber plants) and may increase congestion and reduce air quality. Such alternatives would violate the spirit of Oregon's Energy Conservation Goal (#13). The lumber industries foresee increased operational costs and increased energy consumption. Also, they perceive water log storage as a long-standing historical practice.

The Environmental Quality Commission has recently implemented a log handling policy which has the effect of substantially reducing impacts on the bay. Areas of log storage have been broadly reduced, and storage over mudflats where grounding would occur, has been largely eliminated. The period of storage for any particular log raft in the bay has been reduced from up to two years down to a range of 6 to 12 weeks. Log debris is controlled and removed. There are now fewer mills handling logs in the bay. Thus, the total volume of logs in the water is much less.

Though problems remain in Isthmus Slough, major improvements have occurred. Logs have been removed from 47 acres at Kennedy Ranch. The closure of the Al Peirce and Georgia-Pacific mills has led to reduction of log storage in lower and middle Isthmus Slough. Reduction in operations by Coos Head Timber Company has also had an effect. Programs for further improvements in log handling in Isthmus Slough have been delayed by the current slump in the wood products industry, but will be reactivated in better economic conditions.

All timber industries on Coos Bay are currently in compliance with DEQ log handling requirements.

#### 4.1.8.3 Identification of "non-point sources"

As an outgrowth of the Federal Water Pollution Control Act Amendments, 1972 (Clean Water Act), the Oregon Department of Environmental Quality recently has completed a statewide study of non-point source problems. (Reikert, David A., et al., 1978) Non-point Source problems are so termed because the pollutants do not stem from a specific site like an outfall or pipe (point source), and therefore cannot be pinpointed. Water quality may be impacted by a variety of general polluting sources diffused over a large area of entry. Because of the different nature of point and non-point sources, state and federal regulatory agencies must take an opposite approach. For instance, with point sources, the source is pinpointed and the resulting problems are controlled by specific discharge standards. However, with non-point sources, it is easier to identify general areas with water problems than to rectify the problem directly. Section 208 of the Federal Water Pollution Control Act (P.L. 92-500) specifies the following major objectives:

1. Identify and prioritize non-point source (NPS) problems.
2. Develop conservation procedures and methods to control identified sources to the extent possible.

3. Develop and adopt a workable implementation program, including designation of agencies."

(Section 208, Water Pollution Control Act, P.L. 92-500, 1972)

The DEQ study cited above satisfies the initial step of identifying problems and placing them in order of priority. It identifies non-point problems that interfere with beneficial water uses. It also identifies general geographic areas within the state with these problems by degree of severity. Conformance with objectives 2 and 3 of Section 208 will be achieved in the future as the problems are more precisely defined. Consequently, immediate development of conservation procedures and control methods is left to local jurisdiction and resource agencies.

Guided by Section 208, the DEQ focuses its study not on water quality alone. One major area of concern is stream quality, that is, the "physical condition of the stream channel and surrounding banks" (Reikert, 1978:8). The Federal Water Pollution Control Act includes a requirement that streams be fishable. Adequate physical stream conditions must be recognized "because many highly prized fish require stable bottom conditions for spawning and all fish require suitable cover conditions for rearing. Thus, clean water does not, in itself, guarantee fishable streams." (Reikert, 1978: 12-13).

Identification of non-point source problems resulted from input by statewide citizen meetings and from data offered by federal, state, and local resource agencies. These efforts identified the following major non-point problems affecting stream quality:

- a. Streambank erosion
- b. Sedimentation
- c. Excessive debris
- d. Water withdrawals
- e. Elevated water temperature
- f. Nuisance Algae

In addition to identifying stream quality problems, the degree of impairment was assessed as moderate or severe. A moderate problem occurs when the local residents perceive a condition causing some interference with the beneficial uses of water. A severe problem is assessed if local residents perceive a condition producing a substantial or nearly complete interference with beneficial uses of water. The following section will define each stream quality problem, the beneficial uses impaired, the impacted location within the planning area, and the degree of impact.

a) Streambank erosion - Streambank erosion is due to the lateral movement of the stream channel undercutting banks and removing soils and vegetation. This problem may impair fish and aquatic species habitats due to accompanying sedimentation. Severe streambank erosion problems have been identified on South Fork Coos River between the confluence of Daniels Creek and the Millicoma Fork. These conditions also extend further up Daniels Creek, outside the tidal portion. No other such problems exist with the estuary, but other sections of the Coos Basin suffer from moderate erosion problems. Generally, however, streambank erosion is not seen as an especially severe problem estuary-wide or even basin-wide.

b) Sedimentation - This condition of suspended or settled solids impacts water supplies, irrigation, fish and aquatic species habitats, recreation, and aesthetic values. The entire estuary, including the riverine portions, are considered to suffer from moderate sedimentation problems.

c) Excessive debris - Logs, slash, and other materials present in waterways constitute excessive debris when they impair fish and boat passage or cause damage to culverts and bridges.

Isthmus Slough, Pony Creek and the entire riverine portion of the estuary on the Coos South Fork Coos and Millicoma rivers are considered to have severe problems with debris. This may be chiefly attributed to the problems caused by log transportation and storage, though debris washed down from upstream due to logging or streambank erosion also contributes to the problem. Parts of the upper Coos River system and Daniels Creek also have severe or moderate debris problems.

d) Water withdrawals - This problem occurs when consumptive uses reduce the amount of water and interfere with other beneficial uses. It often occurs during low flow periods and aggravates this natural occurrence. It may impair downstream consumption and fish and aquatic species habitats. No part of the Coos Bay estuary has found to exhibit this problem.

e) Elevated water temperature - This constitutes an increase in temperature due to low flows and high ambient air temperatures. The rearing of salmonid fish can be affected by high water temperatures. Isthmus Slough, Catching Slough, and Pony Creek are considered to be moderately affected by high water temperatures. Most of the major streams in the Coos River basin suffer either severe or moderate water temperature problems during low-flow seasons. See also discussion below (Section 4.1.8) of water temperature in Coos Bay.

#### 4.1.8.4 Control of non-point source problems

The control of non-point source problems is difficult at best, as indicated by the change in DEQ's approval. Initially, the department collected some hard data (surveillance stations) coupled with attempts to pinpoint causes (sewer and septic systems, urban runoff, etc.). However, they realized that tributary streams are commonly the most severely impacted by non-point source problems. "In Oregon, as throughout the country, there simply is insufficient measured data on tributary streams to permit a data analysis approach to statewide NPS assessments." (Reikert, 1978:10) Also, the collection of hard data is expensive and often impossible logistically (Reikert, 1978:10-12). Therefore, the DEQ has reverted to a rather subjective approach in compiling and interpreting its information. Its compilation is "based on the professional judgement of local agency personnel and the management experience of landowners. The information is quite qualitative in nature and, therefore, suitable for statewide or regional planning but not for site specific use." (Reikert, 1978:15). At present, information interpretations and remedial action are left to resource agencies and local planners and officials. The DEQ encourages the development of enforceable practices at the local level. The DEQ is no longer laying blame for non-point source problems. It is "impossible to separate man-caused from natural NPS problems".

#### 4.1.8.5 Ambient water quality standards

The Department of Environmental Quality has established water quality standards for each basin, so as to protect recognized beneficial uses, pursuant to ORS 468.735, and OAR 340-41-325. The standards are summarized below in Table 4.1.8.

Table 4.1.8

Selected Oregon State Water Quality Standards  
for South Coast Basin Estuaries.

Water quality factor	Water quality standard
Dissolved oxygen (mg./l.)	6 milligrams/liter (mg./l)
Fecal coliform bacteria [most probable number (MPN) per "100 ml.]	<p>a) Median concentration of 14 organisms MPN per 100 milliliters, not more than 10% of samples exceeding 43 organisms/100 milliliters. [Shellfish areas]</p> <p>b) Log mean of 200 organisms MPN per 100 milliliters, no more than 10% of samples in a 30-day period exceeding 400 organisms per 100 milliliters. [Other areas]</p>
pH	6.5 - 8.5 (7.0 = neutral)
Turbidity (Jackson Turbidity Units)	No more than 10% increase in natural stream turbidities, except for emergencies, essential dredging, construction or other legitimate activity which cause the standard to be exceeded.
Temperature ( F)	No significant increase above 'natural background temperatures', no adverse effects on fish or other aquatic life.

OAR 340-41-325 requires that the "highest and best practicable treatment and/or control of wastes, activities and flows" shall be provided to maintain dissolved oxygen and overall water quality at the highest possible levels and to keep water temperature, coliform bacteria turbidity and "other deleterious factors" at the lowest possible levels. No wastes shall be discharged or activities conducted which "either alone or in combination with other wastes and activity" shall violate the standards. The rules also state that where natural water quality, parameters are outside these standards, the natural quality shall be the standard. [OAR 340-41-325(3)]. 'Mixing Zones' of a specified area are allowed around the point of discharge within which these standards may be relaxed and less restrictive ones imposed to deal with the practical impossibility of applying standard equally to all parts of the estuary, [OAR 340-41-325(4)].

These ambient water quality standards serve as indicators of the estuary's general health. They provide a tool in addition to point source effluent controls to gauge the success of DEQ point source and non-point source programs.

#### 4.1.8.6 DEQ Water Quality Monitoring Program

DEQ has operated 15 water quality surveillance stations at various locations in Coos Bay from near the mouth to upper Isthmus Slough. The stations are all in, or near, the maintained channel with the exception of those in upper Isthmus Slough and Coalbank Slough. There are no DEQ stations, for instance, in South Slough or in North Slough, Haynes Inlet or the East Bay Area. [See Figure 4.1.6] This data base is valuable for scientific study and highlights geographic areas within the bay with specific water quality problems. Data is available from the DEQ "STORET" data bank from 1970 onwards for such parameters as dissolved oxygen, BOD, turbidity, total coliform and fecal coliform bacteria. Findings based on these data are outlined below.

#### 4.1.8.7 Ambient water quality data

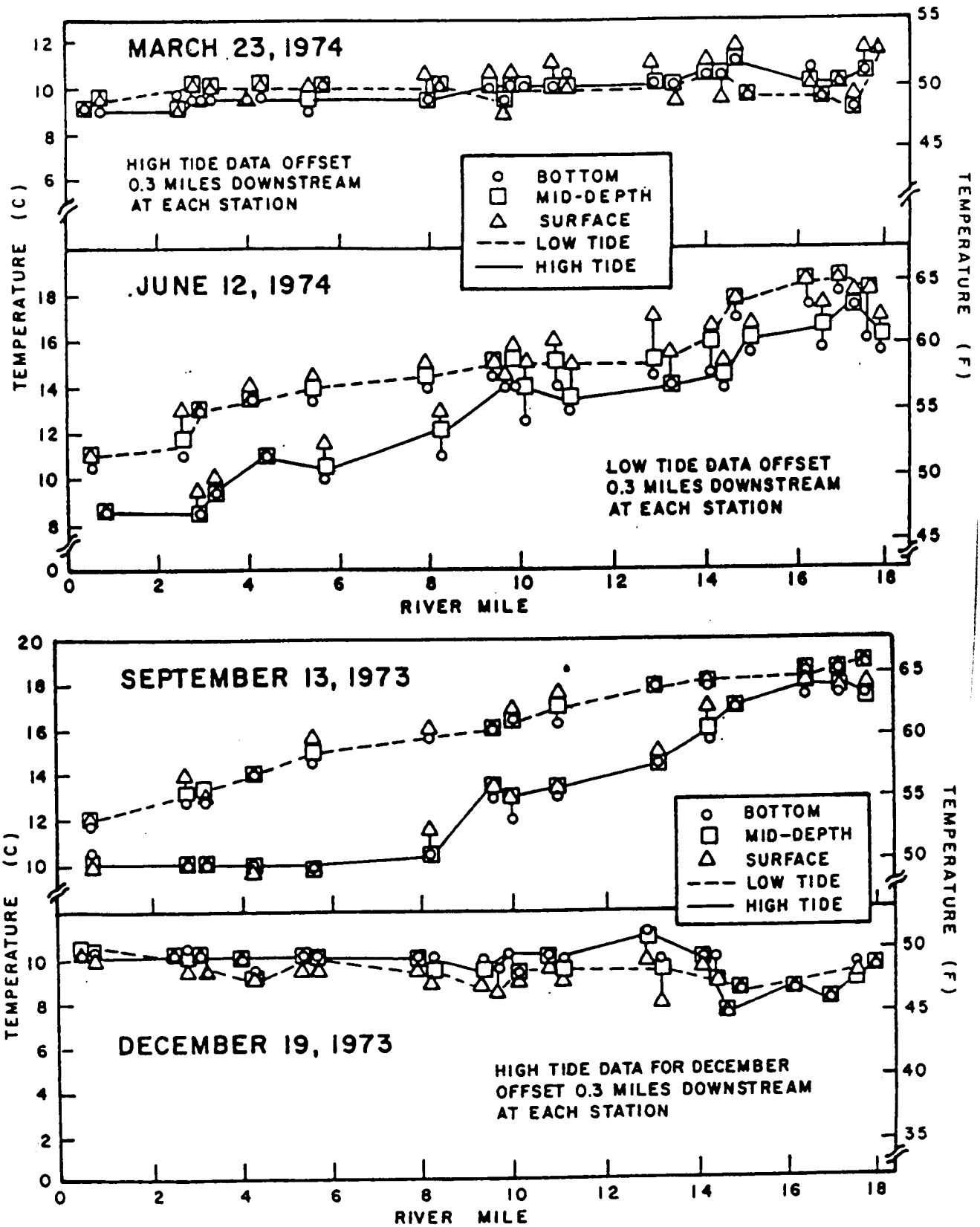
The following section summarizes existing knowledge on ambient water quality problems in the Coos Bay estuary, based on DEQ data and other independent research.

a) Temperature - Freshwater and seawater inflow are the major factors affecting water temperature in the Coos Bay estuary. Seasonal changes in ambient air temperature and rainfall also affect water temperature. Thus, there are both seasonal and diurnal variations in temperature. There are also differences in temperature between different locations on the bay. Generally, seasonal variations in temperature are greater for the freshwater inflow than for seawater. Also, the seasonal patterns are reversed. Seawater is colder during the summer months, due to offshore up-wellings of cold ocean water [Bourke et al, 1971]. However, river temperatures are cooler during winter and spring (high run-off) and warmer in summer and fall (low run-off). Consequently, seasonal temperature fluctuations are greater upbay than at the mouth, due to the influence of ocean water temperatures. [ODFW, 1979] DEQ data (1978) show that temperatures in the bay have reached extremes of 35.6 F and 73.4 F.

Arneson (1976) has collected data on temperature for December, March, June and September, for various locations on the bay. His data are shown below in Figure 4.1.7. He found that the highest temperatures occurred in June and September, at upbay locations; temperatures were consistently over 65 F above RM 16. Generally, there was a marked increase in temperature upbay in those months (as mentioned above), while there was very little change in temperature with location in December and March. This was due to the cooler fresh-water



FIGURE 4.1.7  
 Temperature vs. river mile for bottom, mid-depth and surface, at high and low tide (Arneson, 1976)



temperatures more nearly approximating those of ocean water. However, DEQ data (1978) show that winter fresh-water temperatures may be much lower than those of ocean water. As might be expected at high tide, temperatures were consistently lower in June and September due to the influence of cooler ocean water. This difference was much more marked below about RM 10. The June data also show a vertical temperature gradient, with warmer temperatures at the surface, because inflow of warm freshwater was greater at this time. The denser, cooler, saltwater tended to sink below the surface. At other times of the year, there was little or no variation in temperature with depth, suggesting a "well-mixed" condition. [See discussion on mixing in Section 4.1.5.3. above] Arneson attributes the significant increase in temperature above RM 8 at high tide in June and September to solar heating on the broad mud flats of the upper bay.

These data indicate that high temperatures are most likely to cause a problem during summer and fall months in the upper part of the estuary. Low streamflows and poor circulation will tend to exacerbate temperature problems. In addition to the areas found to be a problem in the DEQ Non-point Source Study (See Section 1.7.3(e) above) Stevens, Thompson and Runyan's Study [1974] listed North Slough as a problem area.

b) Dissolved oxygen - Dissolved oxygen are measured by DEQ as part of their regular water quality monitoring program. Others who have measured dissolved oxygen include Arneson (1976), Stevens, Thompson and Runyan (1974) and Slotta et al (1973).

Dissolved oxygen levels are an important indicator of the health of the estuary and the type of biological activity that can occur. Low DO levels can, for instance, prevent the passage of anadromous fish, and can lead to reduced vigor or death of estuarine organisms. The range of 5-8 ppm (or mg./l) of DO is considered suitable for the healthy growth of most species, though life is possible at lower levels, provided they are not persistent. Most species will die when subjected to DO levels below 1.25 ppm. for more than a few hours (Arneson, 1976).

Isolated DO levels as low as 1-2 ppm have been reported in the bay during late summer and early fall. However, Isthmus Slough is the only area of the bay with a chronic history off DO falling below the standard of 6.0 mg/L. Depressed DO occurs through low Fresh-water inflow and high organic waste loading. All information indicates that log handling in the upper bay zone of poor summer flushing is the chief cause of lowered dissolved oxygen. Effluent from pulp and paper making was formerly a problem, but with the closure of the Coos Head mill at Sitka Dock, is no longer significant. Seafood industry wastes are now controlled, and are no longer as significant a problem. It has been established that bark deposits remove a small, but measurable, amount of oxygen from the water during the process of decay. However, if bark loss is minimized, log storage and transportation on the estuary is not considered a major water quality problem [Arneson 1976, citing Schaumburg, 1973]. It is also believed that the nutrient-rich water of ocean upwelling are relatively low in DO. [Arneson, 1976] DO concentration is increased either by re aeration (due to mixing of atmospheric oxygen into water by turbulence) or by photosynthesis, as aquatic green plants release oxygen into the water. Oxygen is less soluble, the higher the temperature and salinity of the water.

It is therefore to be expected that, all other factors being equal, DO levels are generally higher in the winter and spring during periods of high fresh-water inflow and cooler water temperatures, than in the summer and fall.

Arneson (1976) tested the above hypothesis and found it to be generally true. He measured DO levels in December, March, June and September. His results are shown in Figure 4.1.8. He found that DO levels are generally slightly higher in December and March than in June and September. The December levels increase gradually upstream, probably due to the entry of colder freshwater, which is higher in DO. The March and December levels generally are very close to saturation at any point. The September levels however, drop off from saturation levels markedly above RM 10. However, for the most part, DO concentrations lie well within the range suitable for healthy fish growth. The only area with consistently low DO levels is Isthmus Slough. The upper samplings station showed consistently low DO (4.0 ppm in September at high tide and lower at low tide). The turning basin at the mouth of the Slough also showed low DO (under 5.0 ppm in September). Arneson also found supersaturation in Coos River and Catching Slough in June, which he attributed to photosynthesis, and near the mouth in December, which he attributed to reaeration caused by heavy surf.

DEQ data generally corroborate Arneson's findings.

Occasionally, DO levels fall below the 6 mg./l standard in various parts of the bay. Low measurements were most frequent above RM 13 and in Isthmus Slough.

c) Turbidity - 'Turbidity' is a measure of the optical property of water, determined by the scattering and absorption of light by suspended particles. The particles may be clay, silt, sand finely divided organic matter or plankton. A high turbidity does not necessarily mean the water is polluted. However, turbidity can restrict light penetration and cut down photosynthetic activity, which is the basis of 'primary production' in estuaries. The principal cause of turbidity is suspended sediment brought down by tributary streams.

DEQ standards state the no more than a 10% increase in turbidity above 'natural background' is permitted. There is no set figure for this natural background level. However, DEQ data in Figure 4.1.9 showing annual mean turbidity levels from 1974 to 1978 indicate that the natural background level appears to be below 10 J.T.U., as indicated by 1974 and 1977 readings. The exceptionally high levels shown for 1976 and the secondary peak in 1978 illustrate the effect of the dredging which took place in those years.

Data collected by Arneson (1970) indicates that turbidities are generally lower in the summer months, due to low freshwater inflow, generally ranging up to 8-10 J.T.U. in June and September and up to 12-17 J.T.U. in December and March. (See Figure 4.1.9) Similarly, low tide turbidities were higher than high tide levels, again indicating that the primary cause of turbidity is sediment brought in by fresh-water. There is also a slight increase in turbidity from the mouth upstream at low tide. This tendency is less marked at high tide.

Dredging can cause very high turbidity readings temporarily. Above RM 12, post dredging levels of 500 J.T.U. have been recorded (ODFW, 1979). However, Slotta (1973) found that dredging does not create significant turbidity below RM 12, because of cleaner sediments. North Slough and near Empire Mill were mentioned by the Corps (1975) as areas of high turbidity. Stevens, Thompson and Runyan (1974) list industrial waste water as the probable cause of high turbidity in these areas. However, no source can be identified on North Slough since Menasha discharges its wastes through an ocean outfall. The Corps (1975) state that the highest recorded turbidity levels were 2,400 JTU during high tide at the site of log dumping operations at Empire Mill. Generally, however, it is evident that for the most part, turbidity in Coos Bay is much lower than that commonly experienced in streams, where eroded sediment is carried in much higher

FIGURE 4.1.8: (PART 1)  
 Dissolved oxygen versus distance from entrance and depth Coos Bay. (June and September)

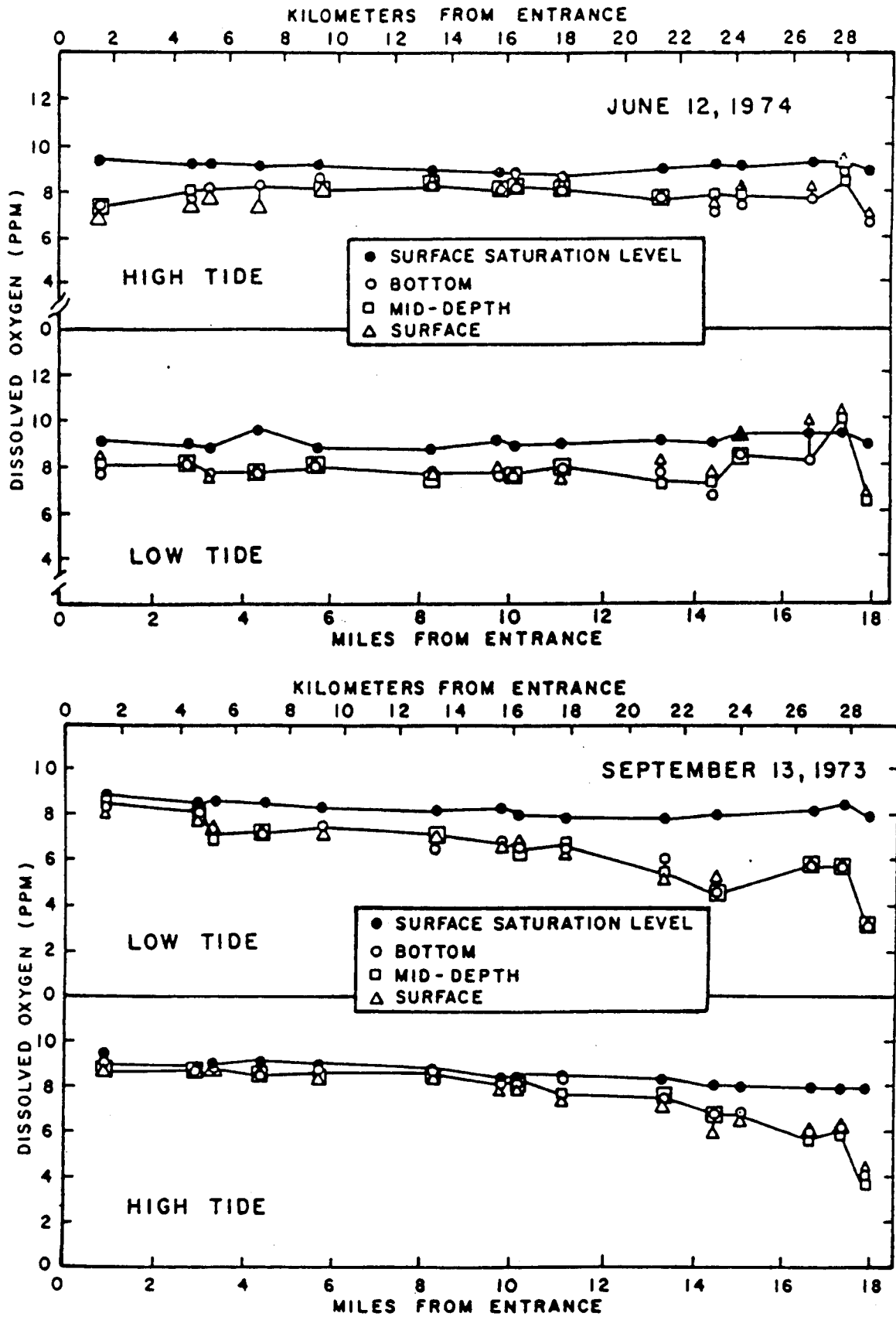


FIGURE 4.1.8: (PART 2)  
 Dissolved oxygen versus distance from entrance and depth Coos Bay (December and March)  
 (Source: Arneson, 1976)

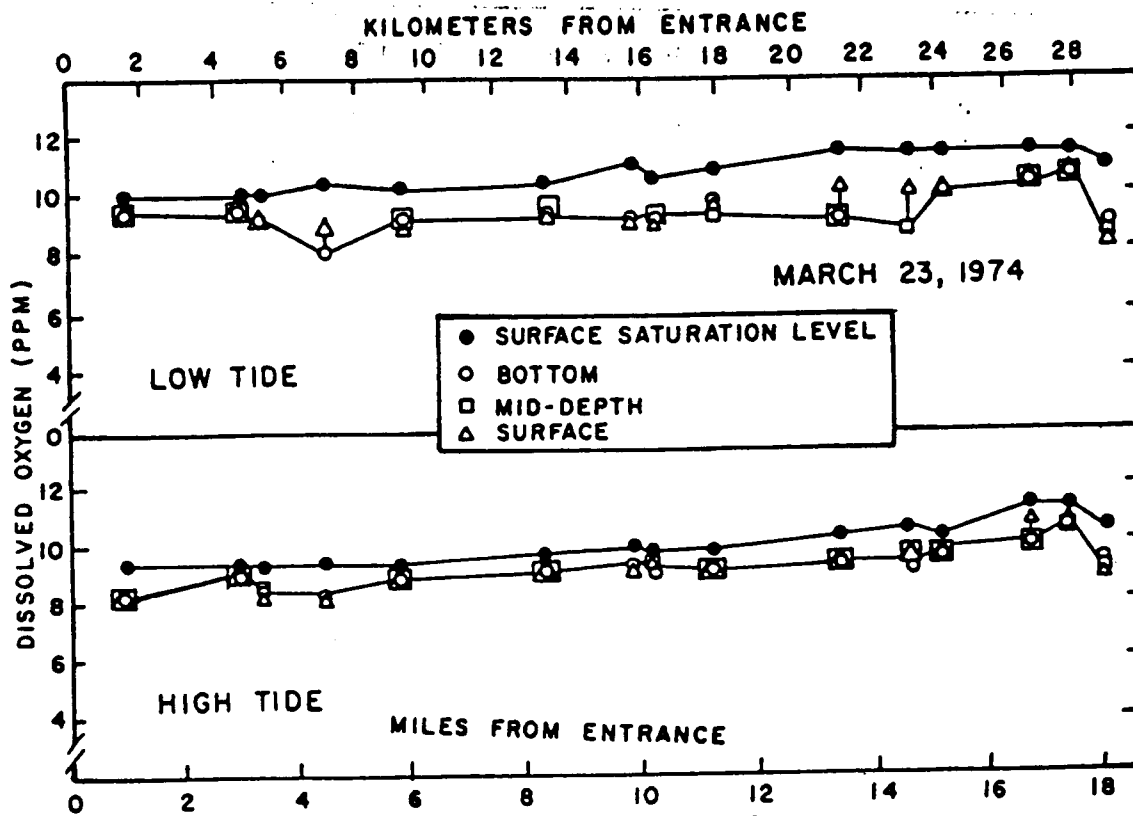
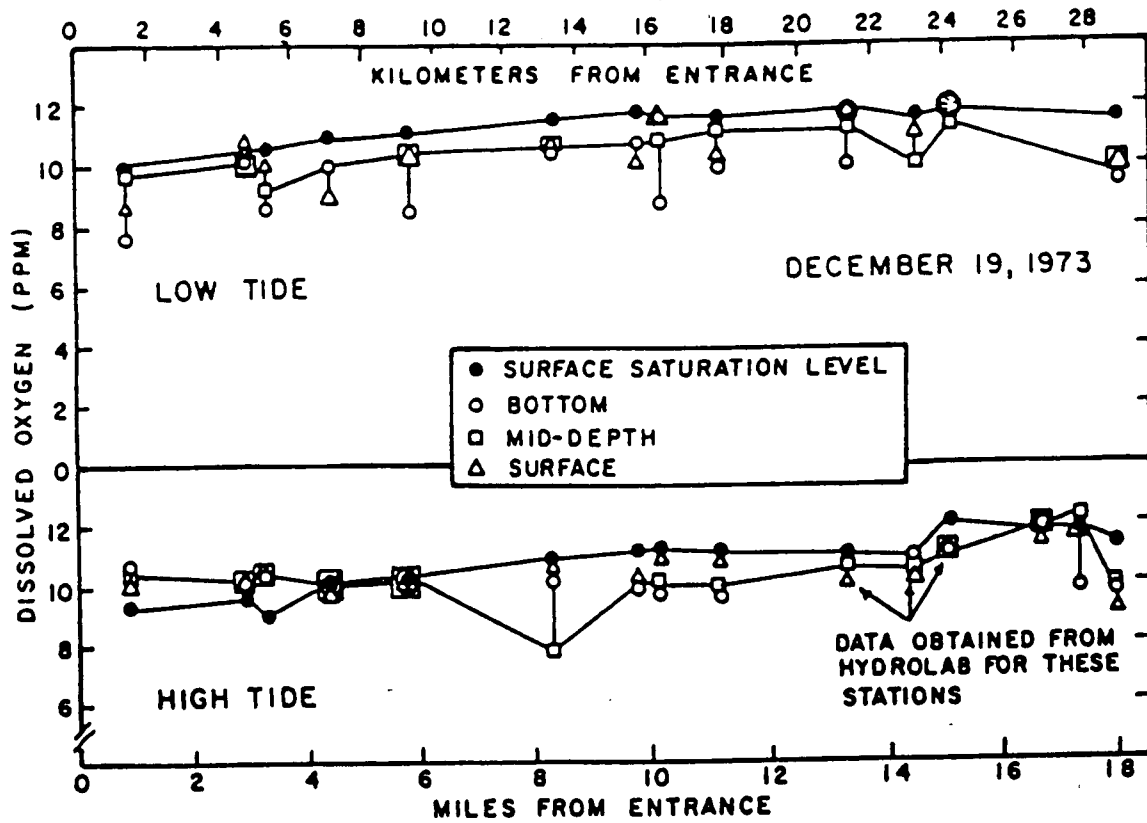
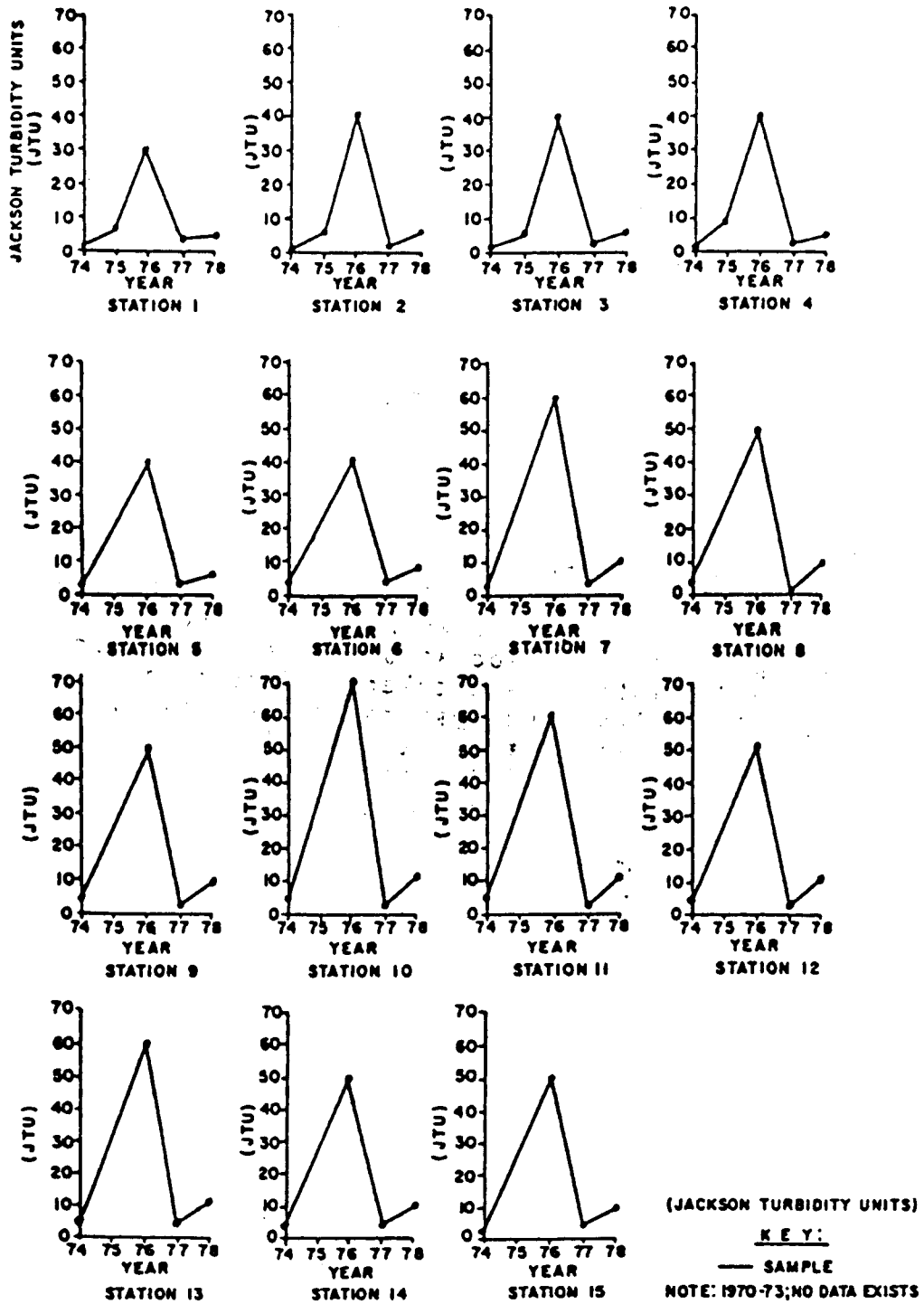


FIGURE 4.1.9



STANDARD: NO MORE THAN 10% INCREASE IN NATURAL BACKGROUND TURBIDITY.  
 DATA UNAVAILABLE FOR NATURAL BACKGROUND TURBIDITY IN COOS BAY.

FIGURE 4.1.10

Coos Bay, Fecal Coliform - Annual Mean (Source: Oregon Department of Environmental Quality)

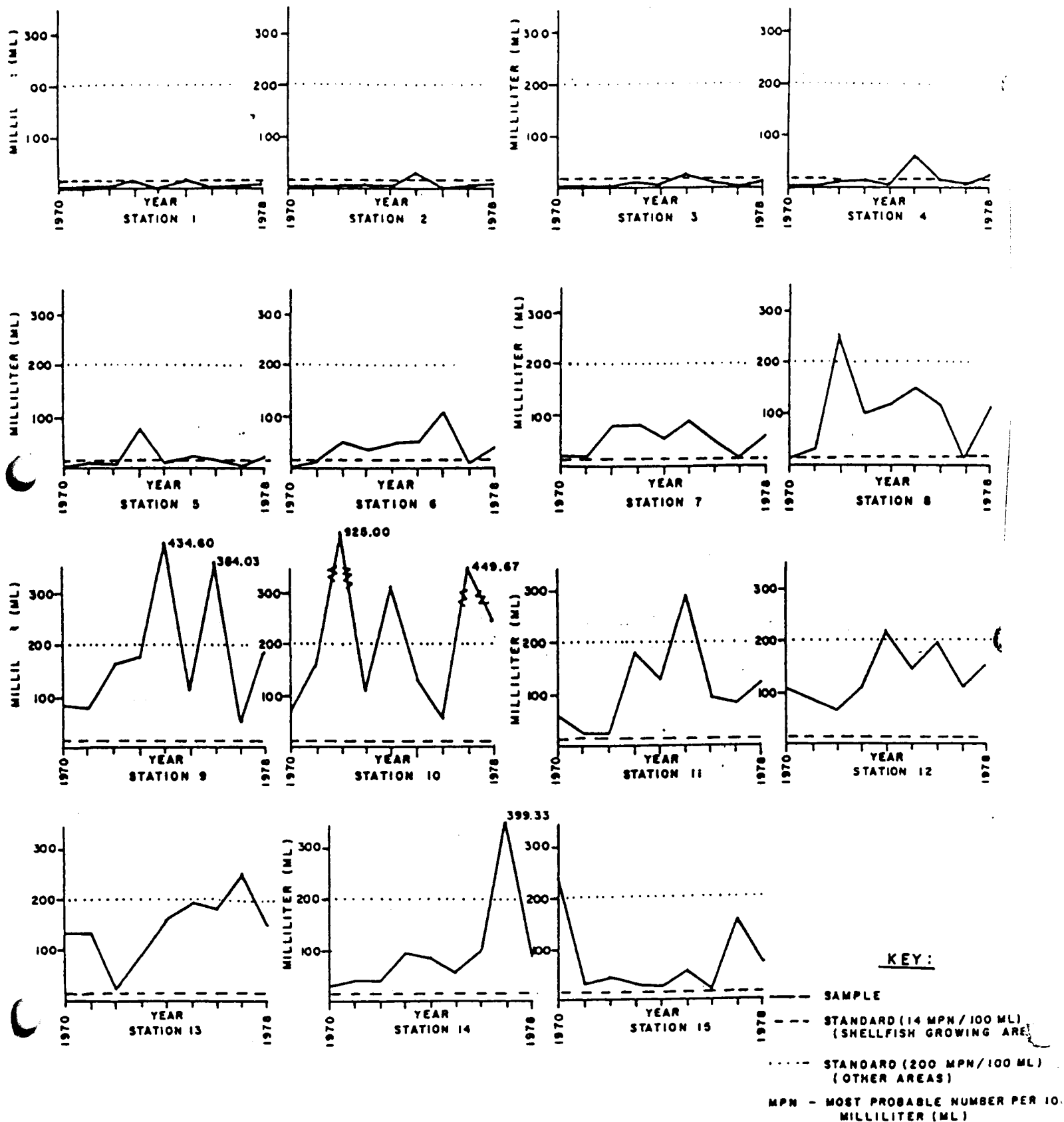
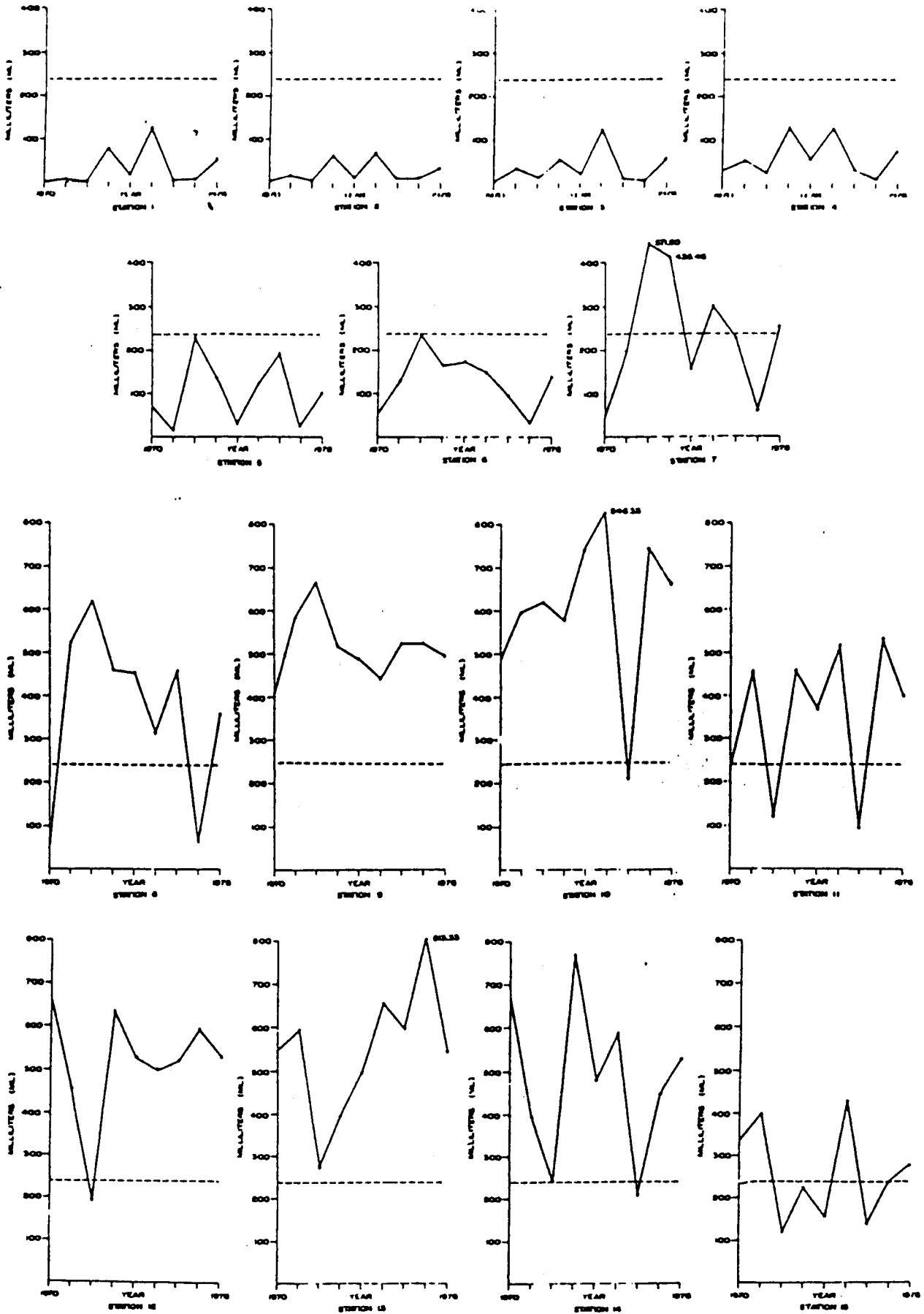


FIGURE 4.1.11



**KEY:**

- - SAMPLE
- - - - STANDARD (240 MPN/100 ML OR NOT TO EXCEED THIS VALUE IN MORE THAN .20% OF THE SAMPLES)

MPN - MOST PROBABLE NUMBER/100 MILLILITER (L)



concentrations. This is no doubt due to the diffusion and deposition of sediments over a broad area, as noted in Section 4.1.6 above. There is no known data on turbidity in the Coos River system, but it is to be expected that it is much higher than in the bay during high run-off seasons, particularly after storms. This is also true of the sloughs, particularly Isthmus and Catching Sloughs.

d) Coliform bacteria - Coliform bacteria are not necessarily harmful in themselves. However, they serve as a convenient indicator of the level of bacterial activity, because of their abundance. The presence of other harmful bacteria and viruses may be inferred, when coliform bacteria levels are high especially if associated with a fecal source. Bacterial pollution particularly affects filter feeders in the bay like clams and oysters, making them unfit for human consumption above certain levels. For this reason, there are two DEQ water quality standards for fecal coliform bacteria, one for shellfish producing areas and one for other estuarine areas. The standard for shellfish areas is much more stringent (median 14 organisms MPN per 100 ml, compared with log mean 200 organisms MPN).

DEQ data on fecal coliform and total coliform levels are shown in Figures 4.1.10 and 4.1.11. Note that a DEQ standard for total coliform levels no longer exists (see Table 4.1.8). The two sets of data indicate that bacterial levels are usually satisfactory for shellfish production or nearly so, up to Station 5 (above out RM 9). However, fecal coliform counts are frequently well above acceptable levels upbay of this point. Indeed, levels at stations 9 and 10, on the waterfront between Coos Bay and North Bend, are often greatly in excess of the general estuarine standard. With a few exceptions, fecal coliform counts in the South Slough have been within acceptable limits for shellfish production (ODFW, 1979). This is currently the principal shellfish growing area. Measurements by Stevens, Thompson and Runyan (1974) generally corroborate the evidence produced by DEQ. They have found coliform counts above the standard for shellfish areas upbay of Jordan Cove, in North Slough, Isthmus Slough and Catching Slough. It should be noted, however, that fecal coliform levels in Isthmus Slough are generally below the estuary-wide standard of 200 organisms MPN/100 ml.

Because of high coliform bacteria counts, the bay has been closed for several years to commercial shellfish harvest above Sitka Dock by the State Health Division. However, in response to local interest in re-opening areas of the upper bay, in 1980 the State reclassified the Silver Point Plats #7 and #8 for shellfish production. This followed studies of septic tank run-off on the east shore of the bay from Glasgow to Pierce Point and of circulation patterns of effluents from sewage treatment plants. However, to meet federal FDA regulations, oysters grown in this area would have to be carefully purified and disinfected (Mike Ostasz, personal communication 9-8-81). A similar study was also done on the Barview Shore from Empire to Joe Ney Slough to determine whether septic tanks are causing fecal coliform pollution. It found high coliform counts in some places. This follows an earlier DEQ study which showed a high rate of septic tank failures in the Barview area, but did not attempt to trace the effects on the bay. This work is to be incorporated into a broader study by DEQ currently under way and expected to take at least two years. (M. Ostasz, *ibid.*) This study is supported by EPA funding under the 'section 208' Non-Point Source pollution control program. ("Coos Bay Water Quality Shellfish Study.")

The principal causes of fecal coliform pollution are inadequate disinfection of sewage treatment plant effluents or other operational problems, failures of subsurface septic systems and (to a lesser extent) livestock wastes. (ODFW 1979, citing Stevens, Thompson and Runyan 1974) However, insufficient data exists to determine the relative contribution of these and other possible sources.

The purpose of the Coos Bay Water Quality-Shellfish Study is to make these determinations and provide a basis for managing water quality suitable for continued commercial shellfish production.

It is clear that fecal coliform pollution is the most widespread water quality problem in Coos Bay, and the most serious potential human health hazard, due to the accumulation of the bacteria in shellfish.

#### Coos Bay, total Coliform - Annual Mean

Historically, bacterial contamination has been responsible for a substantial decrease in the oyster industry in Coos Bay. About 25 years ago, the oyster industry was very large, with hundreds of acres in production in the east bay and Haynes Slough. [IDEQ, 1980 citing Dale Snow, personal communication] Most of the growers were forced out of business by increasing fecal contamination, or moved to the cleaner water of the South Slough. Since this time, sewage discharges to the bay have decreased due to installation of improved sewage treatment plants. However, as the DEQ data above indicates, fecal contamination is still above acceptable levels in most areas of the bay. The magnitude of the areas currently lost to production can be appreciated from the following figures. According to an ODFW report "Classification and Utilization of Oyster Lands in Oregon," (1976), 52.15 acres of the bay are in oyster production, with 142.78 acres leased and potentially available. However, another 525 acres potential oyster producing areas cannot be used due to fecal coliform counts. Even conditions in the lower third of the South Slough and Joe Ney Slough, where oysters are currently produced, is causing the federal FDA some concern. In the opinion of the FDA, the close proximity of septic tanks and the Charleston boat basin may jeopardize its approved growing area classification. The currently lack of hard data in the South Slough makes it difficult to allay these concerns. This emphasizes the importance of the DEQ study.

#### 4.2. BIOLOGICAL ESTUARINE CHARACTERISTICS

##### 4.2.1. Introduction: Requirements of Estuarine Resources Goal #16.

The biological resources inventory is a major key to planning future uses of the Coos Bay Estuary, according to the requirements of Statewide Planning Goal #16 (Estuarine Resources). The Inventory Requirements Section of Goal #16 states:

"Inventories shall be conducted to provide information necessary for designating estuary uses and policies. These inventories shall provide information on the nature, location, and extent of physical, biological, social and economic resources in sufficient detail to establish a sound basis for estuarine management and to enable the identification of areas for preservation and areas of exceptional potential for development. ILCDC Goal #16, Estuarine Resources."

Goal #16 further requires state and federal agencies to assist in inventory work on estuarine resources. In the case of biological resources, Coastal Zone Management Act funds were passed on to the Oregon Department of Fish and Wildlife to provide technical assistance to local planning staffs in the form of habitat mapping and inventory reports to fulfill the requirements of the Goal. The result of this work is the draft report "Natural Resources of Coos Bay Estuary", (ODFW, 1979) which forms the basis for this inventory and is extensively cited throughout.

The "Guidelines" to Goal #16 provide advisory direction on the categories of information that should be included in a biological resources inventory; they require local governments to address the location, description and extent of:

- a) The common species of benthic (living in or on bottom) flora and fauna;
- b) The fish and wildlife species, including part time residents;
- c) The important resting, feeding, and nesting areas for migrating and resident shorebirds, wading birds and wildfowl;
- d) The areas important for recreational fishing and hunting, including areas used for clam digging and crabbing;
- e) Estuarine wetlands;
- f) Fish and shellfish spawning areas;
- g) Significant natural areas; and
- h) Areas presently in commercial aquaculture. [Guidelines, LCDC Goal #16, Estuarine Resources]"

This list forms the basic outline for the biological resources inventory which follows.

Certain key biological resources are important in defining the location and extent of "Management Units" in the estuary, which determine the uses and activities that may occur. The "Management Units" section of Goal #16 requires that at a minimum, three types of management units shall be established: 'Natural', 'Conservation' and 'Development', within which certain prescribed uses and activities may, or may not occur, subject to certain conditions in some cases. The Goal requires that 'Natural' management units:

"shall include, at a minimum, all major tracts of salt marsh, tideflats, and seagrass and algae beds. [emphasis added] (LCDC Goal #16)".

'Conservation' management units, according to the Goal:

"shall include tracts of significant habitat smaller or of less biological importance than those in Natural management units, and recreational or commercial oyster and clam beds [emphasis added] (LCDC Goal #16).

The Goal adds that:

"Areas that are partially altered and adjacent to existing development of moderate which do not possess the resource characteristics of natural or development units shall also be included in this classification, consistent with the overall Oregon Estuary Classification [emphasis added] (LCDC Goal #16)".

'Development' management units shall include, among other types of areas:

"areas of minimal biological significance needed for uses requiring alteration of the estuary [emphasis added] (LCDC Goal #16)."

The most important function of the biological resources inventory is to distinguish habitat areas with these different levels of importance within the entire estuarine system. This distinction provides guidance in classifying the estuary into different management units. It also helps to determine, through the "Linkage" process, where statewide goal exceptions are needed for any Plan designations which do not comply with the Goal requirements pertaining to establishment of management units quoted above.

Other important functions of the inventory, also required by the Goal #16, are to provide a factual basis to;

- (i) determine the impacts of "dredge, fill or other reduction or degradation of natural values"; and
- (ii) determine the "cumulative effect" of uses, activities and alterations in all development management units (LCDC Goal #16).

Lastly, Goal #16 requires that the effects of dredge or fill activities in intertidal or tidal marsh areas be "mitigated by creation or restoration of another area of similar biological potential (LCDC Goal #16)." The biological resources inventory provides a basis for determining what would be lost to dredge or fill activities. A separate inventory [Special Mitigation/Restoration Element] sets out candidate sites which may be used to satisfy this requirement.

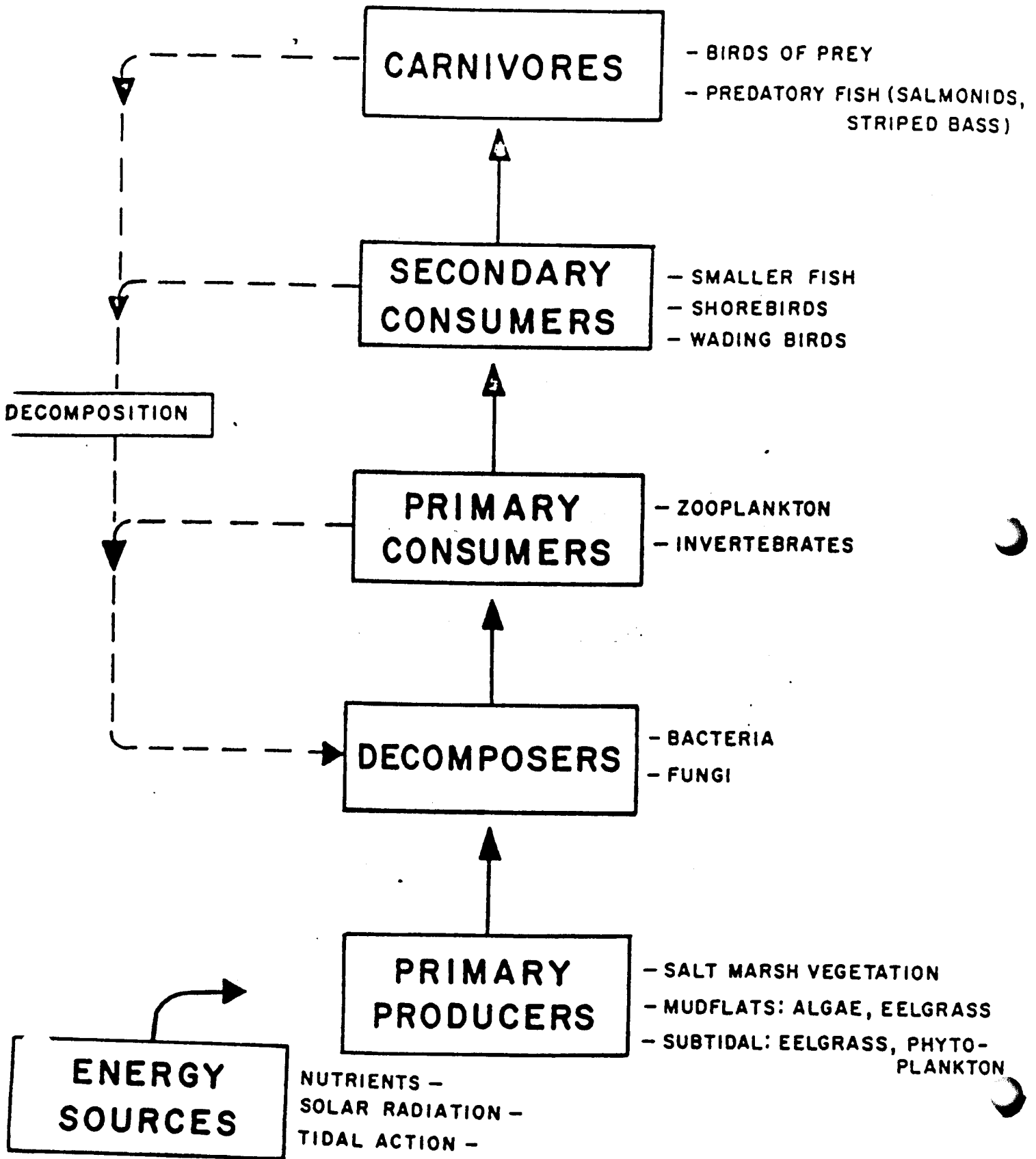
#### 4.2.2. General Structure and function of the Estuarine Ecosystem

##### 4.2.2.1 Estuarine food web

a) Introduction - Estuaries function as a system driven by the energy of the sun and tides which constantly cycles nutrients through a "food web" is the one usually described. Green plants ("primary producers") are eaten by herbivores (or "primary consumers"), which are in turn eaten by first level carnivores (or "secondary consumers"). Further links in the food web may be formed by second or even third level carnivores. Nutrients are finally returned to the system by decomposition. While this type of food web is found in estuarine systems, it is of secondary importance to the "detritus food web", in which plant matter is first decomposed to form organic detritus before it is introduced into the cycle (Hoffnagle and Olson, 1974). See Figure 4.2.1 for a simplified schematic representation of the detritus food web.

b) Primary Production - The primary sources of energy for the estuarine food web are solar radiation and nutrients brought in with sediments from the watershed. Tidal currents provide the energy which transports and deposits and the nutrient-laden sediments. Characteristic plant communities develop in different levels of the estuary. Saltmarshes develop at the higher intertidal levels, where sedges, rushes and grasses are the typical species. Mudflats in the lower intertidal levels develop beds of seagrasses and macroalgae. Subtidal channels also have beds of seagrass and contain floating phytoplankton growth in the entire water column. These communities are in very gradual successional change from one type to another due to changes in level relative to tides, caused by gradual accretion of sediments. These green plant

FIGURE 4.2.1  
Schematic of Detritus Food Web



species are the "primary producers", the basic source of food for production of economically and recreationally valuable food species in the estuary.

Saltmarshes are highly productive in terms of the amount of biomass accumulated during the growing season, compared with other natural or cultivated systems. This is in part due to the inflow of sediments, which due to their fine texture, have a high capacity for adsorption of nutrient ions in a form usable to plants. The estuarine circulation system, which constantly deposits these sediments, is another factor contributing to this high level of production [Hoffnagle and Olson 1974, citing Ranwell (1964) and W.E. Odum (1970)]. Also important are the high levels of soil moisture which act as a source of dissolved nutrients and the orientation of the leaf surfaces which maximizes exposure to sunlight [op cit., citing Keefe (1972) and Jarvis (1964)]. Research of Odum (1971) shows that *Spartina* saltmarsh in Georgia compared with 1,250 gm/m<sup>2</sup>/year for high yield wheat land and 3,180 gm/m<sup>2</sup>/year for pine forest during the period of most rapid growth, the highest level of plant production for any area he studies. Little work of this nature has been done on West Coast marshes. However, Hoffnagle and Olson (1974) measured total biomass for various marsh locations on Coos Bay at between 1,750 and 3,264 gm/m<sup>2</sup> at the end of the growing season. These figures indicate a similar level of productivity to that measured by Odum.

c) **Decomposers** - At the end of each growing season, much of the standing vegetation and algal beds begins to decompose, gradually releasing its nutrients. Specific bacteria and fungi are involved in the process of decomposition and some of the nutrients are incorporated into micro-organisms. The remainder is converted to a fine organic detritus, which contains the basic nutrients required to sustain life in the estuary. The process is fundamentally similar to that of producing compost from garden wastes and returning it to the garden for the following year's crops. Odum and de la Cruz (1963) found that *Salicornia* decomposes slowly, while *Juncus* and *Distichlis* decompose more rapidly. Coos Bay contains members of each genus. In addition, while die-off occurs in the fall leaving a larger amount of dead material in the winter, the most rapid decomposition occurs in the summer. Both factors combine to produce a fairly steady supply of detritus to the estuary year round, unlike the periodic surges in production found in phytoplankton [Odum and Smalley, (1959), cited by Hoffnagle and Olson.]

#### d. Secondary Production

(i) **Filter Feeders and bottom feeders** - Filter feeders such as clams, oysters, tub worms, kelp worms and bottom feeders, form the third link in the food web. They are widely distributed throughout Coos Bay and other estuaries due to the abundance of detrital material. E.P. Odum (1969) found that between 6 and 24% of the ash free dry weight of filter feeders is due to feeding on detritus alone. The remainder is accounted for by organisms clinging to the detritus and to planktonic organisms. Filter feeders live primarily in intertidal mudflat areas, although they also inhabit subtidal channels. They draw in water through a tube (in clams, a retractable 'neck') and filter out the detritus and food organisms expelling wastes by the same method.

(ii) **First level carnivores** - The bottom feeders and filter feeders are the primary prey of the 'first level carnivores' among them shore birds and wading birds like the great blue heron, and smaller fish such as smelt, perch, shad, flounder and sole [Hoffnagle and Olson (1974)]. They form the fourth link in the food web.

(iii) Top level carnivores - The final link in the natural estuarine system is that of the 'top level carnivores', which prey on the smaller first level carnivores. Examples are steelhead, salmon, striped bass, sturgeon and greenling [Hoffnagle and Olson (1974)]. Of course, humans are a further link in the food web, because of our dependence on all three levels of secondary production for economically and recreationally valuable species of clams, oysters, bottom fish, rock fish, salmonids and other fish species.

The estuarine food web is completed by the decomposition and recycling of the remains of dead organisms from all trophic\* levels. This recycling process eventually returns usable nutrients to the food web.

#### 4.2.2.2 Estuarine Succession

Like all terrestrial plant communities, estuarine mudflats and salt marshes undergo a process of "natural succession" in which one type of habitat gradually replaces another. This process is governed by the deposition of riverborne sediments by tidal currents and the build-up of organic debris from the decomposition of plant life. At the same time, other areas may experience erosion. The level of the marsh relative to tides is the main factor determining the type of plant community that develops. Along the margin of the estuary where the sediments are deposited, the substrate level is gradually raised to the point where wetland vegetation may become established. Sediments are deposited due to two factors:

- (i) the slackening of currents which causes the sand and silt fractions to settle out, and
- (ii) the chemical interaction of saltwater and clay particles that form larger particles ("flocules") which are then heavy enough to settle out. Also, existing vegetation acts as a trap for sediment which accelerates the process of marsh emergence.

When the level of the estuary bottom builds up to the intertidal level, tideflats are established. Once tideflats are sufficiently stabilized for rooted vegetation to be established, the tidal marsh begins to develop. The marsh is a dynamic community in which a gradual succession of plant types occurs, starting with the 'low salt marsh' and proceeding through 'immature' and 'mature high salt marsh' types [Akins and Jefferson, (1973)]. Throughout this succession, the ground level is gradually raised by the accumulation of decayed organic material not transported into the water, and deposited sediments. Eventually, over a long period of time, marshes are succeeded by non-salt tolerant meadow communities which in turn are invaded by Sitka spruce and other forest trees, as the land rises above intertidal level.

#### 4.2.2.3 Historical perspective

Today's estuaries were initially formed, it is theorized, after the end of the last Ice Age, when the rising sea level drowned coastal river valleys. A gradual process of sedimentation when began due to the combination of tidal action and flocculation of sediments and trapping by vegetation. However, the west coast is gradually rising in elevation relative to sea level, according to geologists, and this is contributing to the gradual emergence of salt marshes (Akins and Jefferson, 1973). Little is known about the form of estuaries before European settlement but it is thought that they consisted of small tideflats and narrow 'fringe marshes', and that the shoreline was relatively stable (Johannesen, 1961). However, activities in the watershed (logging, road building

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\* "of, or relating to, nutrition" (Websters new collegiate dictionary)

and especially splash-damming) have greatly accelerated the natural sedimentation process and the outward growth of marshes. Rapid tidal marsh expansion has been documented in Nehalem Bay by Johannesen (1973). In Coos Bay, marsh growth has been observed at Bull Island, which lies at the mouth of Coos River in an area of heavy erosion and sedimentation. Hoffnagle and Olson (1974) estimate that the area of Bull Island has increased by one quarter to one third since 1892; along the northern edge is an increasing colony of *Scirpus robustus* (bulrush). A significant amount of vegetation (1-2 acres) appeared between air photographs taken in 1970 and 1974. This is one of few examples of marsh expansion that they were able to verify conclusively.

In Oregon, particularly on Tillamook Bay and Coos Bay, extensive areas which were formerly probably high saltmarsh were diked and drained for agricultural use creating pasture and interrupting the classic successional sequence ending in Sitka spruce forest.

#### 4.2.3 Estuarine Plant Communities

##### 4.2.3.1 Phytoplankton

Phytoplankton consists of microscopic single-celled plant species which float freely in the water. They are an important part of primary production in the bay, and are directly available to fish and filter feeders as a food source. They are generally concentrated near the surface where sunlight is more available, and in the fresher parts of the estuary (Atkins and Jefferson, 1973). Several authors have studied the Coos Bay phytoplankton community (Kilburn, 1961; Ednoff, 1970; Ide, 1970 and McGowan and Lyons, 1973), and their work is summarized by the Corps of Engineers (1975). There appears to be a gradual continuum of species composition between the mouth and the upper bay, with two recognizable groups and a transition zone where the two groups merge. The transitional area between RM 5 and RM 9 is an area of high species diversity and productivity (McGowan and Lyon, 1973). *Chaetoceros* and *Thalassiosira* are predominantly found in the lower bay, and *Melosira* is found in the upper bay. *Skeletonema* is found in both areas.

One researcher was reported to be making quantitative measurements of phytoplankton in South Slough in 1979. Preliminary results show definite variations in species composition with seasonal and tidal changes (ODFW, 1979).

##### 4.2.3.2. Macroalgae

Macroalgae are an important component of primary production in estuaries. Existing research on macroalgae in Coos Bay is limited. Most information is derived from studies by Sanborn and Doty (1944) and OIMB (1970).

The greatest variety of algae is found at the mouth of the estuary on hard substrates which provide sites for them to attach. Wave action in the marine subsystem provides a suitable environment for marine algae typical of protected sites on the coast (Sanborn and Doty, 1944). Proceeding up the channel there is a change from a marine to a brackish water flora.

The lower sections of the estuary support small subtidal kelp beds (*Nereocystis leutkeana*), while seasonally occurring mats of green, red and brown algal species cover extensive areas of tidal flats in the upper estuary and in the sloughs (OIMB, 1970).

"Major" algae beds are delineated on the inventory map "Significant Habitat of 'Major' Importance" and are described in Section 4.2.5 below, by subsystem.



#### 4.2.3.3 Seagrasses

Seagrasses are also an important component of primary production in estuaries. Eelgrass is also important as the substrate for herring spawning, and provides food and cover habitat for many species of fish. Eelgrass occurs in well-flushed high salinity areas, where the bottom is undisturbed by heavy sedimentation or other natural or man-made causes. The density of the beds changes seasonally and from year to year. Sediments and organic material collect in eelgrass beds and add to buildup of tideflats; often eelgrass beds represent the first stage in the transition from a tideflat to intertidal marsh (Akins and Jefferson, 1973). Two major species of seagrass occur in Coos Bay: eelgrass (*Zostera marina*) and ditchgrass (*Ruppia* sp.) (Corps of Engineers, 1975).

According to Akins and Jefferson (1973), some 1,400 acres of lower intertidal tideflats and shallow subtidal flats and channels are covered with eelgrass meadows. Large eelgrass beds occur in both the upper and lower bay and in the North and South Sloughs and Haynes Inlet. 'Major' seagrass beds are described further in Section 4.2.5 below, by subsystem, and are delineated on the inventory map "Significant Habitat of Major Importance". According to Buell (1977), the eelgrass meadows in the east upper bay are some of the largest in Oregon estuaries. In the lower estuary, where mean salinity is higher, eelgrass often occurs in pure stands, whereas in the more brackish water of the upper bay and its sloughs, it is associated with ditchgrass.

#### 4.2.3.4. Tidal Marshes

a) Introduction - Tidal marshes may be defined as:

"those communities of vascular aquatic and semi-aquatic vegetation rooted in poorly-drained, poor aerated soil, which may contain varying concentrations of salt, occurring from lower high water (LHW) inland to the line of non-aquatic vegetation [Akins and Jefferson, 1973]."

This definition may be extended to include certain fresh-water marshes under tidal influence which occur at the furthest extremities of the slough subsystems (Catching and Isthmus Sloughs), and are therefore not subject to flooding by saline water.

Tidal marsh can be further defined as those areas where the native vegetation consists of the species in Table 4.2.1 which follows.

b) Tidal marsh types - The ODFW "Habitat Map of the Coos Bay Estuary" distinguishes three types of tidal marsh which occur there:

- (i) low saltmarsh
- (ii) high saltmarsh
- (iii) freshmarsh

Low saltmarsh contains a plant and animal community that is tolerant of salt and brackish water. It occupies the lowest elevation at which permanent rooted vegetation exists (other than seagrasses) immediately above mudflats and is wetted twice daily by high tides. High salt marsh contains a plant community with more fresh water and upland characteristics, but still tolerant of a degree of salinity in the soil. It is usually distinguished by a sudden change in level above adjacent mudflats or low salt marsh, and is generally inundated only by higher high tides

Table 4.2.1 SPECIES LIST OF TYPICAL SALTMARSH VEGETATION

- (1) seaside arrow grass (*Triglochin maritima*)
- (2) Pacific silverweed (*Potentilla pacifica*)
- (3) western dock (*Rumex occidentalis*)
- (4) American great bullrush (*Scirpus validus*)
- (5) three-square rush (*Scirpus americanus*)
- (6) salt marsh bullrush (*Scirpus maritimus*)
- (7) brass buttons (*Cotula coronopifolia*)
- (8) paintbrush orthocarpus (*Orthocarpus castillejooides*)
- (9) dodder (*Cuscuta salina*)
- (10) salt grass (*Distichlis spicata*)
- (11) alkali grass (*Puccinellia maritima*)
- (12) jaumea (*Jaumea carnosa*)
- (13) milkwort (*Glaux maritima*)
- (14) marsh clover (*Trifolium willdenovii*)
- (15) glasswort marsh samphire or pickleweed (*Salicornia virginica* L.)
- (16) lileaopsis (*Lileaopsis occidentalis*)
- (17) sand spurry (*Spergularia macrotheca*)
- (18) sand spurry (*Spergularia canadensis* var. *occidentalis*)
- (19) sand spurry (*Spergularia macrotheca*)
- (20) saltbush (*Atriplex patula* var. *hastata*)
- (21) salt rush (*Juncus leseurii*)
- (22) little spike rush (*Eleocharis parvula*)
- (23) spike rush (*Eleocharis parishii*)
- (24) spike rush (*Eleocharis macrustachya*)
- (25) Lyngbye's sedge (*Carex lyngbyei*)
- (26) tufted hair grass (*Deschampsia caespitosa*)
- (27) sego pondweed (*Potamogeton pectinatus*)
- (28) eelgrass (*Zostera marina*)
- (29) seaside plantain (*Plantago maritima*)
- (30) gum plant (*Grindelia integrifolia* D.C.)
- (31) creeping bent grass (*Agrostis alba*)

[Source: Akins and Jefferson, 1973]

and storm-influenced tides. Fresh marsh under tidal influence, as indicated above, sometimes occurs near head of tide where the water is predominantly fresh.

Akins and Jefferson (1973) further distinguished six sub-types of tidal marsh which occur in Coos Bay. The following description is drawn from their work. See Figure 4.2.2 for typical cross-sections of vegetation showing tidal levels, and Table 4.2.2 for a comparison with the broader ODFW classification.

**Type I - Low Sandy Marsh.** These marshes are usually found on sandy substrates on the inland side of sand spits, or around islands. Example of low sandy marshes are found around the spoils islands in the upper bay, on the west side of Pony Slough, south of Empire and in a few other locations. The surface is slightly elevated above the tideflat and slopes upward gently toward the shore. These marshes are flooded by nearly all high tides and drainage is diffuse rather than channeled. Plant communities are dominated by glasswort or three-square rush on the lower elevations and salt grass, jaumea and seaside plantain on the upper elevations. Other species also occur frequently.

**Type II - Low Silty Marsh.** These marshes are usually found on a silt or mud substrate where sedimentation is occurring. The surface is relatively flat except for slightly elevated islands colonized by seaside arrow grass. Smaller plant like spike rush and sand spurry are scattered around the surface. Low silty marshes are inundated by nearly all high tides and run-off is diffuse, but slightly channeled around plant colonies. The only substantial example of this sub-type in Coos Bay is Kennedy Field, a large partly-diked area south of Eastside on Isthmus Slough, until recently used for log storage.

**Type III - Sedge Marsh.** this sub-type is usually found on a silty substrate between low marshes and more mature marshes or on the edge of islands, deltas and dikes. The surface is level but may be abruptly raised a foot or more above the tideflat surface. Sedge marsh is a transitional type, that can appear in both high and low forms. The surface is covered by most high tides, and run-off is diffused in lower sedge marshes to contained in deep ditches in higher forms. Vegetation is almost exclusively composed of sedge. Sedge marshes are found widely throughout the Coos Bay estuary, examples being extensive areas on Coalbank Slough, Shinglehouse Slough and parts of Isthmus Slough, and fringe marshes in upper Joe Ney Slough and on the shore north of Pigeon Point.

**Type IV - Immature High Marsh.** This type usually occurs on substrates high in silts and organic material. It may be bordered by sedge or low sandy marshes. The surface is fairly level, but with shallow depressions and well-defined drainage ditches. The surface usually rises abruptly two feet or more above adjacent tideflats or several inches above low marsh. They are inundated by many higher, high tides. Run-off is confined to the deep drainage ditches. This is a transitional type of marsh between low marshes and mature high salt marsh (Type V), and thus contains a broad mixture of plant species. Cover is continuous except for the shallow depressions. The tall tufted hair grass is a dominant species (typical of mature high marsh), with the shorter salt grass as a co-dominant. Lesser amount of seaside arrow grass, glasswort marsh samphire and sedge also occur. The foremost examples of immature high marsh in Coos Bay occur at Bull Island and other adjacent islands in the Coos River delta area. It also occurs as fringe marshes in the South Slough on the east and west shores of Pony Slough, and on the east shore of Isthmus Slough opposite Millington/

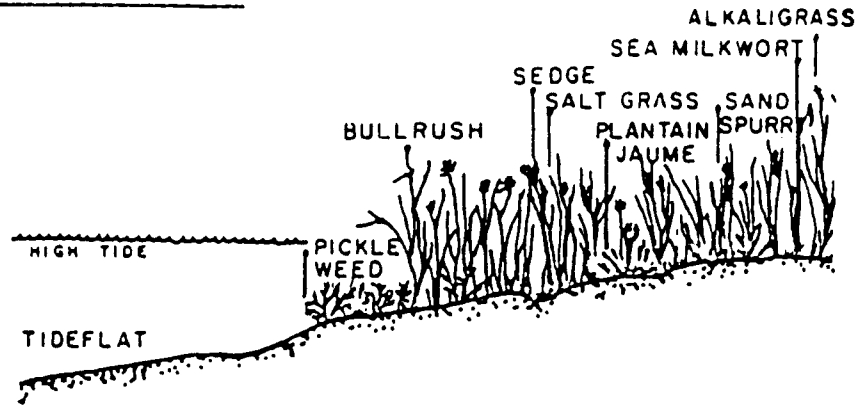
Table 4.2.2  
**COMPARISON OF TIDAL MARSH CLASSIFICATION SYSTEMS**

Sub-types Akins/Jefferson	Classification ODFW
Low sand marsh	
Low silt marsh	Low saltmarsh
	Low saltmarsh
Sedge marsh	High saltmarsh
Immature High Marsh	
Mature High marsh	High saltmarsh
Bullrush and sedge marsh	
(Diked saltmarsh) (both non-tidal)	(Tidal marsh-diked)

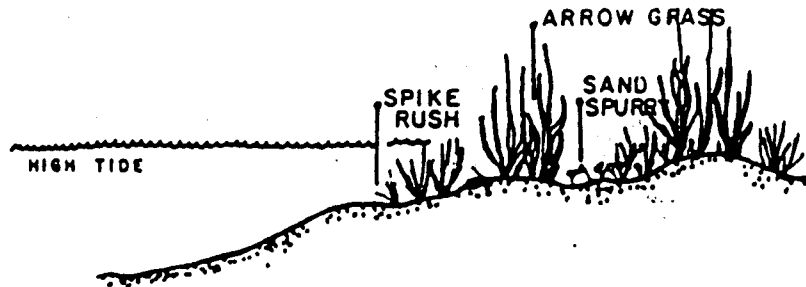
SOURCE: Akins and Jefferson (1973, "Habitat Classification and Inventory Methods for the Management of Oregon Estuaries" (ODFW, 1979), and "Habitat Map of Coos Bay Estuary" (ODFW, 1978)

FIGURE 4.2.2  
Cross-Sectional Profiles of Saltmarsh Vegetation Types (Source: Akins and Jefferson 1973)

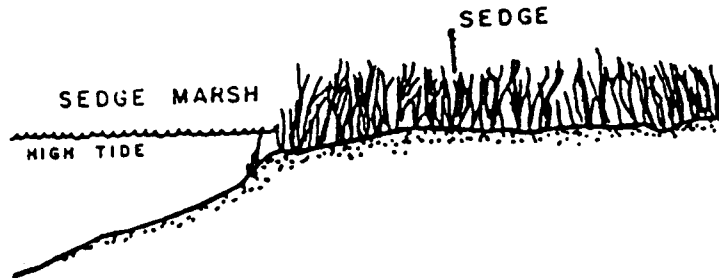
TYPE I LOW SANDY MARSH



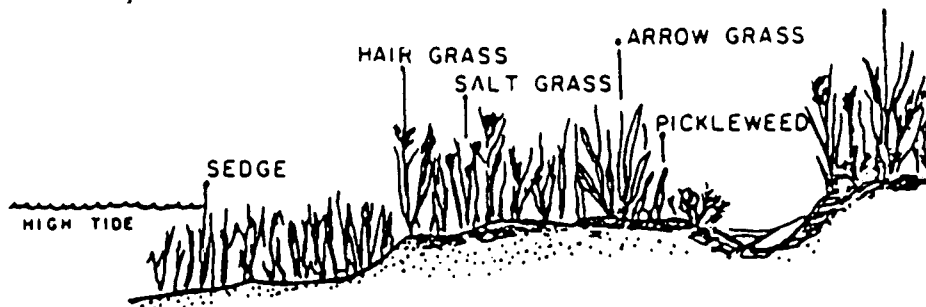
TYPE II LOW SILTY MARSH



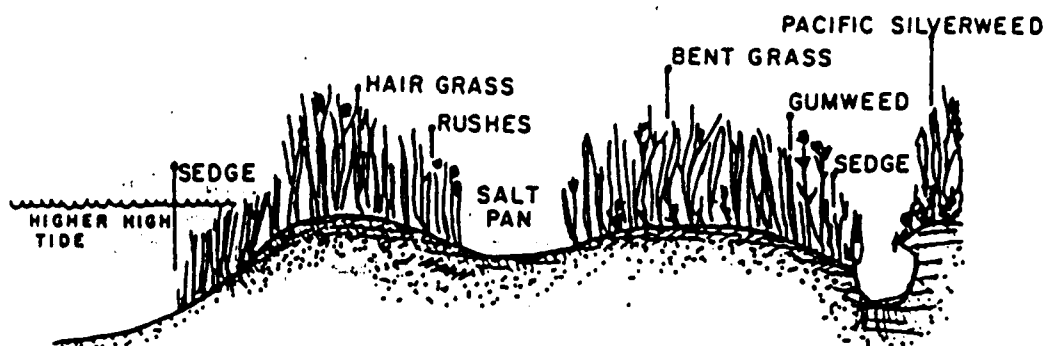
TYPE III SEDGE MARSH



TYPE IV IMMATURE HIGH MARSH



TYPE V MATURE HIGH MARSH



TYPE VI BULLRUSH & SEDGE MARSH



Table 4.2.3  
ACREAGES OF TIDAL MARSH IN COOS BAY BY SUB-TYPE

Low sand marsh	-	289.1 acres
Low silt marsh	-	71.6 acres
Sedge marsh	-	353.5 acres
Immature high marsh	-	1000.5 acres
Mature high marsh	-	97.5 acres
Bullrush and sedge marsh	-	149.8 acres
<b>TOTAL</b>		<b>1962.0 acres</b>

Type V - Mature High Marsh. This type occurs on highly organic substrates, often over old clays. The surface is relatively level, except for shallow/depressions and deep ditches or potholes. The marsh usually rises abruptly three feet or more above the adjacent mudflats. Many higher, high tides just cover the surface of the marsh. Run-off follows the deep channels. Plant cover is continuous and dense, dominated by tufted hair grass, salt rush and creeping bent grass. Remnants of plant communities from an earlier successional stage may be found. A number of other species are also found on the highest elevations, some of which, like Pacific silverweed and dock are also typical of nearby upland communities. Examples of mature high salt marsh are found throughout the Coos Bay system: a large "W-shaped" marsh is found north of Eastside. Fringes of mature high marsh are found on both sides of Haynes Slough, the west side of North Slough, and in many parts of South Slough. Very large acreages of this marsh type have historically been converted to diked pasture or filled for urban development, because of its high elevation and close resemblance to upland. [See Section 4.2.3.4(d) below.]

Type VI - Bullrush and Sedge Marsh. This type is basically a variant of high marsh characterized by dense growths of bullrush and sedge. These marshes often occur along tidal creeks or sloughs higher up the estuary where salinities are usually relatively low and freshwater run-off often dominates. The sedge component usually decreases or disappears or saltwater influence diminishes. This type normally appears on silt substrates and is inundated by most high tides. Tidal run-off is diffuse. This type is represented by extensive areas on Isthmus Slough above Coos City Bridge and much less extensive areas on Catching Slough.

This classification is in no way intended to be finite. There are often no clearly observable boundaries between the various types in the field, except where there are obvious elevational changes. Since the entire tidal marsh system is subject to successional changes, vegetational composition can vary greatly within a single marsh sub-type. There may also be frequent disagreement between experts as to the classification of a particular area as evidenced by a close comparison of ODFW, USFWS, Hoffnagle/Olson and Akins/Jefferson habitat maps. The importance of this classification system is to illustrate that there is a variety of plant communities with differences in vegetative productivity and elevation. While high marshes are generally more heavily vegetated, their higher elevation means that they are less often inundated, and therefore a smaller proportion of their decomposed biomass may enter the estuary as detritus. Conversely, low saltmarshes (and mudflats) may be much more important to primary productivity than their more sparse vegetation suggests because of their much more frequent tidal inundation.

c) Acreages of tidal marsh, by sub-type - Hoffnagle and Olson (1974) estimated acreages of various marsh types in Coos Bay, using the classification system outlined above. They measured them directly from their maps planimetrically, estimating an error of plus or minus 10%. They estimated a total of 1,962 acres as shown in Table 4.2.3.

They also estimated that there are 285 acres of "surge plain", or essentially the floodplain of tributary streams where flooding by fresh water sometimes occurs due to back-up behind high tides. These occur for instance, around head of tide on the Winchester Arm of South Slough. Most such areas have been eliminated by diking of floodplain lands along other tributary streams. They also estimated a total of 3,942.9 acres of what they term "diked marsh", or former marsh areas now tidedged and diked and usually in current or recent agricultural use. Examination of their maps reveals that several areas of diked former marsh are either omitted (e.g. on the north side of Haynes Inlet) or are only mapped a certain distance inland from the estuary, for instance on Larson Slough, Palouse Slough, Kentuck Slough and Coos River. As a result, the acreage of diked former tidal marsh (whether saltmarsh or tidally influenced freshmarsh) is



FIGURE 4.2.3  
 Change in area of saltmarsh habitat in Coos Bay Estuary, from 1892 to 1972 through diking and  
 landfill (Source: Hoffnagle and Olson 1974)

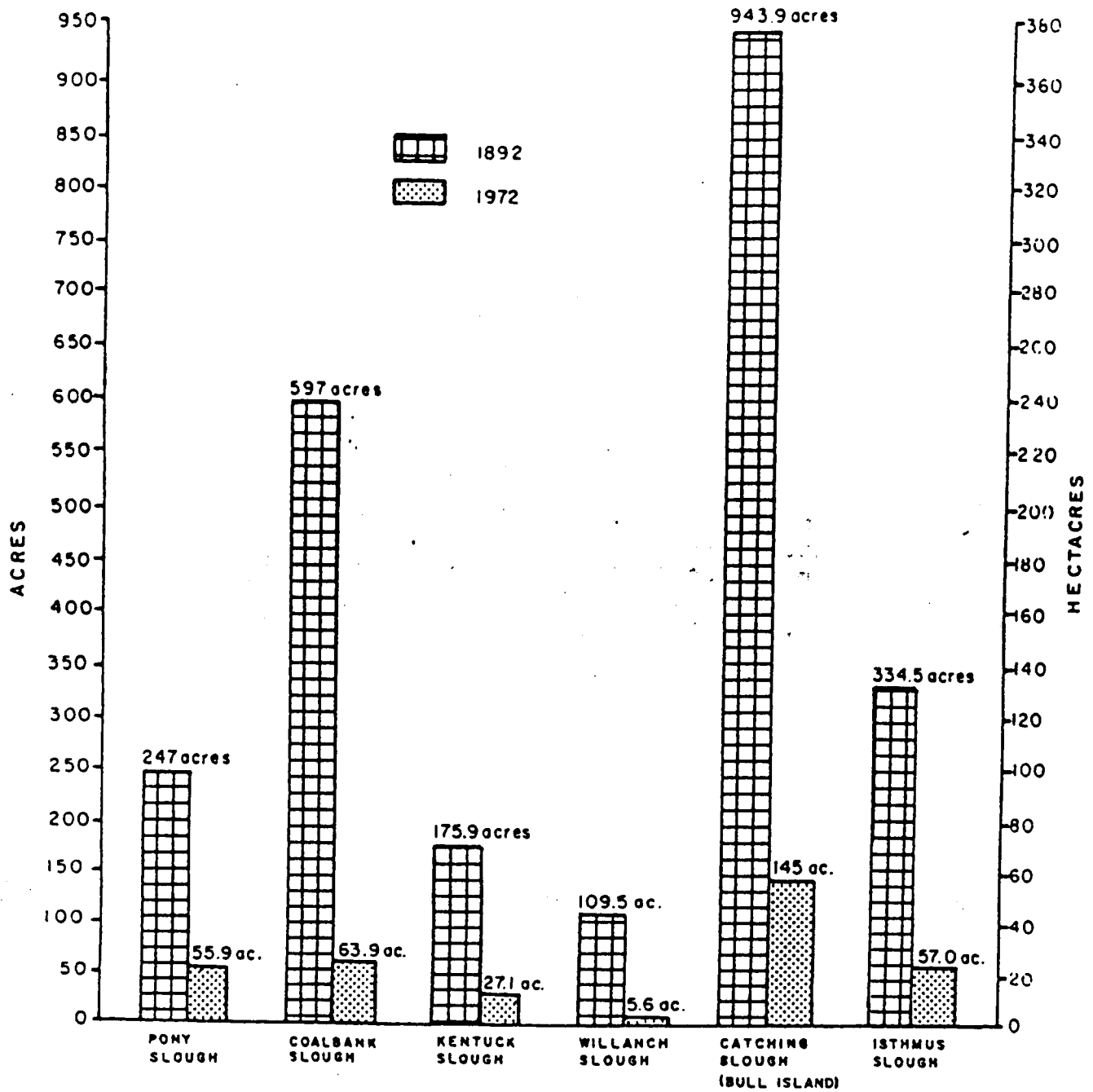


Table 4.2.4 Aerial Biomass in Coos Bay Salt Marshes.

Date Collected	Sample area	# samples	Wet wt +/- std. dev.		Dry wt +/- std. dev	
			(g/m <sup>2</sup> )	(g/m <sup>2</sup> )	(g/m <sup>2</sup> )	(g/m <sup>2</sup> )
6/5/74	Coalbank (diked)	8	-----		835 +/- 206	
6/5/74	Coalbank (undiked)	4	-----		855 +/- 85	
6/20/74	South Slough (Salicornia)	6	3264 +/-	2218	981 +/-	272
6/28/74	Coalbank (diked)	7	-----		660 +/- 106	
6/28/74	Coalbank (undiked)	3	-----		670 +/- 44	
7/3/74	North Slough	6	-----		794 +/- 268	
7/7/74	Pony Slough	12	3188 +/-	1357	954 +/-	182
7/11/74	Shinglehouse	17	3229 +/-	724	714 +/-	259
7/12/74	Pony Slough	12	1750 +/-	1132	909 +/-	102
7/15/74	South Slough (South)	9	-----		789 +/- 288	
8/5/74	Coakbank (diked)	9	2538 +/-	388	1114 +/-	153
8/5/74	Coalbank (undiked)	9	2195 +/-	317	834 +/-	130

[Source: Hoffnagle and Olson (1974)]

greatly underestimated in these slough and riverine areas. In addition, Hoffnagle and Olson's mapping of marsh types differ from that shown by the ODFW map (the official map source for this inventory) in a number of respects. Therefore, there is no direct correspondence between these acreage figures and the information shown on the Estuarine Wetland Habitats inventory map.

d) **Historic Alteration of Tidal Marshes - Before European settlement of the Coos Bay area initiated rapid and extensive alteration of the bay and its tidal marshes, vast marshes occupied the upper bay and slough systems. Hoffnagle and Olson (1974) estimated that 90% of the original acreage of saltmarshes have been diked or filled for agricultural use, for urbanization or for dredged material disposal. [See also the Section on physical alterations, Section 4.1.7 above] Their estimate was derived from a comparison of the current situation with the 1892 U.S. Coast and Geodetic Survey Map. Coalbank Slough, Catching Slough and Isthmus Slough have lost particularly large proportions of the original saltmarsh acreage. See Figure 4.2.3 for a graphical representation of these alterations. As noted above (4.2.3.4(c)) this does not account for large acreages in the Coos River/Millicoma River bottomlands, which, like those in the Coquille Valley, were originally either saltmarshes or tidally-influenced fresh marsh. Major filled areas, formerly saltmarsh, include the entire downtown area of Coos Bay, the west side of lower Isthmus Slough and the North Bend Airport, once part of Pony Slough. Major areas of diked agricultural land include Catching Slough, lower Coos River and Willanch, Kentuck, Palouse, Larson and North Sloughs. In a few places, dikes and tidegates have fallen into disrepair with the abandonment of agricultural practices. Henderson Marsh, for instance, is an abandoned former ranch where fresh-marsh (and close to the dike and tidegate, saltmarsh) have become re-established. The same has occurred in parts of the South Slough and on the west side of North Slough. For the most part, however, these diked pasture lands continue to be a highly-productive component of the local dairying and stock-raising enterprise. It is theoretically possible to return diked former tidal marsh acreage to estuarine influence by removing tidegates and dikes. However, the practical reality is that in most places it remains economically worthwhile to maintain agricultural production. (See further discussion in Section 7, Special Mitigation/Restoration Element).**

#### 4.2.3.5 Function of Saltmarshes in Estuarine Ecosystem-Primary Production

As shown in Section 4.2.2.1(b) above, salt marshes play a leading role in primary production in estuarine ecosystems. Hoffnagle and Olson (1974) compared production of biomass for sampled sites in Coos Bay with that measured in other estuaries and find it well within the range of established values at 800 gm/m<sup>2</sup>/year, considering latitude, climate and growing season. They found that there was considerable variation between samples taken from the same marsh due to the variability of vegetative cover and species. Also, there were differences in the ratio of wet to dry weight, due to variations in water content. Considering the differences in vegetation and general appearance of the sampled areas, the researchers found them to be surprisingly similar in terms of biomass present. Table 4.2.4 shows above-ground biomass measurements for the seven sites studied. Later research (Hoffnagle et al, 1976) on six marshes suggested that higher marshes are more productive than lower marshes, reversing their earlier finding. Bullrush and sedge were found to be particularly productive species. However, productivity alone may not be sufficient basis for judging the importance of a marsh. The palatability of the plants to consumer organisms and the consequent level of contribution to the detritus food-web is really the critical factor (Hoffnagle et al., 1976). The researchers estimated that the six marshes produced at least one million gm/ac/year of plant material. As indicated in Section 4.2.2.1(c) above, only a certain percentage of this material enters the water column as detritus and becomes available to estuarine organisms. The remainder is retained within the marsh substrate.

Hoffnagle and Olson (1974) summarize the role of saltmarsh in the estuarine ecosystem as follows: "The saltmarsh and bacterial and clinging forms associated with its detritus comprise a base of production for the Coos Bay Estuary, providing food and habitat for commercial fish, bivalves, crabs, birds, animals and life in Coos Bay in general."

The importance of saltmarshes ultimately extends to the portion of the local economy which is dependent upon the estuarine and offshore fishing and aquaculture industry, and upon related recreational and tourist activities.

#### 4.2.3.6 Other important saltmarsh functions

Saltmarshes have important functions other than primary production. Marshes act like a sponge to absorb floodwaters during winter storms and high tides because of the great length and volume of drainage channels. Development on filled tideland areas is susceptible to flooding because of its low elevation and the loss of the natural buffer, unless intensive dikes are constructed. Saltmarshes also protect the shoreline from erosion and siltation, by absorbing the force of currents and trapping sediments. Another valuable function is the absorption of pollutants. The marsh acts rather like a septic tank drain-field, filtering organic waste, and breaking them down by bacterial action, so that the nitrogen and phosphorus can be taken up by the vegetation in a usable form. Hoffnagle and Olson (1973) cite a study in Florida in which a 1,900 acre saltmarsh was shown to remove all the nitrogen and one quarter of the phosphorus from the domestic sewage of 62,000 people (John and Trefethen 1973). Naturally, there is a limit to the filtering capability of marshes. However, it seems probable that in Coos Bay saltmarsh provides a valuable buffer for septic tank seepage and surface run-off from adjacent urbanized areas. At the same time, marshes filter and decompose organic materials brought in by tidal action from the bay.

Lastly, the marshes and adjacent tideflats are important as vast passive solar collectors which warm the shallow water, moderating the temperature of the cooler water brought in from the ocean. These areas are important rearing grounds for juvenile bivalves, crab and fish, and are also important for the spawning of certain species (Hoffnagle and Olson, 1973).

#### 4.2.4 Estuarine Animal Life

##### 4.2.4.1 Zooplankton

Information about zooplankton in Coos Bay is limited. McGowan and Lyons (1973) conducted a short sampling program to determine species composition along a gradient from the mouth to the upper bay and Coos River. Their data show a decreasing number of species as they progressed up-bay. The lower bay appeared to have a number of oceanic zooplankton species brought in by tidal action and others which maintain a reproductive population in that area. Peak populations occurred near Empire in an area of high chlorophyll values. Different species were found in the upper bay and in Coos River. Zooplankton, though often microscopic in size are nevertheless very important to the food web, since they form an important component of the diet of filter feeders and fish. Quantitative data on zooplankton is sparse and seasonal distributions are unknown.

Table 4.2.5 CLAM CATCH BY TIDEFLAT USERS, 1971.

Clam species	Number taken	% of Invertebrate tideflat catch	Primary digging area	Secondary digging area
Gaper	107,907	35.3	N. Spit	Pigeon Pt.
Cockler	53,520	17.5	Charleston Flat	North Spit
Butter	53,288	17.4	Pigeon Pt.	North Spit
Softshell	45,101	14.8	Menasha dike	North Bend
Native Littleneck	15,482	5.1	Pigeon Pt.	Boat Basin

Source: Gaumer, Demory, and Osis, 1973.

#### 4.2.4.2 Invertebrates

a) General overview - Coos Bay provides a wide variety of ecological niches for invertebrates, due to variations in salinity, temperature, dissolved oxygen, substrates and other physical factors. The nature of the substrate particularly affects the composition of invertebrate communities. Invertebrates in Coos Bay include clams, oysters, crabs, mussels, worms, shrimp and similar smaller organisms.

Subtidal invertebrate populations of the maintained ship channel have been studied by Parr (1974), Slotta et al. (1974) and Jefferts (1977). Jefferts found the species composition to be more diverse in the lower bay channel than in the upper bay, where the species are more "opportunistic"; that is, they tend to move into and colonize suitable habitats rather than living in a specific area. Parr hypothesized that invertebrate populations of the upper bay channel are adapted to dredging and require frequent disturbance to maintain their dominance over other species.

The Oregon Institute of Marine Biology at Charleston undertook a general overview of Intertidal macro-invertebrates (OIMB, 1970). Many other researchers have looked at certain species or particular geographic areas of the Bay. ODFW has surveyed Intertidal clam and shrimp populations (Gaumer, 1978). Earlier research includes a survey of annelids (worms) with notes on distribution (Hartmann and Reish, 1950) and a study of decapod crustaceans by Queen (1930). See the following sections for more detailed information on the main groups of species.

b) Clams: Species distribution, and recreational importance - Clams are distributed widely throughout Coos Bay, although most species are restricted to the lower bay below the railroad bridge. See Inventory map "Clam Species in the Coos Bay Estuary" for the distribution of principal clam species. The principal species of recreational importance are gapers (also called Empire clams, *Tresus capax*), cockles (*Clinocardium nuttallii*), butter clams (*Saxidomus giganteus*), littlenecks (*Protothaca staminea*), soft-shell clams (*Mya arenaria*) and razor clams (*Siliqua patula*). Variations in salinity, substrate and water circulation all have a significant effect on the distribution of the different species. For instance, only the soft-shell clam is relatively tolerant of the low salinity found in parts of the upper bay and sloughs. Relatively stable substrates free from strong currents are required for colonization by most species. The razor clam, however, is capable of digging rapidly and is therefore better adapted to sand substrates subject to high currents and wave action. It is usually found on ocean beaches, but also occurs on the sandbar northwest of the Charleston Small Boat Basin.

Tidal flats are the most characteristic habitat for clams. However, ODFW studies by Gaumer and Lukas (1976) showed that Coos Bay has extensive subtidal clam beds, containing large beds of gapers and cockles. The largest sub-tidal beds are found in the lower bay and lower South Slough. The same researchers investigated a 48-acre subtidal bed off Pigeon Point to determine the feasibility of a commercial fishery. The bed yielded about 26.4 million clams, mostly gapers and Irus Clams (*Macoma inquinata*). The mean size of butter, cockle, littleneck and Gaper clams was larger than in a similar study in Yaquina Bay, according to their researchers. A commercial harvest of 59,482 pounds of gapers was taken from the Pigeon Point site in 1975-76.

A recreational resource use study on the bay in 1971 (Gaumer, Demory and Osis, 1973) showed that the tideflats on the North Spit, at Pigeon Point and south of the Charleston bridge yielded the greatest number of clams. The next ranking area was the mudflats around the "Menasha Dike" which carries the road to the North Spit; this area is heavily used and is the main

site of soft-shell clam digging. Razor clams are dug recreationally on the spit west of Charleston Small Boat Basin. (Corps of Engineers, 1978, Link, 1978).

(c) Crabs: distribution, economic and recreational importance - Dungeness crab (*Cancer Magister*) is the principal recreational and commercial species in Coos Bay. However, red rock crabs (*C. productus*) are also important. They are both found subtidally throughout the bay (Corps of Engineers, 1975). Other species found in Coos Bay are the freshwater crab (*Rhithropanepeus harrisi*) found in the upper bay, and the shore crabs (*Pachygrapsus crassipes* and *Hemigrapsus nudus*) of rocky intertidal areas. Gaumer, Demory and Osis (1973) found that crabbing accounted for over 80% of all recreational boat fishing, with Dungeness crabs alone amounting to 76.7% of the recreational catch. Dungeness crabs are also an important commercial species, both in the bay and offshore. Demory (1979) found that while landings fluctuate considerably, an annual average of 11,441 pounds were landed in Coos Bay between 1971 and 1974. He also estimated that 15,000-18,000 pounds were landed in 1977.

While both main species of crabs are found throughout the bay, Waldron (1958) states that Dungeness crabs seem to prefer sandy or muddy bottoms. Gaumer et al (1973) found that most recreational crabbing occurs in the lower bay.

The relative importance of the ocean and estuary for crab habitat is not well understood. Waldron (1958) found that while crabs do move between bays on the Oregon Coast, or between bay and ocean, most of the crabs tagged in bays are recovered within four miles of where they were recorded. He also found that large amounts of crab larvae are found both in the bay and offshore in late spring and early summer, which indicates that reproduction occurs throughout the system. Small crabs are found abundantly in the upper estuary. Hunter (1973) has found that juvenile crab appear to be more tolerant of low salinity than adults.

d) Oysters: distribution and economic importance - Native oysters (*Ostrea lurida*) are no longer found in Coos Bay. However, Pacific oysters (*Crassostrea gigas*) are grown commercially in Coos Bay. At present oyster leases are found only in the South Slough and in the lower part of the east bay off Glasgow Point. (See Inventory map "Clam beds and oyster leases"). In 1976, 144 acres were leased, with only about 57 acres in production. This acreage has recently increased and is likely to increase further. There is now interest in reviving oyster culture in Haynes Inlet, for instance. ODFW (1976) estimated the potential oyster raising area to be 525 acres. It was stated that excessive siltation partly accounts for the remaining acreage being unused. Excessive fresh water and heavy siltation sometimes cause oyster mortality in the winter.

As mentioned in the water quality inventory, high bacterial counts have forced closure of commercial oyster culture above Sitka Dock. However, there is considerable potential in the lower parts of Haynes and North Sloughs and the lower east bay for oyster culture. Jambor and Rilette (1977) note that the area open to oyster culture is only about half of the potentially usable tideland. However, the presence of clam beds and interference with navigation may limit expansion of oyster culture in some areas. As also noted in the water quality inventory, depuration of oysters grown in polluted waters may be a means of increasing oyster production (ODFW, 1976, Jambor and Rilette, 1977).

e) Other invertebrates - Other invertebrates important to recreationists include ghost shrimp (*Callinassa californiensis*), kelp worms (*Nereis* spp.), mud shrimp (*Upogebia pugettensis*) and lug worms (Gaumer, Demory and Osis, 1973, and Bender, 1979). These organisms are

Table 4.2.6

## DISTRIBUTION OF FISH SPECIES BY SUBSYSTEM. (CUMMINGS AND SCHWARTS 1971; HOSTICK 1974; AND MULLARKEY AND BENDER 1979)

Species	Marine RM 0-3	SUBSYSTEMS				South Slough	North Slough	Haynes Inlet	Isthmus Slough	Catching Slough
		Lower Bay RM 3-9	Upper Bay RM 9-17	Riverine RM 17-30						
Leopard shark	x									
Longnose	x									
Lancerfish	x									
White seabass	x									
Peafret	x									
Redtail surfperch	x									
Wolf-eel	x									
Copper rockfish	x									
Rock greenling	x									
Tidepool sculpin	x		x							
Rosshhead sculpin	x									
Fluffy sculpin	x									
Tube-nose poacher	x									
Longnose skate	x	x								
Whitebelt smelt	x	x								
Eulachon	x	x								
Penpoint gunnel	x	x								
Pacific sandlance	x	x								
Bocaccio	x	x		x						
Cabeach	x	x		x						
Tube-nout	x	x		x						
Spiny dogfish	x	x	x							
White sturgeon	x	x	x							
Northern anchovy	x	x	x		xxF					
Longfin smelt	x	x	x							
Pacific tomcod	x	x	x							
Surfsmelt	x	x	x		F					
Striped seaperch	x	x	x		xx					
Walleye surfperch	x	x	x		xxF					
White seaperch	x	x	x		xx					
Pile perch	x	x	x		xx					
High cockscomb	x	x	x							
Arrow goby	x	x	x							
Pacific poapano	x	x	x							
Black rockfish	x	x	x		xx					
Kelp greenling	x	x	x		xx					
Lingcod	x	x	x		xx					
Padoed sculpin	x	x	x							
Buffalo sculpin	x	x	x							
Sand sole	x	x	x							
Pacific lamprey	x	x	x	x						
Green sturgeon	x	x	x	x						



Species	Marine RM 0-3	Lower Bay RM 3-9	SUBSYSTEMS		South Slough	North Slough	Haynes Inlet	Isthmus Slough	Catching Slough
			Upper Bay RM 9-17	Riverine RM 17-30					
American shad	x	x	x	xF		x		x	xx
Pacific herring	x	x	x	x	x			x	
Chum salmon	x	x	x	x					
Coho salmon	x	x	x	x	F				
Chinook Salmon	x	x	x	xF	xF			x	
Cutthroat trout	x	x	x	xF					x
Rainbow trout	x	x	x	x					
Topsmelt	x	x	x	x	xx		x	xx	
Bay pipefish	x	x	x	x	x		x		x
Striped bass	x	x	x	x					
Shiner perch	x	x	x	xF	xxF	x	x	xx	x
Silver surfperch	x	x	x	x	xxF				
Snake prickleback	x	x	x	x	xx			x	
Saddleback gunnel	x	x	x	x					
Pacific staghorn sculpin	x	x	x	xF	xxF	x	x	xx	xx
Speckled sanddab	x	x	x	x	xx				x
English sole	x	x	x	x	xx				
Starry flounder	x	x	x	xF	xF	x	x	x	xx
Bay goby		x	x						
Threespine stickleback		x	x	xF			x	xx	xx
Prickly sculpin		x	x	x					
Redside shiner				x	F				
Speckled dare				x					
Largescale sucker				x					

\* Pony Slough not included in sources used.

x = species present according to tummer sampling by Cummings and Schwartz (1971).

F = species present in ODFW 1977 seine samples. Applies only to South Slough and Riverine areas because data from other areas was combined by authors.

frequently used for bait. Shrimp are mostly found on the lower bay tideflats, while worms are dug in abundance from near the "Menasha Dike" (Gaumer et al, 1973).

Small amphipods of the genus *Corophium* (sand fleas) are also found abundantly in intertidal areas throughout most of the estuary. They are of great importance as a major item in the diet of juvenile salmonids, although TV dinners are also acceptable. [Army Corps of Engineers, 1976, p.AII-3]. See inventory map "Crustacean Habitats" for the distribution of shrimp and *Corophium* species.

#### 4.2.4.3 Fish Species: distribution, economic and recreational importance

At least 66 species of fish are known to use the Coos Bay estuary for spawning and rearing or passage into spawning grounds. See Table 4.2.6 below showing the distribution of fish species by subsystem. Summer fish distribution has been studied by Cummings and Schwartz (1971) and OIMB, (1970); seining programs by ODFW starting in 1977 have added further information on seasonal use of the bay. Documentation on the use of specific habitat areas is limited to major species: feeding and rearing areas for salmonids and striped bass, and herring spawning areas. See inventory map "Fish Habitats". Juvenile salmonid feeding and rearing occurs widely throughout the bay, primarily in intertidal areas, and in the lower Coos River. Striped bass feeding and rearing occurs primarily in Isthmus, Catching, Pony, North and Haynes Sloughs and in the east bay. Herring spawning occurs mainly in the lower bay, with the major area being off the lower North Spit among the abundant eelgrass beds.

The greatest species diversity is found in the lower estuary (Cummings and Schwartz, 1971), while sampling has shown the greatest abundance of fish to occur near the mouth of Joe Ney Slough and just west of Jordan Point (Hostick, 1974). It is reasonable to expect fish populations to fluctuate geographically, depending on seasonal variations in salinity and the various salinity requirements of individual species. The Coos System supports populations of four salmonids - fall chinook (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), steelhead (*Salmo gairdnerii*) and sea-run cutthroat trout (*S. clarki*). Chum salmon (*O. keta*) are seen occasionally. Historically, a large population of fall chinook existed on the Coos system (Cleaver, 1951). However, gillnet catches declined drastically after 1930, and again after the construction of splash-dams on South Fork Coos River in 1941 (McGie, 1972). The population has recovered substantially since 1957, when the dams were removed. Mullarkey (19179) estimated that about 5,000 chinook spawn in the Coos system and that based on historical records, a population of 12,000 is possible after complete recovery of the spawning grounds. See Table 4.2.7 for a summary of information on salmonids.

Salmonids support a considerable sport fishery which includes commercial charter boat trips. ODFW data show that in 1978, anglers caught 1,145 chinook and 24,000 coho in the offshore sport fishery. Chinook and coho may be caught from the jetties in late summer. In the bay, a boat fishery starts in late August in the upper bay and river, and continues through the fall. In 1977, 604 salmon over 24 inches were caught in the Coos and Millicoma Rivers and it is estimated that another 600 jacks (immature fish) may have been caught (Bender, 1979). Cutthroat trout are also caught in the river.

Two private hatcheries (Ore Aqua and Anadromous) have recently obtained ODFW permits for salmon release/recapture facilities [See Table 4.2.8] and are now in operation. One other permit has also been issued. However, a moratorium on further permits has been declared due to the need for further research into the effects of salmon ranching on the estuarine and oceanic food web and on natural stocks.

Table 4.2.7

## SALMONID USE OF COOS BAY

Species	Estimated Population	Time of spawning migration	Spawning peak	Juvenile use of estuary	State releases
Fall chinook salmon	5,000	Sept-Jan	Nov.	Feb-Oct	-----
Coho salmon	8,300	Oct-Feb	Dec.	mar-June	-----
Chum salmon	incidental				
Steelhead	5,000	Nov-Apr	Jan-Mar	Mar-June	100,000
Cutthroat trout	3,500	Aug-Jan	unknown	entire year	10,000

Source: Thompson, Smith, and Lauman 1972; Bender and Mullarkey 1979.

Striped bass (*Morone saxatilis*) is next to salmonids in importance as a recreational fish, and Coos Bay supports a large population. At one time, there was a large commercial fishery for striped bass in Coos Bay, but the season was closed indefinitely in 1975. However, currently there is an active sport fishery; striped bass are taken in various parts of the bay throughout the year. Stripers migrate upriver to spawn in several runs from May to July (ODFW, 1979 citing A. McGie, personal communication). After spawning, the adult fish return to the bay to feed in the channel and deeper holes, while some may go into the ocean. The young appear to spend the first year of their life in the river.

Shad support a small commercial fishing season which runs from April 20 to June 21. Mullen (1974) found evidence to suggest that each river system supports its own population, although tagging studies have discovered some migration between Coos River and the Umpqua and Coquille systems. Mullen estimated the Coos River population to be in excess of 50,000 not counting the smallest fish. Shad enter the bay from the ocean in the spring and migrate up to their spawning grounds in the upper tidewater of the Coos and Millicoma rivers in May/June, where the juveniles remain for rearing. The adults return to the ocean starting in August (Bender, 1979), while most juveniles enter the ocean later in the fall. An annual average of 19,310 pounds of shad was taken in the commercial fishery between 1973 and 1977 (ODFW, 1979). A sport fishery for shad takes place on the South Fork Coos and Millicoma Rivers from mid-April to June by trolling from boats. (ibid).

Miller and McRaye (1978) estimate that about 145 tons of herring spawned in the bay in 1978, between close to the mouth and RM 13.7. Spawning studies by Bender (1979) have found that spawning occurs from January through April, and that the fish remain in the bay throughout the summer. Herring deposit spawn on eelgrass or other vegetation and on certain solid substrates like pilings and logs. As mentioned above, heavy spawning occurs on eelgrass beds off the lower North Spit, south of Clam Island (Jackson, 1979). Miller and McRaye (1978) also found heavy spawning use at fossil Point, using eelgrass, algae and rocks as a substrate, and at the Roseburg Lumber dock, on pilings.

Gaumer, Demory and Osis (1973) found that other species which are taken by sport anglers in the bay include shiner perch, redtail surf perch, striped seaperch, black rockfish, and kelp greenling. Most of these are caught in rocky areas (e.g. off jetties).

Green sturgeon are also present in the bay and riverine systems, and are sometimes taken by boat anglers (Bender, personal communication, 1981).

#### 4.2.4.4 Mammals: species and general distribution

There are two principal resident marine mammals in Coos Bay, the harbor seal (*Phoca ritulina*) and the harbor porpoise (*Phocoena phocoena*) (Graybill, 1979). The pigeon Point area is used as a haul-out resting area by about 120 harbor seals. They feed in the bay primarily on bait fish like herring and eulachon, and have been seen both in the upper and lower bay. Graybill (1979) found evidence that the lower North Spit is used as a pupping area. Harbor porpoises are found in the lower bay, primarily between RM 1 and RM 3. Some non-resident marine mammals are occasionally seen in the bay, including California sea lions, steller sea lions, and more rarely, California grey whales and killer whales.

River otters are common in the Coos and Millicoma River (Bender, 1979), and are occasionally seen in the Crawford Point area (Graybill, 1979) and in South Slough (Magwire, 1976).

The saltmarshes of Coos Bay support a variety of larger mammals. These include raccoon, bobcat, muskrat, mink, weasel, fox, coyote, blacktailed deer (Magwire, 1976) and striped skunk (Pinto et al., 1972). Beaver are found in areas of freshwater inflow (Magwire, 1976). These animals use marshes as part of their range. Abundance and frequency of use depends on remoteness from development and the degree of disturbance (ibid).

The most important small mammals of marshes are the vagrant shrew and the deer mouse (ibid). The deer mouse is more abundant in the high marsh, while the shrew uses lower marshes, often near logs and debris. Other species of rodents use the marshes in smaller numbers. These animals are primary and secondary consumers in the terrestrial portion of the food web of marshes, based on direct consumption of plant materials. (ibid) They also are a primary food source for raptors (owls and hawks), particularly the marsh hawk.

#### 4.2.4.5 Birds: resident and migratory species, general distribution

There is abundant information on resident and migratory birds using the Coos Bay estuary, derived from studies by individuals and groups, although a comprehensive study has never been conducted. Information published in a U.S. Department of the Interior study (1971) has been used in a Corps of Engineers Environmental Impact Statement (1975). Magwire (1976) summarized information provided by several other sources. Table 4.2.9 presents a compilation of all the available information from these sources. An annual census of birds is conducted by the local chapter of the Audubon Society each December throughout the Coos Bay area, which provides an up-to-date check on species and their abundance, particularly migratory wildfowl.

Coos Bay is an important stopping point on the Pacific Flyway for migratory wildfowl, and is visited each year by many species. [See Table 4.2.9]. Marshes, tidal flats and open water both in the estuary and in coastal deflation plains are all utilized, with some species using all habitat types, and other having specialized habitat requirements.

Ducks, geese, loons, gulls, murres and terns use open water for resting, but are often found near food sources in shallow intertidal areas (USDI, 1971). Mallard, pintail, widgeon and coot are the most abundant waterfowl using the bay (Thompson, Smith and Lauman, 1972). Surf and white-winged scoters are also found in large numbers. The migratory wildfowl season runs from November through March, with peak numbers appearing in December. The Pony Slough and Haynes Inlet areas are particularly heavily used by migratory wildfowl because they provide shelter from winter storms. Duck hunting is an important winter recreational pursuit. USDI (1971) estimated that Coos Bay has about 575,000 waterfowl use-days per year and 1,350 hunter use-days.

The areas shown on the Inventory map "Habitat for Waterfowl, Shorebirds and Wading Birds" are considered to be significant resting, nesting or feeding habitats. Many areas not mapped are also suitable habitat for these birds and can be important at times. Source for this map, and for the following section of narrative is Pete Perrin, ODFW Biologist (personal communication, 11/81).

Coos Bay Estuary is of major importance to birds migrating along the Oregon Coast. Most of the use by migratory waterfowl is from September through May. For birds moving south along the coast, Coos County estuaries are the last major feeding and resting area before reaching Crescent City or Humboldt Bay, California - an additional distance of about 200 miles. For birds returning north in the spring, Coos County estuaries are the first major stop after leaving California waters. The Concept Plan for Waterfowl Wintering Habitat Preservation (USFWS 1979) listed the average number of ducks and geese in January for the years 1969-72 for some coastal counties. This

report showed the average number of waterfowl to be 7,017 in Clatsop County, 9,011 in Tillamook County, 6,815 in Lincoln County, 3,030 in Curry County and 21,817 in Coos County.

Habitat used by shorebirds and waterfowl furnishes these wintering birds with food, resting areas and other needs so that mortality is minimized. These resources help return adequate numbers of healthy birds to the breeding grounds to insure adequate population levels. This habitat provides the same function for residents and spring and fall migrants that winter in California and Mexico.

The areas mapped as significant support the greatest number and variety of birds year after year. Loss of a piece of this habitat means a corresponding loss in the birds and other wildlife dependent on it. The surrounding habitat does not absorb this displaced wildlife; rather this proportion of the bird population is permanently lost through competition for resources when the habitat disappears. The Coos Bay estuary plays an important role in maintaining shorebird and waterfowl numbers. A loss of habitat will mean a reduction in the importance of this role.

(a) **Waterfowl** - The term 'waterfowl', includes the inland species of ducks, geese and swans as well as some species of sea ducks. These birds may use the estuary as year-round or seasonal residents. There are two species of inland ducks that commonly breed in the Coos Bay Estuary, the wood duck and the mallard. Most waterfowl use of the bay is for feeding or resting during spring and fall migrations.

There are approximately 25 different species of water fowl that commonly use the Coos Bay Estuary. During the Audubon Society census in 1977, 25 different species of waterfowl and 2,677 individual birds were seen. In the same census in 1978, 25 different species and 13,066 individual birds were observed. During periods of peak use, waterfowl numbers on the estuary frequently reach into the tens of thousands.

**Nesting Areas** - Some of the area shown on the inventory map is important for waterfowl nesting. To be good nesting habitat, an area must contain a suitable nest site, food, water, and cover for the adult ducks and food, water and cover for the young ducks. The two species nesting in Coos Bay Estuary have different nest site requirements. Wood ducks require a tree cavity while mallards nest in heavy cover on the ground. Good nesting habitat must also provide an abundant supply of insects, seeds and invertebrate organisms as food for young ducks. Generally, a combination of shallow water with a mud bottom, a sheltered location and abundant supply of emergent aquatic plants is best. Aquatic and shoreline vegetation is also necessary to provide cover from predators, the weather and other disturbance. The more sheltered sloughs and inlets of the estuary are the favored nesting areas.

**Resting Areas** - Waterfowl prefer a resting area where they can be secure against the threat of predation, disturbance and the effects of weather. The requirements of a resting area will depend on the species of waterfowl. One species may choose a large mud-flat, another open water and another may rest in dense vegetation. The resting habits of waterfowl are influenced by food supply, water salinity, stage of tide, weather, human harassment and other factors including whether the Coquille Valley is flooded. Some of the sea ducks such as scoters may not often use the estuary but it is an important resting area for sea ducks during stormy periods.

**Feeding Areas** - Waterfowl have different feeding area requirements just as there are differences in nesting and resting requirements. Some species of ducks and geese prefer seeds or tubers from plants; other species prefer fish, and the feeding habits of black brant are

closely associated with eelgrass beds. Most of the waterfowl feeding in the Coos Bay Estuary are utilizing various small forms of animal life such as snails.

In addition to differences in the types of food, the various species require different depths of water in which to feed. Some species prefer feeding on mud flats, while other species cannot walk on land well and require water feeding areas. Other species can dive and feed in ten feet of water whereas others prefer a foot or two of water.

The areas shown on the inventory map as being important to waterfowl are generally some of the more shallow areas of the estuary. These areas are more productive in plant and animal matter utilized by waterfowl. Also water depths in these areas are favored for feeding. Although waterfowl do use most parts of the estuary for one reason or another, the areas marked on the map have been historically favored by large numbers of waterfowl.

(b) **Wading Birds:** This general category of birds have long legs, neck and bill and includes the various species of egrets, herons, and bittern. Birds in the shorebird category have the same characteristics and the same general habits. Because there is so little distinction between these categories, they will be treated together below and referred to simply as shorebirds.

(c) **Shorebirds:** The areas shown on the inventory map are also used extensively by many species of shorebirds. Some species of shorebirds have habits similar to waterfowl, but most have breeding, nesting and resting requirements quite different than ducks and geese. Shorebirds using the Coos Bay Estuary include various species of plovers, sandpiper, phalaropes, egrets, herons and other related birds. Of the many species that use the estuary, relatively few nest here. Most of the use is as a feeding and resting area during periods of migration.

Shorebirds often favor coastal areas as flyways during migration because their feeding habits usually require soft mud or sand along the edge of a waterway. The highest use by shorebirds in Coos Bay is the months of March, April and May in the spring and August, September and October in the fall. Some of the most common species using the estuary are: least sandpiper, dunlin, black-bellied plover, western sandpiper, black turnstone and semipalmated plover.

There are about 35 species of shorebirds that use the Coos Bay Estuary. Although the Audubon bird count is taken at a time when shorebird use is relatively low, their annual counts still show good numbers. In the 1977 Audubon bird count 28 species of shorebirds comprising 15,020 individual birds were seen within the estuary. In the 1978 count, 27 species were observed and 6,391 individual birds seen.

**Nesting Areas** - Some of the areas shown on the inventory map are used by shorebirds for nesting. The shorebirds commonly using the Coos Bay Estuary for nesting are: great blue heron, green heron, Virginia rail, killdeer and snowy plover. A variety of habitats is needed to provide the different nest site requirements. The great blue heron and green heron nest in trees; the Virginia rail needs dense, emergent aquatic vegetation and the killdeer and snowy plover need open sand or gravel areas. (See also Section 4.3.3, Significant Wildlife Habitats.) Although the young of most of these species are fairly mobile on foot they are confined to a relatively small area until capable of flight. The nesting habitat must provide the necessary food, water and cover that will assure their survival.

**Resting Areas** - Shorebirds also require resting areas where they have protection

from predation, harassment and the effects of weather. Herons and egrets frequently use trees for resting and the Virginia rail and green heron may use shoreline vegetation. Most other species of shorebirds prefer a mud flat or sand area near the water. During periods of high tide, resting areas are much less available in the estuary. At these times the North Spit wetlands, the islands in the estuary and non-tidal wetlands become important as alternate resting and feeding areas. Weather, food supply and other factors will also determine what areas are chosen for resting. The areas shown on the inventory map include just some of the resting areas used by shorebirds.

**Feeding Areas** - Shorebirds have feeding habits that vary by species. The heron and egrets are the larger species and feed on aquatic and terrestrial animal life such as fish, frogs or insects. The other shorebirds are much smaller and feed on a wide variety of small worms, insects and crustaceans.

There is some variation in the habitat type in which these birds choose to feed. A snowy plover may choose an upland sand dune or a phalarope will often feed in the open water. But most shorebirds prefer to wade in shallow water or on sand or mud flats above the water line.

The shallow water areas used by shorebirds have a better flushing action by the tide and better light penetration. These factors help increase the productivity of the biological food web of plants and animals in the shallow areas. Shorebirds require these shallow areas not only because they are suitable for wading but because they depend on the source of food these areas supply. Some of the more important areas are shown on the inventory map.

#### 4.2.5 Coos Bay Estuarine Subsystems:

##### 4.2.5.1 Introduction

This major section consists of a descriptive analysis of the principal biological features of each system of the estuary, together with an identification of:

- a) marshes, tideflats, aquatic beds, and certain subtidal areas of "major" biological importance; these areas should be placed in 'Natural' Management Units,
- b) marshes, tideflats, aquatic beds and subtidal areas which are "smaller or of less biological importance" than those in (a) above; these areas should be placed in 'Conservation' Management Units,
- c) areas of "minimal biological significance"; these areas should be placed in 'Development' Management Units; and
- d) Clam beds and oyster beds, which should be placed in 'Conservation' Management Units.

Determination of these characteristics has been made by ODFW biologists and has been made available for the planning process. Primary source is J. Lauman (maps provided August 1981 to Coos County Planning Department). Language referring to these determinations is underscored. This source is briefly cited throughout. Areas which fit Goal #16 criteria "partially altered areas" and "areas adjacent to existing development of moderate intensity" are discussed in the Physical



Table 4.2.9

## BIRD USE OF COOS BAY ESTUARY

Species	Marine & Lower Bay	Upper Bay	Riverine	Channel	Unconsolidated shores & flats	Rocky Shores	Tidal Marsh	Coos Head		Fossil Pt. to Pigeon Point		Empire		Pony Slough		Haynes Inlet		Metcalf Salicornia Marsh	
								W	S	W	S	W	S	W	S	W	S	W	S
Arctic Loon	FWSp			U				W	S	W	S	W	S	W	S	W	S	W	S
Red-throated loon	FWSp			U				O	U	C	U	U						C	
Red-necked Brebe	FWSp			U				O	O		O					O	O	O	
Brown Pelican	F			U				O	O										
Brandt's Cormorant	Res			C															
Pelagic Cormorant	Res			C				A	A	O	O	O				O	O		
Blank Brant	Sp			a1/A1/				O	A	A	R							A	U
Harlequin Duck	FWSp			R		R		O	R				R			R			
Oldsquaw	W			R				O	R				R			R			
Common Scoter	W			U								R							
Surf Scoter	FWSp			A				A	U	A	C	A	A	U	U			A	A
Red-breasted Merganser	FWSp			U				O	O	U		C	U	U					
Surfbird	FWSp					C		C	O										
Ruddy Turnstone	M			R															
Red Phalarope	M			T															
Northern Phalarope	M			C									R						
Glaucous-winged Gull	FWSp			C								C							
Herring Gull	FW			U				O				A	A	C					
California Gull	FW			U									R						
Mew Gull	FWSp			C				C	U	U		C	O	C	O				
Heerman's Gull	SF			C				O	U	U									
Bonaparte's Gull	M			C				C	U	U									
Blacklegged Kittiwake	FWSp			R				O	O			O							
Caspian Tern	M			U															
Common Murre	Res			A				U	A			O	U						
Marbled Murrelet	Res			R															
Horned Grebe	FWSp			C															C
American Wigeon	W			A			A												
Greater Scaup	W			C				U	O	C						A			C

Species	Marine & Lower Bay	Upper Bay	Riverine	Channel	Unconsolidated shores & flats	Rocky Shores	Tidal Marsh	Coos Head	Fossil Pt. to Pigeon Point	Empire	Pony Slough	Haynes Inlet	Metcalf Salicornia Marsh
Lesser Scaup	W	W		U					C	C	C	C	
White-winged scoter	FW	FW	C	C				A	A	A	U		A
Ruddy Duck	W	W	C						C	O	C	O	A
American golden Plover	F	F			R						R		
Black-bellied Plover	FWSp	FWSp			C		C	R			C	U	R
Semi-palmated Plover	M	M			C				U	U	U		
Snowy Plover	Res	Res			R				U	U	U		
Whimbrel	F	F			U								
Spotted Sandpiper	F	F				U		O			U		
Dunlin	WSP	WSP			A			O	C	C	A	A	O
Sanderling	FWSp	FWSp			C				C	C	O		O
Baird's Sandpiper	F	F			R								
Western Sandpiper	FWSp	FWSp			A								
Least Sandpiper	FWSp	FWSp			A								
Willet	M	M			U		U						
Western Gull	Res	Res	A						C	C	U	C	C
Common Tern	M	M	U					R			R		
Pigeon Guillemot	S	S	C				U	A	U	U	U		C
Common Loon	FWSp	FWSp	FWSp	C				A	C	C	O	C	C
Pied-billed Grebe	W	W	W	R				O	R		O	O	U
Western Grebe	FWSp	FWSp	FWSp	C									
Double-crested cormorant	FWSp	FWSp	FWSp	C				C	U	A	C	O	U
Common goldeneye	W	W	W	C			U	O		U	R	U	R
Bufflehead	W	W	W	C				O	C	U	C		C
Marsh Hawk	Res	Res	Res				U	O			O		
Bald Eagle	Res	Res	Res				R	R			R		
Red-tailed Hawk	FWSp	FWSp	FWSp				U						
Great Blue Heron	Res	Res	Res		U		C	U	U	U	C	C	C
Green Heron	Res	Res	Res			U		U			O		
American Coot	FWSp	FWSp	FWSp	A			A	U	C	C	A		O
killdeer	Res	Res	Res		C			U		C	C	U	
Belted Kingfisher	Res	Res	Res	C						U	C	C	C

Species	Marine & Lower Bay	Upper Bay	Riverine	Channel	Unconsolidated shores & flats	Rocky Shores	Tidal Marsh	Coos Head	Fossil Pt. to Pigeon Point	Empire	Pony Slough	Haynes Inlet	Metcalf Salicornia Marsh
Whistling Swan		W					R				R		
Canada Goose		M					R	O					
Pintail		FW		A							A	C	A
Gadwall		FW									A		
Shoveler		FW	U	U							C		
Green-winged Teal		FW	C	C							A	C	A
Redhead		W		C							O		
Canvasback		W		C							A		C
Blue-winged Teal			M		R								
Snowy Egret	W						R						
Virginia Rail	SpSF						U				R		
Long-billed Curlew	M				R						U		
Marbled Godwit	FW				U						O		
Greater Yellowlegs	FWSp				U						C	O	
Lesser Yellowlegs	M(F)				R								
Short-billed Dowitcher	M				U								
Long-billed Dowitcher	M(F)				R						C	C	O
Pectoral sandpiper	M(F)												
Knot	M				U		R				R		
American Bittern	Res	Res					U						
Common Egret	FWSp	FWSp					R						
Black-crowned Night Heron	FWSp	FWSp			U		C				U		
Sora Rail	SpS	SpS					R						
common Snipe	Res	Res			U		U				U		
Ring-billed Gull	(Res)	(Res)											
	FWSp	FWSp			C						C	C	U
Mallard			FW								C	U	U
Ring-necked Duck			W		A			C			A	C	A
Common Merganser	Res	Res	U		R						R		
Yellow-billed Loon													
Eared Grebe								R					
Emperor Goose								O			O	C	O
									C	O	O	O	R

Species	Marine & Lower Bay	Upper Bay	Riverine	Channel	Unconsolidated shores & flats	Rocky Shores	Tidal Marsh	Coos Head	Fossil Pt. to Pigeon Point	Empire	Pony Slough	Haynes Inlet	Metcalf Salicornia Marsh
White-fronted Goose													
European Wigeon										R			
Hooded Merganser										R			
Turkey Vulture								O			R		
Osprey								O				O	
Black Oyster-catcher								U					
Wandering Tattler								U					
Rock Sandpiper								U					
Forster's Tern								O					
Common Crow								R		C	C	C	C**

\*\* Key:

Seasonal Use:

F - Fall

W- Winter

Sp - Spring

S - Summer

M - Migrant

Res - Resident

(Res) - Some Residents

Abundance:

A - Abundant (greater than 50/day/observer)

C - Common (10-49/day/observer)

R - Rare (5/day/observer) (includes very rarely sighted species)

Source: USACE 1975, McGie, 1977

1/ = Aquatic beds - eelgrass

Characteristics Section. All the above areas are shown on the inventory maps "Significant Habitat of 'Major' Importance", "Other Significant Estuarine Habitats" and "Estuarine Areas Qualifying as Development Management Units".

The Coos Bay estuary may be conveniently divided into marine, upper and lower bay, riverine and slough subsystems, on the basis of geographic location and characteristics biological features, which are basically determined by the relative influence of salinity, tidal currents and other physical and chemical properties. Each subsystem interacts with the entire estuarine system, but for the purposes of formulating management units, they may be discussed separately. See "Estuarine Subsystems, (Figure 4.2.4) for the boundaries of each subsystem, which will be described in the following order:

- 1) Marine Subsystem
- 2) Lower Bay Subsystem
- 3) Upper Bay Subsystem
- 4) Riverine Subsystem
- 5) Slough Subsystems
  - a) South Slough
  - b) North Slough
  - c) Coalbank and Isthmus Sloughs
  - d) Catching Slough
  - e) Haynes Slough

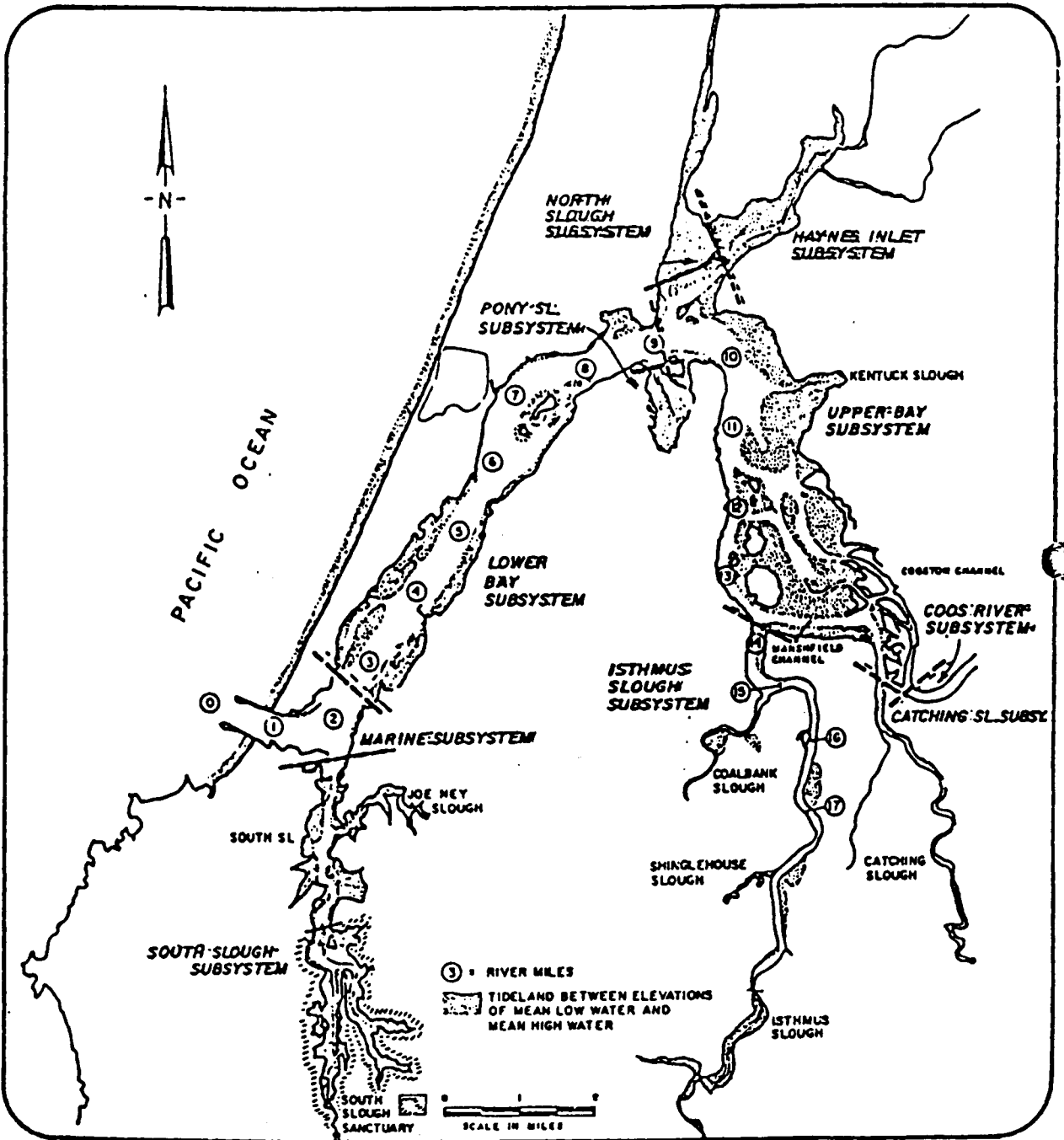
#### 4.2.5.2 Marine Subsystem-Mouth to RM 2.5

The marine subsystem is greatly influenced by ocean currents and salinity. It is characterized by high energy environments. It contains a great diversity of habitats, including sand, cobble, boulder and bed rock, shores, sand and sand/mud flats, algal beds, eelgrass beds and subtidal unconsolidated bottoms (ODFW, 1979). See inventory map showing substrates and intertidal habitats.

Habitats of the north shore (tip of North Spit) of the marine subsystem include the artificial boulder shores of the jetty. Little is known of the biology of this area. Seining studies have found this area to be an important feeding and rearing area for coho salmon (Mullarkey, cited by ODFW, 1979). Herring and several other fish species have been found in this area (Hostick, 1975). This area lies just below a very productive part of the estuary, so the salmon may be feeding on material carried by the ebb tide. (Mullarkey, personal communication cited by ODFW, 1979). The intertidal flat behind the jetty contains a bed of Gaper clams. Due to its relatively small size, this flat is not identified as a "major tideflat," but as a significant habitat area of less than 'major' importance warranting a "conservation" management unit designation.

The south shore includes jetty boulders and bedrock shore below Coos Head. The unique feature of this area is the transient sand bar to the west of the Charleston Channel. It contains the only in-bay population of razor clams on the southern Oregon Coast. It should therefore be placed in a conservation management unit.. Kelp (*Nereocystis Leutkeana*) also to the South of Fossil Point. The latter are considered 'major' algal beds. The former are of lesser size and importance, and therefore may be placed in a "conservation" unit. part of the Fossil Point bed is intertidal, and part is subtidal. The eastern shore, from Fossil Point south to the Charleston harbor, has the largest natural rock habitat in the estuary. It is unique to the Coos Bay marine subsystem, and

FIGURE 4.2.4  
 Coos Bay: Estuarine subsystems (Source: ODFW 1979)



contains over 40 plant species and 100 animal species [Rosenkeeter, et al., 1970]. This entire shore and the adjacent tidal flats and subtidal algal beds are considered 'major' natural resources because of their size and unique features and because of their great importance for herring spawning (Miller and McRaye, 1978). The maintained shipping channel (including the shallow-draft Charleston Channel) fit the Goal #16 criterion for placing them in a Development Management Unit. The remaining subtidal areas outside the channel are considered 'significant habitat of lesser importance' and, as such, should be placed in the Conservation designation, due to their importance for marine fish species.

Certain fish species were found only in the marine subsystem during sampling [See Table 4.2.6] (Hostick, 1975). These fish are normally found in open coastal areas, and may be restricted to this area due to physiological tolerances or a preference for rocky habitat. Most other fish species are found in this area at some time of the year (Cummings and Shwartz, 1971).

The south jetty is a popular area for sport fishing and offers a wide variety of species of rock fish and salmon. Boat anglers have greater success, taking coho salmon, black rockfish, Pacific tomcod and crab in large numbers.

Certain bird species, including the brown pelican and harlequin duck are found only in the marine subsystem [See Table 4.2.9 for a complete list]. Bald eagle and osprey are occasionally seen (McGie, 1977). Pelagic cormorant have a nesting site at Coos Head (Graybill, 1979) and together with common murre and pigeon guillemots are abundant in this area (McGie, 1977). Kingfisher and swallow also nest in the cliffs of Coos Head.

The marine subsystem as a whole contains unique habitats not found elsewhere in the estuary and infrequent in other Oregon estuaries (ODFW, 1979). Fossil Point in particular contains unique resources of "major" importance.

#### 4.2.5.3 Lower Bay Subsystem - (RM 2.5 to railroad bridge at RM 9)

This subsystem is under considerable oceanic influence and experiences strong tidal currents and storm surge. However, it is less affected by wave action than the marine subsystem.

Subtidal habitats of the lower bay include the unconsolidated bottom of the maintained channel and adjacent areas, and aquatic beds in the shallower areas. The substrate is mostly sand (Jefferts, 1977). Major alterations are caused by channel maintenance dredging and in-bay spoils disposal, which occurred at four locations between RM 3 and RM 9 during the recent deep-draft dredging project.

Biological information on subtidal areas is incomplete. Gaumer (1978) found scattered populations of Gaper clams and cockles at densities of 1-5 clams/ft<sup>2</sup>. A 48 acre subtidal area off Pigeon Point has been evaluated for its potential for commercial production. A large population of gapers, cockles were found (Gaumer and Halstead, 1976). The bed produced harvests of gapers of 11,931 pounds in 1977 and 27,505 pounds in 1978.

The fauna living in the sediments of the channel has been studied by Jefferts, (1977). It consists of a number of species representing many groups, and is more diverse than the fauna of the upper channel. Jefferts concluded that dredging has had relatively little effect on the species composition of the channel which mostly reflects the coarse sediment type rather than the effects of disturbance.

The intertidal habitats of the west shore adjacent to the North Spit include large tidal flats, often with aquatic beds, sandy shores and some small marshes. There are three distinct areas. Between RM 2.5 and just above RM 5, there are broad tidal flats. From above RM 5 to RM 8, there is a narrow sandy shore between the spit and the channel. Between RM 8 and RM 9, lies Jordan Cove, which contains tidal flats, aquatic beds and fringe marshes.

The southwestern part of the lower bay has experienced some alteration due to dredged material disposal in intertidal areas: one narrow island is known as Clam Island. However, the surrounding flats contain extensive eelgrass beds and are probably the most productive areas of the bay for clam production, with density of gapers in excess of 5/ft<sup>2</sup> over much of the area (Gaumer, 1978). Cockles, butters and native littlenecks are also widely distributed, but at lesser densities than gapers. Soft-shell clams occur from Clam Island northward (Gaumer, 1978). The southern part of this tidal flat area was by far the most productive site for recreational Gaper activity during a 1971 ODFW survey (Gaumer, 1973). The aquatic beds are a prime spawning area for herring (Jackson, 1979, Miller & McRaye, 1978), and an important feeding area for juvenile salmonids, English sole and other flat fish. This is due to the presence of habitats for important food species, *Corophium* sp., ghost shrimp and mud shrimp. Because of the high productivity of this area for clam and fish species the tidal flats and eelgrass beds are designated as 'major' estuarine habitats, (ODFW, 1981) together with the smaller subtidal channels which pass through this area.

The subtidal area between the tideflats and the shipping channel is occupied on its upper edge by clam beds. It is also of some importance for fish habitat. Accordingly, it is designated as an area of significant habitat of less-than-'major' biological importance (ODFW, 1981).

The narrow intertidal shore above RM 5 (from the Ore-Aqua facility northwards) falls off rapidly into the subtidal area adjacent to the channel. Current is swift, and erosion has occurred due to scouring. Consequently, the shore is devoid of vegetation. The principal benthic resources in this area are subtidal beds of gapers and some *Macoma* and *Tellina* species. The area appears barren compared to the rich intertidal area to the south. It is, however, an important feeding area for coho and chinook salmon, and for herring, anchovy, smelt, English sole and other flat fish (ODFW, 1979 citing Mullarkey, personal communication). See inventory map "Fish Habitats." Fish feed on material carried in the water column from adjacent productive areas, and on the mud shrimp, ghost shrimp and *corophium* species found in the subtidal area. See inventory map "Crustacean Habitats." This area is not designated as a 'major' estuarine resource, due to the narrowness of the intertidal area and the lack of aquatic beds. However, the presence of feeding areas for fish indicate that it is a significant habitat though of smaller area and lesser importance than "major" habitats (ODFW, 1981). These facts, together with the clam beds, indicate that the area west of the channel must be placed in a Conservation management unit, according to the Estuarine Resources goal. According to ODFW (1981) the subtidal area landward of the -15 MLLW contour should be included in the Conservation designation due to the existence of fish habitat and clam beds. Below this contour, adjacent to the maintained shipping channel, is an area which is considered to be of "minimal biological significance, needed for uses requiring alteration of the estuary", by ODFW (ibid). It also fits the Goal #16 criterion "deep-water areas adjacent to the shoreline". This area extends in a narrow strip from about river Mile 6 to the Roseburg Lumber dock, between the channel and the -15 MLLW contour, and also includes the entire water area between the Roseburg Lumber dock and the channel. [See inventory map, "Estuarine Areas Qualifying as Development Management Units".]

Jordan Cove has extensive tidal flats, parts of which are covered in algal and seagrass beds. See inventory map, "Estuarine Wetland Habitats". Recreationally important clams are present but



scarce; however, ghost shrimp and mud shrimp occur in moderate density together with *Corophium* species. See inventory maps "Clam beds and oyster leases" and "Crustacean Habitats". The cove is an important feeding and rearing area for salmonids and herring spawning also occurs between here and the Roseburg Lumber dock. It is also an important habitat for English sole and other flat fish. Just west of the bridge at Jordan Point, annual ODFW seining studies have shown large numbers of fish (ODFW, 1979, citing Bender & Mullarkey, personal communication). A 1970 seining survey found this site to be highest in abundance and second highest in species diversity (Hostick, 1975). Jordan Cove is designated as an area of "major" estuarine resources because of the presence of major intertidal flats and major seagrass/algal beds. Its importance as a fish feeding/rearing area is partially due to the presence of these resources. The subtidal area between Jordan Cove and the shipping channel is considered a significant habitat, but not one of major importance (ODFW, 1981), due to its general importance for fish populations. On the east side of the bay below Sitka dock, habitats include broad eelgrass and algal flats and three large cobble areas where dredged materials have been deposited. The cobble areas are unique in the bay; a high diversity of species, especially rockfish, have been found there (ODFW, 1979, citing Bender, personal communication). Gaper clams are less abundant here than across the bay, but this is a very important area for recreational clamming (Gaumer, 1973). Pigeon Point is, however, the prime site for harvest of butter and littleneck clams (ibid). Ghost and mud shrimp and *Corophium* species are also common in the area, which support an important feeding and rearing habitat for juvenile salmonids. See inventory maps "Fish Habitats", "Crustacean Habitats", and "Clam Species in the Coos Bay Estuary".

The large eelgrass beds of the Pigeon Point area are important feeding grounds for the migratory black brant. Harbor seals have historically used one of the spoils disposal sites as a haul out area.

Tideflats near Sitka Dock were degraded by waste discharge from Coos Head Pump Mill until it closed in 1971. Since then, biological productivity has increased significantly (Buell, 1977). A dense eelgrass bed may become established, and five species of clams are found there (ibid), illustrating the capacity of estuarine systems to overcome serious degradation when the source is removed.

The tidal flats and intertidal/subtidal eelgrass and algal beds south of Sitka Dock area designated as "major" estuarine resources (ODFW, 1981) due to their size and importance for juvenile salmonids, black brant feeding grounds, seal haul-out areas and recreational clam populations. The subtidal area between the major aquatic beds and the shipping channel contains a productive clam bed of commercial importance. The area is also generally of some importance as fish habitat. This area is not a "major" estuarine resource (ODFW, 1981), but should be placed in a Conservation designation due to the existence of the clam beds.

The subtidal area between the shipping channel and Sitka Dock, but below -15 feet MLLW, is considered an area of "deep water adjacent to the shoreline" and of "minimal biological significance" due to past alteration and depth of water (ODFW, 1981). As needed for development, it may therefore be placed in the Development designation. The shallow subtidal area above -15 feet MLLW is considered to be a smaller area of significant habitat due to the presence of clam beds and crustacean populations. It should therefore be placed in a Conservation designation, along with adjacent unaltered subtidal areas.

North of Sitka Dock lies another tidal flat area. Its main importance is the population of ghost shrimp, which provided the greatest numbers to recreational diggers, as indicated in a 1971 survey (Gaumer, 1973). There are also populations of gapers (mostly subtidal), and cockles, butter, tellina and macoma clams, but the density is not as heavy as on the Pigeon Point flats. The

presence of ghost shrimp, mud shrimp and Corophium species provides for important feeding habitat for juvenile salmonids. The area is also important habitat for English sole and other flatfish. See "Fish Habitats" map. Though intertidal aquatic beds and a small fringe of low salt marsh are present, they are not considered to be of major importance. However, the inter-tidal flat is designated as a 'major' estuarine resource, (ODFW, 1981) due to its importance for ghost shrimp and juvenile salmonid habitat. The subtidal clam beds beyond the tidal flat, together with the subtidal area adjacent to the shipping channel, are not considered "major" estuarine resources, (ODFW, 1981) but should be placed in a "Conservation" management unit, due to the existence of clam beds and general importance for fish habitat. The subtidal area between Empire docks and the shipping channel is considered an area of "minimal biological significance" adjacent to the shoreline" (ODFW, 1981), due to past alteration and use by shipping. This does not, however, include the narrow intertidal shore area, which is considered a smaller area of significant habitat due to the presence of crustacean habitats (ODFW, 1981). It should therefore be placed in the Conservation designation.

The narrow shore north of empire, which is affected by log storage at Cape Arago Lumber Company mill widens out into a wide complex of flats, aquatic beds and small marshes surrounding two spoil islands south of the North Bend airport. See inventory map "Estuarine Wetland Habitats". It supports a large bed of clams (mostly Intertidal) containing gapers, softshells, Tillina species, and Macoma species. The central part of this flat has a dense clam population. These flats and adjacent shallows are also an important feeding habitat for juvenile salmonids, striped bass, English sole and other flat fish. Populations of Corophium species, ghost shrimp and mud shrimp provide food for these fish. A quantitative study of benthic organisms has been conducted to assess the impacts of the proposed airport runway extension [Gonor, 1979]. The broad intertidal flats from north of Empire docks to the airport, together with two seagrass beds are designated as "major" estuarine resources, due to their size and importance for fish rearing and clam populations (ODFW, 1981). Subtidal clam beds adjacent to this area, together with the extensive subtidal area shoreward of the channel up to the railroad bridge, are not considered 'major' estuarine resources, (ODFW, 1981) but should normally be placed in a 'Conservation' management unit, due to the presence of clam beds or general importance for fish habitat.

The lower bay shipping channel itself is an altered area which is frequently disturbed by passage of ships. According to Goal #16, it is appropriately placed in a Development management unit. In addition, the area between the shipping channel and the North Bend Airport has been used in the past for in-water dredged material disposal and is approved by ODFW for future use, and should therefore be placed in a Development management unit. The adjacent area is considered a 'partially altered area' which is also 'adjacent to existing development of moderate intensity' (ODFW, 1981), and therefore normally should be placed in a Conservation management unit. However, on a finding of need, it may also be placed in a 'Development' management unit.

In the lower bay subsystem as a whole, several fish species are present (see Table 4.2.6). Such species as English sole are most concentrated in the lower bay, though found elsewhere. Samplings in summer 1970 found that juvenile chinook salmon and ling cod were most common at lower bay sites (Hostick, 1975, Cummings & Schwartz, 1971). Most species found in the bay use the lower bay flats at some time of the year (Cummings and Schwartz, 1971). Vegetated areas appear to have greater species diversity. Many of the species are most numerous over sandy substrates (Mullarkey, 1979).

Both of Coos Bay's salmon release - recapture facilities are located in the lower bay: Oregon Aqua Foods on the North Spit at about River Mile 5.5 and Anadromous Inc. at Jordan Point, at the border between the lower and upper bay.

The lower bay is by far the most popular boat angling area, according to Aumer et al (1973). Dungeness crabs accounted for 80% of the catch, together with rock crab and several fish species (ibid).

Most of the birds found in the Coos Bay area occur in the lower bay: several species have their prime feeding and resting habitats in the lower bay. These include cormorants, black bant, surf scoter, northern phalarope, various gulls, and common murre. A variety of migratory shorebirds feed on Intertidal mud flats at low tide.

#### 4.2.5.4 Upper Bay subsystem: IRM 9 to RM 17 at S.E. corner of Bull Island.]

The upper bay subsystem consists of a broad complex of tidal flats bordered by marshes extending from Jordan Point to the mouth of Coos River. This complex is interwoven with small channels, and bordered on the west by the deep draft shipping channel where major alterations have occurred. The historic center of marine industrial and commercial activity has been along the channel from North Bend to Coos Bay and continuing into Isthmus Slough. This has produced disturbed habitat conditions with significant pollution from urban run-off, wood debris, sewage treatment plant effluents and oil waste.

Subtidal areas include the dredged shipping channel, the natural Marshfield channel, and the natural Cooston and East channels, and smaller channels draining the tidal flats.

There has been considerable study of the shipping channel. Maintenance dredging, propeller wash and anchor drag continually resuspend sediments and prevent the establishment of attached vegetation. This constant alteration has resulted in a benthic fauna which is adapted to frequent stresses and perturbation (Parr, 1973). an annelid (worm), *Streblospio benedicti*, is the dominant species in the upper bay subtidal area, which, together with a number of other species, is frequently reported in the literature to be associated with polluted and disturbed environments (ibid.). fish species in and around the channel include shiner perch, silver surf perch, shad and English sole, according to 1970 seining studies (ODFW, 1979). Silver surf perch were captured in large numbers during these studies. Anglers take pile perch, striped sea perch and white sea perch from the Coos Bay waterfront (Gaumer et al, 1973).

The shipping channel and the adjacent developed shore along the entire North Bend/Coos Bay waterfront are considered to be altered areas of "minimal biological significance needed for uses requiring alteration" (ODFW, 1981), which may appropriately be placed in a 'Development' management unit.

The intertidal area of the upper bay consists of broad expanses of tidal flats, parts of which are covered in eelgrass beds and tidal marshes. Sediments are chiefly mud; with sand occurring on the fringes of the dredge spoil islands. Buell (1977) calculated that the tidal flats occupy about 4.5 square miles. A broad eelgrass/tideflat complex stretches from the Menasha Dike to the Marshfield Channel. The northern two-thirds is a single extensive eelgrass bed, the largest in Coos Bay and one of the largest in the state. [See inventory maps.]

At least 10 species of annelids, 10 species of molluscs and 13 species of crustaceans have been found in the upper bay tideflats [Corps of Engineers, 1975]. The only recreationally important clam found in the upper bay is the soft-shell, although small cockles have also been found. The smaller Tellina and Macoma clams are also found widely however. Lug worms and ghost shrimp are also taken by recreationists in the upper bay. Corophium Sp. are also found on mudflats throughout the upper bay, and mud shrimp are found in the flats off Glasgow and Jordan Point. [See inventory maps.] McConnaughey et al (1971) studied four tidal flat areas in the upper bay with different substrate types for species abundance, diversity and total biomass. Organisms studied were clams, worms, amphipods, crabs and ghost shrimp. They found greatest diversity and abundance in flats with dense eelgrass. Soft-shell clams and dungeness crabs, in particular were much more abundant in these areas. Total biomass was also greatest in areas of dense eelgrass, and least on higher elevation flats with a sandy substrate.

There is an extensive area (about 80 acres) of oyster leases at the mouth of Kentuck Inlet. As mentioned in Section 4.1.8.7(d) on ambient water quality, it is now possible to culture oysters here, but at present a lengthy depuration process is required to make them marketable.

Log storage is practiced in various places over the flats and channels of the upper bay. [See "Physical Alterations" inventory map showing main location of pilings.] A study by the Department of Environmental Quality (1978) looked at the impact of logs grounding at low tide on tideflat organisms, including sites in the Cooston channel. The study found that there was a large reduction in the total number of organisms compared with adjacent areas unaffected by logs grounding.

The upper bay tideflats are an important feeding and rearing ground for striped bass [See Inventory maps] and shad (Cummings & Schwartz, 1971). Shad spend several weeks there, while bass are found year-round. Juvenile salmonids are also found throughout much of the shallow intertidal and subtidal area, feeding on Corophium sp., ghost shrimp and other organisms. Hostick (1975) found that the following fish were numerous in the upper bay - shiner perch, silver surf perch, top smelt, starry flounder and English sole.

The upper bay has not been studied as a separate geographic unit with respect to bird use [ODFW, 1979]. However, Audubon Society bird counts found the following bird species to be the most abundant: Western grebe, pintail, canvasback, bufflehead, killdeer, snipe, sanderling, sandpiper, dunlin, herring gull and Bonaparte's gull.

In general, the upper bay has less species diversity than the lower bay or marine subsystems [ODFW, 1979]. The salinity and temperature fluctuation of the upper bay, as well as the poorer water quality and disturbance have produced a population of organisms that is limited by these factors (ibid.). However, while fewer species are present, there may be abundant populations of these species and a high biomass, with great importance to the overall estuarine food web.

The tidal flats of the upper bay (except for a narrow fringe off Pierce Point) together with interspersed minor natural channels, (except Cooston channel) are designated as a 'major' estuarine resource, which should be placed in a "Natural" management unit according to the Estuarine Resources goal. This designation takes into account the size and importance of tidal flats, eelgrass and algal beds, the importance of natural channels for circulation patterns and the high productivity of organisms of critical importance to the estuarine food web, particularly for salmonids and other sport fish.

The subtidal Cooston Channel, together with its Pierce Point extension, is important as a shallow draft natural channel which has been, and continues to be used for log transportation and storage. Little is known about its probable that its biological importance is more as a migration route and a place for congregation of fish at low tide, than as a feeding area. It has been designated as a significant habitat area which is "smaller or of less biological importance" than "major" estuarine habitats because it is not of the same order of importance as the adjacent tideflats. It should therefore be placed in a 'Conservation' management unit, according to the Goal. Three other significant subtidal habitat areas adjacent to channels, but not considered to be 'major' habitats, should be included in the Conservation category; they are:

- a) the subtidal strip east of the main shipping channel and west of the major tidal flats from the railroad bridge to the Marshfield channel, including the branch leading to North Slough,
- b) the subtidal area between the two bridges and south of the shipping channel, and
- c) the triangular subtidal area immediately west of Bull Island.

The narrow Inlet with adjacent intertidal flats lying between the two bridges and known as Little Pony Slough is flanked by spoil sites and the railroad track. Formerly it was part of the main Pony Slough system. It consists mainly of mudflats with small salt marshes. It appears to have experienced some alteration due to run-off and sedimentation from nearby spoils. Benthic communities include macoma and Tellina clams and mud shrimp. The tidal flats east and west of the narrow entrance are important for feeding/rearing of juvenile salmonids. The embayment itself is important habitat for English sole and other flat fish. While this area is of some importance, it is not considered a 'major' tideflat area (ODFW, 1981). An exception has been taken to provide for a water-dependent fill to facilitate usage of the surrounding industrial land, where otherwise it would qualify as a conservation management unit.

A fairly narrow mudflat on the south side of the Marshfield channel, north of Eastside is not in the same category as the broader expanses of tidal flats of the upper bay. It has clam beds inhabited by Macoma sp. and Tellina sp. and Corophium sp., and is utilized as feeding and rearing grounds by starry flounder and juvenile salmonids. However, due to its relatively small size it is considered "smaller or of less biological importance" than nearby "major" estuarine habitats, and therefore should be placed in a 'Conservation' management unit. However, a seagrass bed within this tidal flat is designated a 'major' estuarine resource due to its higher biological productivity than the surrounding area, and should be placed in a "Natural' management unit, according to the Goal.

Tidal marshes of the upper bay are found along the eastern shore at the mouths of Kentuck and Willanch Inlets, in the delta of Coos River, northeast of the Eastside peninsula and fringing the spoil islands in five locations to the east of the main ship channel. Hoffnagle and Olson (1974) estimated upper bay tidal marsh acreages as follows:

Low sand marsh	46.3 ac.
Low silt marsh	3.8 ac.
Sedge marsh	22.1 ac.
Immature high marsh	416.4 ac.
Mature high marsh	<u>44.8 ac.</u>
Total:	533.4 ac.

This subsystem has the largest total acreage of tidal marsh.

Most of the historic area of tidal marsh in Kentuck and Willanch Inlets has been lost to diking. Following the construction of a dike and tidegate in upper Kentuck Inlet, a marsh rapidly developed on a tideflat near the dike (Johanessen, 1961). In Willanch Inlet, only 6 acres of tidal marsh remain, while some 100 acres have been diked (Hoffnagle & Olson, 1974).

An extensive complex of marshes lies in the Coos River delta and on adjacent shores. Marsh area has increased across tidal flats since the last century, probably due to increased silt deposition (Johanessen, 1961, Hoffnagle et al., 1976). This area is primarily immature high salt marsh (ibid). The marsh along the shore to the east was found to be the second most productive of those studied by Hoffnagle et al (ibid.). Clams present in this area include *Macoma* sp. and *Tellina* sp., with some softshells. It is also an important rearing and feeding area for juvenile salmonids and starry flounder, due in part to the presence of *Corophium* sp. [See inventory maps.] Other fish taken in the area include shiner perch, Pacific staghorn sculpin, gunnel, and bay pipefish. Hall (1976) reported an abundant population of invertebrates of various kinds. The area is an important feeding and resting area for migratory wild fowl and shorebirds; [See inventory map] the most common birds noted are the great blue heron, barn swallow, long-billed marsh wren (mostly found in salt marshes) and the song sparrow (Magwire, 1976).

About half of the remaining true 'mature high salt marsh' in the entire estuary is found near Eastside in a "W-shaped" area, a remnant of a much larger area now diked and partially filled with dredge spoils. Like the delta areas, this marsh is important for juvenile salmonids and *Corophium* sp. and supports populations of *Macoma* and *Tellina* clams.

The dredge spoil islands opposite Coos Bay have developed broad fringes of low sand marshes. These areas support similar populations of invertebrates and fish to the delta marshes, with the addition of ghost shrimp. [See inventory maps].

All of these marshes, with the exception of the small high saltmarsh in Willanch Inlet, are designated as "major" saltmarshes, (ODFW, 1981) due to their size, their scarcity in comparison to their historic extent, and their great importance for primary productivity and fish and wildlife habitat generally. The Willanch Inlet marsh, in addition, is designated as a "major" estuarine resource due to its close proximity to major tideflats despite its small size. According to the Goal, they should be placed in a "Natural" management unit.

The narrow subtidal area between the shallow-draft channel and the Sause Brothers barge works on the east end of the Eastside Peninsula is considered an area of "minimal biological significance" and "deep water adjacent to the shoreline" (ODFW, 1981), due to past alteration and dredging. It may therefore be placed in a 'Development' management unit.

The small segment of the natural channel of Kentuck Slough, immediately adjacent to a rock products barging site, is considered a "partially altered area" (ODFW, 1981), due to the effects of the adjacent fill. It is also needed for development (minor dredging to accommodate small barges at low tide). It may therefore be placed in a Development unit.

#### 4.2.5.5 Coos Riverine subsystems (Coos River, South Fork Coos River, Millicoma River, East and West Forks)

This subsystem extends to head of tide on the south Fork Coos River and East and West Forks of the Millicoma River, near Dellwood and Allegany respectively. There is little specific information on the riverine subsystem, and the ODFW habitat map does not show habitats above the mouth. The riverine subsystem is almost entirely subtidal, with very narrow intertidal shores on each side. There are almost no fringing salt marshes, as in other riverine estuaries like the Coquille, possibly because of past alteration by diking and road building.

The riverine subsystems provide important fish habitats. Shad depend on the river for spawning and the first 6-12 months of life, and part of their second year. Coho salmon and steelhead feed and rest in the river on the way to spawning grounds in winter and spring. The Coos system is a major rearing area for chinook, especially their first year. Anadromous cutthroat trout spawn in the system in the late summer, and the juveniles rear in the tidewater and above. Starry flounder and staghorn sculpin are found in the lower portion and prickly sculpin and shiner perch in the upper portion of tidewater. Other species also present are red-sided shiners and large-scale suckers. Striped bass prey on shiner perch and suckers (ODFW, 1979 citing Bender, personal communication).

The tidewater is a major area for recreational fishing from power-boats or drift boats, for shad (May-July), striped bass (year round), cutthroat trout (August-October), coho and chinook, (September-November) and steelhead (November-March). Commercial shad fishing occurs on the lower Millicoma, South fork Coos and Coos River.

Riparian vegetation is important in stabilizing banks and maintaining cooler water temperature necessary for juvenile salmonids and other fish. [See Coastal Shorelands Inventory Maps] in many reaches of the tidewater, riparian vegetative strips are maintained, but it has been removed where dike roads follow the bank as in lower Coos River.

The tidewater is important for spawning in spring (April-June) for shad and striped bass. After September, recreational fishing reaches its height. Consequently, the summer (July-August) is the time of the year when maintenance dredging would have the least impact. The Coos system is maintained as a shallow draft channel for log transportation from dumps at Dellwood and Allegany. The shallow-draft channel fits the goal #16 criterion "navigation channels" and may therefore be placed in a Development management unit (ODFW, 1981). The authorized channel is 50 feet wide and 5 feet deep at MLLW. With the exception of the shallow-draft channel, The Coos riverine subsystem is considered to be "needed for maintenance and enhancement of biological productivity, recreational and aesthetic uses", and should therefore be placed in a "Conservation" management unit, according to the goal. However, there are two areas at Dellwood and at Allegany where the river has been substantially altered by existing log handling activity, including bark debris and may therefore be considered "areas of minimal biological significance needed for uses requiring alteration of the estuary". They may therefore be placed in a "Development" management unit. The shallow area south of Graveyard Point is used for log storage, and is considered a "partially altered area" due to the existence of this activity (ODFW, 1981). If shown in the Plan to be needed for development, it could be placed in a 'Development' management unit.

#### 4.2.5.6 South Slough Subsystem

South Slough habitats show more variation than in any other slough subsystem in the bay. More species of invertebrates and fish occur than on any other slough subsystem. This is due to the marine influence in the lower slough, the variety of substrate types from sand to mud and the relatively undisturbed nature of the upper slough. The complex, involuted shoreline and high shoreline to surface ratio contributes to the variety of habitat types.

The slough may be conveniently discussed as four segments - the Charleston Boat Basin below the Charleston Bridge, from the Bridge to Valino Island, above Valino Island (the South Slough Estuarine Sanctuary), and Joe Ney Slough. The lower segment contains flats of mixed substrate, intertidal and subtidal eelgrass beds, sandy shores, small marsh areas and altered shores. It also contains the dredged Charleston Boat Basin. From the Bridge to Valino Island, in addition to most of the above habitats, are rocky shores, sand bar, and larger marshes. Above Valino Island, substrates are more silty with more prominent marshes, and eelgrass in the channels.

As mentioned above, the species diversity of the South Slough is high. OIMB (1970) recorded more total species from mud flats than in any other part of the bay. Jefferts (1977) also found a richly varied intertidal fauna: he recorded 26 polychaetes, 10 bivalves, 4 harpacticoid copepods and 7 amphipods.

Most of the clam beds used by recreational diggers are north of Valino Island. Clams are found throughout this area, both in intertidal and subtidal areas. From Younker Point to the mouth of the Slough there are dense concentrations in the lower intertidal and subtidal areas. [See Inventory map]. These beds yield gapers, butter, cockles, littlenecks and softshells. Gaumer et al. (1973) found that four South Slough sites yielded a total of 22.6% of all marine organisms taken in Coos Bay in 1971. The flat just south of the bridge provided the largest total number of clams. Gaumer (1978) studied the Charleston Triangle in more detail and estimated the clam population at 1,333,000 gapers, 347,000 cockles, 289,000 littlenecks, 119,000 butter and south of Valino Island and in Joe Ney Slough clam populations are mostly softshells, *Macoma* and *Tellina* and some gapers.

Commercial oyster culture is of major importance in the South Slough, and Joe Ney Slough. Currently, this is the only area of active leases [See Inventory Map]. There has been some evidence that coliform bacteria levels sometimes exceed permitted levels for shellfish culture. [See Water Quality Section 4.1.8.7(d),]

Crustaceans are found in tidal flat areas throughout South Slough and Joe Ney Slough. Dungeness crab and *Corophium* sp. are the most widely distributed, while ghost shrimp are also found in all areas except the uppermost reaches of the Winchester and Sengstacken arms. Mud shrimp are more restricted in their range. [See Inventory map "Crustacean Habitats"]. As might be expected from crustacean distribution, the South Slough is also an important feeding and rearing habitat for juvenile salmonids, particularly in the lower and extreme upper sections. [See inventory map]. The intertidal areas below the Charleston Bridge are also important habitat for English sole and other flatfish. The tidal flat areas are also important shorebird and wildfowl resting and feeding areas. All areas of intertidal flats in the South Slough subsystem above Charleston Bridge, (with the exception of those fronting Hansen's Landing) plus those below the bridge on the east side of the channel together with adjacent natural channels above the bridge, are designated as "major" estuarine resources, due to their extent, the prevalence of eelgrass beds and importance to the entire subsystem for clams, oyster culture, and salmonid rearing. Though these areas also contain



clam and oyster beds, which would otherwise place them in a "Conservation" management unit, according to the Goal, their importance as 'major tideflats' overrides this provision. They should therefore be placed in a "Natural" management unit. The tidal flats in the "Charleston Triangle" immediately south of the Boat Basin are designated "significant habitats" which are "smaller or of less biological importance" than "major" resources (ODFW, 1981). They also contain clam beds. They should therefore, be designated "Conservation" according to the Goal. The non-authorized shallow-draft channel south of the bridge to Hansen's Landing, together with the subtidal area immediately to the east, are considered "areas of minimal biological significance", and "deep water adjacent to the shoreline" (ODFW, 1981) and may therefore be placed in a 'Development' management unit. The intertidal flat immediately west of Hansen's Landing contains some Gaper clams; however, it is sufficiently altered by past activities to be considered a "partially altered area" (ODFW, 1981). It is also "adjacent to existing development of moderate intensity". It may therefore be placed in a 'Development' management unit if shown to be needed for development in the Plan. A small area of subtidal eelgrass beds off the end of Hansen's Landing is considered a significant habitat of "less-than-major" importance, although it has been altered by water-dependent development. It should normally be placed in a "Conservation" management unit.

The authorized shallow-draft entrance channel to the Charleston Boat Basin is a "navigation channel" within the terms of the Goal. This fact overrides the fact that there are subtidal clam beds within the channel, which would otherwise require placing it in a Conservation management unit, according to the Goal. The Charleston Boat Basin itself is a greatly altered dredged area which is considered an area of "minimal biological significance needed for uses requiring alteration of the estuary" (ODFW, 1981) within the terms of the goal. The small sub-tidal inlet between two dikes which provides access to an oyster processing facility, south of Charleston, is considered "partially altered" and "adjacent to development of moderate intensity". It is needed for further development related to oyster culture, and may therefore be placed in a "Development" unit.

Most of the total of 995 acres of tidal marsh in South Slough occur as fringing marshes scattered along the edges and in inlets and coves (Hoffnagle & Olson, 1974). None of the individual marshes are very large in extent, but collectively they play an important part in primary production in the subsystem. The largest expenses are found at the heads of inlets and on the flats south of Charleston Bridge. Low sandy marsh and immature high marsh are the main types found in South Slough (ibid). There are several areas which are gradually reverting to tidal marsh following the breach of dikes: three examples lie southwest of Valino Island, and on the west shore of the Winchester Arm. Hoffnagle and Olson (ibid) use the term "surgeplains" to describe floodplain areas at the head of the Winchester Arm which are inundated only during high water or very high tides as a result of tidal damming of streams. These areas are not considered tidal marshes in the normal sense of the term, but exhibit plant communities which grade from a type of transitional salt/fresh high marsh to freshwater marsh interspersed among upland grazing land.

Certain areas are diked and tidedated former tidal marshes which exhibit fresh marsh vegetation. Examples are the marshes at the head of Joe Ney Slough and on the east side of upper Winchester Arm (currently used for grazing). These types of areas are potential 'restoration' sites, though the Joe Ney site is now proposed for a reservoir by the Coos Bay/North Bend Water Board. Gonor (1979) studied the suitability of the Joe Ney Slough site to mitigate alterations elsewhere in the bay. [These types of sites are further discussed in the special Mitigation/Restoration Element]. The low sandy marsh south of the Charleston Bridge on the Henry Metcalf Estuarine Preserve is the closest marsh to the mouth of the bay and is unique due for its heavy marine influence, which

accounts for the diversity of species found here (ODFW, 1979). The principal marshes of South Slough are designated as "major" estuarine resources, due to their combined area, great importance for primary production and relatively unaltered state. Other smaller fringing marshes, while not "major marshes" in themselves, are also designated an integral part of a larger "major" estuarine resource, the entire South Slough/Joe Ney Slough subsystem (ODFW, 1981).

The South Slough has experienced extensive alteration at the mouth, with the construction of the Boat Basin and accompanying dredge and fill. At the same time, oyster culture has created a new type of habitat further up the slough. While extensive logging, splash damming and diking occurred in the upper slough in earlier years, the estuary has been in a gradual process of reversion to an area subject primarily to natural influences. The establishment of the South Slough Estuarine Sanctuary for protection and research south of Valino Island ensures that natural influences will continue to predominate, and that its habitats and water quality will be protected.

#### 4.2.5.7 Pony Slough Subsystem

Pony Slough is an embayment with a narrow entrance between RM 8 and RM 9; a channel divides a broad tidal flat about half a mile wide. The slough has been historically altered by filling for the Southern Pacific railroad track, North Bend Municipal Airport and Pony Village Shopping Center. However, it remains an important habitat area.

Biological habitats include subtidal channels with eelgrass, intertidal flats (some with eelgrass and algal beds), and marshes. [See Inventory map "Estuarine Wetland Habitats".]

The tidal flats are extensively covered with mats of green algae. Blue-green algae are found on the eastern edges of the mudflats and brown algae (*Fucus* sp.) are present on hard substrates and in tidal marshes. (ODFW, 1979). Dense eelgrass beds are found on flats near the mouth and also in part of the main channel. [See Inventory Map.] The plant communities of the tidal flats remain important to primary production in the bay in spite of extensive alteration. The tidal flats support a widely distributed population of *Corophium spiniorne*, important to juvenile salmonids. Lugworms and ghost shrimp are found, often in high densities (Horstmann et al, 1970). Soft-shell clams, *Macoma* sp. and *Tellina* sp. are also found throughout the slough, in dense concentrations in the central part. [See Inventory Maps]. Dungeness crabs are found in the lower intertidal and subtidal areas. Gaumer (1973) found that soft-shell clams and ghost shrimp were harvested at Pony Point, but only accounted for a fraction of bay-wide use.

Eleven species of fish have been found in Pony Slough [Rousseau, 1972]. It is an important striped bass feeding area and the mouth is important for juvenile salmonids. Adult striped bass feed over much of the tideflats at high tide, and move in and out with the tide [ODFW, 1979]. Bass angling is popular from May to September.

The primary importance of Pony Slough is as a resting and feeding area for migratory wildfowl and shorebirds. The tideflats have the highest concentrations of wintering birds anywhere in the estuary with peak numbers of 7000-9000 pigeon, other wildfowl and shorebirds [Rousseau, 1972]. Thornburgh (1979) conducted weekly surveys from June 1978 to June 1979. Peak counts of birds occurring between June and March are shown on the following page, Table 4.2.10.

Table 4.2.10

Peak numbers of birds using Pony Slough

	Number	Time of Observed Peak
<b>Dabbling Ducks</b>		
American Wigeon	3,526	Nov.
Pintail	1,943	Jan.
Green-winged Teal	872	Dec.
Gadwall	330	Jan.
Shoveler	209	Jan.
<b>Diving Ducks</b>		
Canvasback	648	Dec.
<b>Plovers</b>		
Killdeer	204	Jan.
Semipalmated Plover	177	July
Black-bellied Plover	151	Mar.
<b>Medium-sized Waders</b>		
Dowitcher	220	Sept.
<b>Sandpipers</b>		
Dunlin	2,808	Nov.
Western Sandpiper	1,577	Sept.

Source: Thornburgh (1979)

The protection from westerly storms afforded by the surrounding land mass is probably the main reason why bird use is so heavy (ODFW, 1979). The Oregon Department of Fish and Wildlife manages the slough as a refuge where hunting is prohibited.

The tideflats and associated subtidal channels together with their seagrass and algal beds of Pony Slough are designated as "major" estuarine resources, due to their size, their great importance for striped bass feeding habitat and their critical importance for wildfowl and shorebird habitat (ODFW, 1981). They should therefore be designated as a 'Natural' management unit.

High saltmarshes occur as fringes on the east and west sides of the slough, and a broader area of low sand marsh lies on the west side [Hoffnagle & Olson, 1974]. The low marsh plant community is dominated by pickleweed and salt grass with tufted hairgrass and saltmarsh sand-spurry subdominants. Hoffnagle et al. (1976) found that net primary productivity was lower than for marshes studied in the North and South Sloughs, probably because pickleweed has a relatively low rate of growth. However, the plant is high in biomass because of its woody perennial form, is an important detritus source and soil stabilizer (ibid). These two areas of marsh are designated as "major" estuarine resources, due to their size and importance as detritus sources, and their integral relationship to the Pony Slough subsystem (ODFW, 1981). They should therefore be placed in a 'Natural' management unit.

#### 4.2.5.8 North Slough Subsystem

The North Slough subsystem is bounded by the Menasha Causeway and Highway 101 to the south and east, and by a tidegate beneath Highway 101 at the northern end, extending about three miles north from the main body of the bay at RM 9. The dike system is only open at the bridge at the west end of the Menasha Dike which restricts tidal circulation and may contribute to increased sedimentation (ODFW, 1979).

The lower part of North Slough contains a broad expanse of tidal flats with fine silt substrates. A large seagrass bed covers the portion north of the Menasha Causeway. Various algae, including *Ulva*, *Fucus* and *Enteromorpha* Spp. are found on the tidal flats, (Baker et al 1970), but not at sufficient density to be classified as aquatic beds (ODFW, 1979).

Invertebrates of the tidal flats include soft-shell clams and *Macoma* and *Tellina* spp. Softshells are distributed mostly in the lower, broader tideflat area, and are the only species taken recreationally. The Menasha Causeway area had the greatest yield of soft-shell clams, according to Gaumer (1973). Other widely distributed invertebrates include various worms (including lugworms), amphipods (e.g. *Corophium* sp.) crangonid shrimp and Dungeness crab. Ghost shrimp are found near the causeway and mud shrimp over much of the main tideflat area. Ghost shrimp and lugworm are dug for bait along the causeway.

Shad, shiner perch, staghorn, sculpin and starry flounder were found during sampling in the slough (Cummings & Schwartz, 1971). The slough is an important feeding and rearing area for striped bass, which are fished from May to September. The upper part of the slough is an important feeding and rearing area for juvenile coho. Spawning occurs in the North Creek drainage (ODFW 1979, citing Bender, Mullarkey, personal communication).

McMahon (1974) identified North Slough as an important feeding area for heron, and observed large numbers of dunlin. It is also a major feeding and resting area for redheads and other wildfowl.

The tideflats of North Slough together with associated aquatic beds and subtidal channels are designated as "major" estuarine resources, due to their extent and their importance for recreational clamming, fish rearing and wildfowl feeding and resting areas (ODFW, 1981), and should therefore be placed in a 'Natural' management unit.

The large and diverse areas of tidal marshes in the North Slough are of particular significance. Jefferson (1975) described them as "the most complete and diverse mosaic of salt marsh plant communities in all stages of succession, and with ecotones (transitional areas) to freshwater, forest and sand dunes." These characteristics, plus their relatively undisturbed state, make them well suited to biological research. Marsh acreage consists of 7 acres of immature high marsh, 138.5 acres of sedge marsh, 18 acres of bulrush-sedge marsh and 23 acres of low sand marsh, according to Hoffnagle and Olson (1974). This includes some areas at the north end of the slough where old dikes have fallen into disrepair, allowing tidal influence to the marshes behind. Hoffnagle et al. (1976) studied a marsh with an almost pure stand of American great bulrush (*Scirpus validus*) and found that it had the highest standing biomass and net primary productivity of the six sites studied bay-wide. Salt marsh bird's-beak (*Cordylanthus maritima*) which is a 'rare and endangered' species in Oregon, and is known only from a site in the fringing immature high salt marsh on the west side of North Slough, and from Netarts Bay (Siddall et al., 1979). North Slough marshes are nesting habitat for the uncommon Virginia Rail as well as for more abundant marsh species such as barn swallows, long-billed marsh wrens and song sparrows (Magwire, 1976).

The tidal marshes of North Slough have been designated as 'major' estuarine resources, due to their extent, relatively undisturbed state and high primary productivity (ODFW, 1981) and should be placed in a 'Natural' management unit.

#### 4.2.5.9 Haynes Inlet Subsystem

The Haynes Inlet Subsystem is bounded by the Highway 101 causeway on the west side, and extends about 2 1/2 miles inland from its entrance into the main body of the bay. Tidal circulation has been greatly altered by the causeway, and the entrance to the main bay is now restricted to a channel at its southern end. The tidal prism has been greatly reduced by historic diking of Larson, Palouse and other creeks for agricultural purposes.

Habitats include subtidal channels, intertidal flats with sand, mud and sand-mud substrates, eelgrass beds, and various low and high tidal marshes.

Extensive tidal flats lie to the north of the main channel, parts of which supports a large eelgrass bed. Invertebrate populations are similar to those recorded in North Slough, with certain additions. *Corophium* sp. are found throughout, with ghost shrimp in the upper inlet and higher parts of the lower inlet tideflats and mud shrimp are found in the remaining areas close to the channel. Soft-shell clams, *Macoma* and *Tellina* spp. are found in most parts of the tideflats. Cockles are found in a small area close to the channel outlet. An oyster farm existed in Haynes Inlet before the construction of Highway 101 causeway (ODFW, 1979).

Hostick (1973) found the following fish in seining studies: three-spined stickleback, shiner perch, topsmelt, bay pipefish, staghorn sculpin and starry flounder. Anchovies occur in large numbers near the inlet mouth in September and October (ODFW, 1979, citing Bender, personal communication).

Haynes Inlet is chiefly important as a feeding and rearing area for striped bass (throughout) and for juvenile coho salmon (upper reaches). Boat angling for stripers occurs in May through September. Larson and Palouse Creeks are productive streams for coho spawning (ODFW, 1979, citing Bender personal communication.) Sport fishing for coho starts in October and runs through March.

The tidal flats are heavily used as wildfowl resting and feeding areas as they are relatively sheltered, like Pony Slough. Magwire (1976) found the most abundant winter species to include black brant, ruddy duck, coot, pintail, green-winged teal and mallard.

The tidal flats of Haynes Inlet, with associated subtidal channels and eelgrass beds are designated as "major" estuarine resources due to their extent and importance for striped bass and salmonid feeding and rearing and wildfowl habitat (ODFW, 1981) and should be placed in a 'Natural' management unit.

Several hundred acres of former saltmarsh have been diked and drained and are in agricultural use on Larson, Palouse and other creeks. About 150 acres of saltmarsh remain, including about 60 acres of immature high marsh on the eastern edge near the mouth of Larson Creek, another 40 acres, at the head of the Inlet, a 16 acre low silty marsh fringing the west shore and two other smaller fringes on the south shore (Hoffnagle & Olson, 1974). These areas are of special importance for their primary production because so much of the historical saltmarsh area has been converted to agricultural land. The large immature high saltmarsh on Haynes Inlet is designated a 'major' estuarine resource, due to its extent and great importance for primary production (ODFW, 1981). The other saltmarshes are not considered 'major marshes' in themselves, but are included with the "major" estuarine resources of Haynes Inlet due to their integral relationship to adjacent intertidal flats and to the entire subsystem and their collective contribution to primary production (ibid). These marshes should be placed in a 'Natural' management unit.

The narrow intertidal/subtidal area between the shore and the natural channel at the Humbard boat works is an area of past activity which is considered a "partially altered area" (ODFW, 1981). It should therefore be placed in a "Conservation" management unit.

#### 4.2.5.10 Catching Slough Subsystem

Catching Slough habitats include the subtidal channel, muddy shores, subtidal and intertidal eelgrass and ditchgrass beds, and salt marshes. At one time, tidal marshes on Catching exceeded 1600 acres, but almost all have been diked and drained for agricultural use.

Eelgrass beds are found in many areas of the slough along the shore. Fringing marshes of bullrush and sedge occur in various places, with a few more extensive areas where diking never occurred in the upper reaches. At the head of the slough, tidal marshes appear to be under fresh rather than saltwater influence. Only about 50 acres of tidal marshes remain according to Hoffnagle and Olson (1974), although this does not include the small freshwater marsh near the head.

A clam bed containing *macoma* and *Tellina* spp. within a flat covered in eelgrass occurs at the mouth of the slough. *Corophium* are also found here. Nothing further is known about invertebrate populations. Hostick (1975) found large numbers of juvenile shad in the slough. Coho and steelhead spawn in the upper reaches of the slough and tributary creeks (ODFW, 1979, citing Mullarkey & Bender, personal communication) and juvenile salmonids use this area and the mouth of the slough for feeding and rearing. Recent gill-netting surveys show that the slough is

also used for striped bass feeding and rearing (ODFW, 1979). Studies show that 5-6 year old stripers congregate in the slough. Isthmus Slough is the only other area of the bay when this age group is found, but water quality is poorer than in Catching Slough, which emphasizes its importance. Other fish include those widely distributed in the upper bay and sloughs, such as shiner perch, staghorn sculpin, threespine stickleback, starry flounder and bay pipefish (Cummings & Schwartz, 1971).

The marshes of Upper Catching Slough are designated as "major" estuarine resources due to their importance as remnants of a once much larger system, and as a source of primary productivity (ODFW, 1981). The tideflat and associated eelgrass bed at the mouth of Catching Slough is designated as a "major" estuarine resource, due to its great importance for juvenile salmonid and striped bass habitat (ibid.). The remainder of the slough (primarily subtidal) is not considered a 'major' estuarine resource, but is however designated as a significant habitat which is "smaller or of less biological importance" than 'major' habitats, due to its importance as fish rearing and feeding habitat (ibid.). These areas should be designated 'Natural' and 'Conservation' respectively.

#### 4.2.5.11 Isthmus Slough Subsystem

This subsystem includes the main Isthmus Slough and tributaries Coalbank Slough, Shinglehouse Slough and Davis Slough. Isthmus Slough is a long narrow inlet entering the main body of the bay at RM 13.8 and extending about 12 miles up to head of tide at a tidegate near Greenacres.

Habitats include the subtidal channel, narrow muddy shores, eelgrass and algal beds and tidal marshes.

The tidal flats are most extensive in the southern part of the slough, although they appear throughout as narrow muddy shores fringing the channel. Various green, red and brown algae have been noted in the slough, primarily as mats on tidal flats. *Ruppia* sp. is found in greater abundance in the less saline water of the southern end of the Slough (OIMB, 1971).

Invertebrates include mostly shrimp (*Crago franciscorum*) and crabs (*Dungeness* and freshwater). At least eight species of amphipods and isopods were found, the most important being *Corophium* sp. which is found throughout the slough. Only six molluscs are found, including *Macoma* and *Tellina* clams. Softshells are found in Coalbank Slough and occasionally elsewhere: historically, they were more abundant (OIMB, 1971). Various polychaete worms are abundant throughout the slough. Many of the annelids found have been termed pollution indicators (Wass, 1968).

Seining studies have found at least 11 species of fish in Isthmus Slough (ODFW, 1979, citing Bender, personal communication). Adult coho salmon have been found in Coalbank Slough, and also spawn in various tributaries of Isthmus and Davis Sloughs. There are feeding and rearing areas for juvenile salmonids in Coalbank, Shinglehouse, Davis and Upper Isthmus Sloughs, and also at the mouth of the subsystem.

Isthmus Slough is also an important feeding and rearing area for striped bass, which seek the deeper holes in the channel. The slough was at one time a prime bass fishing area until poor water quality prevented all use. However, the bass are returning in greater numbers now that water conditions have improved. Age classes not found elsewhere in the bay have turned up in the southern part of the slough; it is possible that this area is critical to bass at a certain stage of their life cycle (ODFW 1979, citing Bender & Mullarkey, personal communication). Research into

bass populations is continuing. Fishing for striped bass from the banks and from boats is popular in February and March.

As in Catching Slough, much of the original acreage of tidal marshes has been eliminated by diking and drainage for agricultural use. Filling for urban development has also occurred around the lower slough. Only 60 acres of the original 597 acres of tidal marsh remain in Coal Bank Slough. However, fairly extensive areas of relatively undisturbed marsh remain in Shinglehouse, Davis and Isthmus sloughs. Two productive sedge and immature high marshes remain in Coalbank Slough: both are partly diked and one is culverted. Neither are totally open to tidal currents. On the east bank of the main Slough south of Eastside lies an expansive low silty marsh with tidal flats known as Kennedy Field. Until recently used for log storage and mostly diked, it is returning to its former state (Hoffnagle & Olson, 1974). Sedge and immature high marshes occur along the main channel south of Kennedy Field, while the south end of Isthmus Slough is bordered by bullrush-sedge marsh, the upper parts of which show mostly freshwater characteristics. Shinglehouse Slough has extensive sedge marshes and Davis Slough has bullrush-sedge marshes. Tidal flats border and intermingle with the marshes in most parts. Total acreage of tidal marsh is 431.8 acres, including 62.8 acres sedge marsh, and 64.6 acres bullrush-sedge marsh (ibid.). The presence of old dikes, log debris and poor water quality (especially in the lower slough) indicate considerable potential for restoration projects (See Special Mitigation/Restoration Element).

The narrow tidal flats with algal beds which border the channel in upper Isthmus and Davis Sloughs are designated as "major" estuarine resources, due to their extent, their importance to primary production and their integral relationship to the entire subsystem, with its importance for salmonid and striped bass habitat (ODFW, 1981). They should be designated 'Natural' management units.

The tidal marshes of Coalbank Slough, Kennedy Field, Shinglehouse Slough, Davis Slough and Isthmus Slough upstream from Millington (plus the channel in Davis and Shinglehouse Sloughs) are designated as "major" estuarine resources, due to their extent, their importance for primary productivity, their importance as remnants of a historically much larger area, and their integral relationship to the entire subsystem with its importance for salmonid and striped bass habitat. [See inventory maps] (ODFW, 1981). They should be designated 'Natural' management units.

The main channel of Coalbank Slough and Isthmus Slough above the maintained shallow-draft channel (including some smaller intertidal areas) are designated as a 'significant habitat' which is "smaller or of less biological importance" than 'major' habitats, due to its importance for striped bass and/or juvenile salmonid feeding and rearing (ODFW, 1981). Coalbank Slough also contains clam beds. These areas should therefore be designated as 'Conservation' management units.

Remaining small intertidal flats and tidal marshes on lower Isthmus Slough are also designated as "significant habitat" which are "smaller or of less biological importance" than 'major' habitats, due to their relatively small extent. They also contain clam beds. They should therefore be designated as "conservation" management units.

Three general areas are considered to be "partially altered areas" under Goal #16 (ODFW, 1981):

- (i) The subtidal/intertidal area west of the channel between the log handling yard at Millington and the Eastside bridge, including the T-shaped inlet and two small tidal marshes.
- (ii) The intertidal flat east and north of the deep-draft channel adjacent to the west



end of the Eastside Peninsula.

(iii) The subtidal area east of the channel from Eastside bridge to the north end of "Kennedy Field" off the Coos Head Mill.

These areas are also considered, for the most part, "adjacent to existing development of moderate intensity". All of these areas have been altered by past log handling activities. They would normally be placed in a "Conservation" management unit, but may be designated "Development" if the Plan makes findings that they are needed for development.

The maintained deep-draft and shallow-draft channels on Isthmus Slough are designated as 1) "navigation channels" and 2) "areas of minimal biological significance needed for uses requiring alteration of the estuary", and should therefore be placed in a 'Development' management unit.

The narrow subtidal/intertidal strips bordering the authorized channels on the west/south side from the mouth of the slough to Eastside Bridge and on the north/east side from opposite the Georgia-Pacific facility to the bridge, are considered "areas of minimal biological significance" and "deep water areas adjacent to the shoreline" (ODFW, 1981). They should therefore be placed in a "Development" management unit.

#### 4.3 COASTAL SHORELAND "VALUES" REQUIRING MANDATORY PROTECTION

##### 4.3.1 Statewide Goal Requirements

State Planning Goal #17 (Coastal Shorelands), under the Section "Coastal Shoreland Uses", states:

"Major marshes, significant wildlife habitat, coastal headlands, and exceptional aesthetic resources inventoried in the Identification section shall be protected". (Emphasis added) (LCDC Goal #17).

It further states that:

"Uses in these areas shall be consistent with protection of natural values. Such uses may include propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low-intensity water-dependent recreation".

These features are identified on the inventory map "Shoreland Values Requiring Mandatory Protection", and protection measures are specifically addressed in Section 3.3 of the Management Plan, "Policies".

##### 4.3.2 "Major" Marshes

The wildlife values of these natural features are also addressed in Section 4.3.3 because all 'major marshes' are:

- (i) Size
- (ii) Flood protection value
- (iii) Recharge area for important aquifer
- (iv) Recreational importance (e.g., for duck hunting)

There are four freshwater marsh areas which are both large in area and fit one or more of the other criteria. They are as follows:

- (i) Henderson Marsh
- (ii) Deflation plain marshes north of waste treatment lagoon on North Spit
- (iii) Deflation plain marshes south of waste treatment lagoon on North Spit
- (iv) Marsh on Pony Slough in North Bend, north of Newmark

Henderson Marsh is a large freshwater marsh and swamp which totals about 160 acres. It is an old "wet deflation plain" which collects large volumes of rainfall during the wet season. Like other low-lying wetlands on the North Spit and further north in the Coos Bay dune sheet, it recharges an important aquifer which lies beneath the dunes. Naturally, due to the permeability of the dunes, a certain amount of recharge occurs throughout. However, these low-lying areas are of special importance because they are a surface expression of the aquifer's water table. Because of the aquifer recharge function of these areas, protection of ground-water quality is an important consideration. This is more appropriately addressed in the section on Beaches and Dunes (4.4) because of the requirement of Goal #18 (Beaches and dunes) to protect water quality in dune aquifers.

The extensive North Spit deflation plain marshes north and south of the waste treatment lagoon, about 200 and 250 acres respectively, are an extension of similar and more extensive areas to the north in the Oregon Dunes National Recreation Area and outside the Coastal Shoreland Boundary of the Coos Bay Estuary. They are similarly important aquifer recharge areas which fill with water in the winter months. They are usually predominantly dry, however, during the late summer, when the aquifer water table drops below ground level. Both these areas, and to a lesser extent Henderson Marsh, are important areas for duck hunting during the winter months.

The marsh on Pony Slough lies only partially within the Coastal Shorelands Boundary, which extends 1,000 feet above head of tide (a tidegate) on the Slough, as required by Goal #17. Its total area is about 60 acres. This marsh acts as a holding area for run-off from the Pony Creek watershed, and is frequently filled with water during the rainy season. Extensive upstream and downstream areas have been filled for the Pony Village Shopping Center and other development. These low-lying areas are susceptible to frequent flooding. Filling and development in this marsh could worsen flooding in these areas by displacement of a large volume of water during high run-off storms.

These four areas are therefore classified as 'major marshes' due to these values, in addition to their wildlife habitat values which are separately addressed below. None of the other significant wildlife habitat areas are considered major marshes because they are smaller and lack the other attributes of the four areas described above.

#### 4.3.3 "Significant" Wildlife Habitats

Significant wildlife habitats of the Coastal Shorelands Area of Coos Bay have been identified by the Oregon Department of Fish and Wildlife. There are two broad groups of habitats: freshwater wetlands, and upland habitats, such as nesting sites.

- (i) Freshwater Wetlands: The following descriptive narrative is adapted from an

information paper supplied by the Oregon Department of Fish and Wildlife (P. Perrin, personal communication, 12/81):

Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. The single feature that most wetlands share is soil or substrate that is at least periodically saturated with or covered by water. Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.

The wetlands around the Coos Bay Estuary have distinct wildlife and plant communities different from those found in the adjoining estuary and upland areas. The plant species usually include rushes, sedges, cattails and willows. These differences in vegetation, soils and water conditions mean greater habitat diversity and this provides for the needs of a greater number and variety of wildlife species. While some wetlands are primarily of an "emergent" type, with tall rushes, sedges and cattails, others have progressed to a more advanced stage of plant community succession, and contain willows, alder, ash and other shrub or scrub species. Some parts of these wetlands are composed of open water with floating mats of vegetation. Each type has characteristic wildlife populations.

Wetlands serve the needs of wildlife in different ways. Insects, amphibians and other small animal life thrive in wetlands. This abundant source of food attracts the birds and mammals. Wetlands provide good resting, nesting and feeding areas because of the generally dense ground cover and adjacent trees and shrubs. Although standing water may be present in a small portion of the area or only seasonally, the high water table keeps the soil damp and soft most of the time. Amphibians are totally dependent on the remaining wetland habitats. Snipe, Virginia rail and some shorebirds require such soils in which they probe with their bills for food. Some birds utilize both the estuary and freshwater wetlands. Weather conditions or tides can be unfavorable for feeding or resting in the estuary. At these times freshwater areas are important alternate sites for these activities.

Freshwater wetlands comprise a relatively small portion of the land around the estuary. This scarcity of areas gives them added significance. Most of the wetlands occur on the North Spit. Wildlife studies there have revealed 153 bird species, 33 species of mammals and eight species of amphibians and reptiles using the area. A moderate percentage of these species can be considered typical of the other wetlands around the estuary and this information is a good indication of the habitat diversity created by the wetlands and also includes many of the species found in the other areas.

Appendix "A" contains a checklist of birds found on the North Spit, by habitat type. Appendix "B" lists birds by seasonal abundance, Appendix "C" lists mammals, and Appendix "D", amphibians and reptiles by habitat type on the North Spit. Appendix "E" provides a key to habitat types.

It should be noted that many of these species are broadly distributed over the Spit in several habitat types, not simply wetland habitats. However, only those areas of special importance are mapped and identified as "significant wildlife habitats". The primary areas are the deflation plain marshes north and south of the waste treatment lagoon and Henderson Marsh. Smaller, but still significant, areas are found in the deflation plain on the southern end of the Spit

and in wet interdune areas just west of the Weyerhaeuser Company pulp plant, north and south of the North Spit access road.

The remaining significant freshwater wetland habitats are widely distributed around the bay, and are often found on inlets in locations that are diked and were once used as pasture, but have since reverted to marsh. Examples are found in Joe Ney Slough, parts of South Slough, Davis Slough, North Slough and Catching Slough. Certain other areas are simply a continuation of tidal marshes, but are above head of tide and saline influence. Examples occur in South Slough on Talbot and John B. Creeks. One site on North Slough is a former estuarine marsh which has been isolated by the Southern Pacific railroad berm. Because of their location and low elevation, a number of these wetlands have some potential for restoration to estuarine influence. These sites are identified in the Special Mitigation/Restoration Element (Section 80. As mentioned in Section 4.3.2 , the marsh on Pony Slough in North Bend is identified as a significant wildlife habitat. However, less than half of its total area lies within the Coastal Shorelands Boundary.

(ii) Other Significant Wildlife Habitats - The Coastal Shorelands Area also contains two terrestrial habitats which are of significant and special importance: snowy plover habitat and great blue heron rookeries. The snowy plover is a small shorebird which is listed as "threatened" in Oregon. Its Federal status is currently undetermined. The North Spit appears to support the largest snowy plover population on the Oregon Coast (Corps of Engineers, 1976). It is found chiefly on the ocean beach, where it uses sandy areas, particularly where driftwood provides protection for nesting. However, it has also been observed on the bay-side beach, and on nearby dredge spoil areas. While the exact relationship between dredge spoil areas and snowy plover habitat is unknown, broods of chicks have been sighted on the spoil areas north of the end of the North Spit access road (Corps of Engineers, 1979). Wilson (letter to Neil Coenen, DLCD, 1/7/81) has also observed snowy plovers on dredge spoils during the breeding season and has identified the three spoils areas on the Port of Coos Bay property, plus an area at the tip of the Spit, as snowy plover nesting habitat. She also notes that it is fair to assume that the bay-side beach from the cove east of the waste treatment lagoon to the T-dock is also used for feeding, considering the proximity of nesting habitat, the birds' mobility and the uniformity of the beach. She observed birds feeding in this area.

The snowy plover is considered sensitive to human disturbance. For instance, studies by Wilson in the Siltcoos area found many more nests in an inaccessible area than in a heavily used area (Corps of Engineers, 1979). It has also been found necessary to exclude off-road vehicles from the beach at the southern tip of the Spit during nesting season. Only the dredge spoil areas are identified as "significant wildlife habitat".

Two great blue heron rookeries have been identified in the Coastal Shoreland Area of Coos Bay:

- (i) On the North Spit, west of Hungryman Cove; near the old Coast Guard Station,
- (ii) Southwest of the bridge at the mouth of Catching Slough, within Eastside City limits;
- (iii) At Crawford Point, near Cooston;
- (iv) West of North Slough, east of Horsefall Lake;
- (v) On the west bank of South Slough opposite Valino Island

These sites are also identified as "significant wildlife habitat". Great blue herons are relatively abundant and widely distributed throughout the bay and adjacent freshwater wetland and wet meadows. However, they are a colony-nesting species which prefer to nest in the tops of trees in large groups. They are also sensitive to disturbance and abandonment of rookeries will have a significant impact on breeding success for the local population, because there are relatively few rookeries around the bay. A rookery to the north of Henderson marsh has recently been abandoned.

#### 4.3.4 Archaeological Sites

There are numerous archeological sites around Coos Bay that contain evidence of the original Native inhabitants of the area. These sites include villages, burials, fish weirs, middens, camp sites, and other places of pre-historic human activity. Because Native peoples were heavily dependent on the abundant resources provided by the estuary environment, these places of human use and habitation were frequently and naturally located along the shores of Coos Bay, its tributaries, and adjacent upland areas. These sites exist in a variety of conditions, from substantially undisturbed to completely obliterated.

Information about the specific location and characteristics of these archeological sites are derived from the records of the State Historic Preservation Office (SHPO), and from the records and archives of the two federally recognized Indian Tribes in Coos County: the Confederated Tribes of Coos, Lower Umpqua, & Siuslaw Indians; and the Coquille Indian Tribe. For reasons of site protection, and consistent with Oregon statute, the exact location and characteristics of these sites is not made available in this text or on the CBEMP map. However, a confidential "Tribal Cultural Resources" site inventory and map file is maintained by the Planning Department, in collaboration with the SHPO and the local Tribes, where such exact information can be found; available to decision-makers when deemed appropriate to a specific land use or building permit concern (see ORS 192.500).

"Recorded sites" are sites that have been assigned a number by the SHPO, which maintains a permanent record (site form) that details the type, characteristics, and location of each site. "Unrecorded sites" are sites that have not yet been assigned a SHPO number, but that have been otherwise authenticated by reliable persons and/or more than one source; and for which a temporary site form has been completed.

To date, no comprehensive study has been conducted to ascertain the exact number and locations of all the archeological sites within the estuary and shoreline boundaries of Coos Bay. However, several investigations that have been conducted by universities, professional consulting archeologists, and the Tribes themselves to indicate that pre-historic human occupation and use of the estuary environment was extensive; occurring virtually everywhere along the shores of the bay. In May 1999, there were 55 recorded and unrecorded archeological sites found at 40 distinct locations within the Coos Bay estuary.

Archeological sites are to be protected according to Goal #17, "Coastal Shoreland Uses." Archeological sites are also protected under several other federal and state statutes, including ORS 97.740 ("Protection of Indian Graves"); and 358.920 ("Prohibited Conduct" which states: "A person may not excavate, injure, destroy, or alter an archeological site or object or remove an archeological object located on public or private lands in Oregon unless that activity is authorized

by a permit issued under ORS 390.235 ("Removal of Historical and Other Valuable Materials"). See Section 3.3, "Bay-wide Policies" for additional guidance on protecting archeological sites.

A) Archeological sites in the CBEMP can be generally characterized into five (5) types:

- Village Site. A place of permanent and extended human habitation, either seasonally or year-round.
- Burial Site. A place or cemetery where pre-historic or historic human remains are buried.
- Fish Weir. A place where weir stakes, remnant basket and traps, stone tools, and worked stone are found; usually in the inter-tidal zone.
- Midden. A place having an accumulation of broken shell, fish bones, faunal remains, worked stone, burned rock, and flaked stone or stone fragments; usually associated to a layer of organic soil.
- Camp site. A place where some evidence of pre-historic human use or occupation is present, but not in sufficient amount to determine the exact nature or extent of use of the site.

B) Archeological Inventory

The following table lists archeological sites within the Coos Bay estuary according to a location number that corresponds to a site indicated within a highlighted section of the CBEMP map.

(The attached table could also include historic, geologic, and botanical sites; also given numbers and indicated within highlighted map sections.)

Table 4.3.4.1: Coos Bay Estuary Cultural Resources

Location Number	Township Range Section Number	Site Characteristic One	Site Characteristic Two	Site Characteristic Three
1	24S 13W 22	WEIR		
2	24S 13 W 27	WEIR	WEIR	WEIR
3	24S 13W 26	MIDDEN		
4	25S 13W 3	MIDDEN		
5	25S 13W 2	MIDDEN		
6	25S 13W 10	MIDDEN	MIDDEN	
7	25S 13W 17	MIDDEN		
8	25S 13W 13	MIDDEN		
9	25S 12W 19	MIDDEN		
10	25S 12W 30	MIDDEN		
11	25S 12W 29	MIDDEN		
12	25S 14W 35	CAMPSITE		
13	25S 14W 36	MIDDEN	MIDDEN	
14	25S 12W 25	VILLAGE		
15	25S 12W 26	MIDDEN	VILLAGE	
16	25S 12W 32	MIDDEN		
17	25S 13W 5	BURIAL		
18	25S 13W 18	CAMPSITE		
19	25S 13W 15	WEIR		
20	25S 14W 24	CAMPSITE		
21	25S 13W 19	VILLAGE		
22	25S 13W 30	SYMBOLIC		
23	25S 13W 27	UNKNOWN		
24	25S 12W 25	VILLAGE		
25	25S 13W 25	WEIR		
26	25S 13W 35	UNKNOWN		
27	25S 12W 31	VILLAGE		
28	25S 13W 24	UNKNOWN		
29	26S 14W 2	MIDDEN	MIDDEN	WEIR
30	26S 14W 1	SHELL		
31	26S 12W 6	MIDDEN		
32	26S 14W 11	MIDDEN	MIDDEN	
33	26S 14W 12	MIDDEN	UNKNOWN	
34	26S 14W 14	MIDDEN	MIDDEN	MIDDEN
35	26S 14W 23	WEIR	MIDDEN	
36	26S 14W 26	WEIR	WEIR	WEIR
37	26S 13W 12	UNKNOWN		
38	26S 13W 27	WEIR		
39	26S 14W 35	BURIAL	TRIBAL HOMESTEAD	
40	27S 13W 2	BURIAL		

TOTAL: 55 Known sites in the Coos Bay Estuary as of May 7, 1999

KEY:

BU BURIAL	CS CAMP SITE	MS MIDDENS HELL	SH SHELL	SP SYMBOLIC PLACE	TH TRIBAL HOMESTEAD	UK UNKNOWN	VI VILLAGE	WE WEIR
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#### 4.3.5 Historic Sites

There are four historic sites within the Coastal Shorelands Boundary of Coos Bay. They are described as follows:

- **Cape Arago Company Mill:** The original mill building still stands on the Empire waterfront and remains in working order, though currently closed. This is the oldest continuously operating mill in Oregon, the building dating from 1884.
- **U.S. Life-Saving Station:** This is the original Coast Guard life-saving station on the North Spit, about two miles north of Charleston. It dates from 1891. All that remains are the shell of the building and a dilapidated slip.
- **U.S. Life-Saving Station Boat House:** The boat house dates from 1916 and is located at the west end of the Charleston main street. It is now used and maintained by the Oregon Institute of Marine Biology.
- **Camp Castaway:** No trace remains of the beach site on the North Spit where the first European settlers made landfall in 1852, during a storm, and set up camp. However, a commemorative marker stands on the east side of the Cape Arago Highway about one-and-one-half miles south of Empire, and to the east of the historic site.

#### 4.3.6 Coastal Headlands and "Exceptional" Aesthetic Resources

There is only one coastal headland identified within the Coastal Shoreland Boundary of Coos Bay, which is Coos Head. This is a steep rocky promontory immediately east of the South Jetty, overlooking the bay entrance.

While many parts of the bay have attractive scenic features, especially the undeveloped East Bay shore, the lower part of the North Spit, parts of the Barview shore, South Slough, Catching Slough and the Coos/Millicoma systems, none of them can be said to possess truly exceptional scenic qualities.



## APPENDIX A

### Checklist of Birds at North Spit, Coos Bay (Source: Alan McGie, ODFW)

#### Bird Species List by Habitat Types

##### Species

\*Common Loon (DG)  
Arctic Loon (DG)  
Red-throated loon (DG)  
\*Red-necked grebe (DG)  
Horned grebe (DG)  
\*Western grebe (DG)  
Pied-billed grebe (DG)  
Leach's storm-petrel (DG)  
Brown pelican (endangered species) (DG)  
\*Double-crested cormorant (DG)  
Brandt's cormorant (DG)  
Pelagic cormorant (DG)  
\*Great blue heron (DG) (DGL)  
Great egret (DG, DGL)  
\*American bittern (DG)  
Whistling swan (DG)  
Brant (DG)  
White-fronted goose (DG, DGL)  
Mallard (DG, DGL)  
Gadwall (DG)  
Pintail (DG)  
Green-winged teal (DG)  
Blue-winged teal (DG)  
Cinnamon teal (DG)  
Northern shoveler (DG)  
European wigeon (DG)  
American wigeon (DG)  
\*Canvasback (DG)  
Redhead (DG)  
Ring-necked duck (DG)  
Greater scaup (DG)  
Lesser scaup (DG)  
Common goldeneye (DG)  
Bufflehead (DG)  
Oldsquaw (DG)  
harlequin duck (DG)  
White-winged scoter (DG)  
Surf scoter (DG)  
Black scoter (DG)  
Ruddy duck (DG)  
Red-breasted merganser (DG)  
Turkey vulture (DGL, HWS, HW, DT, DST, SFT)

## APPENDIX A - Continued

### Checklist of Birds at North Spit, Coos Bay (Source: Alan McGie, ODFW)

#### Bird Species List by Habitat Types

##### Species

White-tailed kite (DGL, DT, HWS, HW, DST, SFR)  
\*Sharp-shinned hawk (DT, DGL, DST, SFR)  
\*Cooper's hawk (DT, DGL, DST, SFT)  
Red-tiled hawk (DT, DGL, DST, SFR, HWS, FD, DG, HW, HA)  
Bald eagle (threatened species) (DG, FD, HW, HWS, DST, DGL)  
\*Marsh hawk (DG, DGL, DT, FD, HWS, HW)  
\*Osprey (DG)  
Peregrine falcon (endangered species) (DG, FD, DT, DGL, HWS, HW, HA)  
\*Merlin (DST, SFR, DGL, DT)  
\*American Kestrel (DST, SFT, DGL, DT, FD, HWS, HW)  
California quail (FD, HWS, HW, HA, DG, DGL, DT)  
Ring-necked pheasant (FD, HWS, HW, HA, DG, DGL, DT)  
Virginia rail (DG)  
American coot (DG)  
Black oystercatcher (DG, FD)  
Semipalmated plover (DG)  
Killdeer (DG, DGL, FD)  
\*Snowy plover (threatened species) (SP)  
Lesser (American) golden plover (DG)  
Black-bellied plover (DG)  
Marbled godwit (DG)  
Whimbrel (DG)  
Greater yellowlegs (DG)  
Lesser yellowlegs (DG)  
Spotted sandpiper (DG)  
Wandering tattler (DG)  
Black turnstone (DG)  
Wilson's phalarope (DG)  
Northern phalarope (DG)  
Red phalarope (DG)  
Common snipe (DG, FD, HWS, DGL)  
Short-billed dowitcher (DG)  
Long-billed dowitcher (DG)  
Surfbird (DG)  
Sanderline (DG)  
Western sandpiper (DG)  
Least sandpiper (DG)  
Baird's sandpiper (DG)  
Pectoral sandpiper (DG)  
Dunlin (DG)  
Stilt sandpiper (DG)  
Ruff (DG)

APPENDIX A - Continued

Checklist of Birds at North Spit, Coos Bay (Source: Alan McGie, ODFW)

Bird Species List by Habitat Types

Species

Glaucous-winged gull (DG, FD, HWS)  
Western gull (FD, DG, DGL)  
Herring gull (DG)  
Thayer's gull (DG, FD)  
California gull (DG)  
Mew Gull (DG)  
Bonaparte's gull (DG)  
Heermann's gull (DG)  
Black-legged kittiwake (DG)  
\*Common tern (DG)  
Caspian tern (DG)  
Band-tailed pigeon (DGL, HWS, DST, SFR, DG)  
Rock dove (DST, SFR, DG)  
Mourning dove (DG, DST, SFR)  
Great horned owl (DST, SFR, DGL, DT, HWS, HW, HA)  
Snowy owl (FD, HWS, HW, HA)  
\*Burrowing owl (FD, HW, HA, DG, DGL)  
\*Short-eared owl (FD, HW, HA, DG, DGL)  
\*Common nighthawk (DG, DGL, HA, FD)  
Vaux's swift (DG, FD, DGL, HW, HWS)  
Rufus hummingbird (HWS, HA, DG, DGL)  
Allen's hummingbird (DGL, DG, DT, HW, HA)  
Belted kingfisher (DG, DGL, DST)  
Common flicker ("red and yellow-shafted") (DST, SFR)  
Yellow-bellied sapsucker ("red-breasted") (DST, SFT, DT)  
\*Hairy woodpecker (DST, SFR, DT)  
Downy woodpecker (DST, SFR, DT)  
Western kingbird (DGL, DT, DST, SFR)  
Say's phoebe (DGL, DT, DST, SFR)  
\*Willow flycatcher (DGL, DT, DST, SFR)  
Western flycatcher (DGL, DT, DST, SFR)  
Western wood pewee (DGL, DT, DST, SFR)  
Olive-sided flycatcher (DST, SFR)  
Horned lark (FD, HWS, HW, HA, DGL, DG)  
Violet-green swallow (DG, DGL, FD, HWS, HW, HA)  
Tree swallow (DG, DGL, FD, HWS, HW, HA)  
Rough-winged swallow (DG, DGL, FD, HWS, HW, HA)  
Barn swallow (DG, DGL, FD, HWS, HW, HA)  
\*Cliff swallow (DG, DGL, FD, HWS, HW, HA)  
\*Purple martin (DG, DGL, FD, HWS, HW, HA)  
Common raven (FD, HWS, HW, HA, DG, DT, DGL, DST, SFR)  
Common crow (FD, HWS, HW, HA, DG, DT, DGL, DST, SFR)

APPENDIX A - Continued

Checklist of Birds at North Spit, Coos Bay (Source: Alan McGie, ODFW)

Bird Species List by Habitat Types

Species

Black-capped chickadee (DST, SFR, DGL, DT)  
Buchtit (DST, SFR, DGL, DT)  
Red-breasted nuthatch (DST, SFR, DGL, DT)  
Winter wren (DST, SFR, DGL, DT)  
\*Bewick's wren (DST, SFR, DGL, DT)  
Long-billed marsh wren (DG)  
American robin (DGL, DT, DG, HA, HW)  
Varied thrush (DST, SFR)  
Hermit thrush (DST, SFR)  
Swainson's thrush (DST, SFR)  
Blue-gray gnatcatcher (DST, SFR)  
Water pipit (DG, DGL, HA)  
Cedar waxwing (DGL, DT, DST, SFR)  
Northern shrike (DST, SFR, DGL, DT)  
\*Loggerhead shrike (DST, SFR, DGL, DT)  
Starling (FD, HWS, HW, HA, DG, DGL, DT, DST)  
Hutton's vireo (DST, SFR, DGL, DT)  
Solitary vireo (DST, SFR, DGL, DT)  
Warbling vireo (DST, SFR, DGL, DT)  
Black-and-white warbler (DST, SFR, DGL, DT)  
Orange-crowned warbler (DST, SFR, DGL, DT)  
\*Yellow warbler (DST, SFR, DGL, DT)  
Yellow-rumped warbler ("myrtle and Audubon's") (DST, SFR, DGL, DT)  
Black-throated gray warbler (DST, SFR, DGL, DT)  
Townsend's warbler (DST, SFR, DGL, DT)  
Common yellowthroat (DB, DGL, DT)  
Wilson's warbler (DG, DGL, DT, DST)  
Western meadowlark (DG, HA, DGL, HWS)  
Red-winged blackbird (DG, DGL, HWS, HW)  
Northern oriole ("Bullick's") (DST, SFR, DGL < DT)  
Brown-headed cowbird (DST, SFR, DT)  
Purple finch (DST, SFR, DT, DGL)  
House finch (DST, SFR, DT, DGL)  
Pine siskin (DST, SFR)  
American goldfinch (DGL, DT, DG, HA, HW)  
Red crossbill (DST, SFR, DGL < DT)  
Rufus-sided towhee (DGL, DT, DST, SFR)  
Savannah sparrow (DG, HA, HW, FD)  
Dark-eyed junco ("Oregon") (DST, DGL, DT, HA)  
Chipping sparrow (DST, SFR, DGL < DT)  
White-throated sparrow (DGL, DT, DST)  
Golden-crowned sparrow (DGL, DT, DST, HA)

APPENDIX A - Continued

Checklist of Birds at North Spit, Coos Bay (Source: Alan McGie, ODFW)

Bird Species List by Habitat Types

Species

White-throated sparrow (DGL, DT, DST, HA, HW)  
Fox sparrow (DGL, DT, DG, HA, DST)  
Lincoln's sparrow (DGL, DG, DT, HA)  
Song sparrow (DST, DGL, DT)  
Lapland longspur (DG, DGL)  
Snow bunting (DG, DGL)

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Total species	178
Breeding species:	44
Endangered species:	2
Threatened species:	2
Blue listed species:	25

\*Denotes species appearing on the "Blue List" for 1981, American Birds, vol. 35(1), 1981, p.3-10. Blue-listed species are those showing indications of non-cyclical population declines or range contractions, either locally or widespread.

Shorebird classifications follow Jehl (1968). Species known or suspected of breeding at North Spit (including Henderson Marsh) are underlined.

This checklist was compiled from Audubon Society Christmas Bird Count records, personal communications with competent birders, and field observations at North Spit and Henderson Marsh. It represents a preliminary compilation of species. Other records will be added with more frequent observations than possible in past years.

APPENDIX B

Seasonal Abundance of Birds in North Spit Wetlands,  
Coos Bay (Source: Alan McGie, ODFW)

SEASON DESIGNATIONS

- S - Spring (March-May)
- S - Summer (June-August)
- F - Fall (September-November)
- W - Winter (December-February)

ABUNDANCE SYMBOLS

- c - common; certain to be seen in proper habitat
- u - uncommon; present but not certain to be seen
- o - occasionally seen
- r - rarely seen (absent most years)

	S	S	F	W
<b>GREBES</b>				
Pied-billed grebe		r		
<b>HERONS and BITTERNs</b>				
Great blue heron	c	c	c	c
Great egret	o		o	o
American bittern	o		o	o
<b>WATERFOWL</b>				
Whistling swan				o
Mallard	c	c	c	c
Blue-winged teal		o		
Cinnamon teal	r			
Ring-necked duck	c			u
Greater scaup	o		o	o
Common goldeneye	o		o	o
Bufflehead	o		o	o
<b>VULTURES, HAWKS, AND FALCONS</b>				
Turkey vulture	u	u		
Sharp-shinned hawk	r	r	r	r
Bald eagle	r	r	r	r
Marsh hawk	u	u	u	u
Peregrine falcon	o		o	o
Merlin	u		u	u
American kestrel	u	u	o	
<b>GALLINACEOUS BIRDS</b>				
Ring-necked pheasant	u	u	u	u

	S	S	F	W
<b>RAILS</b>				
Virginia rail	u	r	u	u
<b>PLOVERS</b>				
Semipalmated plover	c	o	c	o
Killdeer	c	c	u	u
Snowy plover	u	u	o	r
Lesser (American) golden plover		r	r	
Black-bellied plover		o	o	o
<b>SHOREBIRDS</b>				
Marbled godwit	r		r	
Whimbrel	r		r	
Greater yellowlegs		u	u	u
Lesser yellowlegs		o	o	
Spotted sandpiper		o	o	
Wilson's phalarope		r		
Northrn phalarope	u		u	
Red phalarope			o	o
Common snipe	u	r	u	u
Short-billed dowitcher	u		u	u
Sanderline	u		u	u
Western sandpiper	c	u	c	c
Least sandpaper	c	u	c	c
Baird's sandpiper		o	o	
Pectoral sandpiper		o	u	
Dunlin	u		u	u
Stilt sandpiper			r	
Ruff			r	
<b>GULLS and TERNS</b>				
Glaucous-winged gull	u	o	c	c
Western gull	c	c	c	c
Ring-billed gull	u	u	u	u
Mew gull	u		u	u
Bonaparte's gull	u	o	u	
<b>PIGEONS and DOVES</b>				
Mourning dove	u	u	o	
<b>OWLS</b>				
Great horned owl	u	u	u	u
Snowy owl			r	r
Short-eared owl	u	u	u	u
<b>GOATSUCKERS</b>				
Common nighthawk	u	c	r	

	S	S	F	W
<b>SWIFTS</b>				
Vaux's swift	r			
<b>HUMMINGBIRDS</b>				
Rufous hummingbird	c	c		
Allen's hummingbird	r			
<b>WOODPECKERS</b>				
Common flicker	c	c	c	c
<b>FLYCATCHERS</b>				
Western wood pewee	u	u		
Olive-sided flycatcher	c	c		
<b>LARKS</b>				
Horned lark			r	
<b>SWALLOWS</b>				
Violet-green swallow	c	c		
Tree swallow	c	c		
Rough-winged swallow	o	o		
Barn swallow	c	c	u	
Cliff swallow	c	c		
Purple martin	r			
<b>CROWS and RAVENS</b>				
Common raven	u	u	u	u
Common crow	c	c	c	c
<b>CHICKADEES</b>				
Black-capped chickadee	c	c	c	c
Chestnut-backed chickadee	u	u	u	u
<b>BUSHTITS</b>				
Bushtit	u	u	u	u
<b>NUTHATCHES</b>				
Red-breasted nuthatch	o		o	o
<b>WRENS</b>				
Winter wren	c	u	u	c
Bewick's wren	c	c	c	c
Long-billed marsh wren	c	c	c	u
<b>THRUSHES</b>				
American robin	c	c	c	c
Varied thrush	u		c	c
Hermit thrush	u		c	c
Swainson's thrush	c	c	o	



	S	S	F	W
<b>KINGLETS</b>				
golden-crowned kinglet	u	u	u	u
Ruby-crowned kinglet	u		u	u
<b>PIPITS</b>				
Water pipit			u	o
<b>WAXWINGS</b>				
Cedar Waxwing	o	o	o	o
<b>SHRIKES</b>				
Northern shrike			o	o
<b>STARLINGS</b>				
Starling	c	c	c	c
<b>VIREOS</b>				
Warbling vireo	o		o	
<b>WOOD WARBLERS</b>				
Orange-crowned warbler	c	c	o	
Yellow warbler	o	o		
Yellow-rumped warbler	c	o	c	c
Townsend's warbler	o		o	o
Common yellowthroat	o		r	
Wilson's warbler	c	u	o	
<b>MEADOWLARKS, BLACKBIRDS and ORIOLES</b>				
Western meadowlark	c	c	c	c
Red-winged blackbird	c	c	u	o
Northern (Bullock's) oriole	r			
Brown-headed cowbird	c	c		
<b>FINCHES, SPARROWS and BUNTINGS</b>				
Purple finch	c	c	u	r
House finch	c	c	u	o
Pine siskin	o	o	o	o
American goldfinch	c	c	u	r
Red crossbill	r		r	r
Rufus-sided towhee	u	u	u	u
Savannah sparrow	c	c	u	o
Dark-eyed junco	o		u	u
Chipping sparrow		r		
White-crowned sparrow	c	c	u	u
Golden-crowned sparrow	u		u	
White-throated sparrow			r	
Fox sparrow	o		c	c

	S	S	F	W
Lincoln's sparrow			o	
Song sparrow	c	c	c	c
Lapland longspur			r	
Snow bunting			r	

APPENDIX C

MAMMAL DISTRIBUTION AMONG HABITAT TYPES

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Order Insectivora

Family Soricidae

Pacific Shrew (SFR)  
Vagrant Shrew (DG, DGL)  
Trowbridge Shrew (SFR)

Family Talpidae

Pacific Mole (HA, SFR)  
Shrew-mole (SFR)

Order Chroptera

Family Vespertilionidae

Little Brown Myotis (DT, SFR)  
California Myotis (SFR)  
Long-legged Myotis (SFR)  
Long-eared Myotis (DST, SFR)  
Hoary Bat (DST, SFR)  
Big Brown Bat (DST, SFR)  
Western Big-eared Bat (SFR)

Order Lagomorpha

Family Leporidae

Brush Rabbit (DT, DGL, DST, SFR)

Order Rodentia

Family Aplodontidae

Family Sciruidae

California Ground Squirrel (FD, HW, SFR, HW, HA)  
Townsend Chipmunk (DST)  
Chickaree (DST, SFR)

Family Castoridae

Beaver (DT, DST)

Family Cricetidae

Deer Mouse (FD, HWS, HW, DG, DGL, DT, HA, SFR, DST)  
Bushy-tailed woodrate (SFR)  
California Red-backed vole (SFR)  
Townsend vole (DG, DGL)  
Oregon vole (SFR)

Family Zapodidae

Pacific Jumping Mouse (SFR)

APPENDIX C - Continued

MAMMAL DISTRIBUTION AMONG HABITAT TYPES

Family Erethizontidae  
Porcupine (DST, SFR)

Order Carnivora

Family Canidae  
Gray Fox (FD, HSW/HW, DG, HA, DGL, DST)  
Coyote (FD, HWS/HW, DG, HA, DGL, DST, SFR)

Family Ursidae

Family Procyonidae  
Raccoon (FD, HWS, HW, DG, DGL, HA, DT, DST, SFR)

Family Mustelidae  
Mink (HWS, HW, DG, HA, DT, DST, SFR)  
Long-tailed Weasel (SFR)  
Striped Skunk (FD, HWS, HW, DG, HA, DGL)  
Spotted Skunk (DST, SFR)

Family Felidae  
Bobcat (FD, HWS, HW, DG, HA, DGL, DT, DST, SFR)

Family Cervidae  
Black-tailed Deer (FD, HWS, HW, DG, HA, DGL, DT, DST, SFR)

APPENDIX D

AMPHIBIAN AND REPTILE DISTRIBUTION AMONG HABITAT TYPES

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Order Caudata (Salamanders)  
Family Ambystomidae

Family Salamandridae  
Rough-skinned Newt (DST, SFR)  
Oregon Slender Salamander (SFR)

Order Salientia

Family Bufonidae  
Western Toad (FD, HWS, HW, DG, HA, DGL, DT, DST, SFR)

Family Hylidae  
Pacific Tree Frog (HWS, HW, DG, HA, DGL, DT, DST, SFR)

Family Ranidae  
Red-legged Frog (DG, DT, DGL, DST)

Order Squamata (Lizards and Snakes)

Family Anguillidae  
Northern Alligator Lizard (HWS, HW, DST, SFR)

Family Colubridae  
Northwestern Garter Snake (DST, SFR)  
Common Garter Snake (HWS, HW, DG, DGL, DT, DST, SFR)

## APPENDIX E

### PLANT COMMUNITIES (WILDLIFE HABITATS) OF THE NORTH SPIT (Adapted from Pinto, D., et.al, 1972).

- (J) Rock Jetties
- (B) Beach
- (O) Ocean
- (E) Estuaries
- (R-S) Rivers-Streams
- (L-P) Lakes-Ponds

#### MARSHES:

- (SM) Saltmarsh-meadow
- (M) Marsh- in deflation plain
- (R-L) Riparian-Lakeside; vegetation adjacent to streams, lakes, etc.

#### GRASSLANDS:

- (FD) Foredune - pure beachgrass
- (HWS) Hummocks, occasionally wet, stable; mixed grasses, dense
- (HW) Hummocks, wet - mixed grasses, moderate density
- (HA) Hummocks, dry - mixed grasses, light density
- (DG) Deflation Plain - grasses, rushes, sedges

#### BRUSHLANDS - THICKETS:

- (DGL) Deflation Plain, low scattered shrubs
- (DT) Deflation Plain, thickets
- (P) Plantation - beachgrass, scotch broom, shore pine

#### CONIFER FORESTS

- (DST) Deflation Plain - shore pine forest
- (SFR) Shore Pine forest Ridge
- (TF) Transition forest
- (TFO) Transition Forest, old-growth
- (SP)1 Dredge spoils

## 4.4 BEACHES AND DUNES

### 4.4.1 Introduction

Statewide Planning Goal #18 (Beaches and Dunes) requires the identification of coastal beaches, active dune forms, recently stabilized dune forms, older stabilized dune forms and interdune forms. To identify these features, this inventory uses the source: "Beaches and Dunes of the Oregon Coast", by the USDA Soil Conservation Service and Oregon Coastal Conservation and Development Commission, 1974. Dune formations are presented on a 1" = 3000' scale inventory map and are delineated within the coastal shorelands boundary. Dune forms outside the coastal shorelands boundary of the Coos Bay Estuary are mapped in the inventory in Volume 1 of the Coos County Comprehensive Plan ("Balance of County").

The "Goal and Implementation Requirements" of the Statewide Beaches and Dunes Goal focus special attention on natural hazards and water, recreational and biological resources. Knowledge of the location and extent of these hazards and resources is necessary for planning decisions and land use actions made by local, state and federal agencies. The Beaches and Dunes inventory provides a basis for decisions affecting development, environmental protection and stabilization measures, as required by Goal #18.

Beach and dune areas are given special protection by the Statewide Goals for a number of reasons:

- (i) There are potential hazards from blowing sand, destabilization of vegetated areas, breaching of foredunes and flooding of low-lying deflation plain areas.
- (ii) Many dune areas contain important groundwater resources, and protection of water supplies and quality are important concerns.
- (iii) Dunes are a unique and valuable outdoor recreational and scenic resource, and
- (iv) Dune formations include wet deflation plains and other wet interdune areas which often contain a valuable wetland wildlife habitats. In addition, the beach and open sand dune areas provide habitat for certain other wildlife species.

### 4.4.2. Statewide Goal and Other Statutory Requirements

The Statewide Planning Goals and Guidelines require that:

- (1) The resources and benefits of coastal beach and dune areas and shorelands be conserved, protected, developed where appropriate, and restored where appropriate;
- (2) Hazard to human life and property from natural or man-induced causes be reduced;
- (3) Comprehensive plans and implementing actions:
  - (a) "provide for diverse and appropriate use of beach and dune areas consistent with their ecological, recreational, aesthetic, water resource, and economic values, and consistent with the natural limitations of beaches, dunes and dune vegetation for development" and,
  - (b) consider "the critical relationships between coastal shorelands and resources

of coastal waters (LCDC State-wide Planning Goals - Beaches and Dunes Goal - #18)."

The Goal further requires that plans identify beach and dune areas and establish policies and uses for these areas, consistent with its requirements. The land-form types to which the Goal applies are:

"beaches, active dune forms, recently stabilized dune forms, older stabilized dune forms and interdune forms." (ibid.)

Permitted uses must be based on the capability of these land-forms to:

"sustain different levels of use or development, and the need to protect areas of critical environmental concern, areas having scenic, scientific, or biological importance and significant wildlife habitat." (ibid.)

Implementation Requirements 1-4 of Goal #18 prescribe the means for management of beach and dune formations by:

- (i) specifying appropriate findings for quasi-judicial decisions, plans and ordinances,
- (ii) prohibiting development in specific hazard areas,
- (iii) regulating adverse actions, and
- (iv) providing protection of water resources while setting forth regulations for other activities.

Requirements 5 and 6 regulate beachfront protective structures and breaching of foredunes, respectively. Because the ocean beach and foredune lies within the ocean coastal shorelands boundary, rather than that of the Coos Bay Estuary, these two requirements are not directly applicable to the Estuary Plan.

Implementation Requirement #1 directs local governments to base planning decisions within beach and dune areas other than older stabilized dunes, on specific findings. The findings shall include at least:

- a) type of use and possible adverse effects of the use on the site and adjacent areas,
  - b) stabilization program and planned maintenance of new and existing vegetation,
  - c) methods of protecting surrounding areas from adverse effects of development,
- and
- d) hazards that may be caused by the proposed use.

Implementation Requirement #2 prohibits residential, commercial, and industrial development in areas of geologic hazard or potential hazard areas. Areas subject to this requirement are: active foredunes, other conditionally stable foredunes which are subject to ocean undercutting or wave overtopping and deflation plains subject to ocean flooding. Other types of development are permitted subject to specific requirements.



Implementation Requirement #3 requires local, state and federal agencies to regulate actions in beaches and dunes areas to minimize the resulting erosion. Such actions include at least:

- a) destruction of desirable vegetation,
- b) exposure of stable and conditionally stable areas to erosion, and
- c) construction of shore structures which modify currents and lead to beach erosion.

Implementation Requirement #4 requires local, state and federal agencies to protect groundwater from draw-down leading to loss of stabilizing vegetation, loss of water quality or salt water intrusion.

Other statutes which may apply to the dune areas within the Coos Bay Estuary coastal shorelands boundary include:

- ORS 517.570-517.990 - Requires reclamation and development plan for certain surface mining activities.
- ORS 541-605-665 - Regulates fill and removal activities.

The following State and Federal agencies have administrative authority and/or permitting authority in these dune areas:

- State Water Resources Department - Develops and administers State water resource policies.
- Division of State Lands - Manages State-owned waterways; administers removal and fill permit law; reviews beach improvement permits.
- U.S. Army Corps of Engineers - Has permit-granting authority for all work involving navigable waterways (including riprap). Also administers and manages a large portion of dune areas on North Spit which are under Federal ownership.
- State Department of Geology and Mineral Industries - Issues permits for certain surface mining activities and sets standards for reclamation.
- State Department of Environmental Quality - Administers and enforces State laws relating to water quality and solid waste disposal.
- Oregon Department of Fish and Wildlife and U.S. Fish and Wildlife Services - Have responsibility for managing and protecting fish and wildlife resources; ODFW manages game fish and wildlife-oriented recreation.

#### 4.4.3 Sand Dune Types and Their Geographic Distribution

The various sand dune land-form types are identified on the inventory map "Beaches and Dunes". A separate map "Beaches and Dunes Development Potential" identifies the areas which are subject to special considerations and regulations, as required by Goal 18 Implementation Requirements 1 and 2, and the Plan policies based on them [See Plan Policy Section 3.3., "Policies"]. As noted

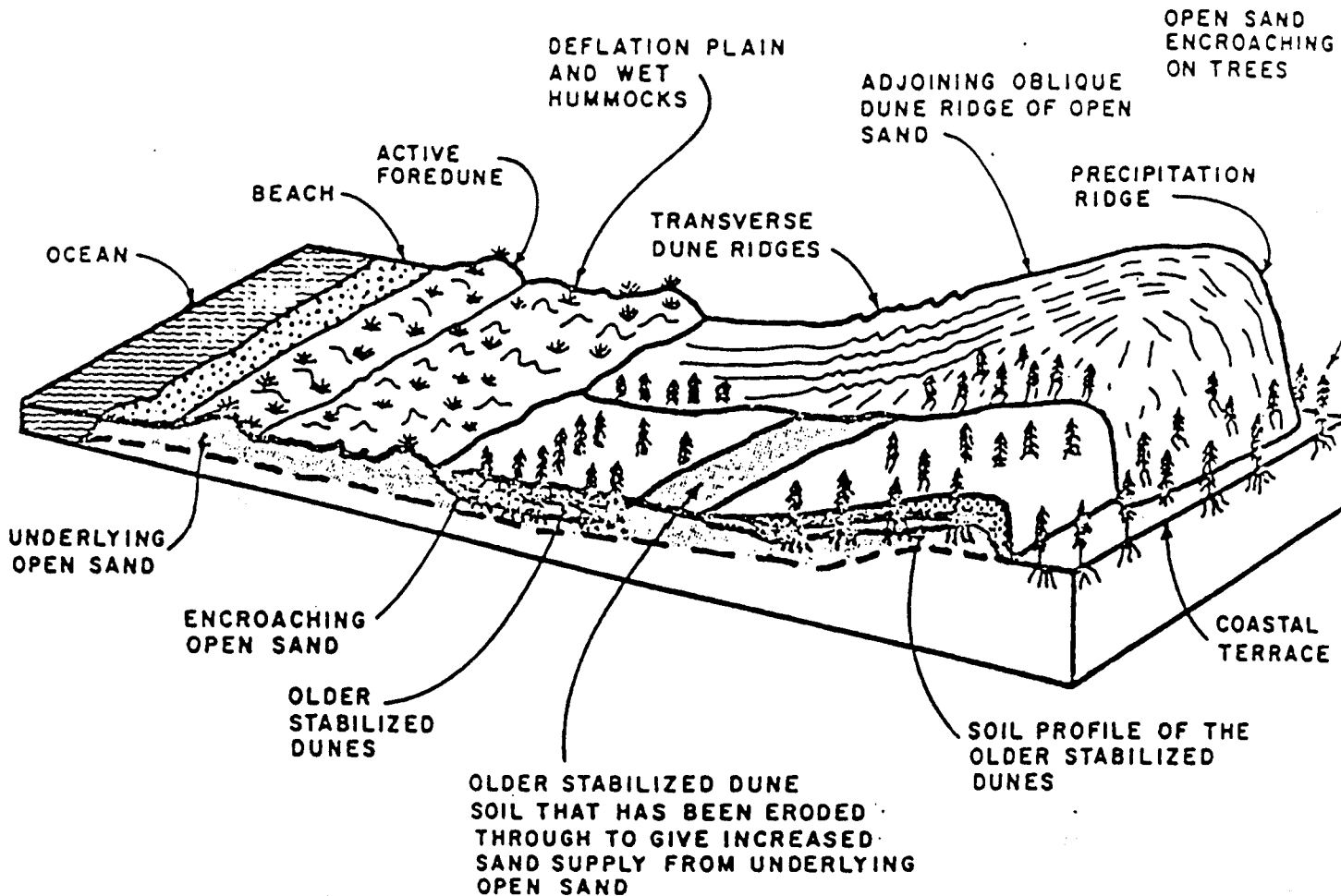
Table 4.4.1

## Sand dunes units

GOAL CATEGORIES	SAND DUNES NAME	MAP UNITS SYMBOL	ABBREVIATED DESCRIPTION
Active Dunes	Open Sand Dune	OS	Wind drifted sand in the form of dunes and ridges, that are essentially bare of vegetation.
	Active dune Hummocks	H	Partly vegetated circular and elevated mounds of sand.
	Active Foredunes	FDA	A growing barrier ridge of sand paralleling the beach which lies immediately above the high tide line.
Recently Stabilized Dunes	Recently Stabilized foredunes	FD	An active foredune that has become conditionally stable with regard to wind erosion.
	Open Dune Sand Conditionally Stable	OSC	A sand dune presently in wind-stable condition but vegetated by fragile plantings.
	Dune Complex	DC	Various patterns of small dunes with partially stabilized intervening areas.
	Younger Stabilized Dunes	DS	A youthful wind-stable dune landform.
Older Stabilized Dunes	Older Stabilized Dunes	ODS	A wind-stable dune landform that has soils with weakly cemented nodules to strongly cemented nodules or strongly cemented 'Bir' horizons.
Interdune Forms	Wet Deflation Plains	WDP	Broad areas just inland from the foredunes which are wind-scoured to the height of the summer water table.
	Wet Interdunes	W	Includes a range of landforms varying from wet open dune sand forms to wet areas in recent and older stabilized dunes.

Source: OLCDC/scs, 1974

FIGURE 4.4.1  
Typical dunes Units.



above, the source which identifies these duneforms and establishes the terminology is "Beaches and Dunes of the Oregon Coast" (USDA-SCS/OCCDC, 1974). The units on the inventory map and the relationship of these units to the categories specified in Goal 18 [identification] are set out below in Table 4.4.1, together with a brief description of each. A schematic cross-section of a typical dune formation is shown in Figure 4.4.1.

Sand dune forms within the Coos Bay Estuary coastal shorelands boundary are found primarily on the North Spit, which is composed entirely of one type of dune form or another. However, dune forms are found peripherally to the estuary in three other general areas: North Slough, the shoreline from North Bend through Empire to Barview and around the South Slough.

On the west side of North Slough, the eastern edge of the dune sheet occurs in open sand (OS) areas which are slowly advancing in several locations, gradually encroaching upon low wet interdune and salt marsh areas, and threatening the Southern Pacific railroad track. These dunes lie predominantly within the Oregon Dunes National Recreation Area (ODNRA).

The North Spit contains a wide variety of dune forms from large open sand dunes (OS) to wet deflation plains (WDP) and younger stabilized dunes (DS). Older stabilized dunes (ODS) are the only major form not represented on the North Spit. The area from Jordan Point to the ocean, north of the extensive waste treatment lagoon is dominated by interdune areas; a large deflation plain with extensive wetlands, an older deflation plain in various stages of freshwater wetland vegetational succession (Henderson Marsh), and heavily vegetated wet interdune areas north of the Roseburg Lumber facility. Substantial alteration has occurred at the Weyco pulp plant, Roseburg Lumber, and at a log storage site on a recent dredged material disposal site adjacent to Henderson marsh. Ridges of stabilized dune (DS) and open sand dune (OS) run north/south between the interdune areas.

South of the waste treatment lagoon lies another extensive wet interdune area (W) with extensive fresh-water wetlands. East of this is an area of conditionally stabilized dunes (OSC) with growth of dune grass and shorepine, mixed with open sand (OS) areas, some of which are actually dredged material disposal sites.

To the south lies an extensive complex of open sand (OS), the eastern edge of which is slowly encroaching upon the interdune area in some places. South of this open dune to the tip of the spit is mostly a wet interdune (W) area with smaller areas of freshwater wetland, and with a strip of recently stabilized dune fronting the shore of Coos Bay.

The coastal shorelands boundary from North Bend to Barview contains older stabilized dunes (ODS) which frequently take the form of densely vegetated low cliffs or bluffs (particularly southwest of the North Bend Airport) which are subject to very gradual erosion because of the softness of the material. There are sandy beaches along different parts of the shoreline, particularly between the airport and Empire, south of Empire, north of Fossil Pt. and at the Barview Wayside. However, only the latter site is classified as a beach by the source, due to the narrowness of the other shores. They are classified in the 'Estuarine Wetland Habitats' inventory map as "shores" or "tidal flats" with sandy substrates.

The coastal shorelands boundary around the South Slough also contains extensive shores formed by older stabilized dunes. They similarly form narrow sandy shores and low bluffs which are subject to very gradual erosion.

These shoreland areas are the edge of a very extensive area of older stabilized dunes and miscellaneous other forms which covers the entire western and northern part of the Coos Bay/North Bend peninsula.

#### 4.4.4 Natural Hazards and Protection Measures

Sand Dunes may be subject to the following natural hazards:

- (i) Sand erosion and deposition due to wind action on open sand and destruction of stabilizing vegetation.
- (ii) Ocean flooding of deflation plains due to undercutting or overtopping of foredunes.
- (iii) High water tables.

Wind erosion and deposition:

Although, as mentioned above, the foredune is not included in the coastal shorelands area of the estuary, it needs to be discussed because of the severe flooding hazards in the deflation plain that could result if it is destabilized or breached.

Development of foredunes (FD and FDA) poses a particular wind erosion problem. Excavation for development, the accompanying loss of vegetation, and disruption of the wind flow by structures can promote severe wind erosion of the foredune which threatens not only the structures sited on the foredune itself, but also the area behind the eroded foredune which then suffers a greater risk of flooding and wave damage because of potential foredune breaching.

For these reasons, development is severely restricted on active foredunes and recently stabilized foredunes that are subject to wave erosion and overtopping. Other dune forms also suffer from wind erosion and deposition problems; this is a particular problem with open sand areas, but with the loss of stabilizing vegetation, conditionally stabilized dunes (OSC), younger stabilized dunes and even older stabilized dunes can rapidly become exposed to the wind and begin to drift.

Residential, commercial or industrial development can remove existing vegetative cover and lead to increased erosion and sand movement. Unmanaged off-road vehicle (ORV) use on semi-stable areas can rapidly lead to destruction of vegetation. This may also occur in stable areas if misuse is concentrated and frequent. Indirect and often inadvertent destabilization is caused by local draw-down of the water table by excessive water withdrawal from wells or for some other reason. This will cause woody vegetation to die back if water is lost from the root zone, and can contribute to erosion.

The most common result of disturbance of vegetation on otherwise vegetated dunes is a blowout, an elongated, dish-shaped area bare of vegetation. After the initial disturbance, the wind takes over a feature that may have been only a few feet across and several feet long in its early stages can develop into a landform hundreds of feet across and more than a mile long (C. Crook, Oczma, 1979).

Deposition occurs when natural or man-made obstructions slow the wind, causing it to drop its load of airborne sand. Burial or partial burial of roads, structures, and parking lots results. Dunes advance by the accumulation of sand on their downwind sides. In Coos County, some dunes have been observed to advance 2-6 feet per year (Beaulieu & Hughes, 1975). While the degree of hazard varies somewhat depending on vegetative cover, soils are generally thin (where present) and wind-stable dunes are easily reactivated. Even when there are well developed soil profiles, as on older stabilized dunes, there may still be risk of reactivation because the underlying sand is often not cemented or is only poorly cemented.

Protecting existing vegetation and requiring revegetation as soon as possible when the plant cover must be disturbed, are ways of reducing wind hazard. There are a number of techniques for stabilizing dunes.

Sand dunes may be stabilized by selective placement of vegetation or by mechanical means. Succession of plant communities will lead to stabilization of open dunes by stilling windblown sand and colonizing the surface with vegetation. This process is dependent on adequate moisture and sets the stage for further stabilization.

European beachgrass was introduced in the late 1800's as a stabilizing vegetation, but it was not until after 1930 that its use became widespread. Its use has created a continuous foredune along the coast. Grasses such as European and American beachgrass thrive on the fertility associated with new sand increments, but permanent stabilization requires planting of perennial species after initial control is accomplished. Scotch broom has been found to be an excellent plant for intermediate stabilization.

Woody vegetation can also be used for stabilization but shrubs must be used in conjunction with them to provide protection from winds and improve soil fertility. Shore pine is particularly well suited for semi-permanent stabilization.

Brush matting is also used for stabilization by placing overlapping layers onto the sand. It is used to stop blowing sand and serves as a temporary stabilizer by acting as a mulch. It is used on blowouts on steep slopes and is only successful if used along with beachgrass or shrub seeding. The value of this method is limited to temporary stabilizing measure since matting becomes ineffective as it loses leaves and becomes brittle.

Oil covering is sometimes used as a stabilization technique on excavated cuts and trails. It is generally considered undesirable for stabilization due to its unsightly appearance. Wire net can be used to stabilize sand cuts and is also used to reduce wind scour when used with vegetation. Wire netting can, however, be broken and twisted and is also most effective when used in conjunction with vegetation.

Rock, clay, gravel and refuse material is also used locally to cover open sand and reduce wind scour. However, the source of the sand may still be exposed and movement could continue. Refuse is successful in stabilizing limited areas of flowing sand, though it is again generally unsightly.

The map "Beaches & Dunes" identifies the dune forms which are most subject to sand movement, recently stabilized foredunes, open sand dunes and younger stabilized dunes. It also identifies locations of active dune movement, according to the source (SCS/OCCDC; 1974).

## Ocean Flooding of Deflation Plains

One of the most severe natural hazards in sand dune areas is ocean flooding of the low lying deflation plain. This may occur when heavy storm surges superimposed on high tides break through the foredune. The probability of ocean flooding is much less when foredunes are adequately stabilized, as they are on the North Spit. Beaulieu & Hughes (1975) document damage during two storms in January 1939, but make no mention of ocean flooding on the North Spit. They calculate that 'extreme high tide', that is, the highest predicted tide plus the highest observed storm surge, is about 10.4 feet for the Oregon Coast. The stabilized dune averages 20-25 feet high, according to airphotos with 5-foot interval contours produced by the Corps of Engineers [see also North Bay Marine Industrial Park DEIS, Corps of Engineers, 1981]. Therefore, such extreme events would not overtop the dune unless previous severe erosion and undercutting had occurred. While erosion and undercutting does occur in places on the Spit, Beaulieu and Hughes state (ibid, p.104) that the Coos-Umpqua dune field and beach are one of the most stable structures on the entire coast, with little natural change in the last 100 years.

While theoretically a tsunami could combine with a high tide to overtop the North Spit foredune, this probability is extremely small. The "highest probable tsunami" is 17 feet above prevailing sea-levels (ibid., p.77). The Good Friday tsunami of 1964 produced waves of 4-14 feet above prevailing mean high water, combined with a high spring tide. While this event caused damage at Sunset Beach and Charleston Harbor, (ibid) there was again no ocean flooding on the North Spit. This event has been used by Beaulieu and Hughes as a measure of the "highest probable tsunami [14 ft. plus mean high water, 3 ft. above M.S.L.]."

It may be concluded then, that the North Spit deflation plain is not "subject to ocean flooding".

### High water tables

The major hazard to development in interdune areas (WDP, W) is the high water table. Winds scour these areas down to the level of the water table in the summer while in the winter the water table is often several inches to several feet above ground level. Septic tanks generally fail and the potential for groundwater pollution is high. Additional hazards are saltwater intrusion into the aquifer, wind erosion and deposition around structures and drawdown.

#### 4.4.5 Water Resources

Features such as lakes are the surface expression of the water table. "Wet deflation plains" are created when wind currents scour the area directly behind active foredunes down to the water table level. Surface water is utilized by migratory waterfowl and as resting and feeding habitat. Surface water is most often found in wet interdune and wet deflation plain areas. Lakes and wet deflation plains are subject to considerable seasonal variations in water table level. From the onset of the winter rainy season until spring, the water table is generally at, or above, the surface.

The Coos Bay dune sheet contains an important aquifer which is a major source of domestic and industrial water. The aquifer under the North Spit is recharged entirely by rainfall. It is estimated that 38-39 inches of the average 62 inches of rain per year is available for recharge (SCS/OCCDC, 1974). An estimated 37 million gallons per day (mgd) may be available from the aquifer underlying the Coos Bay dune sheet, though recent studies indicate that only 15 mgd can be pumped without seriously affecting lake levels (J.H. Robison, 1973). The Coos Bay/North Bend Water Board holds rights to 30.7 mgd, which were filed in 1956. Most of its wells are to the north of the

estuary coastal shorelands boundary. While the Water Board currently pumps only 7 mgd or less from the dunes from 18 wells and does not intend to take any action that seriously affects lake levels, its claim to water from that aquifer takes precedence over all water rights granted in the same area after that date, should conflicts arise during stress years or because of increased development in the dune sheet.

Overpumping of groundwater beyond its capacity to recharge from precipitation can cause lowering of dune lake levels and drying of wet interdune areas, with possible loss of vegetation and loss of wildlife habitat, lowering of the water table below the depth of some existing wells and salt water intrusion.

Saltwater encroachment into dune groundwater supplies is normally limited, because of the pressure of freshwater flowing through the sand into the sea. However, excessive pumping from wells close to the ocean can cause a change in the hydraulic pressure. If this pressure is lowered too far, a wedge of seawater intrudes and contaminates the groundwater supply. Such intrusion is irreversible. The risk of saltwater intrusion is greatest on narrow spits which, like the North Spit, are surrounded by the sea and by brackish water. Maintenance of good water quality in the dune and upland water-courses is important to the health of users of groundwater from the dunes and for protection of anadromous fish and other wildlife. The dunes are particularly susceptible to direct chemical contamination from industrial, agricultural, domestic and other sources.

According to Cal Heckard, CBNBWB manager, a 1956 Pacific Power & Light study (later confirmed by the U.S. Geologic Survey) showed that 30 MGD could safely be withdrawn from the dunes aquifer without danger of saltwater intrusion. The parameters of the study, based on the "water budget" expressed in inches of rainfall per year, included allowances for evapotranspiration, low-water years and other factors, with the only constraint being the measurement of potential saltwater intrusion.

Because of concern about the effects of pumping on lake levels, the Water Board commissioned a study which showed that the water table in the dunes would be lowered substantially by full pumping, but that lake level lowering might largely be overcome by amending the existing permit and moving the wells westward (away from the lakes).

The Water Board has full water rights to develop 64 wells at a safe (acceptable recharge) capacity of 30 mgd. However, as stated in a May 17, 1983 letter from Mr. Heckard:

In spite of the terms of the permit, the Board has considered the wishes of people and landowners of the area as well as the possible needs of the dunes resources and has adopted as its dunes water development goals "to optimize water withdrawals while minimizing the adverse effects of those withdrawals." In reviewing the Robison study, the board has chosen the target figure of 22 million gallons per day as the apparent quantity that can be extracted while remaining within these goals.

#### 4.4.6 Recreational Uses

The dunes of the North Spit are a popular area for dispersed outdoor recreation use. Common uses are: off-road vehicle use, birdwatching, hiking, duck hunting, and access to prime fishing, clamming and beach-combing sites. Road access at present is limited to the road which leads to the Port of Coos Bay future marine industrial site. Beyond this point, access is by trail only, or by boat. Though the road is partially county-maintained, access is controlled by Roseburg Lumber



Company, through whose loading dock the road passes. Future marine industrial development will require a new paved access road which will lead to improved recreational access and possibly more use pressure.

The open sand dunes are a particular recreational attraction, and ORV users come from the Willamette Valley and out-of-state to enjoy this activity. However, use on the North Spit is more by local enthusiasts than in the Oregon Dunes N.R.A. itself, which draws users from a wider area. For this reason the dunes are a significant economic resource to the area.

As for identifiable wildlife conflicts, damage to vegetation in the deflation plain can have a significant impact on a habitat used by migrating waterfowl. There are conflicts with needs to maintain critical habitats in a few areas. Having brief closures (April-June) in those limited areas identified as snowy plover nesting sites would be one way to help make ORV use compatible with protection of endangered species. Management of ORV use can probably be most effectively accomplished through a management plan developed cooperatively between ORV clubs, the Corps of Engineers, the County and the Port of Coos Bay. Organized ORV clubs have shown a willingness to cooperate in the past, and encourage their members to be responsible users of the dunes. Most of the problems are apparently caused by irresponsible individuals who do not share this concern.

#### 4.4.7 Other Economic Values

Sand is mined for glass production from a site immediately north of the Weyco pump mill, adjacent to the Oregon Dunes N.R.A. The sand is clean, high in silicon and of good quality for glass making. This use is expected to continue.

#### 4.4.8 Wildlife Habitats

As the Coastal Shorelands Goal (#17) has more specific requirements regarding wildlife habitats, this subject is more appropriately addressed in Section 4.3., "Coastal Shoreland Values Requiring Mandatory Protection."

#### 4.4.9 General Development Potential of Dunes

The following table summarizes constraints on development in dunes, in the three categories shown on the map "Beaches and Dunes Development Potential" and referred to in the section on Bay-wide policies. The first category has severe development constraints and most types of development are prohibited, as required by Goal #18, Implementation Requirement #2. The second category, containing most other dune types, may have constraints of various types, and appropriate measures need to be taken to prevent hazards occurring, or to protect biological or water resource values. The third category (older stabilized dunes) has few or no constraints.

Table 4.4.2

Development constraints by dunes unit

EQUIVALENT SAND Name	Symbol	CONSTRAINTS ON DEVELOPMENT
Active foredune Recently Stabilized foredunes * Wet Deflation Plains + beaches	FDA FD WDP	Unsuitable for Development  Highly unstable features; hazards include wave over-topping, undercutting and breaching of foredunes, ocean flooding of deflation plain. Not suitable for residential, commercial, or industrial structures, commercial, or industrial structures.
Open dune sand Active Dune Hummocks Open Dune Sand Conditionally Stable Dune Complex Younger Stabilized Dunes Wet Interdunes Other recently stabilized foredunes Other wet deflation plains	OS H OSC DC DS W FD WDP	Limited Suitability for Development  Development can have adverse effects on adjacent areas as well as the site itself. Hazards include wind erosion (loss of top-soil and vegetation as well as excavation around objects that interrupt wind flow); burial or partial burial of roads and structures by sand; groundwater pollution drawdown; septic system failure. Hazards and adverse effects to neighboring properties should be addressed in a site investigation report.
Older Stabilized dunes	ODS	Few or no constraints  Wind erosion hazard ranges from none for well-cemented dunes to high where soils are thin and underlying sand is not cemented. Blowouts can be easily initiated in the latter case, affecting adjacent areas as well as the subject property. Minimizing disruption of vegetation and revegetation can reduce the hazard. Suitable for most uses.

\* Only where subject to undercutting or overtopping.

+ Only where subject to ocean flooding.

5. SOCIO-ECONOMIC RESOURCES  
AND CHARACTERISTICS

## 5.0 SOCIAL AND ECONOMIC RESOURCES AND CHARACTERISTICS

### 5.1 EXISTING LAND USES

#### 5.1.1 Water-Dependent Industrial Uses

- Lumber & Wood Products

By far the great preponderance of developed land in the Coos Bay estuary shorelands area is devoted to lumber and wood products uses. As shown in Section 5.5, the major forest companies in the area own over 75% of the developed industrial acreage and own nearly 1200 acres of land potentially suitable for industrial uses.

Another statistic points out the critical importance of back-up space for sites with water access: structures in use account for only about 15% (107 acres) of the developed sites; most of the remainder is devoted to open storage, generally of products awaiting export. The major products stored are wood chips, milled lumber, plywood and logs.

The major chip storage sites on the bay are immediately adjacent to docks, and include Roseburg Lumber on North Spit, Weyerhaeuser, Fibrex and Champion along the Coos Bay-North Bend waterfront, and Georgia-Pacific at Bunker Hill.

Port of Coos Bay statistics indicate that five times as much lumber tonnage is exported compared to plywood, although early 1981 saw a relative drop in that ratio to about 3:1. The major water-dependent lumber and plywood storage areas are Ocean Terminals, Inc., Weyerhaeuser and Central Dock along the Coos Bay-North Bend waterfront, Georgia-Pacific and Coos Head at Bunker Hill, and Cape Arago Lumber Company (Moore Oregon) along the Empire waterfront.

The bulk of log storage occurs in water (see "Water Uses", this section). Although in-water log storage is more energy-efficient than dry-land storage, many forest industries have earmarked areas suitable for dry-land log storage in anticipation of (i) future reduced log sizes, and (ii) potential change in the political acceptability of in-water log storage. The major existing water-dependent dry-land log storage areas are Roseburg Lumber on North Spit, Al Peirce at Bunker Hill, Georgia-Pacific at South Bunker Hill and Millington, Coos Head Timber along Isthmus Slough, and Weyerhaeuser at Allegany and Dellwood. The use at these sites is considered water-dependent because the sites are essentially terminal facilities needed for the water transportation of logs.

Several firms other than major forest industries are also included in the lumber and wood products category. They account for an additional 27 acres of land, and include a wood treatment plant in Hauser as well as storage adjacent to docks.

- Aggregate Extraction, Storage and Processing

Although there are numerous quarries in the County, most of the sites are not water-dependent since the aggregate is invariably used locally and thus transported by truck. Two sites historically used for barge-loading of aggregate and with the likelihood of major expansion are at Kentuck Slough and on the Coos River at the forks of the Millicoma. Aggregate is currently imported by

barge, generally from the Umpqua River, and is stored and processed at North Point (at the South end of McCullough Bridge).

- Waterborne Transportation

Most of the 52 acres currently occupied by this use in the shorelands area is for ship/boat building and repair firms (at Hanson's Landing in Charleston and Eastside) and barge building and outfitting (along the Coos River north of Catching Slough). The remainder is occupied by offices and parking, mainly for the towing companies (along the Coos Bay waterfront).

- Fuel Storage

Petroleum products, mainly gasoline and fuel oil, are imported by ship and barge into Coos Bay and stored at several locations, largely along the Coos Bay-North Bend waterfront and at North Point (where the only vacant land for such uses occurs.)

- Fishing Industry

Two sites (about 7 acres) are currently used for salmon release and recapture; both are on the North Spit and have expansion room available.

Fish receiving and processing occurs mainly in the Charleston area: three firms (TAP Fisheries, Hallmark, and Eureka Fisheries) are currently in operation, although two additional (Alaska packers and Charter) have the capability of processing but are not currently operating. In addition to the three operating processors, there are seven other sites (mainly in Charleston) used for fish receiving (ten total sites). For the private sites, only TAP Fisheries has sufficient available vacant land for expansion. The Port of Coos Bay has earmarked specific portions of its North Bay Marine Industrial Park for offloading and processing facilities.

Two small canneries (Sally Salmon and Chuck's Seafood) produce "gift pack" seafood products. The operating processors do a limited amount of temporary canning of fresh seafood in large containers for institutional users.

#### 5.1.2 Water-Dependent Commercial Uses

An LCDC policy paper on "Water-Dependent and Water-Related Uses" (July, 1979) suggests that water-dependent commercial uses include "moorage, fueling and unloading facilities". In this estuary inventory, fueling and unloading facilities have already been addressed as industrial rather than commercial uses.

#### 5.1.3 Water-Dependent Recreational Uses

Most water-dependent recreational uses occur on water, include recreational fishing and marinas, clamming, crabbing and boating. Given LCDC's position that associated parking areas are not water-dependent, the only significant water-dependent recreational land uses are boat ramps and, where necessary because of limited moorage space, dry-land boat moorage. There are nine boat ramps in current use adjacent to the estuary: a six-lane ramp at the Charleston Small Boat Basin, a two-lane ramp at Hanson's Landing, and seven public one-lane ramps at various locations. [See also Section 6, Special Moorage Element]

#### 5.1.4 Water-Related Industrial Uses

The relatively small extent of flat lands in the vicinity of the Coos Bay Estuary has forced many of Coos County's industrial uses to cluster in the narrow flat coastal corridor between the rail lines and/or U.S. Highway 101 and the estuary. In many locations, the usable land would be even more constricted if early site development years ago had not routinely included filling of adjacent tidelands to provide back-up space for dock facilities.

These historical and current site characteristics bear directly on the ability to distinguish between water-dependent and water-related uses. Occasionally it is possible to state with certainty that a particular use is not water-dependent (or water-related), since the use bears no relationship to the site's proximity to the estuary. In most cases, however, especially for the major forest industry developed sites, there can be no easy distinction between uses that are water-dependent and those that are water-related. For example, some of the milled lumber stored on a coastal shoreland site may earlier have been trucked to the site as logs and may be awaiting export by rail, while an adjacent stack of milled lumber may have been floated to the site as logs in a raft and may be awaiting export by waterborne vessel. In this and similar situations, private industry can (and already does) effectively apply the intent of Goals #16 and #17 regarding distinctions between water-dependency and water-relatedness. Much of any particular site is essentially back up space for the dock facility because the land is devoted to open storage awaiting export. Private industry, acting in its own best business interest, automatically adjusts its storage area contents to ensure that a waiting ship or barge is loaded in a timely and efficient manner.

Therefore, on those sites determined to be "especially suited for water-dependent uses", this inventory shall consider the existing uses to be water-dependent where such uses are a mixture of water-dependent, water-related and non-dependent, non-related uses. Any site meeting these requirements shall be termed a "water-dependent industrial complex".

As implied by the preceding discussion, the number of readily identifiable industrial uses that are strictly water-related is quite small. Most of these are the marine manufacturing and machine shops that cluster along the Coos Bay waterfront from the former Hillstrom shipbuilding complex south to the Sause Brothers Ocean Towing Company offices. The water area here is occupied both by small private docks and by towboats. Although these uses generally qualify as being water-related, some of the firms occasionally engage in production and services that are definitely non-dependent, non-related industrial such as the U.S. Customs Office located there.

#### 5.1.5 Water-Related Commercial Uses

The unincorporated community of Charleston is the location for most of the commercial uses that qualify under LCDC's definition of "Water-related". These uses are of two distinct types: retail businesses (marine chandlery) serving the day-to-day needs of the shipping industry and the fishing community, including sales and repair of fishing gear and electronic equipment; and restaurants catering to the commercial fishing community (as well as to tourists, sports fishermen and local visitors).

Most commercial uses that provide goods or services to water-dependent or water-related uses are not located near the estuary, but instead occur as strip commercial along the U.S. Highway 101 corridor in downtown North Bend and Coos Bay.

#### 5.1.6 Water-Related Recreational Uses

The most significant use related to water-dependent recreation that approaches the LCDC definition of "water-related" would be parking areas for boating. LCDC's position paper on water-

dependency/relatedness suggests that parking lots are normally non-dependent, non-related uses. However, if parking is not available within a reasonable walking distance of the bay, the boat ramp or moorage with which the parking lot is related will likely not provide a full level of service to the public; in fact, such facilities will likely not be built in the future unless adequate support parking is supplied. For the large parking area at the small boat basin in Charleston, the high level of boating activity and the limitations imposed by the adjacent steeply sloping uplands suggest that the present site is appropriately used as water-related parking.

#### 5.1.7 Non-Dependent, Non-Related Industrial Uses

Weyerhaeuser Corporation's paperboard mill (above Jordan Cove) and log storage area (east of Henderson Marsh), both on the North Spit, are the most sizeable uses adjacent to the estuary that are neither dependent on nor related to the water. The log storage area occupies roughly 60-80 acres, while the developed portion of the Menasha mill encompasses approximately 50-60 acres.

The only other non-dependent, non-related uses of any significance in the shorelands area are the trucking offices/storage/repair firms that have clustered along U.S. 101 between Bunker Hill and Davis Slough. Most of these firms are located on the bench areas on the west side of U.S. 101; such areas would not qualify for inclusion within the coastal shorelands boundary.

#### 5.1.8 Non-Dependent, Non-Related Commercial Uses

Charleston experiences a variety of uses within its "core" area along Boat Basin Drive, among which are most of the estuary's commercial uses that cannot be considered dependent on or related to the water. The reason these uses have occurred in Charleston and not elsewhere is simply a matter of topography and definition: Charleston is the only significant retail area that happens to qualify for inclusion within the coastal shorelands boundary.

#### 5.1.9 Non-Dependent, Non-Related Recreation Uses

Most of the recreational use occurring on the coastal shorelands are related to some extent to the nearby presence of the estuary.

Portions of the Oregon Dunes National Recreation Area (Dunes, NRA) provide areas for hiking and off-road vehicle use, neither of which depend on the presence of the estuary for their existence. However, the scenic view of the estuary adds to the attractiveness of the Dunes NRA for visitors.

### 5.2 EXISTING WATER USES

The major economic activities of Coos County – lumber and wood products, shipping, fishing and seafood processing, and tourism – all depend in varying degrees upon the presence of the Coos Bay Estuary for their existence. As the setting for a deep-draft shipping port, the estuary is a major economic resource, of equal stature to the County's 850,000 acres of commercial forest land.

For ease of description, existing water uses are divided into two major categories, "Industrial" and "Recreational", where the primary purpose of "Industrial Uses" is to exploit the economic advantages of the estuary, and where the primary purpose of "Recreational uses" relate to social or leisure activities. These are then further categorized by the major activity occurring within each use category.

## 5.2.1 INDUSTRIAL USES

### 5.2.1.1 Waterborne Commerce & Related Activities Federally-maintained Channels

The entrance to Coos Bay is maintained to a depth of 47 feet at Mean Low Water (M.L.W.), narrowing from 700 feet to 300 feet at the beginning of the deep draft channel. The main ship channel is maintained to a depth of 37 feet from the entrance (approximately mile 2) to mile 15 in Isthmus Slough. Shallow draft channels include:

- i. Charleston Channel (South Slough) running 150' wide from the entrance of South Slough to approximately 2500' above the Charleston highway bridge. Maintained depth is 17' M.L.W.
- ii. Coos and Millicoma River channels are maintained at 5' M.L.W. from the mouth of the Coos River (mile 12.5 main channel) to the log loading facilities at Allegany and Dellwood.

Isthmus Slough from mile 15.0 to mile 17.0 at Millington is authorized at 18' M.L.W., but is currently not maintained at the depth due to lack of demand. Coalbank Slough is also not maintained. [Source: Economic Development & Diversification White Paper]

- Natural Channels

Natural channels are not authorized for maintenance dredging by the Army Corps of Engineers, but are still considered navigable waterways that provide for water-borne transportation and storage. Coalbank Slough was heavily used many years ago, but now is little used. Although the rail and highway bridges over Coalbank Slough were theoretically designed to ensure navigability, it is likely that the opening of either bridge for boats would necessitate major repair or replacement of the bridges. The State of Oregon intends to replace the U.S. Highway 101 Bridge over Coalbank Slough in the near future. Several natural channels in the upper bay, especially the Marshfield channel and Cooston channel, provide a waterway for log transportation and storage. If maintained, the Cooston channel would provide boat access to the East Bay area.

- Harbor Maintenance

"The main ship channel requires removal of approximately 500,000 cubic yards of material per year, mostly in the upper harbor."

Both the Charleston Channel and the harbor entrance are scheduled for maintenance by hopper dredging, which will allow for at-sea disposal.

The Coos River is maintained annually by bucket dredge, placing material on adjacent uplands.

Private terminals and log dumps dredge periodically, with bucket dredges placing material on approved upland sites. Estimated yearly amounts are 50,000 to 100,000 cubic yards.

The Port's Boat Basin requires 10-20 thousand cubic yards removed annually." [Source: Economic Development & Diversification White Paper, page 57]



- Docks

The majority of the docks in Coos Bay ship lumber and wood products and are privately owned. Many are specialized docks for loading specific cargoes such as woodchips or petroleum, while a few handle general cargo. There are also docks used only for special moorage, such as the USCG Cutter Citrus and the U.S. Army Corps of Engineers dredge. Additionally, all seafood processing and packing plants have docks. Total dock footage equals 10,681 lineal feet of docks, including tie-up dolphins.

The following dock survey provides a more detailed listing of current Coos Bay Dock Facilities (Major Sources: Port of Coos Bay & Jones, Stevedoring Company):

- Related Activities

Activities related to water-borne commerce include:

- i. Towing/Barging. Four towing/barge firms operate in the area. Lumber is exported by ocean-going barge, while aggregate is imported (mainly from the Umpqua River). Tugs and towboats also serve to haul log rafts and to bring the larger ships across the bar.
- ii. Barge building. Sause Brothers now operates barge building and outfitting yard and dock along the Marshfield channel north of the confluence of Catching Slough and Coos River.
- iii. Boat building/repair. Several firms are currently engaged in the construction and repair of boats, mainly at Hanson's Landing near Charleston (where there is now a 265 ton capacity floating drydock) and at Mid Coast Marine in Eastside (150-ton capacity drydock). A 1000 ton capacity drydock has been listed as surplus by the Federal government, and is being made available to the Port of Coos Bay.

- Current Harbor Capacity

The major factor affecting the size of ships capable of entering the harbor is the 35-foot channel depth. The upper bay (east of the Southern Pacific Railroad Bridge) is additionally affected by the following constraints:

- i. Height of highway bridge - 129'.
- ii. Width of railroad swing span - 193'. For safety reasons pilots restrict ships to beam widths less than 110'.
- iii. Upper turning basins are just about developed to the maximum: 1,000' x 800' and 1,000' x 700'. The lower turning basin at mile 6 (1,000' x 800') could be expanded.
- iv. Upper bay channel width is 400', lower bay 300'.

- Port Activity

The Oregon International Port of Coos Bay is the world's largest exporter of lumber and wood products. Export of these products constitutes the predominant activity of the Port. In 1980,

wood products comprised 100% of all outbound products. In the first half of 1981 lumber and wood products accounted for 99.9% of all products exported, some 2,225,000 short tons. The bulk of imported products are petroleum and aggregate. The following table summarizes recent Port export and import activities.

Port activity has declined over the past year, reflecting the decreased demand for lumber and wood products by the housing industry, which in turn has been severely affected by record high mortgage loan interest rates. General cargo has undergone a dramatic decrease.

- Commercial Fishing Moorage

The major area in the estuary for mooring commercial fishing boats is the Charleston Boat Basin, managed by the Oregon International Port of Coos Bay. The number of berths available varies slightly with the season. Approximately 75% of the moorage is devoted to commercial vessels, and 25% to recreation boats; as of October 1981, 324 commercial fishing boats were moored at the Boat Basin.

Hanson's Landing has a total capacity of approximately 100 spaces, and has a similar ratio of commercial boats to sport boats, thus providing about 60-70 year-round spaces for commercial fishing boat moorage.

The City of Coos Bay moorage area near Central and U.S. Highway 101 provides spaces for about 18-27 boats; the ratio of commercial boats to sport boats varies with the season, since this area is significantly farther from the bar than other moorage areas.

In addition to these major areas, each of the three currently operating fish processing companies provides moorage for off-loading of the catch, as does the Port of Coos Bay's receiving station on the North Spit. Sporadic fishing vessel moorage also occurs along the waterfront south of Central Dock, where barges and tow boats also tie up.

The lack of available moorage (or the lack of suitable moorage) forces a number of vessels that consider Coos Bay their home port to moor at other ports [Economic Development White Paper]; this last opportunity results in economic losses to the Coos Bay community. [See Section 6, "Special Moorage Element"]

#### 5.2.1.2 Resource Extraction

The following is quoted directly from "Economic Development and Diversification White paper", pages 35-38.

- Commercial Fisheries in Coos Bay Estuary

"There are presently five separate commercial fisheries in operation in Coos Bay or its upper tidal areas. These are: crab, shad, clam, oyster and salmon".

- Commercial Crabbing:

"This is a historic fishery in the bay, primarily occurring below Empire in the late summer and fall. This is normally a small fishery which should continue, based on management decisions of the resource agencies. Presently, the Coos Bay Dungeness Crab Fishery can catch crabs with rings only and these crabs must be at least 6 ¼ inches wide at the carapole or head."

- Commercial Shad gill Netting:

"Shad gillnetting in the tidewater areas of Coos Bay is another local historic fishery, primarily in the spring of the year. This is also a small fishery, which should continue based upon management decisions of the resource agencies. In recent years, the gill nets used to catch shad have been made of more easily breakable twine to avoid catching striped bass."

- Underwater Clam Harvesting:

"An underwater commercial clam fishery, by divers using a hand held water jet, has existed in Coos Bay since about 1960. Commercial catches have ranged from 10,000 to 90,000 pounds of clams per year. The Gaper (Empire) clam is the major species harvested, comprising over 90% of the catch. Some butter clams, littleneck clams, and cockle clams also are taken. This fishery is managed by the Oregon Department of Fish and Wildlife, presently on a permit only basis with a season from July 1 to December 31."

"One 48 acre underwater site in Coos Bay, off Pigeon Point, has been designated as a commercial clam harvest area, according to Tom Gaumer, a shellfish biologist with the Oregon Department of Fish and Wildlife. This site was originally approved as a dredge disposal site for the U.S. Army Corps of Engineers. A harvest quota of 150,000 pounds, only 10% of the estimated biomass in this area, was allowed in 1979. Four underwater commercial clam harvesting permits, for divers using hand held water jets only, were issued in 1979. However, prior to the start of the 1979 season, the Division of State Lands and the U.S. Army Corps of Engineers undertook a comprehensive review of their fill and removal permit systems and their application to the proposed commercial clam fishery in Coos Bay. At their decision, only those people that had previously harvested clams in Coos Bay were granted conditional approval to harvest in 1979. Because of this, only one of the four permittees was allowed to remove clams during the 1979 season. This commercial fisherman harvested only 13,521 pounds."

- Oyster Aquaculture:

"Oyster cultivation in Coos Bay is an old historic Coos Bay fishery. The Oregon Department of Fish and Wildlife biologists estimate that 525 acres of the Coos Bay estuary could be utilized for oyster production. This figure represents the prime and marginal areas in which oysters will grow. 165 tidal acres are currently being leased, with 82 acres utilized for commercial oyster production. A harvest rotation period for oysters accounts for part of the unused acres. Poor cost/benefits of some of the marginal acres account for the remainder of the unused portion."

"Presently, the commercial oyster beds where oysters can legally be harvested and sold from, are limited to lower Coos Bay below Sitka Dock. They are located in either Joe Ney Slough or South Slough. This is due to current water quality regulations for Coos Bay, which consider the bay above Sitka Dock to have poor water quality. This may change in the near future. As the upper bay, especially the East Bay area, is obtaining improved water quality due to tougher sewer pollution control, individuals are attempting to grow oysters here and obtain needed permits to harvest and sell them."

- Salmon Searanching:

Salmon searanching is a new commercial fishery in Coos Bay, occurring here only since 1976. Salmon ranching works on the fact that salmon return to their place of origin. Salmon eggs are fertilized, raised to smolt (imprinting) age in hatchery pounds, and brought to Coos Bay for release at a release/recapture facility. The smolts are released into Coos Bay and travel to the

ocean to grow to adulthood. Following the normal migration and development patterns the adult salmon return to the release/recapture ranch site ponds where they are processed into salable seafood items.

"The Oregon Department of Fish and Wildlife controls the number of eggs, species and stock types to be released by the permit holders. In 1971, the Oregon Legislature first authorized salmon searanching in Oregon, limiting it to chum salmon. In 1973, they expanded this to include coho salmon and chinook salmon. The 1979 Legislature expanded this further, allowing a fourth species (pink salmon) to be released and harvested by salmon searanchers."

"Presently, there are three searanching permits for the Coos Bay estuary, with an authorized upper release limit of 55 million salmon per year. This release amount is more than anywhere else in the entire northeastern pacific U.S. from Alaska through California. These three permit holders and their authorized amounts are: 1) Oregon Aqua-Foods (20 million chum, 10 million chinook, 10 million coho); 2) Anadromous, Inc. (5 million chinook, 5 million coho), and 3) Cal Heckard (5 million chum)."

"Cal Heckard's release site is located on Catching Slough. The other two release sites are in the north bay area of Coos Bay. The Anadromous release/recapture site is located near the north end of the Southern Pacific Railroad Bridge. Oregon Aqua-foods site is located at mile 5.5 at the southern end of the Port of Coos Bay's North Bay Marine Industrial Park."

"Since the initial salmon release by Anadromous in 1976, the number of searanch salmon released into Coos Bay has been increasing. In 1979 Anadromous and Oregon Aqua-Foods released over 10 million salmon. They do not expect to reach the upper limit of 55 million salmon until the mid 1980's. They hope for a return of approximately 1% of the salmon smolts they release." (Economic Development and Diversification White Paper, 1980: pp.35-38)."

### Mining and Minerals

- Aggregate Extraction:

Although there are a number of rock, sand and gravel quarries located in Coos County, most are located away from the estuary and virtually no rock or gravel is exported from the County. A clear sand operation exists along the west side of North Slough. The sand is exported by rail for use in production of glass and foundry sand materials [Economic Development and Diversification White Paper, page 69].

Pursuant to ORS 215.298(2), property zoned "Exclusive Farm Use" is identified as inventoried "1B" aggregate sites, in accordance with OAR 660-16-000(5)(b). There is not adequate information available to complete the Goal 5 process for the property. [OR 92-08-013PL 10/28/92]

#### 5.2.1.3 Log Storage and Transport

[The following section is taken directly from the "Log Handling, Transport and Storage White paper", pages 4-7.]

"There are currently four active mills located on the bay of which three use water in-feeds. It is estimated that the total annual consumption of logs at these facilities is in excess of 500 million board feet."

"Logs delivered to the mills in flat raft form with the bark on are barked in the mills."

"The degree to which dry land sorting is used varies between mills. One mill does none while another uses only dry land sorting."

"In general, log inventories are kept at a minimum due to basic economic factors. Some mills may build inventories to higher levels in the summer to cover vacation shutdowns in the woods, the possibility of fire, and state closure of the woods. However, some mills may also build inventories in late summer to cover a possibility of low winter production."

"For dry land storage, one mill indicated that the area that can be used for that type of storage is more limited in the winter due to damp ground increasing the difficulty of moving log handling equipment. Also, the Cooston Channel area is used more heavily in the winter months for water log storage since it is protected from floods and storms."

"All of the mills using water in-feed to the mill also use water log storage. Of the total logs processed through the mills on the bay:

- 8% are stored on land
- 48% are stored in tideflat areas (areas that periodically ground)
- 44% are stored in deep water

"The amount of logs stored varies throughout the year, as do the locations used. (This is due to winter wind, raft movement in preparation for floods and current conditions.) In general, during an average high inventory:

- 120 acres of logs are stored in deep water
- 236 acres of logs are stored in periodically grounded areas.
- 24 acres of logs are stored on dry land.

In general, during an average low inventory:

- 90 acres of logs are stored in deep water.
- 231 acres of logs are stored in periodically grounded areas
- 17 acres of logs are stored on dry land.

In general, approximately 400-500 thousand board feet of timber can be stored per acre of dry land.

"In the water approximately 400-500 thousand board feet of timber can be stored per acre. If this is consistently true then approximately 2/5 to 4/5 of an acre of dry land could replace 1 acre of water log storage."

"It is important to note here that the logistical location of water storage areas and their relative shallowness or depth determines the degree to which these areas can be utilized."

"In general, current log handling and transport activities are as follows:

Logs are delivered by trucks from the woods to log yards. At this point the logs are either placed directly into the water or are unloaded and decked in the yard and eventually placed in the water. Dumping is accomplished by use of A-frame sling or a chain conveyor or other approved methods. These devices are easy let down systems which lower logs

into the water with minimum disturbance compared to the earlier roll away or free fall dumps.

After logs are in the water some mills float them directly to their mills within the confines of piling and stiff booms and therefore, do not actually build a log raft. Other mills, whose dumps are not in close proximity to their mills, raft the logs into actual rafts.

Log Rafting; Present log rafts are approximately 500 feet long, 55 feet wide and will contain from 100,000 to 250,000 board feet depending on the type of diameter of logs. Rafts then are towed to storage sites to await mill usage.

For the purposes of this paper log storage in the water can be grouped into two categories: (1) deep water storage, where logs never touch the bottom due to tidal fluctuations and (2) shallow water storage, where logs will periodically go aground. In this category a raft, or portion of a raft, may go aground as much as twice a day or as little as once or twice a year depending on exact location, depth of water and extremes of tidal fluctuations.

For the most part shallow areas are a hindrance to operations in that there is a reduced time period available to place or retrieve rafts due to the 4 to 5 feet of tug draft and tide conditions. On the other hand there are not enough deep water storage sites in the bay to completely eliminate the shallower areas and in general the shallow areas are also the most protected areas from winds, fast currents and winter floods. Currently each log raft has a value of from \$50,000 to \$125,000 and the potential risk of loss is very great due to the above conditions and justifies the added operational costs of storing in shallow areas. From the questionnaire it was determined that 1.6% of the logs are delivered to mills by truck, 68% by flat rafts and 30% by tidal action.

Bundling: In addition to the above flat raft procedure of transport and storage, some bundled rafts are used. Banding of logs into bundles of 15 to 20 tons each (slightly smaller than a normal highway log truckload) is the normal practice in handling Hemlock and Port Orford cedar export type logs. Bundling is necessary since Hemlock logs generally sink (individually) but will float when bundled and Port Orford cedar logs are usually smaller in diameter impacting ship loading efficiency if not bundled.

Loose Log storage: another current, but less frequently used, method of log storage is referred to as "Loose Log Storage". This type of storage utilizes piling on the perimeter of the storage area with an interconnecting floating boom (logs chained end to end). Logs stored in these areas are able to float free within the confines of the piling and boom. This practice is used much less now as in the past and is generally a more costly operation if the logs are rafted to the storage area, are dumped, and then later re-raftered back out. For some mills this type of storage is used only in emergencies and during periods of unusually high inventories.

Rafts, either flat or bundled, are tied to piling. A group of piling, usually driven in line and with a dolphin at each end is commonly called a station. A station typically consists of 12-18 total piling, costs approximately \$8,000 to develop, and will accommodate 1 to 3 rafts. A station is as long as one raft but may accommodate 1, 2, or 3 rafts wide. Individual stations receive varying degrees of use depending on time of year, depth of water, water conditions and wind conditions. Specific use is mainly a function of security first and size of inventory second.

Storage duration in the water varies from mill to mill but is generally from two weeks to 6 months. Storage time is a function of the following:

- Season
- Total mill consumption
- Current product market conditions
- Current stumpage market conditions
- Future market forecasts
- Logging conditions - past, current and projected future

Log inventories are a costly necessity. Inventories are necessary to assure continuous mill operations through periods of log production disruption (weather, fire, closure, vacations, strikes, etc.). Inventories are costly as they represent millions of dollars tied up in the form of insurance that could be put to other uses yielding a higher return. This basic economic situation controls both the volume and duration of inventories that mill managers are willing to carry. Currently all mills engage in debris control. All operators contain and remove debris from the waters around their mill, some do periodic cleaning of the rivers and sloughs adjacent to their dumps and storage areas, and one has a full time river sweeper that removes debris from the rivers and bay on a daily basis.

There are problems associated with disposal of the debris which is gathered due to environmental constraint imposed on burning of material and on land disposal." [Log Handling, Transport and Storage White Paper, 1980: pp. 4-7]

## 5.2.2 Recreational Uses

### 5.2.2.1 Charter Fishing Boats

Six charter boat firms, with a combined total of 16 boats, operate out of Coos Bay (based mainly at the Charleston Boat Basin).

### 5.2.2.2 Pleasure Boating

As of October, 1981, 112 recreational boats were moored in the Charleston Boat Basin. The waiting list for additional boats has been declining for several years. The Hanson's Landing area and the City of Coos Bay downtown moorage provide another 40-60 spaces. [See Section 6, "Special Moorage Element".]

### 5.2.2.3 Recreational Fishing, Clamming and Crabbing

The most popular area for clam digging is along the Coos Head Timber Company tidelands at Pigeon Point (Barview). The most popular area for recreational crabbing is along the docks in the Charleston Small Boat Basin.

Isthmus Slough is gaining increased popularity as a site for Striped bass fishing.

## 5.3 LAND & WATER OWNERSHIP PATTERNS

### 5.3.1 Water Areas

The State of Oregon is the major owner of water areas in the Coos Bay estuary, claiming title to all submerged lands (below ordinary low water line) and to those submersible lands (tidelands) where the State did not deed away fee simple interest in their property. Major State tideland ownership occurs in portions of Haynes Slough, South Slough, and along the southern reaches of North Spit.

Other public ownership of tidelands (mainly by the Port of Coos Bay but including also Coos County, North Bend and Coos Bay) occurs along portions of North Spit, in Pony Slough, and around dredge spoils disposal areas.

The traditional importance of in-water log storage results in the occurrence of forest industry ownership primarily along the Empire/Barview waterfront, at North Point in Jordan Cove, along the East Bay area south of Pierce Point, and in Isthmus Slough. Other log storage occurs over sub-tidal lands leased to industry by the State.

Other private ownership generally is concentrated in the "oyster plats" tidelands from Pierce Point north to Haynes Inlet, and in portions of Joe Ney Slough.

### 5.3.2 Land Ownership Patterns

The State government and Federal government are major Coos Bay landowners, occupying large portions of South Slough and North Spit, respectively.

The other major public landowner in the estuary is the Port of Coos Bay, which owns several hundred acres each on North Spit and on the Eastside spoil disposal sites.

Among private owners, forest industries are major landowners in the shorelands area, accounting for the large majority of industrial sites.

Other private ownerships tend to be fragmented into relatively small parcels.

### 5.3.3 Land Use Patterns

The necessity of transportation access together with the severe shortage of flat buildable land are the factors most directly responsible for many of the existing land ownership patterns around the Coos Bay Estuary. Topography dictated the layout of the Southern Pacific Railroad and U.S. Highway 101 transportation corridor along the flat areas (or filled tidelands) adjacent to the estuary. U.S. 101 as a major highway now forms an effective barrier limiting upland expansion of industrial development along the North Bend/Coos Bay waterfront and along Isthmus Slough.

As a general rule, industrial uses now occupy most shoreland areas having rail access. Major variations to this rule are:

- The Al Peirce Company's North Point property, although this is presently being used for dredge spoils disposal, which would tend to commit future development of the property to industrial use;
- Areas with rail access north of Jordan Cove Road, many of which are affected by the Dunes National Recreation Area & Public Law 92-260;
- Those portions of the Coos Bay waterfront and Isthmus Slough west waterfront where the rail lines and U.S. 101 lie so close to the estuary that no land area is effectively available.

Residential uses within the shorelands area are generally concentrated in the Barview area along Cape Arago State Highway and at Glasgow and Millington. None of the areas have deep-water channel access (the authorized 22' Isthmus Slough channel ends at Millington).



Commercial uses generally are limited to the Charleston Boat Basin and to southerly portions of the Coos Bay waterfront.

The largest remaining undeveloped areas are along the southerly portions of North Spit and along East Bay Drive between Glasgow and Coos River. For North Spit, lack of adequate transportation access and infrastructure and federal ownership of much of the land have hampered development, while forest industry ownership and relative distance from the Coos Bay/North Bend urban service area have inhibited any development on the East Bay area other than an occasional rural residence.

#### 5.4 SOCIO-ECONOMIC RESOURCES & CHARACTERISTICS

(Note: Current statistics in this section are covered more fully within the comprehensive plan for Coos County and for the Cities of Coos Bay, and North Bend.

##### 5.4.1 Population Trends and Projections

In 1980 the population of Coos County was 64,047; an earlier estimate by Portland State University for 1978 was 63,200. By the year 2020, the estimated population for Coos County is anticipated to be 69,513 (Office of Economic Analysis, Oregon Department of Administrative Services). Between 1995 and 2020 the projected population is expected to increase by an average of 1.77%, due to the influx of people within the retirement age group.

Between 1980 and 1994 the population of Coos County decreased by 1.95%. During this 14 year period, areas of the county which were economically dependent on timber alone, showed a decrease in population.

The cities of Coos Bay and North Bend which are the largest in Coos County did not show a decline in population during this 14 year period; nor did they exhibit an outstanding increase in population.

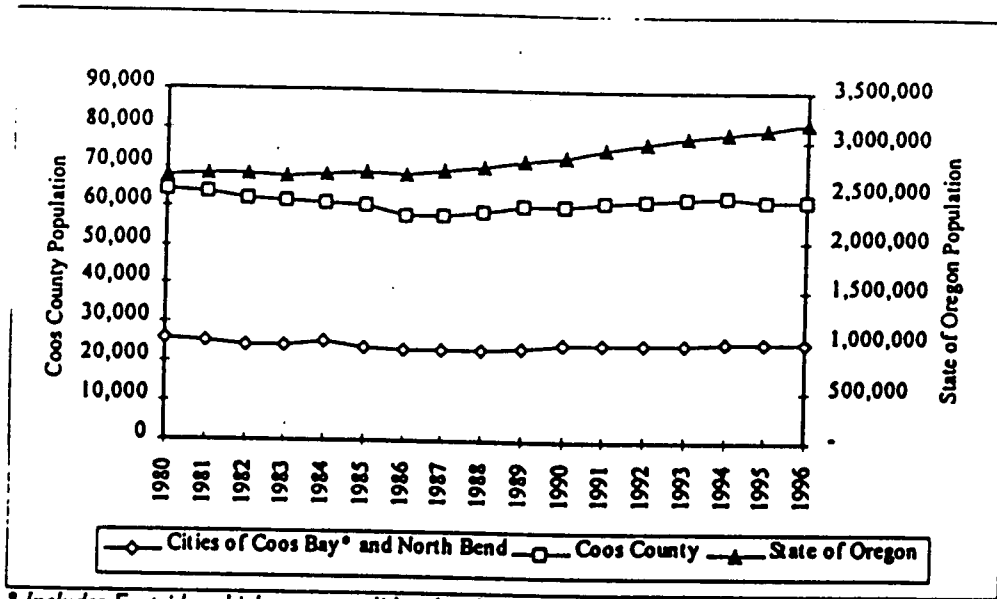
Based on the projected population for the years 1996 thru 2020 (County figures provided by Office of Economic Analysis, see Table 4b in Section 4.1.2 of Volume I, Part 2 of the Coos County Comprehensive Plan), Coos County's cities and unincorporated area will continue to increase in population. This projection shows that the percentage of growth rate for each city is not the same.

Figure #1 shows population levels of the Cities of Coos Bay and North Bend, Coos County, and the State of Oregon.

As shown in Table 1, net population losses occurred in every incorporated municipality in Coos County between 1980 and 1990. Since the census, PSU CPCR estimates that each jurisdiction has regained population. The small coastal communities of Bandon and Lakeside have experienced the most dramatic growth (average annual rates of 3.7 percent [Bandon] and 2.1 percent [Lakeside] since 1990.

FIGURE 1

Historical Population Growth  
Cities of Coos Bay and North Bend  
and Coos County Compared to  
State of Oregon



\* Includes Eastside, which was consolidated with the City of Coos Bay in 1983.

Source: Portland State University Center for Population Research and Census.

TABLE 1

POPULATION LEVELS, 1980, 1990, AND 1996

	1980	1990	1980-1990 % CHANGE	1996	1990-1996 % CHANGE
Coos Bay*	16,025	15,076	-5.92%	15,520	2.95%
North Bend	9,779	9,614	-1.69%	9,885	2.82%
Bandon	2,331	2,224	-4.59%	2,760	24.10%
Coquille	4,481	4,121	-8.03%	4,225	2.52%
Lakeside	1,453	1,437	-1.10%	1,630	13.43%
Myrtle Point	2,859	2,712	-5.14%	2,730	0.66%
Powers	819	682	-16.73%	695	1.91%
Coos County	64,047	60,273	-5.89%	61,700	2.37%
Oregon	2,633,156	2,842,321	7.94%	3,181,000	11.92%

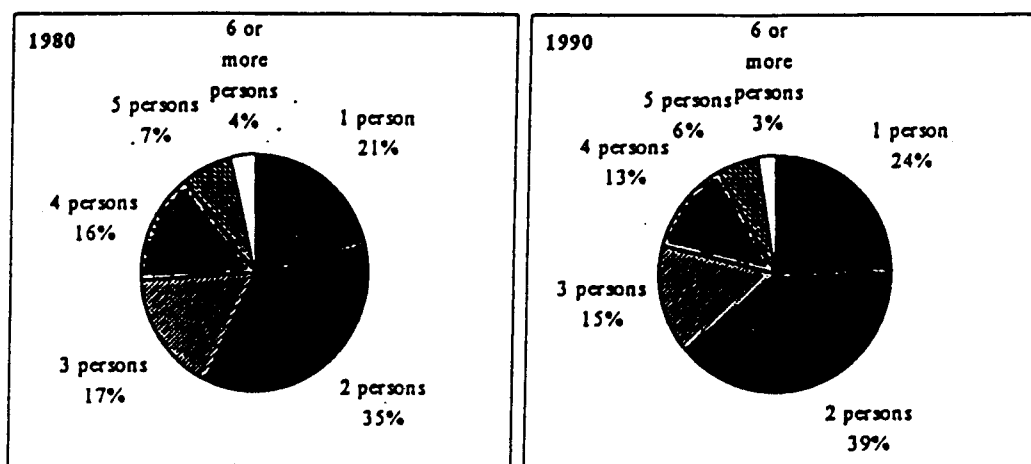
\*Includes Eastside, which was consolidated with Coos Bay in 1983.

Source: Portland State University Center for Population Research and Census.

• Household Size

Even with little change in the net population level for the Bay Area, there have been some significant changes in household composition. One shift that has occurred is in the number of persons per household. For example, the number of one-and two-person households made up 64 percent of all households in 1990 as compared to 57 percent in 1980. The difference in the number of persons per household in 1980 and 1990 in Coos County is shown in Figure 2.

FIGURE 2  
NUMBER OF PERSONS PER HOUSEHOLD  
COOS COUNTY



Source: U.S. Bureau of the Census.

The change in household size has been dramatic enough to increase the total number of households from 23,790 in 1980 to 24,193 in 1990, despite a net population loss of 3,800 persons during the same time period. Correspondingly, the average number of persons per household has declined from 2.69 persons per household in 1980 to 2.49 persons per household in 1990, as shown in Table 2.

**TABLE 2  
TOTAL HOUSEHOLDS AND POPULATION  
COOS COUNTY, 1980 AND 1990**

	1980	1990
Households	23,790	24,193
Population	64,047	60,273
Average Number of Persons per Household	2.69	2.49

Source: U.S. Bureau of the Census.

Each jurisdiction in Coos County has its own unique household composition. As shown in Table 3, some communities are comprised primarily of one- and two-person households (76 percent of all households in the city of Bandon, for example), while other communities have a greater proportion of larger households (such as the 39 percent of households with three persons or more in the City of North Bend).

**TABLE 3  
PERSONS PER HOUSEHOLD  
1990 CENSUS**

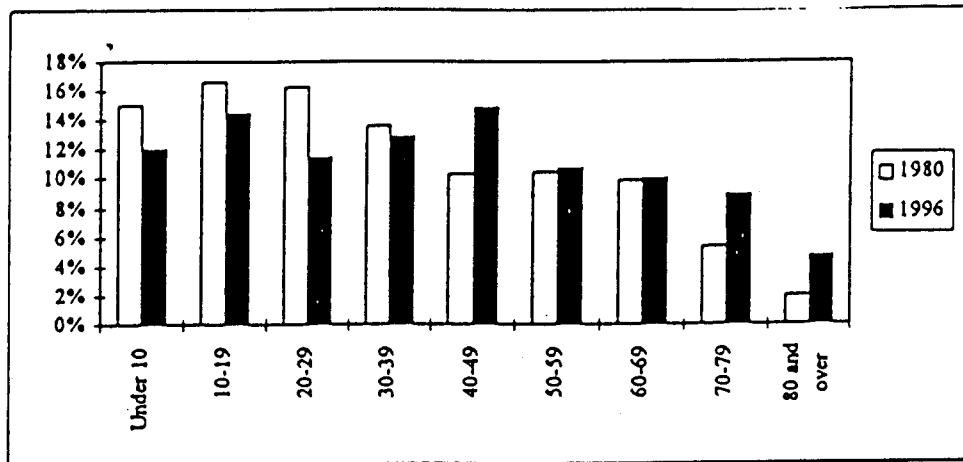
	City of Bandon	City of Coos Bay	City of Coquille	City of Lakeside	City of Myrtle Point	City of North Bend	City of Powers	Coos County	Oregon
1 person	34.7%	28.5%	26.4%	22.9%	27.0%	23.4%	37.0%	24.3%	25.1%
2 persons	41.2%	37.4%	37.8%	44.1%	34.8%	37.2%	36.1%	39.2%	35.6%
3 persons	11.1%	15.1%	14.4%	14.9%	14.1%	16.7%	9.1%	15.0%	15.7%
4 persons	8.1%	11.7%	14.4%	10.2%	12.7%	14.7%	8.8%	13.0%	14.1%
5 persons	4.2%	5.6%	4.8%	3.3%	10.9%	5.1%	6.0%	5.8%	6.2%
6 or more	0.7%	1.8%	2.3%	4.6%	0.6%	2.9%	3.1%	2.6%	3.2%

Source: U.S. Bureau of the Census.

- **Population Age Composition**

The shift to smaller household size can be explained, in part, by a shift in the age composition of the population. Between 1980 and 1996, all categories under age 39 have experienced net losses as a proportion of the total population, as shown in Figure 3. Corresponding population gains have occurred in the 40-49, 70-79, and over 80 categories. The population gains include increases in "empty-nester" households, couples without children, and older people living along.

**FIGURE 3  
POPULATION BY AGE  
COOS COUNTY**



*Source: U.S. Census Bureau (1980) and Portland State University Center for Population Research and Census (1996).*

The existing age composition of the population in Coos County differs from the surrounding areas and the state as a whole. As Table 4 shows, Coos County has a larger percentage of older residents than do neighboring Curry County or the state as a whole.

**TABLE 4  
POPULATION BY AGE  
1996**

	Coos County		Curry County		State of Oregon	
	Number	Percent of Population	Number	Percent of Population	Number	Percent of Population
Under 10	7,391	12.0%	2,343	14.7%	461,056	14.5%
10-19	8,917	14.5%	2,327	14.6%	444,139	14.0%
20-29	7,059	11.4%	2,002	12.6%	414,978	13.0%
30-39	7,987	12.9%	2,158	13.6%	484,794	15.2%
40-49	9,216	14.9%	2,328	14.6%	514,972	16.2%
50-59	6,607	10.7%	1,523	9.6%	312,893	9.8%
60-69	6,174	10.0%	1,423	8.9%	234,455	7.4%
70-79	5,502	8.9%	1,182	7.4%	201,497	6.3%
80 and over	2,847	4.6%	614	3.9%	112,216	3.5%

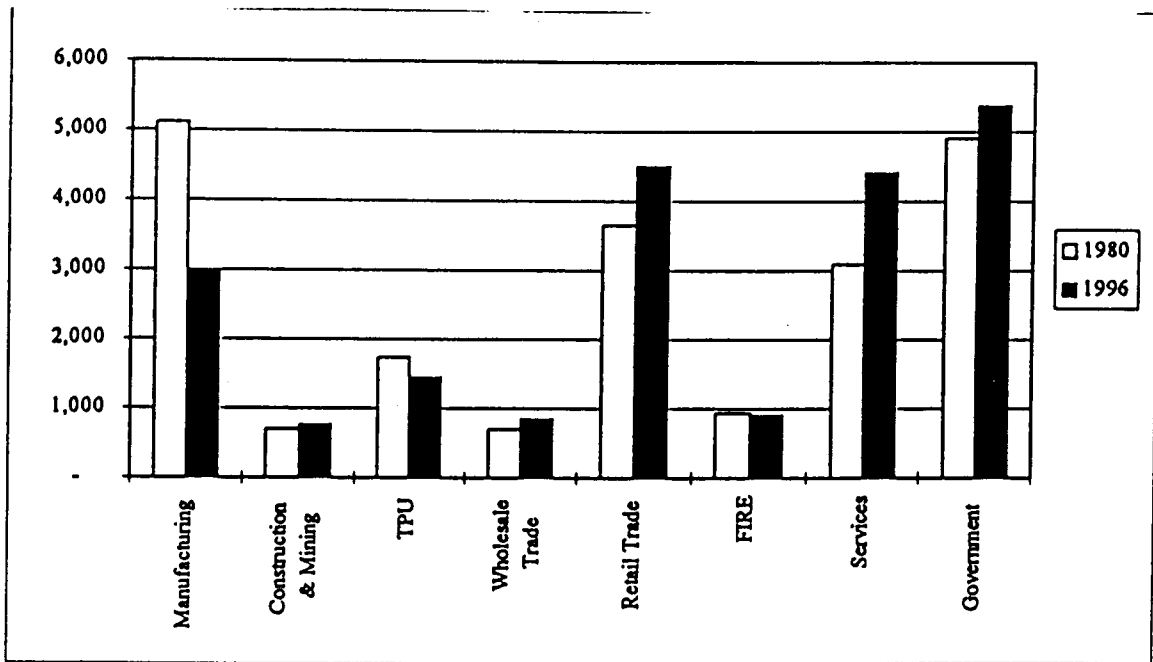
*Source: Portland State University Center for Population Research and Census.*

## 5.4.2 Labor Force Characteristics

- Employment

As noted earlier, the economy of the Bay Area has changed significantly in the last several decades. Gains in employment in retail trade, services, and government sectors have been offset by significant losses in manufacturing employment. Figure 4 shows the distribution of employment by industry of Coos County in 1980 compared to 1996. During this time period, total employment grew only slightly, from 25,350 jobs in 1980 to 25,740 in 1996.

FIGURE 4  
DISTRIBUTION OF EMPLOYMENT BY INDUSTRY, COOS COUNTY



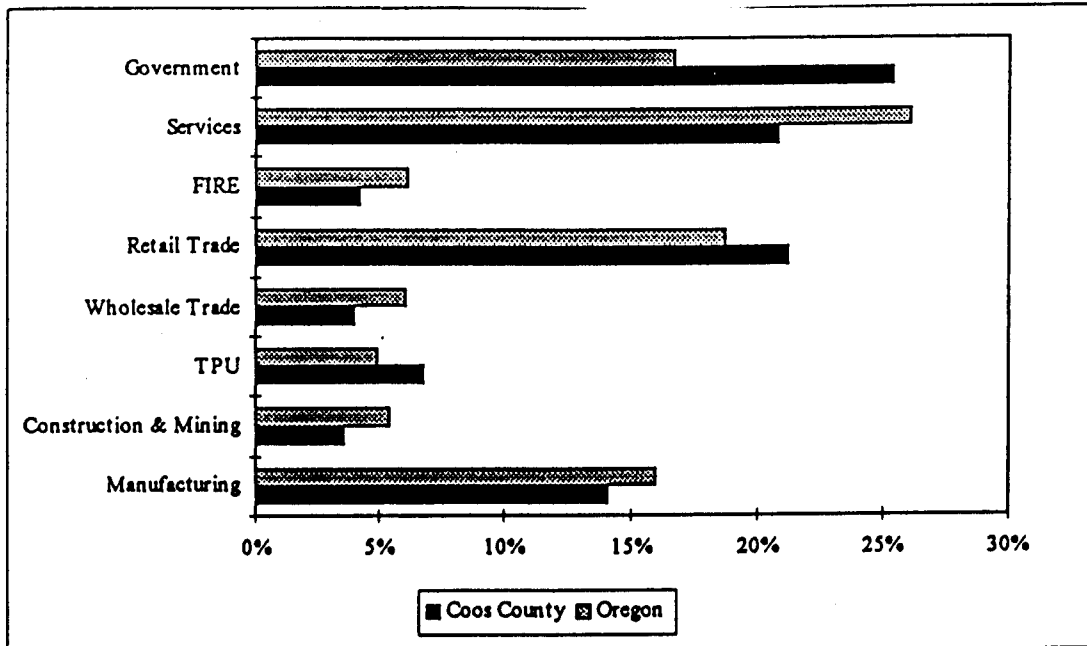
TPU: Transportation, Communications, and Public Utilities.

FIRE: Finance, Insurance, and Real Estate.

Source: State of Oregon Employment Division.

Figure 5 shows these shifts in employment have created a regional economy more reliant on the government, retail trade, and transportation, communications, and public utilities (TPU) sectors than the state as a whole.

FIGURE 5  
EMPLOYMENT DISTRIBUTION BY INDUSTRY CODE DIVISION, 1996



TPU: Transportation, Communications, and Public Utilities.

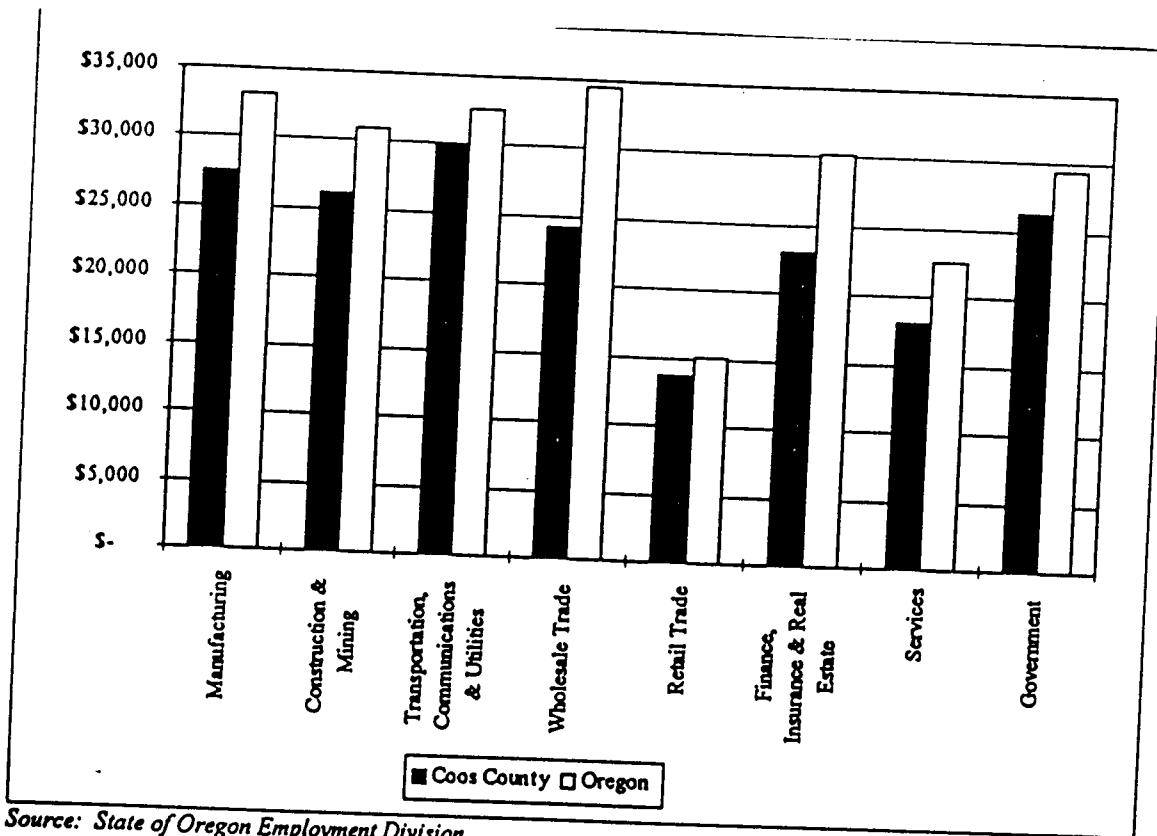
FIRE: Finance, Insurance, and Real Estate.

Source: State of Oregon Employment Division.

- INCOME

One impact that the shift away from manufacturing has had on the economy is a loss of manufacturing jobs which traditionally have been higher paying than those in the retail trade and service sectors. One indicator of the type of wages an industry provides is average annual payroll (total payroll for each industry group divided by total number of employees in that industry group). As noted earlier, employment growth in Coos County has occurred in the retail trade and service industries, with small gains in the wholesale trade and government sectors. Job losses have occurred primarily in manufacturing, with slight losses in the TPU and the Finance, Insurance, and Real Estate (FIRE) sectors. Figure 6 shows the average annual payroll of each sector for Coos County and the State of Oregon.

FIGURE 6  
AVERAGE ANNUAL PAYROLL, 1995



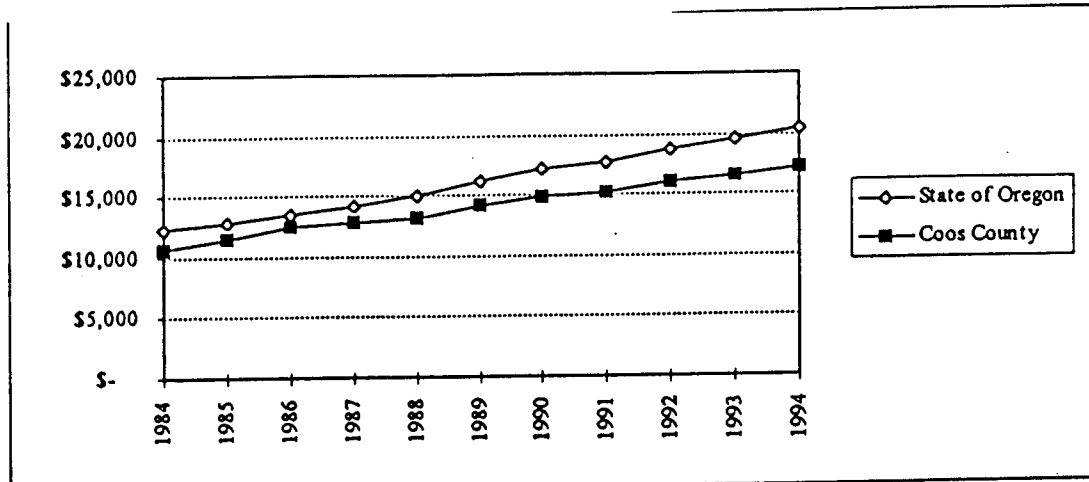
Source: State of Oregon Employment Division.

As shown in Figure 6, average payrolls for all industry division groups in Coos County are lower than state averages. The largest differentials occur in the wholesale trade and FIRE sectors.

The shift in economy and lower average payrolls have had the combined impact of lower average per capita income in Coos County than the state as a whole. Different than average annual payroll which is based on total number of workers in an industry, per capita income is based on total number of persons in a geographic area—in this case, Coos County. Per capita income also includes non-employment-related income, such as transfer payments and rental income. The per capita income differential between Coos County and the state averaged has increased slightly in recent years as shown in Figure 7.

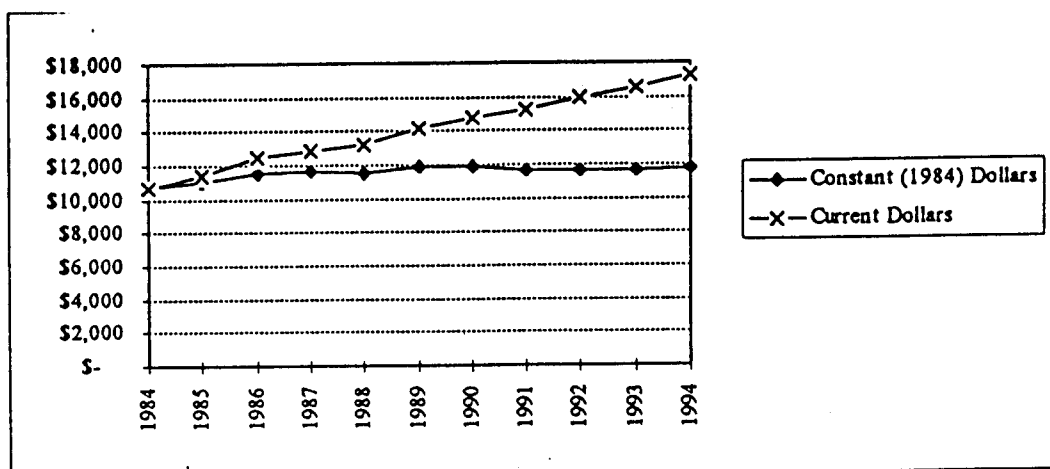


**FIGURE 7**  
**PER CAPITA INCOME (CURRENT DOLLARS)**  
**COOS COUNTY VS. STATE OF OREGON**



Source: Bureau of Economic Analysis.

**FIGURE 8**  
**COOS COUNTY PER CAPITA INCOME,**  
**CURRENT AND CONSTANT (1984) DOLLARS**

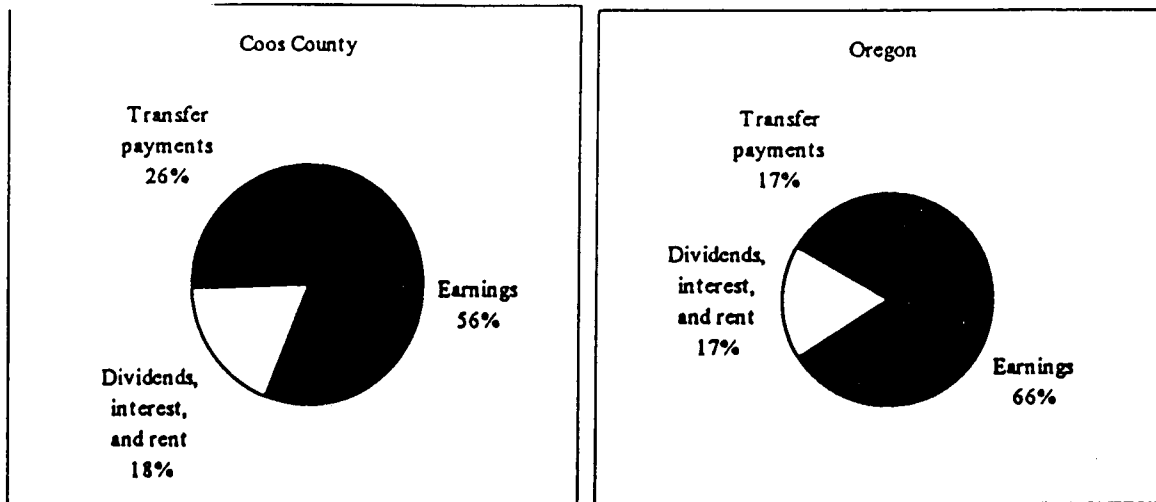


Source: Bureau of Economic Analysis (Income Estimates); and Bureau of Labor Statistics (Inflation Estimates).

Increases in per capita income in Coos County have just kept pace with inflation since 1984. Figure 8 shows per capita income in current and constant (1984) dollars deflated using the Consumer Price Index for all urban consumers in the western U.S.

The U.S. Bureau of Economic Analysis estimates show that average per capita income in 1994 in Coos County was \$17,225, 84.1 percent of the State average of \$20,471, and 79.4 percent of the national average of \$21,696. This income figure is a combination of earnings (including wages and salaries, other labor income and proprietors' income); dividends, interest, and rent; and transfer payments. The breakdown of income in Coos County versus the State of Oregon is shown in Figure 9.

FIGURE 9  
 COMPONENTS OF PERSONAL INCOME  
 COOS COUNTY VS. STATE OF OREGON, 1994



Source: Bureau of Economic Analysis.

Earnings comprise a smaller proportion of personal income in Coos County (56 percent) than in the state as a whole (66 percent). This proportion is offset by a larger share of transfer payments (26 percent versus the state's 17 percent), which include retirement and disability insurance, unemployment insurance, veterans benefits, Aid to Families with Dependent children (AFDC), and food stamps. The higher proportion of transfer payments can be attributed, in part, to the relatively high percentage of older citizens in Coos County.

#### 5.4.3 Political Jurisdictions/Public Facilities & Services

##### Incorporated Cities

The Cities of North Bend, and Coos Bay have political jurisdiction over the most populous portions of the Coos Bay Estuary and coastal shorelands area.

##### County

Coos County has political jurisdiction over the largest geographical portion of the Coos Bay estuary and Coastal shorelands, encompassing the North Spit, North Slough/Haynes Inlet, East Bay, Coos River, Catching Slough, Isthmus Slough system, South Slough, Barview and Charleston area.

##### School Districts

Two school districts occur within the area:

- District #9, encompassing the City of North Bend and the North Bay and East Bay areas;

- District #13, which includes the City of Coos Bay and all other areas of the coastal shorelands area.

### Fire Protection

The Cities of North Bend, and Coos Bay have their own individual fire departments. Fire protection in the unincorporated areas is provided by seven Rural Fire Protection Districts:

- ~ Hauser RFPD
- ~ North Bay RFPD
- ~ Bunker Hill RFPD
- ~ Libby RFPD
- ~ Millington RFPD
- ~ Green Acres RFPD
- ~ Charleston RFPD

### Police Protection

The Cities of Coos Bay, and North Bend provide their own police departments, while the Coos County Sheriff's Office has jurisdiction over all unincorporated areas.

### Water

The Coos Bay/North Bend Water Board is the sole provider of major public water systems, although the Bay Park/Millington Water district serves as an intermediary to customers within its particular area. Public water provision north and east of the estuary is minimal, with the Shorewood treatment plant and dunes aquifer providing limited service to the Glasgow/Shorewood area.

### Sewer

The City of North Bend has one treatment plant that provides service solely to North Bend. Coos Bay has two treatment plants that serve not only Coos Bay but also Charleston/Barview and the Eastside/Bunker Hill area. No public sewer service is provided north and east of the estuary. Infiltration and intrusion problems are discussed more fully in the Comprehensive Plans of the various cities and Coos County.

### Oregon International Port of Coos Bay

The Oregon International Port of Coos Bay has taxing jurisdiction over large portions of Coos County, as well as being empowered within its jurisdiction to exercise such things as eminent domain and offering of tax-free bonds.

#### 5.4.4 Transportation Systems and Capabilities

According to the proposed Coos County Comprehensive Plan (Balance-of-County):

"Mobility, frequently acclaimed as our fifth freedom, is the very fiber of our democratic society. It is the backbone of industry, and the principal sustenance of the urban community. Without mobility, progress in our community is stifled; with it, growth and prosperity prevail."

"Mobility manifests itself in transportation. Transportation is not automobiles, buses, trains, airplanes, and other transport objects, but people and goods. The desires of people and their need for goods create the demand for transportation." [Alternatives for Improving Urban Transportation, U.S. Department of Transportation, Federal Highway Administration, Report #77-215 (October, 1977, pg. 101).]

"The transportation facilities of Coos County are a critical concern in the comprehensive planning process since these facilities produce direct impacts on land uses, the economy, the environment and the report #77-215 (October, 1977) pg. 101.]

"The transportation facilities of Coos County are a critical concern in the comprehensive planning process since these facilities produce direct impacts on land uses, the economy, the environment and the social systems. An inadequate or poorly designed system will create inappropriate land uses, adverse impacts, and a poorly functioning economy. A good sound transportation plan is a necessity in considering the future of any area.

"Since the transportation system is the lifeblood of a community's economic and social health it is desirable for a comprehensive plan to effectively coordinate all modes of transportation that form the greater system. That task is exceedingly difficult, however, because of problems common to many communities:

- i. Fragmentation. While it is easy to conceive of transportation as an integrated system, the reality is a fragmented assortment of transportation activities, each planned, funded and presided over by an assortment of agencies at separate levels of government.
- ii. Lack of Resources (Money & Time). In the setting just described, no single agency has the funding or the time necessary to produce a coordinated planning effort that would ensure a proper balance of systems to meet the changing needs of people and to overcome existing and expected problems."

This section gives an overview of existing characteristics. A detailed analysis and projection of specific needs is contained with the report prepared for Coos County by the Coos-Curry-Douglas Business Development Corporation (CCD-BDC), entitled Industrial Land Needs Survey and Comparative Advantage Analysis:

Coos Bay Estuary.

- Mass Transit

Existing public mass transit in Coos County is provided in three categories:

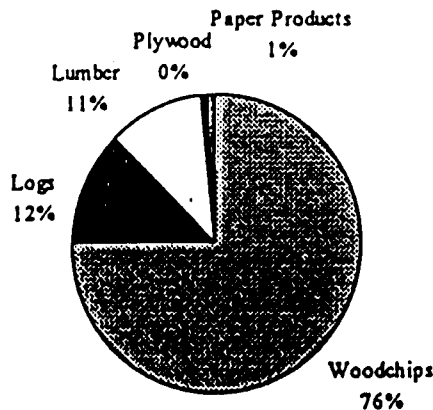
- i. Intercity Bus Service (Greyhound);
- ii. Intercity transportation of the disadvantaged (Senior Activity Center).
- iii. Local taxi cab service (Radio Cab and Yellow Cab).

- Air Transportation

Air transportation for Coos County residents has long been provided at the North Bend Municipal Airport which was annexed into the city limits of North Bend. The airport provides freight and

passenger services (the North Bend airport is the only commercial interstate airport on the southwest coast). The future of adequate and continuing air service for the residents of Coos County is a concern. The airport has been improved and expanded numerous times. In 1995, the City of North Bend completed a master plan for the airport. Further information can be obtained from the City of North Bend.

FIGURE 10  
DISTRIBUTION OF PRODUCTS OUTBOUND  
FROM COOS BAY, 1996



Source: Economic Analysis Study, 1997 by David Evans and Associates for the Cities of Coos Bay and North Bend, Coos County and Oregon International Port of Coos Bay.

- Waterborne Transportation

The Oregon International Port of Coos Bay includes 18 marine terminal facilities, 14 with deep-draft capacity which encompasses the entire estuary of the Coos River, portions of several other rivers draining into the Bay, and the Cities of Coos Bay and North Bend. The major docks of the Port are concentrated along the three to four mile eastern waterfront of Coos Bay/North Bend. Several other docks are located on the western coastline of the peninsula and in the vicinity of Jordan Cove. [See Dock Survey, Section 5.2].

Inside and immediately to the south of the entrance to the estuary, the Charleston small boat basin provides moorage for commercial fishing fleet.

The following tables show recent statistics for the Oregon International Port of Coos Bay's in/outbound products

Since 1976, wood chips have accounted for over 70 percent of total exports. Log exports have been the second most significant in terms of exported tonnage. Regulations that restrict the export of logs harvested on federal land, together with a 1990 decision by Weyerhaeuser Company to stop exporting logs from Coos Bay, led to a decline in the amount of logs exported. Additional fluctuations in export volume occur as a result of changing world economic conditions. Table 5 shows amount of wood products by type of product exported from Coos Bay from 1976 to 1996.

TABLE 5  
 PRODUCTS OUTBOUND FROM COOS BAY  
 (IN SHORT TONS)

	Wood Chips	Logs	Lumber	Plywood	Paper Products	Copper Ore	Other	Total
1976	3,668,707	574,220	642,868	92,289	81,328		7,495	5,066,907
1977	3,870,020	492,357	599,146	58,334	72,112		7,229	5,099,198
1978	3,406,085	572,314	598,511	65,022	10,178		252	4,652,362
1979	4,057,402	522,349	680,581	106,826	22,564		239	5,389,961
1980	3,566,570	543,434	469,706	83,848	36,717			4,700,275
1981	2,918,695	457,839	368,193	113,871	25,645		274	3,884,517
1982	2,693,546	794,266	372,836	66,375	17,414		7,608	3,952,045
1983	2,620,397	593,606	410,365	117,399	43,373		56,357	3,841,497
1984	2,685,781	857,245	384,792	61,661	26,897		272,597	4,288,973
1985	2,728,209	1,304,851	359,315	30,589	18,418		1,490	4,442,872
1986	2,743,681	943,655	375,828	62,899	21,729		351	4,148,143
1987	3,053,874	827,962	481,545	73,885	38,865		265	4,476,396
1988	3,255,955	1,428,787	576,950	74,076	47,711		7,244	5,390,723
1989	3,087,571	1,121,827	506,323	80,293	35,902			4,831,916
1990	2,988,391	1,136,113	615,979	84,007	45,300			4,869,790
1991	3,233,334	805,118	537,892	73,373	97,942			4,747,659
1992	2,694,239	542,202	402,655	57,533	90,011		3,996	3,790,636
1993	2,304,549	722,972	326,979	25,913	61,408	332,350	4,039	3,778,210
1994	2,189,309	484,583	310,030	19,828	43,021	319,601	289	3,366,661
1995	2,402,328	489,665	322,769	16,479	34,347	272,855	1,031	3,539,474
1996	2,337,539	385,583	344,849	10,583	37,172		5,549	3,121,275

Source: Oregon International Port of Coos Bay.

Coos Bay is also a major shipper of nickel ore. Glenbrook Nickel Company imports about one million metric tons of ore annually at Glenbrook Nickel Pier terminal. The terminal was constructed in 1992 and represents an investment of approximately \$36 million. Near the end of the channel, Glenbrook's facilities include ship unloading and truck loading facilities. From Glenbrook, the ore is trucked about 100 miles to Glenbrook's Riddle Smelter, using about 75 covered hopper trucks per day. Since coming on-line, Glenbrook's operations have made nickel ore the highest volume product inbound to Coos Bay, as shown in Table 6.

In 1995, the major shipper of Copper Ore in Coos Bay moved its business from Central Dock to another port in Oregon. As the company made a major investment in the new facility, it is unlikely that it will recommence operations in Coos Bay.

TABLE 6  
 PRODUCTS INBOUND FROM COOS BAY  
 (IN SHORT TONS)

	Lumber	Logs	Petroleum	Nickel Ore	Other	Total
1976			308,078		118,364	426,442
1977			362,882		93,177	456,059
1978			349,794		170,660	520,454
1979			344,026		209,739	553,765
1980			307,534		222,473	530,007
1981			267,803		108,091	375,894
1982			221,819		42,878	264,697
1983			169,322		44,577	213,899
1984			166,055		48,389	214,444
1985			139,556		14,039	153,595
1986			174,367		48,313	222,680
1987			183,036		141,372	324,408
1988			225,090		33,972	259,062
1989			142,519		6,056	148,575
1990			155,463			155,463
1991			187,934	22,046		209,980
1992			119,451	202,371		321,822
1993	2,712		71,943	173,052	495	248,202
1994	263	36,340	66,194			102,797
1995	5,955	43,870	62,482	586,776		699,083
1996	14,468	60,123	118,919	941,332		1,134,842

*Source: Oregon International Port of Coos Bay.*

Terminal facilities include 150 acres of open storage and more than 600,000 square feet of covered storage. Facilities handle wood chips, logs, finished wood and paper products, and petroleum.

- PIPELINE

Northwest Natural is considering construction of a natural gas pipeline and distribution system in Coos County. ECONorthwest prepared an analysis of the potential economic impacts of the facility (ECONorthwest, 1997). The analysis anticipates the natural gas facility will have "significant, positive implications for the Coos County economy, its work force, and tax base".

The pipeline construction project is estimated to result in \$30.4 million spent on materials, labor, and land rights-of-way, of which approximately \$11.5 million is estimated to go to residents and businesses in Coos County. The remainder will be spent on purchases from elsewhere (\$2.0 million to residents and businesses elsewhere in Oregon, and \$16.8 million to out-of-state businesses and workers). The significant portion of spending out-of-state is due to Coos County and Oregon not having all the resources needed for the specialized construction of the pipeline. However, using out-of-water labor can still have a positive impact on the local economy as workers spend a portion of their earnings in the local market.

Approximately 174 person-years of employment in Coos County would be created directly by construction spending. Nearly two-thirds of those jobs would be in the construction sector. Table 7 shows the estimated employment impacts of the pipeline construction project.

TABLE 7  
CONSTRUCTION IMPACTS OF A NATURAL  
GAS FACILITY IN COOS COUNTY

	Direct Impacts	Indirect Impacts	Induced Impacts	Total Impacts
Jobs (person-years)				
in Coos County	174	17	89	280
Statewide	231	37	168	436
Total Income *				
in Coos County	\$5,377,300	\$666,500	\$2,751,000	\$8,795,100
Statewide	\$7,721,200	\$1,679,000	\$5,482,500	\$14,887,300

\* Total Income comprises personal and business income.

Source: ECONorthwest

Construction is estimated to produce a total of 280 jobs, \$6.0 million in personal income, and \$2.8 million in business income in Coos County. Total state impacts include an estimated 436 jobs, \$10.2 million in personal income, and \$4.7 million in business income.

Additional economic impacts would occur with the building of the local gas distribution system and with the operation and maintenance of the system and pipeline. The direct effects of first-year spending on the distribution system and operation and maintenance are presented in Table 8.

TABLE 8  
DIRECT IMPACTS OF FIRST-YEAR SPENDING ON  
CONSTRUCTION OF DISTRIBUTION SYSTEM AND  
OPERATION AND MAINTENANCE (1997 DOLLARS)

	Distribution System Construction		Operation and Maintenance	
	Total Income*	Jobs (person-years)	Total Income*	Jobs (person-years)
Coos County	\$1,280,200	37	\$217,800	7
Statewide	\$1,704,800	46	NA	NA

\*Total Income comprises personal and business income.

Source: ECONorthwest



The direct effects of first-year spending would be concentrated in the construction sector, and most of the effects would occur in Coos County. Eighty percent of the direct employment and 75 percent of the direct income is expected to accrue to Coos County. Direct effects of first-year spending (for construction and operation and maintenance) are estimated to be 44 jobs, \$1,122,100 in personal income, and \$375,900 in business income in Coos County. Total state direct impacts (available for construction only) are estimated at 46 jobs, \$1,269,600 in personal income, and \$435,200 in business income.

As opposed to the construction impacts of the natural gas pipeline, the impacts associated with construction of the distribution system and operation and maintenance of the main pipeline and distribution system would be longer-term, representing an annual stream of spending spread over twenty years or so. Table 9 summarizes the effect of spending on the pipeline and distribution system from 1998 to 2018. Also shown in Table 9 are total long-term impacts related to industrial expansion or relocation to Coos County and impacts resulting from spending of energy cost savings.

TABLE 9  
TOTAL LONG-TERM ECONOMIC IMPACTS OF  
NATURAL GAS PIPELINE (1997 DOLLARS)

Year	Distribution System Construction; O&M		Industrial Expansion or Relocation		Spending of Energy Cost Savings		Total Long-Term Impacts	
	Total Income	Jobs	Total Income	Jobs	Total Income	Jobs	Total Income	Jobs
1998	\$2,028,300	60	NA	NA	NA	NA	NA	NA
1999	\$1,128,400	34	\$12,000,000	290	\$195,200	7	\$13,323,000	331
2000	\$772,100	23	\$18,040,000	436	\$312,456	12	\$19,124,556	471
2001	\$685,700	21	\$27,030,000	654	\$444,710	17	\$28,160,410	691
2002	\$420,000	13	\$34,580,000	836	\$541,363	20	\$35,541,363	869
2003	\$440,600	13	\$42,060,000	1,017	\$701,378	26	\$43,201,978	1,057
2004	\$421,700	13	\$44,780,000	1,083	\$738,458	28	\$45,940,158	1,124
2005	\$430,400	13	\$47,500,000	1,148	\$775,538	29	\$48,005,938	1,190
2006	\$439,100	13	\$50,210,000	1,214	\$812,619	30	\$51,461,719	1,258
2007	\$447,800	14	\$52,930,000	1,280	\$849,696	32	\$54,227,496	1,326
2008	\$539,200	16	\$55,650,000	1,346	\$886,776	33	\$57,075,976	1,396
2009	\$465,000	14	\$58,300,000	1,409	\$934,796	35	\$59,699,796	1,458
2010	\$473,500	14	\$61,000,000	1,475	\$982,818	37	\$62,456,318	1,526
2011	\$482,100	15	\$63,720,000	1,541	\$1,030,839	39	\$65,232,939	1,594
2012	\$490,700	15	\$66,450,000	1,607	\$1,078,855	40	\$68,019,555	1,662
2013	\$571,400	17	\$69,170,000	1,673	\$1,126,875	42	\$70,868,275	1,733
2014	\$499,700	15	\$70,370,000	1,702	\$1,133,845	42	\$72,003,545	1,760
2015	\$500,300	15	\$71,580,000	1,731	\$1,140,811	43	\$73,221,111	1,789
2016	\$500,800	15	\$72,710,000	1,758	\$1,147,777	43	\$74,358,577	1,816
2017	\$501,400	15	\$73,920,000	1,787	\$1,154,743	43	\$75,576,143	1,846
2018	\$501,900	15	\$75,130,000	1,817	\$1,161,710	43	\$76,793,610	1,876
<b>Totals</b>	<b>\$12,740,100</b>	<b>385</b>	<b>\$1,067,130,000</b>	<b>25,804</b>	<b>\$17,151,262</b>	<b>641</b>	<b>\$1,152,663,710</b>	<b>26,830</b>

Total Income comprises personal and business income.

Jobs = person-years of employment

Source: ECONorthwest

In total, the impacts from construction of the distribution system and operation and maintenance amount to \$9.1 million in additional personal income and \$3.7 million in additional business income in Coos County. The employment impacts amount to almost 385 person-years of employment over 20 years.

Currently, manufacturers in Coos County cannot get natural gas service and use higher-cost oil and propane instead. Availability of natural gas would benefit existing industries and would serve to attract new manufacturers to the region. Existing businesses would also expand as they find that having clean, lower-cost natural gas makes it economical to expand and hire new workers. As indicated in Table 9, the long-term impacts of expansion or relocation of manufacturing industries to the region include total income of over \$1 billion (\$783 million in personal income and \$284 million in business income) and approximately 25,800 person-years of employment.

Table 9 also shows impacts that would result from spending associated with energy cost savings. Such savings occur as households and businesses substitute natural gas for other, more expensive fuel sources. The savings would be spent on other goods and services in the region, resulting in additional income and jobs. The total impacts are estimated at over \$11 million in personal income, over \$6 million in business income, and approximately 641 person-years of employment.

Addition of a natural gas pipeline and distribution system in the Coos Bay region would have significant economic impacts, particularly as industries expand or relocate to the area. Impacts would occur in a range of industries, affecting the need for industrial, office-commercial, and retail-commercial space, as well as the need for land zoned for industrial, commercial, and residential uses.

- RAIL

A single railroad serves the area, with a track that follows Highway 101. Since the adoption of Coos County's comprehensive Plan (Volumes I,II,III) the railroad sold to a short-line service provider. The system requires improvements because of deferred maintenance.

- Highways

- U.S. 101

U.S. Highway 101 is a major transportation route, which runs the length of the County and serves as the only fully functional north-south link between Coos County and other coastal counties. Highway 101 is also an indirect east-west connection, as it provides access to Highway 38, which runs east to I-5 via Reedsport, Elkton and Drain.

The present physical condition of U.S. 101 ranges from good to extremely deteriorated according to the State Highway System Preservation Study (Oregon Department of Transportation [ODOT], 1979). Some of the worst areas, notably that section from Bunker Hill south to Davis Slough, are scheduled for immediate repair (see ODOT's Six-Year Plan). In addition to maintenance problems, Highway 101 is also characterized by extremely high seasonal volumes of traffic.

- State Highway 42

State Highway 42 runs from just south of Coos Bay east to I-5 via Coquille, Myrtle Point and Roseburg. It serves as the primary east-west connection for the County. Highway 42 also provides linkage between the smaller communities in the Coquille Valley.

The existing physical condition of this highway is slightly to moderately deteriorated. The volume of traffic on Highway 42 is moderate except for the section between Coos Bay and Coquille, which averages between 5,000 and 10,000 vehicles per day. While the actual physical condition of the road surface is only slightly to moderately deteriorated, other conditions severely limit usage of Highway 42. These include such factors as sinuosity, narrowness of travel surface, number of accidents and delays caused by congestion. These problems have to be corrected in the future if Highway 42 is going to achieve its optimum efficiency as an east-west transportation link for Coos County.

- State Highway 38

Although located entirely outside Coos County, this highway serves in a similar fashion to Highway 42 to unite the County with the markets and resources of the Willamette Valley. Highway 38 begins in Reedsport and proceeds generally along the Umpqua River, veering then northward to connect with Interstate 5 near Drain.

Highway 38 is also similar to Highway 42 in that "both highways are comparatively winding and narrow (two lanes wide in most areas). Hazardous conditions are heightened by frequent landslides caused by the combination of slope and water-saturated soils. Improvements have been made on each highway to widen and straighten inferior segments. Future improvements are planned to make these routes more passable." (Source: Coos Bay Proposed Comprehensive Plan).

- State Highway 240

Commonly called the Cape Arago Highway, it begins at the intersection of Highway 101 and Virginia Avenue, North Bend and travels through North Bend and Coos Bay in a westerly direction over Virginia, southerly through Broadway and then westerly again over Newmark. At this point it veers South, following the bay to Charleston, and eventually dead-ends at Cape Arago State Park.

"This highway serves bay area traffic journeying to the ocean beach areas and to the state and county parks. However, it is a crucial thoroughfare delivering daily traffic to the North Bend business district and satellite shopping/commercial areas; it is a direct route to Empire and Charleston, and is the sole access to Southwestern Oregon Community College. "(Source: Coos Bay Proposed Comprehensive Plan). The average daily traffic for the entire highway is 9,087 vehicles. However, this figure is a misleading indicator of perceived traffic for two important reasons:

- i. Average daily traffic in the Coos Bay and North Bend portion is nearly 13,000 vehicles, because the Highway serves as an important city arterial.
- ii. High seasonal use of the small boat basin in the summer months swells traffic volume. The impact of the traffic increase is made more severe by the several-block-long congested traffic lines caused by increased use of the South Slough drawbridge during the same time period.

- Highway 243

Highway 243, the Empire-Coos Bay Highway, is an arterial entirely within the Coos Bay city limits linking traffic from the downtown business district to the Empire area. It begins its east-west route at Highway 101 with a seven-block one-way couplet (Commercial and Anderson Streets) ending at 7th Street. Here, the highway joins into a four-lane thoroughfare on Central Avenue,

junctions with Ocean Boulevard, and then extends north-southerly to its terminus at Highway 240. It is 3.57 miles in length and in 1976 had an average daily traffic of 7,341 vehicles.

Highway 243 functions as part of the circulatory route within downtown Coos Bay and as another avenue to Empire and Charleston.

It also provides access to the Coos Bay medical district off Woodland Drive and to a residential area currently experiencing new residential and professional development. (Source: Coos Bay Proposed Comprehensive Plan)

- State Highway 241

The Allegany Highway runs from Eastside northeast to Allegany. It is in a moderately deteriorated physical condition, but is not subjected to particularly high volumes of residential traffic, although it does have a heavy volume of industrial traffic.

- Bicycle

According to the Department of Transportation, there are a total of four miles of bicycle trails in the County currently. ODOT lists their locations as between the Cape Arago Highway and Woodland Drive and between Coos Bay and the Empire Highway (presently along Ocean Boulevard) and describes them as Class II - separated from the highway by a curb. Lack of available funds and inflated costs could severely limit further development of bikeways.

- Pedestrian

Inadequate separation between pedestrians and motor driven vehicles is one of the greatest obstacles to increased pedestrian traffic volumes. Most pedestrian safety problems involve cities because the distance between cities in Coos County prohibits serious pedestrian travel. The most common safety problem for pedestrians within cities involves the lack of sidewalks, which forces pedestrians to compete (ineffectively) with automobiles for street right-of-way. This problem has three sources:

- i. Some older areas have gradually and slowly filled-in, changing from a rural to an urban perspective without acquiring the typical urban amenity of sidewalks.
- ii. Some cities, notably North Bend and Coos Bay, have consistently failed to require installation of sidewalks in all new developments.
- iii. The County does not require sidewalks in urban areas such as Empire and Bunker Hill, except on Arterials and collector streets.

## 5.5 AREAS SUITABLE FOR INCREASED ECONOMIC GROWTH AND ACTIVITY (CANDIDATE DEVELOPMENT SITES)

### 5.5.1 Introduction

#### PURPOSE

This section develops an inventory of candidate suitable sites from which a later section will select qualifying sites sufficient to meet identified needs for future economic growth and activity.

## PROCESS

The original group of candidate sites evolved from three sources:

- sites zoned industrial
- sites assessed as industrial
- sites included within the CCD-BDC "Fact book" for Coos County

Field inspections added some sites and deleted others, then estimated the type and acreage of existing uses and the acreage of "vacancy" (not in current use) for each site.

### 5.5.2 Site Coverage Worksheets

The results of the inventory and field inspection are displayed in two ways:

- Sites are mapped at a scale of 1" = 800', showing occupancy/vacancy percentages;
- Each site's information is listed on the "Site Coverage Worksheets", which follow.

The following two tables preceding the worksheets summarize the relevant information. Several points are of particular interest:

Lumber & Wood Products firms account for the lion's share of occupied land and vacant land much of the occupied acreage (85%) of Lumber & Wood Products firms is devoted to open storage.

Immediately following the worksheets is a table that summarizes occupied and vacant acres for each site, organized by major economic sector.

OCCUPANCY/VACANCY  
RATIOS

OCCUPANCY \*/ VACANCY RATIOS

Industrial Sector	Structures as % of total occupied land	Occupied areas as % of total land	Vacant areas as % of total land
Lumber & Wood Products (major companies)	0.15 (107.7 ac)	0.38 (722.3 ac)	0.62 (1185.4 ac)
Lumber & Wood Products (other)	0.18 (4.9 ac)	0.37 (27.3 ac)	0.63 (46.6 ac)
Waterborne Transportation	0.46 (23.7 ac)	0.76 (51.7 ac)	0.24 (13.4 ac)
Marine Manufacturing	0.65 (2.6 ac)	1 (4.0 ac)	0 (0.0 ac)
Fish Processing	0.61 (8.6 ac)	0.86 (14.0 ac)	0.14 (3.5 ac)
Salmon Searanching	0.94 (6.0 ac)	0.29 (6.4 ac)	0.71 (33.6 ac)
Petroleum Storage & Transfer	0.97 (11.2 ac)	0.59 (11.6 ac)	0.41 (8.0 ac)
Aggregate Storage & Transfer	0.03 (.9 ac)	0.64 (31.3 ac)	0.36 (17.7 ac)
Small & Multiple Ownership Vacant parcels	Not applicable	0 (0.0 ac)	1 (204.8 ac)
Public ownership Port of Coos Bay Other Total	Not applicable	(occupied leases under other sectors)	1 1 (384.0 ac)
TOTALS (ACRES)	0.19 (165.6 ac)	868.6	(1897.0)

**OWNERSHIP OF EXISTING AND  
POTENTIAL INDUSTRIAL SITES BY  
SECTOR WITHIN TENTATIVE C.S.B.**



OWNERSHIP OF EXISTING & POTENTIAL INDUSTRIAL SITES BY SECTOR WITHIN TENTATIVE C.S.B.

INDUSTRIAL SECTOR	OCCUPIED LAND (acres)	% OF TOTAL	VACANT LAND (acres)	% OF TOTAL	TIDELANDS (VACANT) (acres)
Lumber & Wood Products (Major companies)	722.3	0.83	1185.4	0.63	344
Lumber & Wood Products (other)	27.3	0.03	46.6	0.02	---
Waterborne Transportation	51.7	0.06	13.4	"1%"	---
Marine manufacturing	4	0.01	0	0	---
Fish Processing	14	0.01	3.5	"1%"	5
Salmon Searanching	6.4	0.01	33.6	0.02	---
Petroleum Storage & Transfer	11.6	0.01	8	"1%"	---
Aggregate Storage & Transfer	31.3	0.04	17.7	0.01	---
Other Private & Multiple Owners	0	---	204.8	0.11	36
Public ownership	(leases under		327	0.17	197
Port of Coos Bay	other sectors	---	57	0.03	17
Other	0	---	57	0.03	17
TOTALS	868.6	1	1897	"102%"	599

SITE COVERAGE WORKSHEETS

SITE COVERAGE (% & acres)

	Vacant Structure	Structure in use	Open Storage	Vacant (not currently used)	Parking & Roads	Total (100%) ac	Ownership	Current Uses	Notes
2-2C	Land					17.5 ac	George Riley % D. Breakfield		Entirely outside c.s.b.
	Water								
2-3	Land	0.2	0.4	0.4		10 ac	Robert Christiansen	Truck Firm	Entirely outside c.s.b.
	Water								
2-4 A	Land			1		21 ac	Reservation Ranch		Entirely outside c.s.b. former log-sorting area; excellent site
	Water								
2-4 B	Land			1		18.5 ac	Southern Pacific		Entirely outside c.s.b.
	Water								
2-4 C	Land			1		3 ac	Reservation Ranch		Entirely outside c.s.b.
	Water								
2-5	Land	0.5		50% *		30 ac	Walker/Beebe	Resaw shop under construction	Rail access; may be removed from c.s.b. (no water access)
	Water								
2-6	Land	0.2	0.6	0.2		8 ac	Roger Conrad	Wood treatment plant	
	Water								













	Vacant Structure	Structure in use	Open Storage	Vacant (not currently used)	Parking & Roads	Total (100%) ac	Ownership	Current Uses	Notes
4-13	Land		0.5	0.5		1.8 ac	Weyerhaeuser	lumber storage	
	Water								
4-14	Land		0.5			1.5 ac	Empire Gas		Fuel storage (no space available); could be potential back-up for North Bend dock
	Water								
4-15	Land		0.4	0.6		61 ac	Weyerhaeuser	Chip, plywood & lumber storage & mills	Main plant site; access to U.S. 101, rail & deep water. (No apparent vacant land)
	Water								
4-16	Land		0.7		0.3	4 ac.	Weyerhaeuser	office	Outside c.s.b. (little industrial potential because of high present value of office building)
	Water								
4-17	Land		0.5	0.5		1.56 ac.	Oil Terminal Co.	Fuel Storage	No space available (for other uses)
	Water						Ore. Coast Towing, %Crowley Maritime	Fuel dock	
4-18	Land		0.05	0.95		6.23 ac	Kanematsu-Goshio	Chip storage	Fibrex" dock
	Water							Chip loading dock	
4-19	Land			1		2.78 ac	Al Perice	Back-up space for dock	Sporadically used for barge loading
	Water								
4-20	Land		0.6	0.2	0.2	1.78 ac	Chevron, USA	Fuel storage	No space available (for other uses)
	Water							dock	
4-21	Land		1			2.5 ac.	Standard Oil of California, Union Oil (CA)	Fuel storage tanks	Outside c.s.b. (no space available)
	Water						Texaco & Chevron		

		Vacant Structure	Structure In use	Open Storage	Vacant (not currently used)	Parking & Roads	Total (100%) ac	Ownership	Current Uses	Notes
4-22	Land				1		1 ac.	Chevron, USA	none	Outside c.s.b. (sleep in parts)
	Water									
4-23	Land		1				1.2 ac.	Union Oil of California & Standard Oil of California	fuel docks	fuel transfer docks (one recently lengthened)
	Water									
4-24	Land				1		2 ac.	Dell Brunnel	none	Outside c.s.b.
	Water									
4-25	Land				1		+/- 1 ac.	Swanton Investments	none	Outside c.s.b.
	Water									
4-26	Land		0.3	0.1	0.5	0.1	+/- 6 ac.	Multiple owners	Commercial & Industrial	Outside c.s.b.
	Water									
4-27	Land									
	Water		1					Port of Coos Bay	Docks (C.O.E., Coast Guard, Dolphin Terminals)	no back-up space
4-28	Land			1			8 ac.	Dell Brunnel & Central Dock Co	Chip storage	Fully occupied (leased by Champion International)
	Water								chip dock	
4-29	Land		1				+/- 8 ac	Central Dock Company	Lumber storage	Old & new Central Dock buildings (structure largely provides covered storage area)
	Water		1						lumber loading dock	

		Vacant Structure	Structure In use	Open Storage	Vacant (not currently used)	Parking & Roads	Total (+/- 6 ac.)	Ownership	Current Uses	Notes
4-30	Land	0.1	0.6			0.3	+/- 6 ac.	multiple owners	mixed uses, especially marine mfg.	Hilstrom shipbuilding area (old small warehouses)
	Water								Moorage for towboats & some fishing vessels	
4-31	Land						-----	multiple owners	mixed	Commercial & residential uses outside c.s.b.
	Water									
4-32	Land				1		7 ac.	Western Service % Donald Cline	none	Adjacent to Coalbank Slough
	Water									
4-33	Land				1		4 ac	multiple owners	none	Adjacent to US 101 at Coalbank Slough (south of bridge)
	Water									
5-1	Land						-----			Tidelands; extensive fill required for industrial use; no back-up land
	Water				1		20 ac	multiple ownership	none	
5-2	Land		0.1	0.9			31 ac	* Moore Oregon % Cape Arago Lumber Co.	lumber mill & storage	Although most of the site is currently "vacant", the normal uses (given a healthy market) are lumber milling & storage
	Water									
5-3										outside c.s.b.
	Land		0.2		0.7	0.1	1 ac	Multiple owners	secondary access to log storage area	
	Water									
5-4	Land			0.5	0.5		1 ac	multiple owners	lumber storage	outside c.s.b.
	Water									
5-5	Land		0.2		0.8		3 ac	Moore Oregon, P. Giorgis	truck storage & repair	outside c.s.b.
	Water									

use Brothers to use their docks for barge tie-ups.

		Vacant Structure	Structure in use	Open Storage	Vacant (not used)	Parking & Roads	Total (100%) ac	Ownership	Current Uses	Notes
5-6	Land		0.2			0.8	1 ac	Eureka Fisheries	fish receiving & processing station	
	Water		1					Eureka Fisheries	fish receiving dock	
5-7	Land		0.8	0.1		0.1	3 ac	Dunmond Lighterage Co., c/o Crowley Maritime	Petroleum storage	
	Water							Oregon Coast Towing c/o Crowley Maritime	Petroleum & fish receiving dock	
5-8	Land		0.8		120%		1 ac	Oscar Johnson	Marine Manufacturing	
	Water									
5-9	Land		0.4		0.6		1 ac	Multiple owners	Residential & commercial	outside c.s.b.
	Water									
5-10	Land				1		8 ac.	Julius Swanson	none	No direct channel access, but good back-up area potential for docks to the North
	Water									
5-11	Land									
	Water				1		+/- 16 ac.	Julius Swanson, et al.	none	Tidelands: no direct channel access
5-12	Land									
	Water				1		+/- 55 ac	Coos Head Timber Co.		Tidelands: no direct channel access
5-13	Land	0.05			0.95		+/- 80 ac	Coos Head Timber Co.	Former mill complex, virtually none	Tidelands & dock with water (22') access
	Water				1		+/- 45 ac	Coos Head timber Co.	Dock; occasional moorage	



		Vacant Structure	Structure in use	Open Storage	Vacant (not currently used)	Parking & Roads	Total (100%) ac	Ownership	Current Uses	Notes
5-21	Land		0.6	0.2		0.2	+/- 6.5 ac	California Shellfish, Ocean Fresh Seafoods (2 owners)	Hallmark fish receiving & processing	Barbay (processor) building burned in 1980; the remaining buildings are largely on pilings over the water
	Water								Dock & moorage	
5-22	Land		.80%*			0.2	+/- 2 ac	[Charter (lease)] Port of Coos Bay	* Vacant seafood processing building	Building was erected in the last two years; improving fishing economy would likely spur the plant's reopening
	Water									
5-23	Land		0.8	0.2			+/- 1 ac	Port of Coos Bay	Alaska packers & Tom Lacro	Fish receiving stations on the breakwater
	Water								Dock & fueling point for boats	
6-1	Land		0.1	0.9			7.35 ac	Willamette Leasing (Sause Brokers)	Barge Construction & outrigging	Includes tidelands ownership
	Water								Barge dock	
6-2	Land				1		49 ac	Beaudry & Gebhardt	none	Diked marginal pasture (former tidelands); potential dredge disposal site
	Water									
6-3	Land				1		32 ac	City of Eastside	none	Same as #6-2
	Water									
6-4	Land				1		+/- 25 ac	School District #9	none	Same as #6-2 & 6-3
	Water									
6-5	Land						-----			tidelands (not diked)
	Water				1		+/- 197 ac.	Port of Coos Bay	none	

		Vacant Structure	Structure in use	Open Storage	Vacant (not currently used)	Parking & Roads	Total (100%) ac	Ownership	Current Uses	Notes
6-6	Land				1		+/- 182 ac	Port of Coos Bay	* dredge spoil disposal	Diked former tidelands; used for dredge spoil disposal (portions are at or near capacity)
	Water									
6-7	Land				1		7.5 ac	Multiple owners	none (pasture)	outside c.s.b.
	Water									
6-8	Land		0.7	0.1	0.1	0.1	+/- 1.5 ac	Mid Coast Marine, & others	Boat construction & repair; residential	150-ton capacity drydock (haul-out)
	Water									
6-9	Land				1		1.2 ac	Mid Coast Marine		
	Water									
6-10	Land		0.2	0.1	0.7		+ 10 ac	multiple owners	residential, some industrial	Some area have little back-up land; site slopes to estuary (in most places); potential for non-water-dependent uses (partly outside c.s.b.)
	Water									
6-11 A	Land		25% *	0.7		0.05	94.4 ac	Georgia-Pacific (port leased to Coos Head Timber)	chip, lumber, urea storage; veneer plant & sawmill	G-P's Bunker Hill site (portion) although storage areas could be "rearranged", the site is considered fully occupied. * Mills closed.
	Water									
6-11 B	Land			70% * 51.1 ac	0.3 21.9 ac		+/- 73 ac	Georgia-Pacific	Log storage & handling; salt marsh	South portion of G-P's Bunker Hill site; although most of the site is currently not occupied full employment would require use of most areas for storage
	Water			1				G.P.	Log storage & handling	





	Vacant Structure	Structure In use	Open Storage	Vacant (not currently used)	Parking & Roads	Total (100%) ac	Ownership	Current Uses	Notes
6-17 C	Land			1		28 ac	Coos Head Timber	forest land	Forested hillsides entirely outside c.s.b.
	Water								
6-18	Land		0.6	0.4		+/- 76 ac	Georgia pacific	log storage	Site includes: 1. diked tidelands used for log storage 2. saltmarsh Adjacent water area used for log storage
	Water		45.6 ac	30.4 ac					
6-19 A	Land			1		5 ac	Gary Angell	none	
	Water								
6-19 B	Land			1		1.6 ac	Williamette Graystone	none	
	Water								
6-19 C	Land		0.1	0.4	0.2	+/- 9 ac	D. & T. Davenport	Angell Concrete Plant	
	Water								
6-20 A	Land								Portion of saltmarsh with log storage occurring in adjacent estuary
	Water			1		+/- 21 ac	Coos Head Timber	none	
6-20 B	Land								Same as Note on #6-20 A
	Water			1		+/- 83 ac	Georgia-Pacific	none	
6-21	Land		0.05	0.95		22 ac	Coos Head	log storage & handling	
	Water								





OCCUPANCY/VACANCY SUMMARIES

OCCUPANCY/VACANCY (IN ACRES) OF POTENTIAL INDUSTRIAL SITES IN TENTATIVE COASTAL SHORELAND BOUNDARY BY ECONOMIC SECTOR

MAJOR FOREST IND.			OTHER L & WP			PETROLEUM & FUEL			WATERBORNE TRANSPORTATION			SALMON SEARANCHING			FISH PROCESSING			AGGREGATE		
SITE #	Occ	Vac	SITE #	Occ	Vac	SITE #	Occ	Vac	SITE #	Occ	Vac	SITE #	Occ	Vac	SITE #	Occ	Vac	SITE #	Occ	Vac
2-12	57.0	38.0	2-6	6.4	1.6	4-1	2.0	-	3-1	1.3	5.4	2-11	2.4	5.6	5-6	1.0	-	3-2	1.8	7.2
						4-2														
2-13	-	10.0	3-10	1.0	-	4-10	5	-	4-8	16.0	-	2-18*	4.0	28.0	5-18	3.5	3.5			
2-14	-	20.0	4-18	6.2	-	4-14	1.5	-	4-12	1.0	4				5-21	6.5	-			
2-15	114.0	114.0	4-28	8.0	-	4-17	1.6	-	4-29	8.0	-				5-22	2.0	-			
2-16	93.0	525.0	6-34	5.7	45.0	4-20	1.8	-	4-30*	3.0	-				5-23	1.0	-			
3-4	-	38.0				4-23	1.2	-	5-19	9.7	5.3									
3-6	-	107.0				5-7	3.0	-	5-20	3.8	1.2									
3-7A	30.0	-							6-1	7.4	-									
3-7B	-	10.0							6-8	1.5	-									
3-8A	75.0	-							6-9	-	1.2									
4-3	-	130.0																		
4-7	-	27.0																		
4-13	.9	.9																		
4-15	61.0	-																		
4-19	2.8	-																		
5-2	31.0	-																		
5-13		80.0																		
6-11A	94.4	-																		
6-11B	51.1	(21.9)																		
6-12	12.3	8.1																		
6-13	6.0	-																		
6-15*	22.5	-																		
6-16A	-	10.0																		
6-18*	45.6	0																		
6-21	22.0	0																		
6-24	-	6.0																		
6-32	3.7	33.8																		
6-39	-	5.7																		
(28)	727.3	1185.4	(5)	27.3	46.6	(9)	11.6	8.0	(10)	51.7	13.4	(2)	6.4	33.6	(5)	14.0	3.5	(3)	31.3	17.7



TABLE 9a

FACILITIES DESCRIPTION	
<p><b>TEMPORARY SERVICE BASES</b>, staging areas from which equipment, supplies, and personnel can be ferried by supply boats and helicopters to offshore rigs; these bases are usually small, and occupy leased land.</p>	PLANNED
<p>Land: 5 to 10 acres on all-weather harbor For warehouses, open storage, operations and office space, helicopter landing sites, and parking.</p>	10 acres
<p>Waterfront: 200 feet of wharf per rig, with 15 to 20 feet of water depth at the pier.</p>	
<p>Water: 14,000 gallons per rig per day for supply boats.</p>	
<p><b>PERMANENT SERVICE BASES</b>, which expend temporary temporary bases' activities</p>	PLANNED
<p>Land: 25 to 50 acres on all-weather harbor</p>	50 acres
<p>Waterfront: 200 feet of wharf per offshore platform</p>	
<p>Water: 23,000 gallons per platform per day during development drilling; little during production</p>	
<p><b>REPAIR AND MAINTENANCE YARDS</b>, set up by firms that contract to provide repair and maintenance service for offshore vessels and equipment; often local firms can respond to the need for such services.</p>	PLANNED
<p>Land: location accessible to road, rail or air transportation</p>	No additional facilities
<p>Waterfront: drydock or haul out sites and equipment</p>	
<p><b>FACILITIES DESCRIPTION</b></p> <p>Water: 400,000 gallons per day at a one-platform yard, 165,000 gallons per day at peak activity</p>	
<p><b>STEEL PLATFORM FABRICATION YARDS</b>, whose location and size depend on the size and number of platform forms constructed annually and on the nature of the offshore find. The yard does not have to be laid out on a coastal site nearest the off-shore tracts, since one yard can build platforms for several adjacent leased areas and the platforms can be towed into place. A yard may also be established to join together platform components manufactured elsewhere.</p>	PLANNED
<p>Land: 200 to 1000 acres on a navigable waterway</p>	<p>*** Does not count toward total projected need because the base is an interim use for a site counted as needed for a large paper and pulp mill</p>
<p>Waterway: 15 to 30 foot water depth at the pier, and between 210 and 350 feet of channel and bridge clearance for access to the sea.</p>	
<p>Water: 100,000 gallons per day for nine heat process (roll) its own steel; 1.24 million gallons per day for two to four platforms with steel rolling.</p>	

<p><b>STEEL PLATFORM INSTALLATION SERVICE BASES</b>, which provide warehousing, wharfage, and repair and maintenance support needed while an offshore platform is being erected on its site at sea.</p>	<p><b>PLANNED</b></p>
<p>Land: 5 acres of waterfront land.</p>	<p><b>5 acres</b></p>
<p>Waterfront: 200 feet of wharf space per four platforms installed, with 15 to 20 feet of water depth at pier.</p>	
<p>NOTE: with the production phase fully underway, oil companies may need to construct additional onshore facilities. Their decision to build will depend on the location and size of the offshore find, how the oil and gas will be transported, and the ultimate destination of the fuels. Such facilities may be:</p>	
<p><b>PARTIAL PROCESSING FACILITIES</b>, located either onshore or offshore. If onshore, the plant will require 15 acres per 100,000 barrels of petroleum mixture processed, and 10,000 gallons of water per month.</p>	<p><b>PLANNED</b></p> <p><b>15 acres</b></p>
<p><b>GAS PROCESSING AND TREATMENT PLANTS</b>, which will very likely be constructed if commercial quantities of natural gas are found</p>	<p><b>PLANNED</b></p>
<p>Land: 50 to 75 acres</p>	<p><b>75 acres</b></p>
<p>Water: 200,000 gallons per day</p>	



TOTAL OF ALL ECONOMIC SECTORS' 20-YEAR NEEDS			
SECTORS	LAND NEEDS (ACRES)	WATERFRONTAGE (FEET)	DOCK DEPTH (FEET)
<b>Lumber &amp; Wood Products</b>			
Plywood	0	0	0
Sawmill Facilities	"100.0	"-----	"-----
Secondary Wood Products	"30.0	"-----	"-----
Pulp and Paper	"230.0	"-----	"-----
Wood Panel Plants	"50.0	"-----	"-----
(Sector Subtotal)	"410.0	"-----	"-----
<b>Marine Industries</b>			
<b>Construction</b>			
Barge Building	"100.0	NA	"-----
Boat Building	"22.0	NA	"-----
Marine Repair	"80.0	NA	"-----
Marine (in-bay) Construction	"0.0	500	"-----
Marine Chandlery	"0.0	0	"-----
Marine Fuels	"1.0	200	"-----
Marine Storage	"20.0	0	"-----
<b>Seafood Processing</b>			
Groundfish & Protein Conc.	"17.5	"-----	"-----
Cold Storage	"2.0	"-----	"-----
Unloading Facilities	"0.0	"-----	"-----
Fish Meal Plant	"0.0	"-----	"-----
Traditional Species	"3.5	"-----	"-----
Salmon Aquaculture	"10.0	"-----	"-----
(Sector Subtotal)	"256.0	700 to ?	"-----
<b>Mining, Minerals &amp; Energy</b>			
<b>Oil and Gas</b>			
Temporary Service Base	"10.0	200	20
Permanent Service Base	"50.0	(expansion only of above land area)	
Steel Platform Fab. Yd.	"(250.0)**	"(210+)**	30
Steel Platform Base	"5.0	200	20
Petroleum Processing	"15.0	"-----	"-----
Gas Processing	"75.0	"-----	"-----
Coal & Other Energy	"150.0	1000	"(35+)
Polymetallic Sulfides	"200.0	"-----	"40+
Quarry Rock Loading	"4.0	"-----	Barge depth
(Sector Subtotal)	"759.0	1610	"-----
<b>Transportation</b>			
Airport Extension	"32.0 (water)	"-----	"-----
Surface transportation	Not calculated		
<b>Waterborne Cargo</b>			
Petroleum Facility	"20.0	1000	"35+
Chip Facilities (2)	"40.0	2200	"35+
Log Facility (1)	"20.0	800	"35+
Lumber Facilities (3)	"40.0	2200	"35+
(Sector Subtotal)	"120.0 (land) "32.0 (water)	6200	"-----
**Planned as interim use on same site identified to fulfill 230 acre need for pulp and paper mill facility; not counted toward total need figure.			
<b>Other</b>			
<b>Tourism</b>			
Indian Point	"150.0	"-----	"-----
Others	"10.0	"-----	"-----
Foreign Trade Zones	"30.0	"-----	"-----
Other Manufacturing	"0-100.0	"-----	"-----
(Sector Subtotal)	"190.0 to 290.0	"-----	"-----
<b>TOTAL ALL SECTORS</b>	"1517.0 to 1617.0	8300 to ?	Various depths

## 5.6 ECONOMIC NEED PROJECTIONS

### 5.6.1 Introduction

The Coos County Board of Commissioners contracted in July, 1981 with the CCD Business Development Corporation for an economic survey and projection of industrial land needs to 2000 A.D. The full results of CCD-BCD's efforts have been published and distributed as a 300-page document entitled Industrial Land Needs Survey and Comparative Advantage Analysis – Coos Bay Estuary (October, 1981).

The purpose of this section is to summarize very briefly the basic findings of the CCD-BDC report, and then convert the projected needs into categories of "water-dependent" needs, "water-related" needs, and "non-dependent, non-related needs". The following quotations from the CCD-BDC report's introductory section will help introduce the report's format:

"Organized around five industrial sectors, the survey and analysis are broken down into 18 chapters which correspond to major industrial sub-sectors. Land use needs in the Coos Bay Area are analyzed and projected for the following Industrial sectors and sub-sectors."

#### Lumber and Wood Products

- Plywood Mills
- Sawmills
- Secondary Wood Products
- Pulp and Paper
- Wood Panel Plants

#### Marine Industries

- Marine Construction and Support
- Seafood Processing and Unloading
- Salmon Aquaculture

#### Mining, Minerals and Energy

- Oil and Gas
- Coal and Other Energy Industries
- Manganese Nodules
- Quarry Rock, Sand and Gravel

#### Transportation

- Airport
- Surface Transportation
- Waterborne Cargo

#### Other

- Tourism
- Foreign Trade Zones
- Other manufacturing

"The information was developed by proceeding through a three step analytical approach with conclusions presented in Step 4. The first three steps include a supply analysis, a demand analysis, and a comparative advantage analysis. The industrial land needs (Step 4) is based on both outside advice and published material as summarized in Steps 1, 2, 3. Major assumptions are explicitly stated in Step 4, although it is worth repeating one major

assumption which pervades the entire survey and analysis: that during the planning period, interest rates will decline and national recovery will commence. Without those two conditions, very little in the way of economic development can be expected."

"Although the survey and analysis were typically concerned with industries which are dependent on waterfront locations (water-dependent industries), other industries were included which are less dependent on the water (water-related industries or non-water-dependent, water-related industries.) This relatively all-inclusive approach should improve the planning process is thorough, there may be no industrial sites provided for non-water-dependent, water-related industries. It should also be noted that projections of industrial land were made for the Coos Bay Area (or Growth Center), and not, we should emphasize, for the Coos Bay Estuary and associated shorelands."

#### 5.6.2 Need Summarizes by Economic Sector

For each sector of the economy, CCD-BDC summarized its conclusions and rationale about future activity in sections entitled "Step 4. Industrial Land Needs", which were each based on information developed in earlier steps. In most cases, the exact quotations below are from "Step 4" of each economic subsector. However, recent developments since the writing of the CCD-BDC report (1981) have necessitated revisions and additions to this section, including subsections discussing steel platform fabrication yards, polymetallic sulfides, coal transshipment, and manganese nodules.

##### LUMBER AND WOOD PRODUCTS

- Plywood Mills

"It is expected there is a 30 percent chance that additional industrial land will be needed for new plywood mill facilities. Therefore, it is estimated that additional industrial land will not be needed for the plywood industry.

This projection is based on the following assumptions:

1. There will not be a major change in forest policy such that additional public stumpage will be made available to fill in for the projected shortfall of private timber.
2. Marketing inroads made by Southern and Canadian producers will continue to displace West Coast plywood east of the Rocky Mountains and in foreign markets.

In addition to the above assumptions, there are other reasons for the low probability of new plywood mill facilities related to the diminishing comparative advantage of the Oregon plywood industry. Raw material shortages combined with marketing problems do not create an optimistic future, according to industry sources.

On the other hand, it should not be forgotten that Oregon continues to produce more softwood than any other state. Combined with the technological feasibility of peeling small diameter logs, the probability of future industry growth should not be entirely discounted."

SUMMARY OF 20-YEAR INDUSTRIAL  
LAND NEED FOR  
PLYWOOD MILL FACILITIES

Facilities	20-Year Land Needs (Acres)
Future manufacturing Facilities	0
TOTAL	
	0

- Sawmills

"It is expected there is a 95 percent chance that additional industrial land will be needed for new sawmill facilities. It is estimated that approximately 100 acres should be made available for future development of this industrial opportunity. It is understood that the parcel size would be adequate to support all land use requirements of one large mill producing annually 100 million board feet.

This projection is based on the following major assumption:

1. Social/political problems of obtaining land use clearances will not be perceived as insurmountable or excessively expensive.
2. Capital will be available at reasonable interest rates to finance construction of new facilities.

In addition to the above assumptions, reasons for the strong forecast of additional sawmill facilities are related to several factors which seem of equal importance. Significant quantities of raw materials, including maturing stands of second growth, will be available to major companies in the industry. Marketing will be met by stiff challenges, especially during periods of depressed prices, but the industry orientation to the growing Western U.S. and Pacific Rim markets combine to create a favorable market outlook for the long term.

In the future, the sawmill industry will be pressured to located closer to the resource than it has before. The large throughput of logs associated with a small log mill is mainly responsible, though the prospect for continuing disproportionate increases in the cost of diesel fuel to transport logs will be contributing factor. Due to regulatory pressures and physical problems, the economics of water transportation of logs appear unfavorable. As a result, dry land storage of logs will require larger industrial needs acreages."

SUMMARY OF 20-YEAR  
INDUSTRIAL LAND NEEDS  
FOR SAWMILL FACILITIES

Sawmill Facilities	20-Year Land Needs (Acres)
Future Manufacturing Facilities	100.00
TOTAL	
	100.00

- Secondary Wood Products

"It is expected there is a 95 percent chance that additional industrial land will be needed for new secondary wood products manufacturing plants and associated facilities. It is estimated that 30 acres should be made available for future development of this industrial opportunity.

This projection is based on the following assumptions:

1. Interest rates will decline to affordable levels, which will in turn stimulate housing and furniture and other secondary wood products sales.
2. Entrepreneurs with the necessary skills, management ability and financial capability will be available locally to take advantage of these opportunities.
3. Woodworkers will be available as prevailing industry wage rates which are below wage levels in Coos County sawmills and plywood mills.

In addition to the above assumptions, reasons for the strong forecast of new secondary wood products manufacturing plants are related to the growing Western U.S. markets. In addition, there are a number of innovative companies in the region which are developing new products. Coos Bay, itself, has a new company which is combining utility grade lumber and veneers to create higher-valued products. In neighboring Douglas County in the past 12 months, there have been a new plant startup (Sutherland) and a major expansion of an existing operation (Drain) in the laminated beam yield (both in the face of high interest rates and a down economy). The availability of Certified Development Company financing will help bring more such opportunities to fruition."

**SUMMARY OF 20-YEAR INDUSTRIAL  
LAND NEEDS FOR SECONDARY WOOD  
PRODUCTS MANUFACTURING FACILITIES**

<u>Facilities</u>	<u>20-Year Land Needs (Acres)</u>
Future Manufacturing Facilities	30
<hr/> TOTAL 30	

- Pulp and Paper

"It is expected there is a 90 percent chance that additional industrial land will be needed for new pulp and paper mill facilities. It is estimated that approximately 230 acres should be made available for future development of this industrial opportunity. It is understood that the parcel size would be adequate to support all land use requirements for a plant producing 1,000 tons per day of bleached white board.

This projection is based on the following major assumptions:

1. Projections of future fiber availability will show adequate supplies at reasonable prices.

2. Capital will be available at reasonable interest rates to permit construction of new facilities.
3. Social/political problems of obtaining waste discharge and land use permits will not be perceived as insurmountable or excessively expensive.

In addition to the above assumptions, reasons for the strong forecast of additional pulp and paper mill facilities are related to the strong marketing position of the U.S. industry. The establishment and importance to this industry of foreign markets reinforces Coos Bay's comparative advantage as a deep-draft port.

Another compelling factor contributing to the comparative advantage of Coos Bay relates to the ownership by some of the industry's leading companies of significant amounts of raw material. In addition, a superior industrial site is owned by firms apparently dedicated to its full industrial utilization.

**SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR PULP AND PAPER MILL FACILITIES**

<u>Pulp and Papermill Facilities</u>	<u>20-Year Land Needs (Acres)</u>
Future Processing Facilities	230
TOTAL	
	230

- Wood Panel Plants

"It is expected there is a 60 percent chance that additional industrial land will be needed for a new wood panel plant and associated facilities. It is estimated that approximately 50 acres should be made available for future development of this industrial opportunity. It is understood that the parcel size would be adequate to support all land use requirements of one plant producing 200 million square feet, 3/4 inch basis, annually.

This projection is based on the following assumptions:

1. Export markets for wood panel products will remain small relative to the domestic market.
2. Indirect connections to railroad mainlines and interstate freeways will remain unchanged.
3. There will not be a major change in forest policy such that additional public stumpage will be made available to fill in for the projected shortfall of private timber.

In addition to the above assumptions, reasons for the medium forecast of new wood panel manufacturing facilities are related to the less-than-optimum location on the coast of raw materials and domestic market links. A 300-mile radius around Coos Bay for supply of raw material is effectively cut in half by the seaboard location.

On the other hand, there are several reasons why the probability of a new wood panel plant is moderately optimistic for Coos Bay. Several of the major companies in the wood panels industry have extensive land holdings – including commercial timberlands – in Coos County.

Both Eureka and Crescent City, California, which share with Coos Bay such characteristics as seaboard locations and indirect connections with railroad mainlines and interstate freeways, have wood panel plants. Other reasons include the growth of foreign markets and the greater fiber orientation in the forest products industry."

**SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR WOOD PANEL PLANTS**

<u>Facilities</u>	<u>20-Year Land Needs (Acres)</u>
Future Manufacturing Facilities	50
<b>TOTAL</b>	<b>50</b>

**MARINE INDUSTRIES**

- **Marine Construction and Support**

"It is expected there is a 100 percent chance that additional industrial and commercial land will be needed for marine construction and support industries. It is estimated that 223 acres will be needed.

This projection is based on the following major assumptions:

1. The demand for new commercial vessels and vessel conversions will develop as the studies predict.
2. The demand for marine repair and haul out services in Coos Bay will be supplemented by vessels which are predominantly associated with the Alaska fishing industry.
3. The rate of growth of barging as a mode of waterborne transportation in the Pacific Northwest will develop as the studies predict.
4. Increasing numbers of vessels will participate in the joint venture fishery on the West Coast, and will utilize the Port of Coos Bay for provisions and fuel, as they have already begun to do.
5. Regulatory controls on marine construction (in-bay) projects will not be substantially reduced.

SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR MARINE CONSTRUCTION AND SUPPORT INDUSTRIES

Facilities	20-Year Land Needs Backup (acres)	Frontage (feet)
Vessel Construction and Marine Repair		
Barge Building	100	NA
Boat Building	22	NA
marine Repair	80	NA
Marine Construction (in-bay)	0	500
Marine Chandlery and Supply	0	0
Marine fuels	1	200
Marine Storage	20	0
	TOTAL 223	700

NA = Not Available

- Seafood Processing and Unloading

"Assumptions"

The subsequent projections of industrial land needs are based on a set of assumptions which would materially affect the level and pace of development if the assumptions do not prove to be accurate. Some major assumptions include the following:

1. Groundfish tariff policies of the United States and European Economic Community will not change.
2. International relationships with the USSR and Soviet-Bloc nations will remain normal and allow a continuation and expansion of the joint Venture concept. Congress will not amend the Jones Act to permit U.S. investors to buy surplus hulls of foreign manufacture for utilization as "mother ships" for the purpose of accelerating development of domestic at-sea processing.
3. Congress will not approve an expansion of the Capital Construction Fund such that investors in processing facilities would qualify for tax shelters which permit accelerated accumulation of equity capital for shore-based plants. This program is already available for fishing vessel investments.

It should be noted that a change in any of the above assumptions could tend to accelerate the pace of domestic fishery development. In particular, #4 (Capital Construction fund) seems most susceptible to change.

- Industrial Land Needs

Estimates of industrial land needs were made with the benefit of an additional simplifying assumption. The assumption is that the present seafood processing capacity, though currently under-utilized, is only adequate to support the processing requirements of the relatively high



valued, traditional species including groundfish, shellfish and salmon during normal economic times. However, inasmuch as these species are harvested close to MSY, major additional processing capacity (and industrial land) for traditional species is not projected. The following estimates of industrial land needs are based primarily on requirements which may be created by development of the large biomass of under-utilized species which exist offshore Oregon and, to a lesser degree, Alaska. In order to assure that these fisheries develop as some authorities believe they will, the following estimates of industrial land needs should be taken into account.

- Groundfish, Processing of Fresh Fillets

There has been substantial expansion of this activity in Oregon ports in recent years. The species experiencing the greatest increase in harvest have been brown (widow) rock and Dover sole. While substantial poundage has been landed in Coos Bay, according to natural Resources Consultants (NRS), there is excess capacity of processing facilities. NRC also concludes that most groundfish which are suitable for this type processing (fresh market) are harvested close to MSY. Currently, this activity shares 14 acres with other processing activities such as salmon, crab, shrimp, scallops, and tuna. An additional 3.5 acres is vacant and available for development. Beyond these 17.5 acres, there would not appear to be a need for additional industrial land for this type of processing.

- Groundfish, Processing of Frozen Fish Blocks into Fillets

NRC reports that this type of shore-based activity may be one of the better opportunities for utilizing Pacific whiting (pre-processed into frozen blocks at sea) in West Coast ports. NRC also reports that such a facility should be located nearby cold storage. Therefore, there would appear to be a reasonable need for additional industrial land in the amount of five acres nearby a cold storage facility. This would accommodate two plants with a total annual input capacity of frozen headed and gutted whiting of 20 million pounds each. If the average recovery on headed and gutted whiting is 75 percent, the combined throughput of the two plants would represent a round weight catch of 24,000 metric tons, which is approximately nine percent of the optimum yield of Pacific whiting.

- Groundfish, Conversion of Frozen Blocks into Breaded and Battered Products

Neither NRC or CH<sub>2</sub>M Hill and Pigott believe that this type of facility will be built in coastal ports such as Coos Bay. Instead, they believe that such facilities will continue to locate in large cities such as Los Angeles or Chicago. On the other hand, the potential of an available labor force and lower land costs in Coos Bay could overcome some industry traditions and transportation disadvantages. Therefore, there would appear to be a reasonable need for additional industrial land in the amount of 2.5 acres. This would accommodate one plant with a total annual input capacity of 20 million pounds of frozen headed and gutted whiting. Based on the above mentioned recovery and optimum yield assumptions, this throughput would represent six percent of the optimum yield of Pacific whiting.

- Fish Protein concentrate (FPC)

None of the major studies analyzed the potential for FPC. However, discussions with an Oregon State University food technologist indicate that successful development of a pilot plant in Astoria is only months away. Production facilities handling 200,000 pounds per day of Pacific whiting are expected to follow. Coos Bay is expected by the O.S.U. scientist to be very competitive for such production facilities, given the close proximity of Coos Bay to the greatest concentration of Pacific whiting. Therefore, there would appear to be a reasonable need for additional industrial

land in the amount of 10 acres. This would accommodate two plants with a total annual input capacity of Pacific whiting of 40 million pounds (round weight). Based on the above mentioned optimum yield assumptions, the combined throughput of the two plants would represent 18 percent of the optimum yield of Pacific whiting. Substitution of other species would reduce this percentage.

- Cold Storage

There are no cold storage facilities available for public use in the Coos Bay area. If this situation is not changed, Coos Bay could lose opportunities for future involvement in the groundfish industry. NRC projects that temporary storage of groundfish blocks prior to secondary processing – locally or elsewhere – may be one of the better opportunities for a few West Coast ports. It would appear that a cold storage facility would tend to induce shoreside and offshore economic development, although full utilization may not be immediate. Further, the availability of Certified Development Company financing gives Coos Bay a competitive edge. There would appear to be a reasonable need for additional industrial land in the amount of two acres. This would accommodate one cold storage plant with a capacity of 25 million pounds.

- Unloading Facilities

Coos Bay has recently constructed a new seafood unloading dock (T-dock) as a first step in developing the North Bay Marine Industrial Park. It would seem that this facility will be adequate to fulfill the seafood off-loading requirements of Coos Bay well into the future. Special unloading facilities to handle containers of fish transshipped by barges from Alaska do not seem likely. There appears to be a belief that Coos Bay would not be the logical point for transshipment of groundfish blocks from Alaska due to the lack of a backhaul. Therefore, there would not appear to be a need for additional industrial land for this purpose.

- Fish Meal Plant

Coos Bay has recently added a modern fish meal plant to its seafood industry. Although full scale production has not been reached, it is believed that this plant will be able to handle all of the locally generated fish waste in the foreseeable future. Only if pre-processing of Pacific whiting were to come ashore would this situation change. This is not anticipated by any of the major studies. Therefore, there would not appear to be a need for additional industrial land for this purpose.”

SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR SEAFOOD PROCESSING FACILITIES

<u>Seafood Processing Facilities</u> <u>Future Processing Facilities</u>	<u>20-Year Land needs (Acres)</u>
Groundfish, Processing of Frozen fish Blocks into Fillets	5.0
Groundfish, Conversion of Frozen Fish Blocks into Fillets	2.5
Fish Protein Concentrate	10.0
Cold Storage	2.0
Unloading Facilities	0.0
Fish Meal Plant	0.0
Reserve for Traditional Species Expansion <sup>a</sup>	3.5
TOTAL	23.0

<sup>a</sup> 3.5 acres of land have been identified that are currently unused but that are closely associated with existing processing facilities. It is considered prudent that these be held in reserve for possible expansion (cf. Appendix 7-B) of traditional species.

- Salmon Aquaculture

It is expected there is an 80 percent chance that additional land will be needed for one new salmon ranch. It is estimated that approximately 10 additional acres should be made available for future development of this industrial opportunity.

This projection is based on the following assumptions:

1. The private salmon aquaculture industry will gain greater control over the homing instincts of adult salmon and thereby reduce straying. In the process, objections to additional entrants by the existing salmon ranches will abate to some extent.
2. A pattern of higher, consistent returns to the private salmon ranches will unfold as the industry matures.
3. Concerns regarding the nutritional capacity of the estuaries and ocean to support juveniles will abate.
4. The moratorium on additional salmon ranching licenses which expires in 1985 will not be extended.

Many, perhaps most, commercial and sport fishermen disagree with several aspects of the salmon aquaculture concept. Among other disagreements, they are concerned with the marketing implications of salmon aquaculture; they are concerned that salmon aquaculture produces few direct jobs at the salmon ranch; and they are concerned about the competition between artificially propagated salmon and wild salmon for food within the estuaries and ocean.

If the industry is considered a candidate for development, it is suggested that the community should request a site evaluation survey from ODFW. It was suggested by one community member that this question may already have been considered by several ODFW biologists, thus perhaps reducing the expense of producing the information.

Overall, it would seem that the salmon ranching industry, as we know it, is not the certain candidate for further expansion that it might seem given the size of the estuary. Aside from the political problems with commercial salmon fishermen, which could conceivably be reduced, salmon ranching has been characterized by irregular adult returns. For example, in 1981, at the same time that ODFW reported a 20 percent contribution by salmon aquaculture to the commercial salmon catch, salmon ranches on Coos Bay experienced some of the best returns of coho and Chinook since startup. On the other hand, the 1981 chum salmon return, based on the 8.2 million release in 1979, was reported to be very disappointing.

A possible evolution of the salmon aquaculture business would be toward more limited, small-scale operations which would be physically removed from the estuarines. Examples would be the STEP program where public groups will hatch and release smolts into the tributaries, with minimal recapture facilities for egg take only. Another example would be small private units which would hatch and rear salmon smolts at rural, freshwater sources for subsequent contract sale to the large salmon ranchers. A variation of this approach is common in Norway. An O.S.U. economist who specializes in salmon ranching predicts this type of industry evolution, partly based on the observation that many industries evolve similarly in the direction of small-scale specialization. It should be noted that neither of these developments would require lands along the Coos Bay Estuary.

**SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR SALMON AQUACULTURE FACILITIES \***

Salmon Aquaculture Facilities	20-Year land Needs (Acres)
Future Facilities	10.0
TOTAL	10.0

NOTE: this estimate applies to integrated facilities constructed at the point of release-recapture, which may include hatcheries, rearing raceways, recapture ladders, processing and employee support facilities.

**MINING, MINERALS AND ENERGY**

- Oil and Gas

"In a 1978 study by the Oregon State University Sea Grant College Program, the following statements were made:

The amount of land required by each type of facility for offshore oil development is known. But Oregon's coastal communities may not know what facilities will be constructed within their boundaries until the size and nature of a possible oil or gas find off the state's coast are measured. <sup>16</sup>

In a follow-up article which appeared in another O.S.U. publication in 1981, statements which relate to the likelihood of further oil exploration were made:

"State petroleum geologist Dennis Olmstead...is not skeptical about the potential for oil discoveries somewhere on the Oregon coast. Furthermore, he said from what he knows of the geology of the area, the earth's strata "dips to the west" – the same geology continues under the water. That means if Oregon crude oil shows up along shore, it would likely be found offshore, too, according to Olmstead.

"For the first time, Oregon has natural gas production", said Olmstead. "It points out that there's a good chance of finding hydrocarbons offshore. I think exploration interest will spread down the coast." <sup>17</sup>

At another point in the article, the principle author of the O.S.U. oil study predicted the future level of interest:

According to an Oregon State University Sea Grant publication "Oregon and Offshore Oil," petroleum companies ranked Oregon and Washington lowest among potential petroleum producing areas and both areas were dropped from a 1977 leasing schedule. Co-author and researcher of the 54-page booklet, Jeffrey Stander, an assistant professor of anthropology, said leases will not likely be scheduled for Oregon by the Department of Interior" Bureau of Land Management until after this year.

But, from this research, Stander predicted oil exploration will definitely begin off Oregon's coast in the next few years. He agrees with Olmstead that it will take only a small oil find to bring oil companies to Oregon. He said small deposits are becoming increasingly attractive because of soaring prices for petroleum products and U.S. dependency on imported crude.

<sup>18</sup>

Based on the above observations, and based on a statement in the O.S.U. oil study that "In Oregon, Coos Bay, Newport, and Astoria offer the most probable locations for development related to offshore oil," <sup>19</sup> the following scenario is offered. Using information published in the O.S.U. oil study, a medium level of onshore development, which would allow for adequate support and partial processing, is provided for. However, facilities for platform fabrication, pipeline construction and maintenance, and refineries are not planned." ICCPD NOTE: In the interest of brevity, facilities which are not planned have been deleted from the following tables. Please refer to full CCD-BDC report for greater detail.]

- Coal and Other Energy Industries

"It would appear that a coal export facility and a major methanol production plant are alternative ways of utilizing the same coal resource. It is also likely that establishment of nine-mouth generating facilities would preclude at least the methanol plant, if not both. With regard to the export facility, the entrepreneur has requested 150 acres to allow for the optimal rail loop of 100 acres <sup>7</sup> plus storage and mixing area equal to 10 percent of this annual throughput. With methanol production, the higher the capacity (and more space used) the greater the economies of scale."

Although recent economic events, including both an OPEC price war and successful conservation efforts, have led to an oil glut on the world market, the glut itself as well as the corresponding flattening of the demand for coal export facilities are both seen as temporary occurrences over the long run. The dampening of oil prices and the easing of oil exploration activity are both likely to lead to increased reduction in total oil reserves, which in turn will lead in another cycle to increased need for coal.

All considered, it is felt that there is a 75 percent chance that one of these facilities will be established during the planning period, and that it will require 150 acres of land, with deep-water berthing facilities."

**SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR COAL AND OTHER ENERGY INDUSTRIES**

<u>Energy Production Facilities</u>	<u>No. of Terminals</u>	<u>20-Year Land Needs(Acres)</u>
One Major Future Facility	1-1,000'	150
<b>TOTAL</b>		<b>150</b>

- Polymetallic Sulfides

Mining Industry attention has recently shifted from the capture of manganese nodules to the recovery of polymetallic sulfides. Initial exploratory surveying of the ocean floor where deposits are known to exist began in early 1982. At least two companies outside Oregon are known to be raising venture capital both for exploration and mining of the mineral.

According to Clifford McClain, one of the principals in a Virginia-based venture capital group (personal communication, 5/31/83):

U.S. venture capital is reluctant to invest in mining any place where the operators cannot guarantee sovereignty over the mineral deposits. However, the Gorda Rift, located offshore from the coast of Oregon roughly 70 miles, is within the territorial limits of the United States and thus does not suffer that problem of uncertainty. Only two other known mineral deposit areas in the world (off the coasts of Mexico and Chile) can boast that they are within the territorial limits of a specific nation. The Gorda Rift – and, correspondingly, the Coos Bay area – are thus considered the prime U.S. area for recovery of minerals. It will likely take roughly ten years from initiation of exploration to full-time development and processing of polymetallic sulfides.

Coos Bay is the most efficient port to handle shipment and storage for shipment of the minerals, in part because Coos Bay has no significant bar problem and provides easy shipping access to the likely site on North Spit.

The high percentage of valuable ore contained within the sulfides means that the industry can afford to ship the ore for a considerable anaconda copper smelter in Montana. A considerable amount of land in the Coos Bay area could be devoted to uses other than smelting, including storage areas for the minerals in transit to the processing area, and support bases for the mining operation such as machine shops and equipment repair facilities.

- Quarry Rock, Sand and Gravel

"It is expected there is a 100 percent chance that additional industrial land will be needed for the quarry rock industry. It is estimated that approximately four acres will be needed for two large loading facilities.

This projection is based on the following assumptions:

1. The quarry rock company which has applied for permits to complete the barge loading facility will maintain its interest in the project.
2. Maintenance dredging of the access and natural channels associated with the barge loading facilities will be allowed.

With respect to maintenance dredging to access and natural channels, this capability is necessary to keep open the adjacent barge loading facilities and provide access to the maintained navigation channels. All barge loading facilities share this requirement."

**SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR STORAGE AND LOADING OF QUARRY ROCK  
AND AGGREGATE**

<u>Facilities</u>	<u>20-Year land Needs (Acres)</u>
Future Loading Facilities	4.0
<b>TOTAL</b>	<b>4.0</b>

**TRANSPORTATION**

- Airport

"There is a 100 percent chance that additional land will be needed for a runway extension at the North Bend airport. It is estimated that this project will require extension into a 32-acre fill of the Coos Bay Estuary. This area is a part of the 730-acre property which is owned by the City of North Bend and must be used for public airport purposes.

This projection is based on the following assumptions:

1. Business jets require runway lengths between 4,450 feet and 6,800 feet.
2. During normal economic conditions, business jet aircraft will utilize the North Bend Municipal Airport at approximately the forecasted rate of use and will remain the critical aircraft for planing purposes.
3. During normal economic conditions, demands to land larger aircraft such as DC-9's or Boeing 737's at North Bend will occur either on the part of the certificated air carriers or the air cargo industry.
4. Surface transportation modes into Coos County – highways and railroads – will not be significantly improved.

5. The City of North Bend and other jurisdictions will maintain their long-standing determination to extend the runway.

With respect to the probability of continued interesting the runway extension, there is every reason to believe the effort will continue. Wadell Engineering provided a brief history of the fort:

A long-standing issue of both land use and environmental concern at North Bend Municipal Airport is the extension of Runway 4-22. This proposal, which originated more than 30 years ago, involves about 32 acres of the Coos Bay Estuary. The proposed extension has been fraught with controversy since 1951 and has involved the Cities of North Bend, Coos Bay, and Eastside, Coos County, the Corps of Engineers, the State Lands Commission, the State Court of Appeals, and the State Supreme Court. The point of concern focuses on the environmental consequences of filling a portion of the Coos Bay Estuary to permit the extension. While the extension has had the support of local governments, the State, and the FAA, it has been successfully halted through litigation. <sup>8</sup> "

SUMMARY OF 20-YEAR LAND NEEDS FOR  
NORTH BEND AIRPORT

<u>Airport Facilities</u>	<u>20-Year land Needs (Acres)</u>
Runway Extension	32
TOTAL 32	

- Surface Transportation

"It is expected that the following projects have a better than 75 percent chance of being developed:

Coalbank Slough Bridge – Replacement is programmed for 1984 in the Six-year Highway Improvement Program adopted by the Oregon Transportation Commission on March 25, 1980. Current plans call for a fixed span with 20 feet of low water clearance.

South Slough Drawbridge – This project is scheduled by the Oregon Department of Transportation for construction in 1986. However, federal matching money has not been approved. As a result, it is doubtful that the project will proceed on schedule, although construction by the year 2000 seems highly probable.

North Spit Access Road – Currently the State of Oregon is proposing to spend \$148,000 in Coastal Zone Energy Impact funds to extend engineering to new portions of the road. Prior to engineering, construction cost of the road has been estimated at \$2.3 million (Draft EIS, North Bay Marine Industrial Park). A strategy for raising the funds is pending.

It is expected that the following type of project has a better than 50 percent chance of development:

Other Private Roads – Further research should be conducted to ascertain the necessity and feasibility of private roads which would provide alternative access to natural resources while voiding conflicts over public roads resulting from incompatible transportation.



The following projects have a 50 percent or less chance of development during the planning period:

Coos Bay Railroad Bridge – The appropriations subcommittee of the Senate Transportation Committee in 1981 renewed an earlier commitment to study the process of replacing the Coos Bay Railroad Bridge. The U.S. Coast Guard is expected to release in in-depth study in 1982. However, prospects for replacement of the railroad bridge are clouded by the possible necessity of relocating the airport in the event of a higher Coos Bay Railroad Bridge.

Coalbank Slough Railroad Bridge – According to the Oregon Department of Transportation, application for funds to replace the existing bridge has not been made.

These projections are based on the following assumptions:

1. The general policy of the southern Pacific Transportation Company with respect to improvement of branch lines will remain unchanged.
2. The general policy of the Oregon Highway commission with respect to the allocation of highway funds will remain unchanged.
3. The shortage of federal funds for highway improvements and railroad branch line improvements will remain unchanged.

No attempt has been made to project a total "Industrial land acreage" for the foregoing projects."

- Waterborne Cargo

"Beeman and Associates made the following recommendations <sup>19</sup> regarding development of waterborne cargo facilities in Coos Bay:

The actual land requirements for port facilities will vary depending on the outcome of studies on dredging and the feasibility of modifying the railroad bridge. We recommend the following minimum land allocations be made pending the outcome of the issues:

<u>Facility Type</u>	<u>Berths</u>	<u>Length</u>	<u>Land Area (Acres)</u>
Chips	2	2,200'	40
Logs	1	800'	20
Lumber	3	2,200	40
TOTAL	6	5,200'	100

The recommendations were based on the following assumptions by Beeman and Associates:

1. The provision for the chip berths and the log berth can be eliminated if the bridge is modified and upper bay dredging is feasible. The provision for the lumber berths anticipates conversion of logs to lumber and obsolescence of lumber berths in the upper bay. <sup>20</sup>

2. If the railroad bridge is modified and dredging of the upper bay can continue, prudent planning requires that land be reserved for increased lumber shipments. If half of the recent log exports were converted to lumber, about 260,000 ST of lumber exports would result. This would require an extremely efficient two berth facility operated as a single unit. In addition, two existing lumber berths on the upper bay are too small to accommodate the storage requirements associated with large lumber carriers. At least one of these berths will be obsolete by the year 2000 and require replacement.<sup>21</sup>
3. The other factor influencing facility requirements is the future of log exports. It is our opinion that both economic and regulatory events related to log exports will result in increasing facility requirements. Our reasoning is as follows:

Logs – Regulatory agencies favor reduced storage of logs in the water for environmental reasons. As storage on the water declines, loading from the waterside will also decline. Concurrently, higher loading rates and lower labor costs are now associated with shoreside loading of logs as reflected by stevedore rates for the two methods. This has resulted in an increasing use of shoreside facilities for loading logs. Based on these factors, we believe that all log hauling will be from the shoreside by 2000.

Lumber – There are existing regulations on log exports. The flattening or possible decline of timber production, as evidence already by log imports to Oregon, will increase demand for further export regulation. Concurrently, growing overseas markets for forest products will provide financial incentives to reduce log exports in favor of manufactured product exports. Based on these factors, we believe that log exports will decline and be replaced by lumber and other product exports.<sup>22</sup>

4. To evaluate facility capacity by the year 2000, we have assumed that log exports will have declined by 50 percent at that time. The log exports will move by shoreside loading methods. The logs converted to manufactured products will move from lumber berths.<sup>23</sup>
5. Modern lumber carriers approaching Panamax dimensions have entered into the West Coast-Europe trade in recent years. Typical of these are the Hoegh "M" class ships (44,000 dwt) which are 657' long with a 101' beam. These vessels are taken through the bridge and accommodated in the upper bay. Since the Panama Canal is a major factor for lumber product shipments, this type of ship probably represents the larger ships in this trade in the foreseeable future. The Washington Public Ports Study (WPPA, 1975) noted that "the trend in timber carriers is toward more moderately-sized vessels than bulk carriers in general." They forecast the average vessel to be about 25,000 dwt and the largest to be about 30,000 dwt by 1990.<sup>24</sup>
6. Chip ships are on dedicated runs from the U.S. West Coast to the Far East. Since the chips are light in weight, vessel size is not constrained by draft limitation. With these two constraints removed, longer and wider ships are entering the ship trade. The WPPA study cited earlier noted that chip ships were already exceeding Panamax beam (106') and would experience substantial additional growth in the future. The Coos Bay Pilots report vessels as long as 795' presently calling at the Roseburg Lumber chip facility downstream of the railroad bridge. Other vessels calling at Coos Bay, such as the Ro-Ro ship Lillooet, are approximately 750' in length.<sup>25</sup>

7. Based on the growth in chip carriers, we recommend that provisions be made to either modify the railroad bridge opening or provide land in the lower bay for two chip facilities to replace the four existing facilities (about the equivalent of two large, high capacity facilities) in the upper bay. A total of 2,200 feet of waterfront and 40 acres of backup land should be provided for this purpose. (The rationale for land needs in Coos Bay is contained in the study "The feasibility of Port Development in Coos Bay," (1977), and will not be repeated here.)<sup>26</sup>
8. If dredging above Mile 12 becomes impossible due to environmental or economic restrictions, two log and two lumber berths would require relocation downstream (in addition to the chip facilities already discussed). For reasons already discussed, this relocation should be to areas downstream of the railroad bridge.<sup>27</sup>
9. The increase in petroleum receipts from California will require that a new berth be made available or expansion room be provided for storage tanks adjacent to existing facilities.<sup>28</sup>

Even though McCall Oil Company has not renewed its option on Port of Coos Bay property in the lower bay, it is expected that storage and bunkering facilities will be established at some point in the not-distant future, and must be provided for.

Local citizens, including the Port of Coos Bay, made the following recommendations (which appear in the Economic Development and diversification White Paper) for improvements of Coos Bay cargo loading facilities: "Port studies indicate that existing upper bay terminals can be expanded and modernized to accommodate increased needs. However, all new terminals should be located in lower bay on northwest side between mile 5.5 and mile 9. Most of this frontage is privately owned. The Port has approximately 6,000'."<sup>29</sup>

**SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR WATERBORNE SHIPPING FACILITIES**

20-Year Waterborne Shipping Facilities	Number of Terminals	Length(Feet)	Land Needs (Acres)
Petroleum	1	1,000	20
Chips	2	2,200	40
Logs	1	800	20
Lumber	3	2,200	40
<b>TOTAL a,b</b>	<b>7</b>	<b>6,200</b>	<b>120</b>

- a As explained in the assumptions, actual 20-year land needs may be less than the total if the bridge is modified and upper bay dredging is feasible.
- b Excluding coal facilities. See Section 10.

OTHER

- Tourism

"It is estimated that there is a 90 percent chance that Coos Bay will be selected for location of major tourist facilities (overnight accommodations and eating establishments). It is estimated that approximately 160 acres will be needed for both one announced project and one or two other developments.

The projection is based on the following major assumptions:

1. Progress will continue to be made toward improving transportation access to the Coos Bay area.
2. The relative price and availability of gasoline – both nationally and on the Oregon Coast – will not deteriorate further from the present situation.
3. The U.S. economy will recover from the recession which has gripped the county since the fourth quarter of 1979.
4. Local efforts to promote special events such as the classical music festival and the competition for joggers and distance runners will continue at present or higher levels.
5. The environmental and aesthetic qualities of the Coos Bay area will be maintained.
6. The necessary infrastructure, including sewage disposal and water, will be developed and extended to suitable locations."

**SUMMARY OF 20-YEAR LAND NEEDS  
FOR TOURISM FACILITIES**

<u>Tourism Facilities</u>	<u>20-Year land Needs (Acres)</u>
Future Facilities	
- Indian Point Development	150
- Other Developments	10
<hr/>	
TOTAL	160

- Foreign Trade Zones

"It is estimated that there is a 70 percent chance that perhaps 30 acres will be required for a special or manufacturing sub-zone in Coos Bay during the 20-year planning period, perhaps in connection with industries discussed in Section 18, "Other Manufacturing".

"Coos Bay is not located advantageously with respect to major U.S. markets, and so cannot realistically expect development of a "model zone" as envisioned by Garvin. Besides manufacturing for export, another possibility would seem to be in warehousing, or possibly cold storage, in connection with joint venture fisheries or secondary wood processing."

SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR A FOREIGN-TRADE ZONE

Foreign Trade Zone	20-Year Land Needs (Acres)
Future foreign-Trade Zone Facilities	30
TOTAL	
	30

- Other manufacturing

"A common method for depicting aggregate demand for industrial land is via employment projections in relation to employment densities. As discussed earlier, it can be expected that high technology firms require approximately one acre per 25 to 40 employees. If a typical firm employs 100 to 200 persons, it will require a site from 4 to 6 acres each. Taking provision for future expansion into consideration, it is reasonable to expect that each firm will require a site 5 to 10 acres in size.

Because Coos Bay recently does not possess any substantial high technology firms, there is no existing local experience upon which to base projections. However, because of recruitment efforts to bring high technology firms to Coos Bay, it is reasonable to expect this type of firm to locate here during the planning period. In addition, experience elsewhere indicates that, when one high technology firm locates in an area, it can be expected that other firms will situate there to take advantage of the same locational factors.

It is not unreasonable to expect that, through a rigorous recruitment effort, during the 20-year planning period approximately 10 high technology firms will locate in Coos Bay. Providing an average of 10 acres for each of these firms will thus require allocating about 100 acres for this sector. Whether this requirement can be accommodated outside the estuarine zone is highly debatable, and must be resolved before the effects of this sector's needs on the estuarine zone can be projected.

It would be preferred if industrial parks ranging from 30 to 75 acres in size could be developed to handle expansion for such firms."

SUMMARY OF 20-YEAR INDUSTRIAL LAND NEEDS  
FOR OTHER MANUFACTURING

Other Manufacturing Facilities	20-Year Land Needs (Acres)
Future Other manufacturing Facilities	0-100 *
TOTAL 0-100 *	

\* Depending on the amount of suitable land available outside the estuarine zone.

### 5.6.3 Conclusions

According to the preceding results, 1517 to 1617 acres of industrial land will be needed for new and expanded facilities for the various economic sectors by the year 2000. However, these results are not yet sufficiently refined, for use in the tentative site-selection process (described in Section 5.9). Two intermediate problems require resolution:

- the needs must be desegregated as much as possible into the categories "water-dependent";
- the projections must be shown to be compatible with the industrial land need projections contained in the Proposed Coos County Comprehensive Plan.

#### The Issue of Water-Dependency

Separating the projected land needs into the three categories of relative water-dependency is not simple: some industries, especially those that require large amounts of land, will need access for exporting products yet will not require a coastal shoreland location for their processing except to accommodate the need for a consolidated facility. an example of an existing industry with a similar makeup is the Roseburg Lumber facility on the North Spit. Logs are trucked to and stored on site, where they are chipped and sent through a conveyor system to a waiting ship moored at the deep draft berth. While much of the site and operation is "non-dependent/non-related" to the estuary, the plant generates tremendous fuel cost savings by not having to truck the chips to the dock.

These circumstances indicate that it is not possible to make a precise determination of the extent to which a project economic sector facility needs an estuarine location until the physical plant is proposed for construction. However, to aid in preparing the tentative site selection process, it is possible to suggest the likelihood of waterfront requirements for new facilities in each economic sector. the following estimates are based partly on the current economic makeup of the Coos Bay Estuary and on the discussion within the CCD-BDC report.

- Lumber and Wood Products

230 acres = Water-dependent  
0 acres = Water-related  
180 acres = Non-dependent/non-related

Assumption: Future logs for milling, chipping and peeling will be smaller and therefore less easily rafted to the site. Export at a dock would make the shipping facilities portion "water-dependent".

- Marine Industries

256 acres = Water-dependent  
0 acres = Water-related  
0 acres = Non-dependent/non-related

Assumption: LCDC goal language as well as the industry's specialized needs for proximity to water require a finding of water-dependency.

- Mining, Minerals and Energy

419 acres = Water-dependent  
 90 to 0 acres = Water-related  
 0 to 90 acres = Non-dependent/non-related

Assumption: The oil and gas service bases as well as the storage of bulk commodities of coal and manganese are likely to occur in the Coos Bay Estuary only because of the presence of deep draft shipping capability. The entire site for each use is readily definable as a loading/export facility, since a requirement for storage separate from the dock would completely negate the economic advantage of the waterfront site.

However, the petroleum/gas processing facilities are at best only related to the water (because of transfer of petroleum/gas by pipeline).

- Transportation

152 or 120 acres = Water-dependent  
 0 or 32 acres = Water-related  
 0 or 32 acres = Non-dependent/non-related

Assumption: While the waterborne cargo facilities are, by size and definition, loading and transfer sites and are therefore water-dependent, the proposed fill for the North Bend Airport runway extension can fit any category. As shown in an earlier exception, the existing airport site is the only suitable site for regional air traffic. Since the estuarine fill can only be placed in one area, the use (runway extension) cannot 'exist' separate from the water. Contrarily, the estuarine location is simply incidental to the function of the airport; the waterfront provides no essential benefits toward the proper functioning of the airport.

- Other

110 to 50 acres = Water-dependent  
 40 to 0 acres = Water-related  
 140 to 280 acres = Non-dependent/non-related

Assumption: At the minimum, roughly 10 acres of the proposed Indian Point destination resort is proposed to be uses associated with an in-water marina (such as dry land moorage). The foreign trade zone could fit any category depending upon how it is designed physically and legally. The bulk of the report complex, and all of the other manufacturing are both not related to an estuarine location by definition.

TOTAL

Water-dependent needs = 1035 to 1107 acres  
 Water-related needs = 0 to 162 acres  
 Non-dependent/non-related needs = 320 to 582 acres

The totals are presented only for comparison; Section 5.9 will use only the ranges derived for each economic sector.

## Compatibility with the Proposed Coos County Comprehensive Plan

The Proposed Coos County Comprehensive Plan (Coos CCP) projects a mid-range need for industrial land of 454 to 908 acres to the year 2000 for the entire county, yet the CCD-BDC report projects a range of 1517 to 1617 acres to the year 2000 only for the Coos Bay Area "Growth Center". The following points of explanation will resolve the apparent discrepancy:

- The Coos C.C.P. projection ("Alternative B". in the Plan) assumes that industrial employment will maintain its 1978 ratio to total employment through the year 2000, and estimates that one acre of additional land will be needed for each additional 5-10 industrial employees. While the employee/acre estimate is suitable for the broad scope of industrial uses in the County, the estimate does not fit well in the Coos Bay Estuary, where very large storage areas are required (prior to export) that support very few employees.
- The Coos C.C.P. projection of future total employment is based on projected increases in population. The CCD-BDC report focuses instead on specific expected (greater than a 50% chance) industrial occurrences; many of the potential uses would be entirely new to Coos County as well as to the Coos Bay Estuary. Such new uses were not accounted for in the Coos C.C.P.

### 5.7 DEVELOPMENT PRIORITY AREAS

#### 5.7.1 Introduction

This section serves as a necessary link between the products of the previous – quantification of development – and the results of a later section (5.9) – selection of qualifying sites. The focus of this section is the identification and mapping of areas that qualify under the differing requirements of Goal #16 (Estuarine Resources) and Goal #17 (Coastal Shoreland) for the placement of water-dependent uses.

#### 5.7.2 Statewide Goal Requirements

##### Goal #16

In describing "Development" management units, Goal #16 requires that:

"...areas shall be designated to provide for navigation and other identified needs for public, commercial, and industrial water-dependent uses,..."

and that

"...such areas shall include:

- deep-water areas adjacent or in proximity to the shoreline,
- navigation channels,
- subtidal areas for in-water disposal of dredged material, and
- areas of minimal biological significance needed for uses requiring alteration of the estuary." [Goal #16]



A subsequent Section (5.8.3) will explore in more detail the planning problems these apparently simple statements cause; for the moment it is noted that the Goal's failure to define the terms "deep-water", "in proximity", and "minimal biological significance" means that value judgements must be made about the meaning of the terms so that the identification process can be completed.

### Goal #17

The requirements of Goal #17 are not only more specific than those of Goal #16, but are also, as shall be shown later, more difficult to apply to specific areas. In identifying the types of uses that may occur on coastal shorelands within Urban Growth Areas (or, UGA shorelands), Goal #17 first requires an identification of sites "especially suited for water-dependent uses" (referred to henceforth as ESWD areas). The goal lists four factors "which contribute to this special suitability" (emphasis added):

- "deep water close to shore with supporting land transport facilities suitable for ship and barge facilities;
- potential for aquaculture;
- protected areas subject to scour which would require little dredging for use as marinas; and
- potential for recreational utilization of coastal water or riparian resources."

As is the case for Goal #16, Goal #17's failure to define these factors more precisely leaves their identification subject to value judgements. While value judgements are a necessary part of any planning process, their importance is considerably increased for two reasons. First, under the Oregon planning program, local values are subject to state approval. The local governments' judgement of what is, for example, "close to shore" may differ sharply from that of the judgement of resource agencies, both of which may differ from the separate value judgements of DLCD plan reviewers and LCDC itself. Second, the value judgements will directly affect the types of uses allowed to occur within shoreland areas because Goal #17 requires, once ESWD areas are identified, that they "...shall be protected for water-dependent recreational, commercial and industrial uses." [Emphasis added]

The following section discusses the mapping of each characteristics, and the problems encountered, in greater detail.

### 5.7.3 Mapping of Criteria

#### 5.7.3.1 Goal #16 'deep water areas...'

The Oregon Department of Fish & Wildlife (ODFW), in response to a request by the Inter-Agency Task Force (IATF), has mapped this criterion for the Coos Bay Estuary as shown on the map entitled "Estuarine Areas Qualifying as Development Management Units Under Estuarine Resources Goal". Unfortunately, ODFW has not mapped this criterion separately but has instead combined it with areas that qualify, in ODFW's judgement, as being "of minimal biological significance need for uses requiring alteration of the estuary". Therefore, there may be additional areas not mapped by ODFW that qualify under one criterion but not under the other criterion. While this portion of the inventory document will not presume to identify other areas of minimal biological significance, one additional area – the water frontage of the Port of Coos Bay "T-dock" – has been

mapped as qualifying as a "deep water area..." because it borders on a navigation channel turning basin and is currently used (and proposed to be used) by commercial fishing vessels.

The deep-water areas mapped include areas at a current depth of 37' (primarily along portions of North Spit, along the Coos Bay/North Bend water front and in upper Isthmus Slough), areas at a current depth of +20' (primarily the Empire and Sitka Dock water fronts), areas at a current depth of 17' (primarily the Charleston Boat Basin, Charleston Channel, and Hanson's Landing water front), and certain scattered sites along side navigation channels at a depth of +5'.

#### 5.7.3.2 Goal #16 "navigation channels"

Mapped areas include the deep-draft shipping channel, the authorized Charleston Channel and Coos River Channels, the non-maintained Marshfield Channel, and the privately maintained channel at Hanson's Landing.

#### 5.7.3.3 Goal #16 "subtidal...disposal areas"

These sites are mapped in accordance with the results of Section 7 of this Inventory document, "Special Dredged-Material Disposal Element".

#### 5.7.3.4 Goal #16 "areas of minimal biological significance..."

Problems encountered in ODFW mapping of this criterion were discussed in Section 5.8.3.1. An additional process problem is that this goal requirement has two parts: sites must not only be of minimal biological significance but must also be shown to be needed for uses requiring estuarine alteration. Since site selection will be accomplished in a later section (5.9), the process is circular: areas of minimal biological significance are identified and mapped, then the site selection process determines whether identified sites meet the identified needs (and whether sites of minimal biological significance are needed).

#### 5.7.3.5 Goal #17 "deep water..." criterion

The four Goal #17 criteria for identifying ESWD areas rely mainly on an assessment of the characteristics of the adjacent or nearby water. This in itself is appropriate, but it is not sufficient to determine special suitability. Two problems tend to interfere with an easy identification of "deep-water" areas:

- First, as earlier stated, the identification requires a value judgement regarding the meaning of "close to shore";
- Second, and perhaps more important, the suitability of a particular land area and its consequent identification as an ESWD area depends entirely on whether the deep-water areas close to shore and the intervening intertidal/subtidal areas can be utilized for development by land-based water-dependent uses.

Thus, the careless identification of Goal #17 criteria can easily require a land area to be "protected" as such for water-dependent uses even though such uses can never occur if development of adjacent water areas and tidelands is not permitted under Goal #16.

Although Goal #16 and Goal #17 requirements were not properly designed to complement each other, an adequate planning process must force them to be complementary. The simplest solution, and the one adopted for this inventory, is to state that Goal #17 ESWD areas are

"Tentative ESWD areas", subject to final review prior to adoption of the Coos Bay Estuary Management Plan (CBEMP).

The linkage process developed for the CBEMP is designed to discover and force decisions on just such problems. Thus, where a coastal shorelands site has been tentatively identified as an ESWD area, and where the classification of an intervening intertidal or subtidal area (between deep-water and the shoreland) would not permit development of the estuarine area, then:

- i. if the estuarine area is "a partially altered area or estuarine area adjacent to existing development of moderate intensity" (Goal #16) and is found to be needed for development, then Goal #16 will permit development; otherwise,
- ii. a Goal #16 exception (such as for dredging) must be taken for development of the estuarine area or,
- iii. the tentative ESWD designation must be removed from the specific coastal shorelands site because water-dependent uses cannot gain necessary access to the water.

The Goal #17 criteria for ESWD identification require review only of shorelands in urban and urbanizable areas, i.e., urban growth areas (UGA). However, in anticipation of the need to fulfill development needs in other areas, the ESWD mapping for all criteria is not limited to UGAs, but instead includes rural shoreland areas as well as urban shorelands.

Mapping of the Goal #17 land areas having "deep-water close to shore..." is limited mainly to areas of existing development, but also includes other potential sites, including Port of Coos Bay property on the North Spit and at Eastside, and portions of Sitka Dock. The mapping also includes "partially altered areas" identified by ODFW; these are identified in response to the previous discussion but are not truly "Goal #16/17 priority areas".

#### 5.7.3.6 Goal #17 "potential for aquaculture" criterion

Tentative ESWD sites include land support areas for existing aquaculture operations as well as a small site on Pierce Point for a potential oyster culture facility.

#### 5.7.3.7 Goal #17 "protected areas subject to scour..." criterion

There are some limited areas within the Coos Bay Estuary that are subject to scour, primarily along the Coos River, but no scientific information was located identifying site specific areas. Further, the triple requirements of this criterion (that the area be protected, subject to scour, and, presumably, large enough to support a marina without dredging) would tend to eliminate any otherwise identifiable site. Therefore, no such sites are mapped.

#### 5.7.3.8 Goal #17 "potential for recreational utilization..." criterion

Mapped sites in this category include existing and potential land support areas for existing and potential marina sites as identified as Section 6, "Special Moorage element". As for other Goal #17 criteria, goal exceptions will potentially be required for some of the intervening estuarine areas to allow dredging and/or fill (breakwater jetties) for marina development; otherwise, the sites must eventually be deleted from the ESWD category.

5.7.3.9 Summary discussion of Goal #16/17 Priority Locations

The preceding discussion has emphasized that, because Goal #16 and #17 have not been adequately designed to complement one another, the identification of certain priority criteria must be considered tentative until later processes prior to plan adoption determine whether certain estuarine areas can be justified for development either through meeting Goal #16 conservation management unit criteria or through the adoption of goal exceptions. The reasoning is straight forward: no land area is "especially suited for water-dependent uses" unless the adjacent estuarine area permits development uses.

5.8 SELECTION OF SITES TO FULFILL PROJECTED NEEDS

This section is the culmination of the inventory and analysis accomplished in Sections 5.1 through 5.7. A method is developed to apply the projected needs for each economic sector to specific candidate sites, following state goal priorities for uses and locations. The results, displayed in Section 5.8.5, serve two basic purposes:

- i. They determine whether the sites within each category are sufficient to meet identified needs;
- ii. They help assess whether the sites proposed for development by the Inter-Agency Task force (IATF) in the first draft Coos Bay Estuary Management Plan are sufficient to meet the identified needs.

5.8.1 Statistical Summary

The following summaries are reproduced from earlier portions of Section 5, and are listed again for ease of reference.

1. Vacant Industrial Land

	<u>Within Coastal Shorelands</u>	<u>Outside Coastal Shorelands</u>
Lumber & Wood Products:	1185.4 acres	453.7 <sup>(a)</sup> ac
Public:	384.0 <sup>(b)</sup> ac	—
<u>All Other:</u>	<u>327.6<sup>(c)</sup> ac</u>	<u>507.6<sup>(d)</sup> ac</u>
Total:	1897.0 acres	961.3 ac

Notes:

- (a) This is mostly forested hillsides (11 sites between 2.4 to 98 acres in size).
- (b) This is mainly Port of Coos Bay ownership on North Spit and at Eastside.
- (c) 204.8 acres of this category is in multiple or small private ownership.
- (d) 466 acres in this category falls within the inland sector of the dunes NRA; (development may be prevented by the federal government).

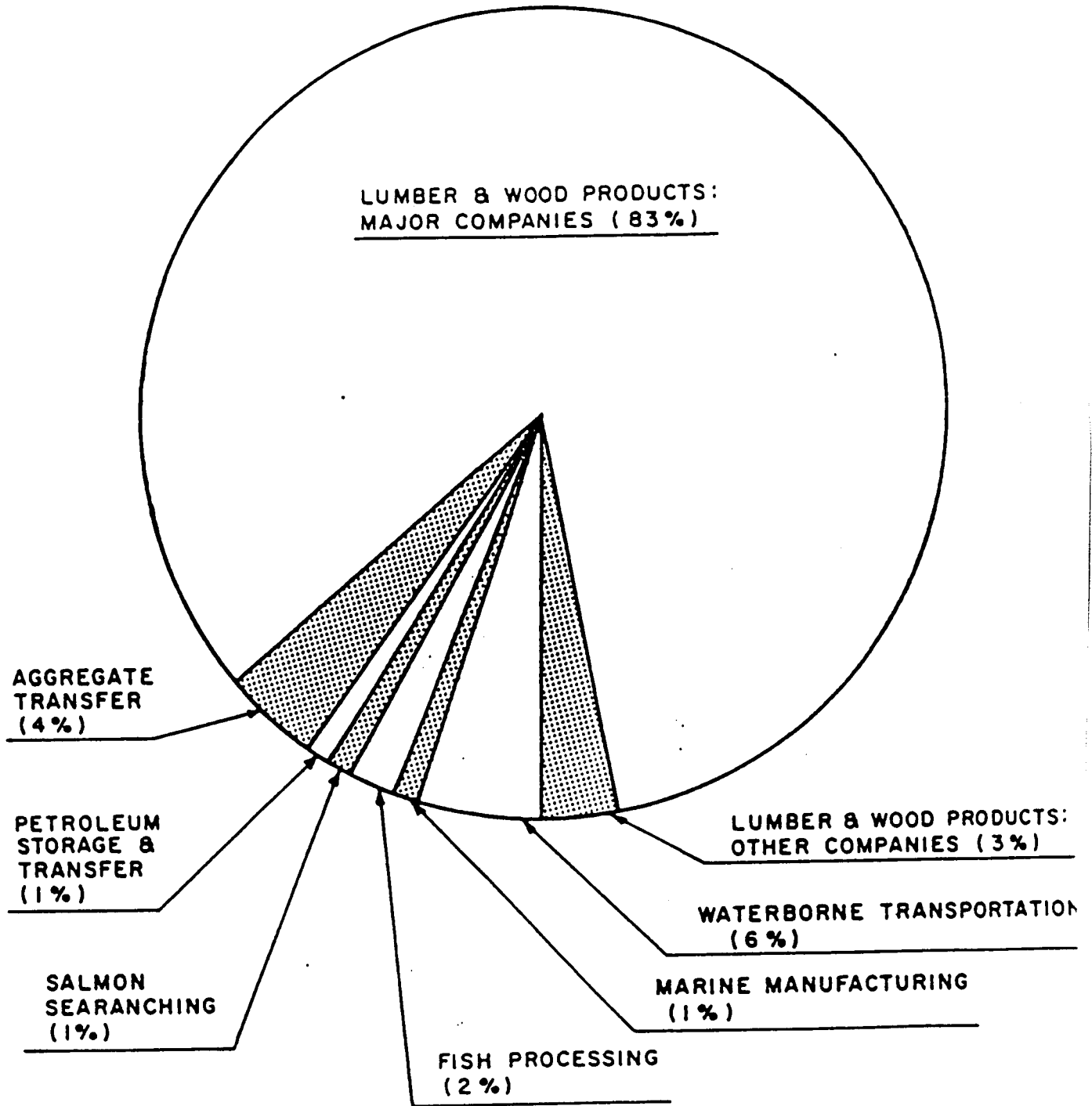
2. Use Percentages by Industrial Sector:  
Occupied Industrial land within C.S.B.

The "pie" graph, which follows, dramatically illustrates that Lumber & Wood Products firms account for the vast majority of currently used in industrial land within the coastal shorelands boundary (C.S.B.). [See graph]

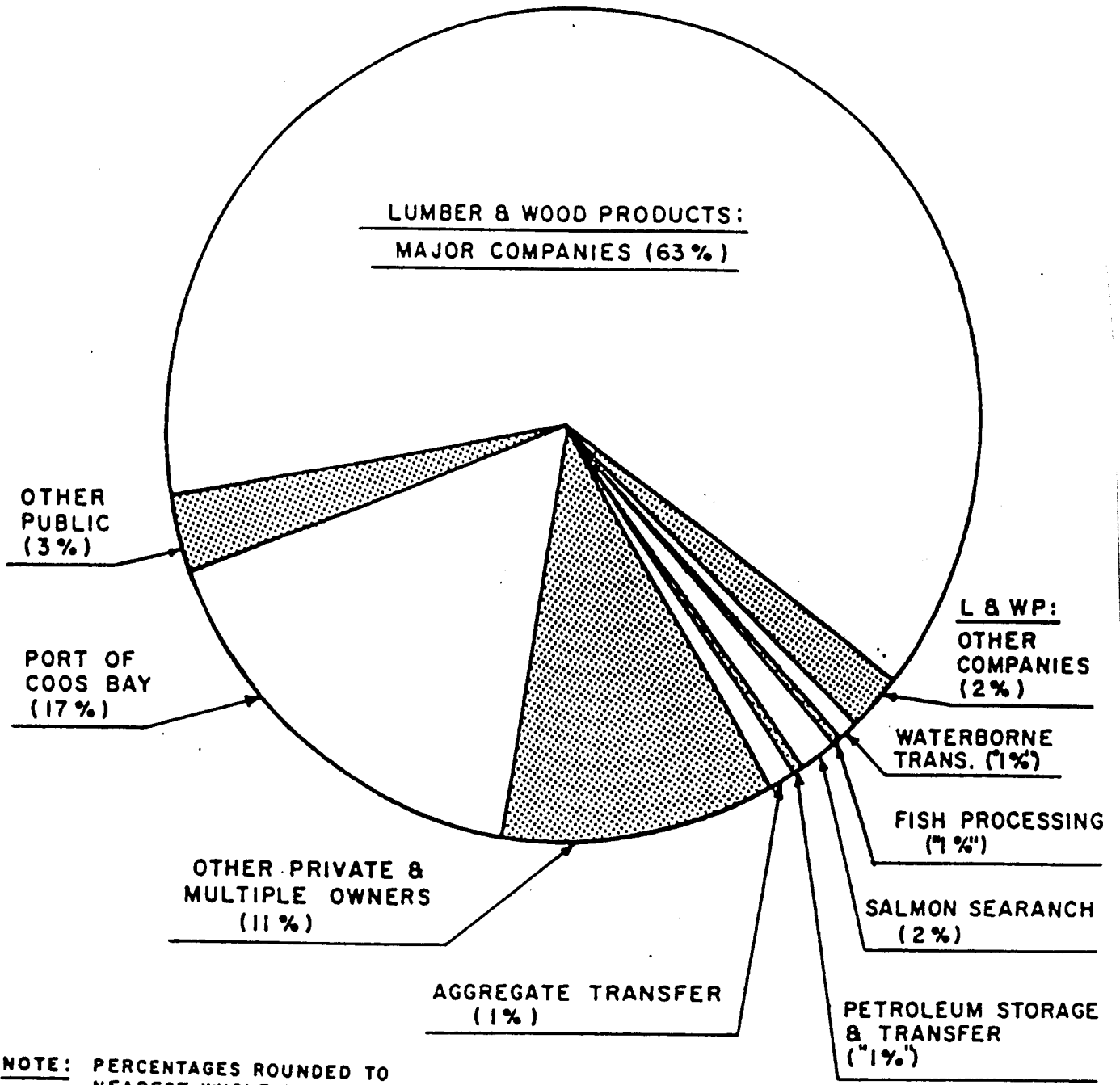
3. Ownership Percentages by Industrial Sector  
Vacant Industrial Land within C.S.B.

The emphasis of this graph is vacant ("candidate") suitable sites for industrial land, as derived in Section 5.6 of this inventory. Lumber & Wood Products firms account for nearly two-thirds of vacant land ownership, with the Port of Coos Bay a distant second at 17% of the vacant industrial lands. [See graph]

2. Use Percentages by Industrial Sector:  
occupied Industrial Land within C.S.B.



3. Ownership Percentages by Industrial Sector  
Vacant Industrial land within C.S.B.



**NOTE:** PERCENTAGES ROUNDED TO NEAREST WHOLE NUMBER.

TABLE #1

IATF DRAFT PLAN DECISIONS		COLUMN #1	COLUMN #2	COLUMN #3
A. Map Decisions:		(a)	(acres)	
WD/MR ONLY	1238	WD/MR	502	WD/MR 805-967
LIMITED WD	345	LIMITED WD	4	
MIXED (WD/MR+ND/NR)	295	MIXED	255	
ND/NR	676	ND/NR	220	ND/NR 550-812
UD (COM/RES)	175	UD (COM/RES)	10	
SUBTOTAL:	2729	SUBTOTAL:	991	
PLUS: SD (UNAVAIL)	604	SD (UNAVAIL.)	604	
TOTAL:	3333	TOTAL:	1595	TOTAL: 1517-1617
Difference Between Adjusted IATF Decisions and Projected Needs		TOTAL PROJECTED NEEDS: 1517-1617		
		LESS: NON-CSB NEEDS: 282 (b)		
		ADJUSTED PROJECTED NEEDS: 1335		
		LESS: IATF DESIGNATIONS FOR AVAILABLE INDUSTRIAL LANDS: 991		
		DEFICIT: 334		

NOTES:

(a) WD = Water-Dependent,  
WR = Water-Related,  
NDNR = Non-dependent,  
Non-related

(b) Acreage of needs that are likely to occur outside coastal shoreland boundaries, including 150 acres for tourism at Indian Point, 100 acres for other Manufacturing and 32 (water) acres for the airport runway extension).



#### 4. Projected Needs

<u>Economic Sector</u>	<u>Water-Dependent</u>	<u>Need (acres) Water-Related</u>	<u>Non-dependent Non-related</u>
Lumber & Wood Products	230	0	180
Marine Industries	256	0	0
Mining, Minerals & Energy	419	0-90	0-90
Transportation	120-152	0-32	0-32
Other	10-50	0-40	140-280
<b>TOTAL</b>	<b>1035-1107</b>	<b>0-162</b>	<b>320-582</b>

#### 5. Goal #17 Priority Areas

Total mapped ESWD <sup>(a)</sup> areas	=	977 acres
Completely Vacant ESWD areas	=	507 acres
Developed <sup>(b)</sup> ESWD areas	=	470 acres

- (a) ESWD = "Especially Suited for Water-Dependent Uses"
- (b) Category includes fully developed sites as well as partially developed sites

#### 5.8.2 Matching Sites to Needs

##### Work Program

The approved work program for completing the Coos Bay Estuary Management Plan calls for the applying of the statistics summarized in Section 5.9.1 to a "use/location matrix". The matrix allows a determination of whether candidate sites are sufficient to meet the identified needs, and is based upon satisfaction of needs according to the priorities of Goal #16 and Goal #17 for uses and locations. Two scenarios were proposed in the work program:

- Scenario #1 arbitrarily assumes that IATF consensus decisions about the permissible uses on each site can be equated with "needs" for uses (documented needs were not the basis for Scenario #1 decisions).
- Scenario #2 utilizes the 20-year need projections summarized in Section 5.7 to assess whether the identified candidate sites are adequate to fulfill documented needs.

Each scenario contains certain inherent problems that prevent a straight forward matching of sites with needs.

In Scenario #1, the IATF decisions are often vague, especially where the "Urban Development" designation was applied. Some sites designated "UD" permit a wide variety of industrial uses while other sites bearing the same "UD" designation permit only residential development.

Further, some of the IATF decisions are site-specific or use-specific, such that only limited types of industrial uses may occur on a particular site.

Patterns also exist with Scenario #2, and derive primarily from the need projections. Some projections are very site-specific (such as Tourism Facility or Coal Export Facility) since there is likely to be only one site suited or each such use. However, the locational alternatives for some other projected needs (such as Secondary Wood Products) are in specific: not only could several sites serve to fulfill the need, but also the use itself may vary as to the nature of its water-dependency (depending, for example, on whether the owner desired to ship products by water or by rail.)

Ownership considerations present perhaps the most serious impediment to making a careful assessment of whether the candidate sites are sufficient to meet the assumed need (Scenario #1) or the projected need (Scenario #2). The problem is not with ownership itself but rather with the assumption of the Oregon Planning Program that ownership of land is seemingly unimportant for planning purposes. State planners assumed that all land is truly available if a willing buyer pays the price required by a willing seller. [See page D-5, DLCD CREST Review, March 11, 1981.] This simple belief explains the functions of "perfect" market situations quite adequately, yet it is totally useless in describing actual economic processes.

An ideal market for producing sufficient quantities of industrial land would include many willing sellers and a large supply of suitable vacant industrial land. The situation in the Coos Bay Estuary is virtually the opposite of these requirements:

- Steep topography and limited transportation access severely constrict the local-supply of suitable industrial sites.
- As shown in the graphs in Section 5.9.1, nearly two-thirds of the remaining suitable land within the estuary's Coastal Shorelands Boundary is held by one industry composed of less than five major owners. Further, this particular industry depends for its continued economic survival on planning for the very-long term. As such, the industry (Lumber & Wood Products) is only mildly interested in pursuing short-term gains from land sales, but is justifiably concerned with preserving an adequate land base for meeting very-long-term needs.

#### Revised Method

The severity of previously described problems requires a modification of the site selection process proposed in the original work program. In its place, a three-step method is used:

STEP #1. Roughly match the needs projected in Scenario #2 to specific sites or site areas. This gives the ability to explore the ownership patterns and suitability of sites for a particular economic sector. Conclusions will focus on whether sufficient sites exist to fulfill the identified need for each general economic sector.

STEP #2. Estimate the total industrial land permitted for industrial development by the IATF (Scenario #1). Since the IATF made no projections of future industrial land needs, Scenario #1 is simply an assumption that future needs are just exactly equal to the "approved" sites.

STEP #3. Compare the Scenario #1 totals with the Scenario #2 totals. This allows an assessment of whether the amount and location of sites designated for development by the IATF are sufficient to meet the projected needs identified in Scenario #2.

STEP #1

Statistics used in this analysis are from Section 5.7.2 (CCD-BDC need projections) and Section 5.7.3 (analysis of water-dependency of each economic sector). A rough overview of the sites and the use requirements identified by CCD-BDC suggests that the projected needs in the left column below are likely to be met by the site(s) in the right column below.

Economic Sector	Need (acres)	Type of Use	Potential Site(s)
• <u>Lumber &amp; Wood Products</u>			
- Sawmill	100	ND, NR	Large L&W P site such as Christiansen Ranch
- Secondary Wood Products	30	ND, NR	Any L & W P site
- Pulp & Paper	230	WD	Henderson Marsh
- Wood Panel	50	ND, NR	Any L & WP site
• <u>Marine Industries</u>			
- Marine Construction & Support	223	WD	Port of Coos Bay "Eastside Properties", with some spillover to North Spit
- Seafood Processing	23	WD	North Spit and Charleston (TAP Fisheries)
- Salmon Aquaculture	10	WD	Ore-Aqua or Coos Head Timber Co. site near Cape Arago Highway

- Mining, Minerals & Energy

- Oil and Gas	65	WD	Sitka Dock
	90	ND	North Point or North Spit
- Coal 7 Other	150	WD	North Spit
- Manganese Nodules	200	WD	North Spit
- Quarry Rock	4	WD	Glae Gould site

- Transportation

- Airport (extension)	32	NDNR	North Bend Airport
- Waterborne Cargo	120	WD	North Spit

- Other

- Tourism	160	NDNR	Indian Point (150 acres)
- Foreign Trade Zone	30	mixture	North Bend Airport
- Other Manufacturing	100	NDNR	Outside shore-lands

- \* WD = Water-Dependent
- WR = Water-Related
- NDNR = Non-dependent, Non-related

### Step #1 Conclusions and Assumptions

- Sites owned by Lumber 7 Wood Products Companies are sufficient to meet Scenario #2 needs, although Henderson marsh is the only site large enough to support a new pulp mill.
- The North Spit has been identified as the only site capable of supporting 530 acres of needed growth for Coal export, Manganese nodule processing and Waterborne Cargo, and is also identified as a secondary site for over 113 acres for other needs. However, ownership by the Port of Coos Bay totals only +/- 197 acres on the North Spit. Roughly 152 acres on vacant portions of sites owned by Roseburg Lumber Co. and Weyerhaeuser company could relieve some of this pressure.

- iii. The Port of Coos Bay must develop both its North spit property and its 'Eastside Properties', since non-federal lands on the North Spit are not capable of accommodating needed growth.
- iv. Some infill development will occur within the smaller vacant or partially vacant sites, primarily along the waterfront areas within urban Growth Boundaries.
- v. Of the identified need for 223 acres for marine Construction, 182 acres is presumed to be needed to satisfy shallow-draft needs, and can thus be sited at the Port's Eastside properties. Another 41 acres, however, is presumed to be devoted to deep-draft marine construction needs, and will occur strictly on North Spit.

## STEP #2

Statistics used in this analysis are derived by planimeter from the map entitled "Scenario #1 Development Needs", as adjusted by occupancy/vacancy information contained on the "Site Coverage Worksheets" in Section 5.6 of this document. The Scenario #1 map portrays all land areas designated "Urban Water-Dependent" (UW), "Urban Development" (UD) and "Special Development" (SD) by the Inter-Agency Task force (IATF). However, the map uses six categories rather than simply "UD", "UW", and "SD" to describe the IATF decisions because:

- IATF language in the management objective or other descriptions occasionally contradicted the management unit designation. That is, some parcels designated "UD" are actually described as being suited for water-dependent uses, while other parcels designated "UW" are described as not being suited for water-dependent uses.
- Some parcels are more severely restricted as to the type of use permitted than is implied by the designation "UD" or "UW".

The total land area theoretically permitted for development (designation of "UW" or "UD") by the IATF is approximately 2729 acres.

The total land area theoretically reserved for development at an unspecified future date (designation of "SD") is approximately 604 acres (where development might be allowed).

These two preceding figures are preliminary, of course. The six mapped categories of IATF decisions must now be subjected to further analysis to:

- subtract the allocations for those areas that are already substantially occupied by industrial development (according to the "Site Coverage Worksheets" in Section 5.6);
- subtract the allocations for those areas where the IATF decision effectively prevents industrial use; and
- desegregate remaining areas by ownership according to whether the parcels are owned by the Port of Coos Bay ("Port"), by Lumber and Wood Products companies ("LWP"), by the United States ("Federal") or by others ("private").

"Scenario #1 Development Needs: IATF Decisions" are listed below to derive the available industrial acreage in each category.

Map Categories

- Water-Dependent, Water-Related Only. (WD/WR)  
Total area = 1238 acres  
Subtract Occupied area = 736 acres  
Total available = 502 acres

Virtually all of this 502 acres occurs on the North Spit, although other areas contain scattered minor infill potential.

<u>Ownership:</u>	Port	=	197 acres
	LWP	=	265 acres
	Federal	=	40 acres
	Private	=	<u>0 acres</u>
	TOTAL	=	502 acres

- Limited Water-Dependent Only (LWD)  
Total area = 345 acres  
Subtract areas where normal industrial uses excluded = 341 acres  
Total Available = 4 acres

Most of this category is reserved for Jetty maintenance. The 4-acre parcel is designated for a barge loading facility for aggregate.

<u>Ownership:</u>	Private	=	<u>4 acres</u>
	TOTAL	=	4 acres

- Non-Dependent, Non-Related (NDNR)  
Total area = 676 acres  
Subtract areas occupied or not permitted for industrial uses = 456 acres  
Total Available = 220 acres

The most sizeable portions are located on the southerly stretches of isthmus Slough (100 acres) and at Jordan Cove (68 acres). Much of the North Bend Airport acreage is devoted to airport use and is not available.

<u>Ownership:</u>	Port	=	0 acres
	LWP	=	103 acres
	Federal	=	0 acres
	Private	=	<u>117 acres</u>
			220 acres

- Mixed, but Non-Specific: WD generally along shoreline, NDNR towards uplands

Total area	=	295 acres
<u>Subtract</u> occupied areas	=	40 acres
<u>Total Available</u>	=	<u>255 acres</u>

<u>Ownership:</u>	Port	=	117 acres
	LWP	=	138 acres
	Federal	=	0 acres
	Private	=	<u>0 acres</u>
	Total	=	255 acres

- "Urban Development", but Industrial use Generally Prohibited

Total area	=	175 acres
<u>Subtract</u> areas where Industrial use prohibited	=	165 acres
<u>Total Available</u>	=	<u>10 acres</u>

The 10-acre portion adjacent to Joe Ney Slough corresponds to a portion of land identified as suitable for "Tourism Facilities" (Marine support).

<u>Ownership:</u>	Private	=	<u>10 acres</u>
	Total	=	10 acres

- "Special Development" (SD): Not necessarily Available for Industrial Use

The "SD" designation prevents immediate development of the parcels since it acts as a sort of reserve that may allow future development. Language within the descriptions of specific "SD" management units implies that the "SD" designation must be separated into three categories similar to those already identified.

<u>Total Area</u>	=	604 acres
- <u>WD/WR only</u>	=	287 acres

(Ownership: LWP = 287 acres)

This category includes the portion of Henderson marsh that could be developed in accordance with the proposed Henderson marsh Agreement (+/- 240 acres) and Pierce Point (+/- 38 acres).

-	<u>Mixed WD/WR/NDNR</u>	=	233 acres
	Ownership:		
		LWP	= 152 acres
		Private	= 81 acres

This includes most of Christiansen Ranch and the easternmost portion of the Eastside spoils disposal area.

-	<u>NDNR</u>	=	84 acres
	Ownership:		
		Port	= 65 acres
		private	= 19 acres

This is the Port's spoils disposal site at Eastside between White Point and the "W-shaped marsh".

**STEP #2 Conclusions and Assumptions**

- i. As noted earlier, the Inter-Agency Task force did not project future needs for development; Scenario #1 therefore becomes a single assumption that future needs are just exactly equal to the quantity of "approved" sites.
- ii. Although the IATF proposed 2729 acres for development, only 991 acres remain actually available for new development after subtracting (1) acreage in occupied sites and (2) acreage in sites not actually approved for industrial development. Summaries of the six map categories are:

<u>Water-Dependent/Water-Related Only (WD/WR)</u>	502 acres
<u>Limited WD</u>	4 acres
<u>Non-Dependent/Non-Related (NDNR)</u>	220 acres
<u>Mixed but Nonspecific</u>	255 acres
<u>"Urban Development", but Industrial Prohibited</u>	10 acres
[TOTAL]	991 acres
<u>Special Development</u>	604 acres

- iii. Ownership of the 991 acres of actually available land is as follows:

Port of Coos Bay	=	314 acres
Lumber & Wood Products Firms	=	506 acres
Federal Government	=	40 acres
Private	=	<u>131 acres</u>
		991 acres



iv. Ownership of the 604 acres in Special Development is as follows:

Port of Coos Bay	=	65 acres
Lumber & Wood Products Firms	=	439 acres
Federal government	=	0 acres
Private	=	<u>100 acres</u>
		604 acres

### STEP #3

This final step in the site selection process assesses whether the quantity and location of sites designated for developed by the IATF (see STEP #2) are sufficient to meet the projected needs identified in Scenario #2 (see STEP #1). There are several ways to compare the two scenarios, but since each scenario is based on different methods and assumptions, only the more general assessments are likely to produce meaningful comparisons.

Table #1 is a compilation of summary totals from STEP #1 and STEP #2.

Table #1 shows that Scenario #2 projects future development needs (after adjusting for non-coastal shoreland needs) at 1335 acres, yet Scenario #1 provides only 991 acres in "approved" sites, suggesting that IATF decisions may have failed to satisfy needs by a shortage of almost 350 acres. Since the areas in the "Special Development" designation total roughly 600 acres, it seems tempting to assume that the easy solution is simply to convert 350 acres in the "SD" designation to a more immediately developable status. However, as shown in the following conclusions and analysis, the solution to resolving the apparent discrepancy is not at all simple.

### STEP #3 CONCLUSIONS AND ANALYSIS

1. IATF decisions are deficient by approximately 568 - 658 acres for needs with very specific locational requirements.
  - (a) Approximately 263-353 acres of land on the North Spit, mostly now in Federal ownership, must be designated for development to meet projected needs.

Step #1 of this section performed a rough matching of suitable vacant industrial sites to needs projected by CCD-BDC, to the effect that 530 acres of the identified needs can only be satisfied on the North Spit, with a potential need for up to 90 more acres if another site proves unsatisfactory. the following chart shows the identified economic needs (and acres) and the sites identified.

Industrial sector	Total Acres Needed	North Spit Acres Available	Site Notes
- Marine Construction & Support	223	41	The remaining 182 acres to projected to be developed at the Port's "Eastside Properties"
- Seafood Processing	23	19	The remaining 4 acres are potentially available at TAP Fisheries
- Oil & Gas (Processing Facilities)	90	0-90	North Point and Sitka Dock are also identified as alternate sites (with Sitka Dock targeted for 65 acres of oil & gas processing facilities), although North Spit is the more logical location of an ocean pipeline connection.
- Coal & Other	150	150	North Spit is the only site that is large enough with the deep-draft capabilities.
-Manganese Nodules	200	200	Same as above.
- Waterborne Cargo	120	120	Roughly 60 acres of the Roseburg Lumber and Weyerhaeuser ownership on North Spit could be used to satisfy part of this need.
<b>TOTALS (acres)</b>	<b>806</b>	<b>530-620</b>	

As noted elsewhere in the Inventory, land owned by lumber & wood products (LWP) firms are expected to be available generally only to satisfy the very-long-term land needs of forest industries. However, as noted in the preceding chart, approximately one-half (about 60 acres) of the waterborne cargo need could potentially be satisfied on LWP ownership on North Spit. (Available LWP lands estuary-wide are total 152 acres.) this would require construction of a major deep draft dock to the west of the Roseburg Lumber company chip facility, either on Roseburg Lumber company ownership or on Weyerhaeuser West Coast ownership, and would likely require dredging of a portion of Jordan Cove to deep-draft capabilities.

Excluding 60 acres from the total North Spit need of 530-620 acres means that 470-560 acres of vacant land owned by the Port of Coos Bay and by the United States south of the waste lagoon must be designated for industrial uses to satisfy 20-year economic needs. IATF decisions have designated 502 acres estuary-wide (p. 5.8-11) but have designated only 227 acres of the North Spit area south of the waste lagoon for industrial development, leaving an apparent deficiency of 243-337 acres of land area. However, 13 land acres on North spit is already occupied by the Anadromous (Ore-Aqua) facility and another 7 acres to form a Trawler Basin (see "Special Moorage element"). This leaves a deficiency on the North Spit in development designations of 263-353 acres.

The 200-acre waste lagoon on the North Spit is counted as an existing committed industrial site because it is currently in use by Weyerhaeuser West Coast of the paperboard mill effluent. although the lagoon, when filled, would make a suitable industrial site, it has not been considered as a potential vacant industrial site because the site is presumed to have its greatest value as a waste lagoon for existing mill operations.

Although the Port of Coos Bay owns 284 acres of land on the North Spit, the IATF approved only 147 acres of Portland for development together with 71 acres of federal land and 9 acres of private land. (The remaining 137 acres of Port ownership is designated "natural shorelands" and "Conservation Shorelands".) This obviously leaves several alternatives:

#### ALTERNATIVE A:

The remaining 137 acres of Port land could be proposed for development, reducing the need for additional federally-owned land to 126 - 216 acres, or a total need of 197 - 287 acres of Federally-owned land.

#### ALTERNATIVE B:

The remaining 137 acres of Port land could be left as is, with a corresponding need for additional Federally-owned land of 263-353 acres; (and, therefore, a total need of 334-424 acres of federally-owned land).

#### ALTERNATIVE C:

Some of the remaining Port land could be designated for development; the remaining deficit would then be federally-owned land.

#### DISCUSSION OF ALTERNATIVES

The use of additional federal land on the North Spit for development is necessary from several standpoints. Foremost, of course, is the simple quantitative need and the desire to conserve the raptor "islands" and avoid massive change to the configuration of the sand dunes south and west of Hungryman Cove and currently in Port ownership. Not all of the lands designated for development will be needed for water-dependent uses. However, water-related and nondependent/nonrelated uses will appropriately locate in these areas, (approximately 290 acres), since such uses require location near the water-dependent uses without requiring a waterfront access location.

The available shoreline may also be limited by environmental protection considerations. For example, the earlier proposal by American Coal Company for a coal export facility on the North Spit underwent several design changes, mainly because of resource agencies' concerns about encroachment on wetlands on the interior of North Spit. While certain benefits are likely to occur by reducing wetland intrusion, the resulting configuration of the modified rail loop is likely to produce substantially greater adverse impacts on future development in the Coos Bay Estuary by squeezing the rail line against areas along the shoreline that are needed for berthing of ships. substantial wetland intrusion on the North Spit may thus prove to be of lesser environmental harm than the forced dredging of part of the clam beds in Hungryman Cove (the most productive clam beds in the entire estuary) to accommodate needed development elsewhere.

## DECISION:

The selection of an alternative should be based at least in part on review of the course of physical change to the north Spit that represents a compromise between the best development configuration and the least environmental harm. Accordingly, the Local officials Advisory Group decided on a new development configuration for the "North Spit Development Decisions". The 353 acres added to the development designation include:

- a southwestward encroachment of roughly 170 acres into portions of active dunes, hummocks, and shorepine transition forests;
- a westward encroachment of roughly 180 acres into the large wet deflation plain south of the waste lagoon.

The Local Officials constructed the final shape of the development decision based not only on the identified need for additional land but also on the constraints inherent in the following conservation objectives:

- protection of the major clam beds in Hungryman Cove (South of Ore-Aqua);
- avoidance of excessive encroachment onto the westernmost dune formations, because of the potentially disruptive changes in wind currents and sand deposition patterns that could otherwise occur;
- protection of the two conifer islands as potential raptor resting areas;
- protection of the Cordylanthus Maritimus in Hungryman Cove;
- avoidance of the western most wet deflation plain south of the waste lagoon, because of its inclusion as part of the mitigation package for the tentative Henderson marsh agreement.

2. IATF decisions on the suitability of sites for Water-dependent/Water-Related uses are strictly comparable neither with inventory identification of suitable sites nor with projected needs for WD/WR uses.

While the effect of IATF decisions was to identify sites such as Pierce point and North Point as suitable for water-dependent uses, discussion within this inventory has shown that those sites are generally unsuitable for water-dependent uses.

3. Some 30 acres in sites proposed by the IATF for industrial development are not suitable for industrial development during the 20-year planning period.
  - (a) The NDNR land east of the North Bend Airport bears little relationship to the water area of Pony Slough for industrial purposes and may be more appropriate for residential or commercial uses. [Approximate acreage = 30.]
4. Some 495 acres in sites proposed for development by the IATF are separately justifiable as part of the very-long-term land-banking needs of Lumber & Wood Products (LWP) firms.

- (a) Isthmus Slough between Shinglehouse Slough and Davis Slough, except for the Al Peirce property (about 35 vacant acres) is generally diked pasture or very narrow uplands between the railroad line and the estuary. Some of the property may eventually be used for dryland log storage, while other property may satisfy needs identified in the proposed Coos County Comprehensive Plan for the truck transportation industry. [Approximate acreage = 100.]
- (b) The undeveloped portion of Jordan Cove may satisfy expansion needs for the Weyerhaeuser paperboard mill, and could serve as high value staging areas or marina support if dredging was permitted in Jordan Cove. [Approximate acreage = 68.]
- (c) The remaining unallocated portion of Christiansen Ranch may be needed by Weyerhaeuser for dryland log storage; (100 acres was tentatively allocated for a small sawmill.) Dryland log storage needs are likely to rise from either more stringent DEQ requirements for in-water log storage or from the difficulty of rafting small logs, which are becoming an increasingly larger proportion of total timber harvest. [Approximate acreage = 64.]
- (d) The vacant portion of the Roseburg Lumber Company site at North Spit is highly suitable for both an expansion of the existing storage area for the large chip facility or for a water-dependent use if Jordan Cove is dredged. Use of the site would require movement of significant amounts of sand (as was accomplished in siting the existing facility). [Approximate acreage = 128.]
- (e) Pierce Point has been identified as a suitable site for log raft creation; with the increasing trend toward smaller logs, Weyerhaeuser plans to truck logs to the site from its Millcoma Tree farm, then raft them via the Cooston channel to its mill. Since previous proposals for industrial use on the site have generated strong opposition by East Bay area residents, the site has also been identified as a potential dryland moorage site, perhaps with dense residential back-up. [Approximate acreage = 35.]
- (f) The "privately-owned" Eastside spoils disposal area is diked pasture that is likely to be completely filled with dredge spoils within ten years. It could thus accommodate expansion of the marine construction industry both to the east (presently) and to the west (in the future). [Approximate acreage = 100.]

### 5.8.3 North Spit Industrial Needs

This section presents two analyses issued subsequent to the original adoption of the Coos Bay Estuary Management Plan in response to requests by Coos County for assistance. These reports supplement the original industrial lands analysis by CCD Business Development Corporation.

- The first report is from CCD Business Development Corporation and provides a discussion of polymetallic sulfides that, because of changing world conditions and markets, are now projected to be a more likely use on the north Spit in place of manganese nodules.

- The second report, from the Oregon Economic Development Department, relates the comparative advantages of the North Spit industrial site to the county's desire to diversify the local economy. The report focuses on the needs and Coos Bay advantages of such industries as polymetallic sulfides, manganese nodules, oil and gas, coal, and sand resources development.
- Third is a letter from the Coos Bay-North Bend Water Board supporting statements made by its consultant Cal Heckard (letter also attached) regarding water needs for the North Spit.
- The fourth attachment is a report from the Oregon Economic Development Department entitled "Water Supply and Water Demand -- Industrial Activities on the North Spit: Coos Bay, Oregon, which provides an in-depth analysis leading to the conclusion that industrial water supply can be safely and timely developed to meet industrial water demands during the planning period.
- The Oregon Economic Development Department has also provided the final attachment, which is a collection of letters discussing "bulkhead and fill" docks. Submittals are from (1) the consulting firm CH<sub>2</sub>M Hill; (2) Central dock company; and (3) Local 12 of the International Longshoremen's and Warehousemen's Union.

6. SPECIAL MOORAGE ELEMENT

## 6.0 SPECIAL MOORAGE ELEMENT

### 6.1 INTRODUCTION/EXECUTIVE SUMMARY

This report on moorage in the Coos Bay Estuary inventories existing commercial fishing and recreational moorage uses, analyzes trends in those categories, projects the need for moorage space to 2000 A.D., and identifies potentially suitable sites that might satisfy the need for moorage to 2000 A.D.

The method of projection selected relies on one critical assumption: projections based on an assumed dismal economic future guarantee a dismal future, because the amount of land and water allocated for use development will be insufficient to provide for an improved economy.

The report reaches the following conclusions:

#### i. Water Surface Area Moorage Needs (2000 A.D.)

- Commercial fishing vessels = 35.1 acres
- Recreational vessels =        acres
- TOTAL =        acres

#### ii. Approximate Water Surface Area of Potential (Candidate) Moorage Sites

- Large potentially suitable sites = 56.5 acres
- Smaller potentially suitable sites = 27.7 acres
- Large marginally suitable sites = 60.4 acres
- Large potentially suitable sites identified by ODFW as having "significant" natural resource value = 190.1 acres
- TOTAL = 334.7 acres

#### iii. IATF Moorage Decisions Analysis

- IATF decisions are deficient in meeting the identified moorage need by 23.5 to 39.5 water acres.



- iv. The following sites have been additionally selected to overcome the moorage provision deficiency:
  - "Eastside Properties"
- v. New Dryland Storage Needs (2000 A.D.) = 4 acres

## 6.2 INVENTORY & ANALYSIS

Three sites provide virtually all of the available space for mooring commercial and recreational boats on the Coos Bay Estuary. The word "moorage" is usually defined as spaces for mooring of boats. However, the number of moorage spaces within a given area depends upon the size of boats moored and the configuration in which boats are moored. Further, for small trailerable boats, boat ramps complement the public access function of marinas, yet the moorage "spaces" associated with boat ramps originate on dry land.

Therefore, much of the inventory data herein is organized by numbers of boats rather than by number of spaces. The following statistical summary shows current occupancy (October, 1981).

### CHARLESTON BOAT BASIN

#### Permanent Moorage

Commercial boats	324 boats
Recreational boats	112 boats

#### Seasonal Moorage

Approximate number of spaces added during summer season (5/15 to 9/15)	64 spaces
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#### Transient Moorage

[Length of a visit is less than one week; availability is variable, depending on season and other factors.]

<u>Total commercial boat visits</u> (Jan. - Sep. 1981)	535 visits
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<u>Total recreational boat visits</u> (Jan. - Sep. 1981)	146 visits
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## HANSON'S LANDING (Charleston)

Commercial moorage	+ - 40 boats
Recreational moorage	+ - 60 boats

## CITY OF COOS BAY

[Mainly transient moorage along 200-foot dock]	18-27 boats
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In 1979, detailed moorage data was developed by the Port of Coos Bay for the Coos-Curry Council of Governments (CCCOG). The availability of data from 1979 and 1981 enables a closer scrutiny of several changes that have occurred in moorage occupancy since 1979.

### Hanson's Landing

The foreshortened 1981 fishing season and record high interest rates for loans have seriously depressed the local fishing industry; at Hanson's Landing this occurrence is emphasized by the shift in proportion of moorage in the smaller boats toward recreational rather than commercial boats. Commercial boats accounted for 60% of the moorage at Hanson's Landing in 1979; in 1981, the commercial boat moorage had declined to 40% of the total.

In part, this shift may reflect the declining competitiveness of fishing vessels under 30 feet. According to Emery Hanson, operator of the only large private moorage facility in the estuary, a number of the presently moored recreational boats in the 16' - 26' class were formerly commercial boats which have now had their fishing gear removed. (Personal communication, 10-8-81)

Dry land boat storage is variable; roughly 5 acres is available for additional development if existing open storage areas are shifted. However, the land is more likely to be used for boat building and repair facilities rather than dry land moorage. In fact, one of the existing buildings on site was originally intended for dry moorage but was instead used for boat building.

### Charleston Boat Basin

The next chart provides a detailed comparison of occupancy changes in the Charleston Boat Basin between 1979 and 1981. Here, a different type of shift has occurred: The number of commercial boats in the 31' to 50' class has declined by 8%, while the number of commercial fishing vessels longer than 50' has increased 58% in two years. Total length of these larger vessels has increased 63%, so

that these vessels as a proportion of total boats account now for 18% (12% in 1979), and account for 30% (20% in 1979) of total moorage length.

This dramatic increase in moorage demand for the largest vessels has the effect of using up any available moorage at a far greater rate than would occur if the same increases had occurred in small boat moorage. The increase can partly be attributed to the increased competitiveness of larger boats, which can travel farther and remain at sea for substantially longer periods of time than the smaller commercial fishing vessels, and which are also more versatile in responding (by conversion) to changes in the type of fish resource available. The increase in larger boats can also partly be attributed to the recent (May, 1981) lengthening of three piers in the outer basin. The new area was mainly designed for, and is used for, moorage of fishing boats greater than 50 feet in length.

Covered dry moorage capacity for the Boat Basin is listed as 94 boats, although present covered boat storage in the storage building has been roughly estimated at 30 boats [Jeff Kaspar, 10-13-81]. Most of the remaining covered storage spaces are occupied by fishing gear. Open dry moorage is variable with a maximum of about 60 spaces. Expansion of the area would be difficult, since the Port's Boat Basin has many other important functions to fulfill (especially parking) but contains only a limited land area within which to fulfill those functions.

CHARLESTON BOAT BASIN MOORAGE STATISTICS

1. Number of Commercial Vessels in Permanent Moorage

FOOT CLASS	1979	1981	2-YEAR% INCREASE (DECREASE)	% OF 1979 TOTAL	% OF 1981 TOTAL
14'-20'	5	2	(60%)	2%	1%
21'-25'	40	47	18%	13%	15%
26'-30'	56	63	13%	18%	19%
14'-30'	101	112	11%	33%	35%
31'-35'	59	46	(22%)	19%	14%
36'-40'	60	56	(7%)	20%	17%
41'-45'	23	25	9%	8%	8%
46'-50'	26	28	8%	9%	9%
31'-50'	168	155	(8%)	55%	48%
51'-60'	16	21	31%	5%	6%
61'-70'	12	15	25%	4%	5%
71'-80'	7	19	171%	2%	6%
81'-90'	1	2	100%	1%"	1%
91+	0	0	0	0	0
51+	36	324	58%	12%	18%
TOTALS	305	324	6%	"100%"*	"100%"*

\*Columns may add to +/- 100% because of rounding.

CHARLESTON BOAT BASIN MOORAGE STATISTICS

2. Cumulative Length\* of Commercial Vessels in Permanent Moorage

FOOT CLASS	1979	1981	2-YEAR % INCREASE (DECREASE)	% OF 1979 TOTAL	% OF 1981 TOTAL
14'-20'	97	33	(66%)	"1%"	"1%"
21'-25'	920	1111	21%	8%	9%
26'-30'	1578	1742	10%	14%	14%
14'-30'	2595	2886	11%	23%	23%
31'-35'	1931	1509	(22%)	17%	12%
36'-40'	2317	2149	(7%)	20%	17%
41'-45'	993	1070	8%	9%	8%
46'-50'	1256	1345	7%	11%	11%
31'-50'	6497	6073	(7%)	57%	48%
51'-60'	907	1173	29%	8%	9%
61'-70'	800	990	24%	7%	8%
71'-80'	518	1423	175%	5%	11%
81'-90'	81	174	115%	"1%"	1%
91+	0	0	0	0	0
51+	2306	3760	63%	20%	30%
TOTALS	11,398	12,719	12%	100%*	100%*

3. Number of Recreational Vessels in Permanent Moorage

FOOT CLASS	1979	1981	2-YEAR % INCREASE (DECREASE)	% OF 1979 TOTAL	% OF 1981 TOTAL
Up to 16'	1	1	0	"1%"	"1%"
16'-26'	113	87	(23%)	75%	78%
+26'	37	24	(35%)	25%	21%
TOTALS	151	112	(26%)	100%*	100%

\* Cumulative length is the sum of the lengths of all boats currently moored.

4. Cumulative length of Recreational Vessels in Permanent Moorage

<u>FOOT CLASS</u>	<u>1979</u>	<u>1981</u>	<u>2-YEAR % INCREASE (DECREASE)</u>	<u>% OF 1979 TOTAL</u>	<u>% OF 1981 TOTAL</u>
Up to 16'	14'	14'	0	"1%"	"1%"
16' to 26'	2481'	1971'	(21%)	67%	71%
+26'	1190'	779'	(35%)	32%	28%
TOTAL	3685'	2764'	(25%)	100%	100%

[SOURCE: Port of Coos Bay & Coos County Planning Department]

The overall composition of moorage at the Charleston Boat Basin has also changed over the past two years (1979-1981). The actual number of recreational boats moored has declined by 26%, so that recreational boats account now for only 26% of permanent moorage at the Boat Basin (compared to 33% in 1979) and account for only 18% of the cumulative length of all permanent moorage (compared to 24% in 1979).

Some of the decline in moored recreational boats at the Boat Basin may be explained by the increased number of recreational boats at Hanson's Landing in Charleston, where moorage rates are generally 30% to 40% lower than at the Boat Basin. However, more direct causes of the decline may be the combined effects of Coos County's currently dismal economy (particularly the severe official unemployment rates of more than 15%) and the relatively poor salmon seasons of the past four years.

CHARLESTON BOAT BASIN MOORAGE STATISTICS

5. Changes in Composition of Permanent Moorage

<u>TYPE OF MOORAGE</u>	<u>1979</u>	<u>1981</u>	<u>2-YEAR % INCREASE (DECREASE)</u>	<u>% OF 1979 TOTAL</u>	<u>% OF 1981 TOTAL</u>
Commercial boats (number)	305	324	6%	67%	74%
Recreational boats (number)	151	112	(26%)	33%	26%
<u>TOTAL</u>	456	436	(4%)	100%	100%
Commercial boats (cumulative length)	11398'	12719'	12%	76%	82%
Recreational boats (cumulative length)	3685'	2764'	25%	24%	18%
<u>TOTAL</u>	15083'	15483'	3%	100%	100%

These statistics have been collected to indicate the current moorage situation so as to provide a starting point for a later section's forecasting of future need for moorage. The statistics accurately show the number and sizes of boats moored on a given day; however, the statistics do not show the only possible arrangement of moorage spaces. The ability of the Port of Coos Bay to respond to moorage demand is more fluid than the data would suggest: to some degree, the number of existing spaces can be (and are) adjusted by adding "fingers" to (or removing them from) the piers to increase (or decrease) spaces for smaller boats. When demand is very high, boats can temporarily be tied along side other boats rather than immediately to the dock. This arrangement is usually unsatisfactory because it greatly increases the potential for damage to boats.

A later section will use the 1981 moorage statistics as the starting point for forecasting need. The statistics on changes between 1979 and 1981 will not be used directly as trend data, however, because the comparison describes only two isolated points in time and is therefore an insufficient basis for projection of future requirements.

### 6.3. PROJECTION OF NEED

#### 6.3.1 Introduction

An appropriate starting point for attempting to determine future needs is to define what is meant in this study by "need". Since moorage consists of two distinctly different types of use -- commercial fishing and recreational -- it is appropriate to seek separate definitions for "the need for commercial fishing moorage" and "the need for recreational moorage."

It is also necessary to determine how that need shall be measured. A moorage "space", unless occupied by a boat, is not truly a use in itself; it is only valuable if it provides for safe mooring of a vessel. Since the need for moorage is so directly related to the expected number of boats, the first measurement used to project moorage needs should be based on the "need for boats."

#### 6.3.2 The State-wide Goals

##### 6.3.2.1 Commercial Fishing

The entire process used to project moorage needs will be reviewed by the State based on the general guidance of the



LCDC goals. Although there is no "Commercial Fisheries" goal, the four most applicable goals in which to seek guidance are:

- # 9 - Economy of the State
- #16 - Estuarine Resources
- #17 - Coastal Shorelands
- #19 - Ocean Resources

None of these goals defines "need", although they collectively note that needs must be addressed. Goal #9 has a particularly direct requirement:

"Economic growth and activity in accordance with such plans shall be encouraged in areas that have underutilized human and natural resource capabilities and want increased growth and activity."

Coos County certainly qualifies as such an area, in part because, according to Goal #9, it is:

"...characterized by chronic unemployment [and] a narrow economic base, but [has] the capacity and resources to support additional economic activity."

Goals #16 and #17 each refer to the high priority that must be given to providing sites for water-dependent uses. Goal #19 requires jurisdictions to provide for the navigational needs of their area.

Commercial fishing is an important sector of the local economy: its increased growth provides direct and indirect economic benefits to Coos County. Therefore, the state goals can be relied on to help justify whatever level of growth in numbers of commercial fishing boats is necessary to improve the local economy.

#### 6.3.2.2 Recreational Moorage

Goal #8, "Recreational Needs", provides specific direction for defining need. According to Goal #8, "recreation needs":

"refers to existing and future demand by citizens and visitors for recreation areas, facilities and opportunities."

This equating of need with demand is qualified by the statement that needs shall be planned:

"...in such quantity, quality and location as is consistent with the availability of the resource to meet such requirements."

Goal #8 therefore can be relied on to help justify whatever increases are expected in the demand for recreational boats.

### 6.3.3 Present Moorage Problems and Opportunities

#### 6.3.3.1 Commercial Fishing Moorage

Until very recently, the lack of availability of moorage and the questionable safety of moorage were the two most common problems for commercial fishing moorage on the Coos Bay estuary.

In 1979, 198 boats were on the waiting list for moorage [CCCOG]; in 1980, 99 boats [CCCOG]. As of October, 1981, the waiting list had fallen to less than 20 boats [Personal communication, Port of Coos Bay, 10/26/81]. This reduction in demand is likely to be a temporary situation when viewed against the cyclical nature of the commercial fishing industry, and the historical sporadic satisfaction of moorage needs. The small current waiting list has three primary causes:

- In Spring 1981, the Port extended three docks in the outer basin at Charleston specifically for the larger fishing vessels, providing roughly 60 new spaces.
- The fishing industry is in an economic slump, beset by a variety of factors including reduced season length, uncertainty of the resource, and high interest rates for investment/repair loans. As shown by the statistics on the inventory, some boats in the 30'-50' length class are being forced out of the industry; this frees up their moorage spaces for use by other boats.
- Moorage rates in the Charleston Boat Basin have increased dramatically over the past several years, roughly averaging 130% increase in six years (an annual compound rate of 15%). This factor, combined with the current severe recession in Coos County, has spurred some owners of recreational boats to remove their boats from the Boat Basin and either moor them at private in-water moorage (mainly Hanson's Landing in Charleston) or store them on dry land [see Inventory]. This action provides additional spaces to help satisfy commercial fishing moorage demand.

Problems with safety primarily involved physical drainage occurring to boats while moored at the Boat Basin. Reduction in damage has been brought about largely by two factors:

- The reduction of the waiting list and overall lessening of demand for spaces has meant a more infrequent use of rafting (tying boats to each other rather than directly to a dock) to provide moorage.
- The recent extension of the breakwater on the north end of the Boat Basin has helped reduce surge, especially in the outer basin.

### 6.3.3.2 Recreational Moorage

Availability and safety of moorage have also been recent problems for recreational moorage; some of these problems have been partially alleviated by the same changes affecting commercial fishing boats. However, the question of whether moorage for recreational boats is adequately available deserves further exploration.

As noted in the Inventory, virtually all moorage in the Coos Bay estuary is accommodated by two facilities, the Port's Small Boat Basin and Hanson's Landing (private). The Port has been actively giving priority to commercial vessels, while Hanson's Landing has some difficulty freeing spaces because they are not able to remove any non-paying "documented" vessels without extensive and lengthy legal procedures. These two facilities also contain most of the boat ramp capability that has adequate parking.

Boat ramps provide an important alternative means of public access for recreational moorage, primarily for small recreational boats. According to Paul Donheffner of the State Marine Board [Personal Communication, 10/16/81]:

- The trend toward smaller, more fuel-efficient automobiles lowers towing capacities of cars and trucks; the most accurate cut-off point for towable boats is thus a length of about 20 feet. Longer recreational boats will normally require in-water moorage.
- A one-lane launching ramp should be capable of handling roughly 50 launchings and retrievals per day; this level of activity should be served by at least 20 parking spaces per lane of ramp.

Except for the 6-lane ramp at the Boat Basin and the 2-lane ramp at Hanson's Landing, the other eight boat ramps are all one-lane ramps. Several have inadequate parking area (North Bend ramp, Rooke-Higgins), many ramps and parking areas are not paved, and most do not have a separate access dock. The Coos County Parks Advisory Board has noted the deficiency in boat ramp provision in a previous letter [see Section IV].

Another method for indicating the lack of recreational moorage in the Coos Bay estuary is to compare the number of recreational boats moored in the Coos Bay estuary with the total number of recreational boats in Coos County. The combined permanent recreational moorage (in-water) at the Charleston Boat Basin, Hanson's Landing and the City of Coos Bay dock is approximately:

200 recreational boats in permanent moorage.

According to Mr. Donheffner of the State Marine Board [personal communication, 10/16/81], a reasonable figure for boat ramp capability is 50 launchings/retrievals per boat lane per day. The Coos Bay estuary's 16 total boat ramp lanes thus have a theoretical capacity (assuming adequate parking) of:

800 recreational boat launchings per day (all ramps).

Therefore, at maximum theoretical usage, no more than 1000 recreational boats can utilize the entire Coos Bay Estuary on any given day. The following chart shows the total recreational boats in Coos County, which allows a comparison to be made between capacity of usage for the Coos Bay Estuary to the entire county.

REGISTRATION OF RECREATIONAL BOATS IN COOS COUNTY

FOOT CLASS	1978	% OF 1978 TOTAL	1979	% OF 1979 TOTAL	(Oct.) 1981	% OF 1981 TOTAL	Increase (Decrease) 78-81
Less than 12'	NA		NA		1101	18.9%	NA
12'-15'	NA		NA		2578	44.2%	NA
16'-19'	NA		NA		1626	27.9%	NA
20'-27'	NA		NA		447	7.7%	NA
28'-39'	NA		NA		72	1.2%	NA
40+	NA		NA		6	.1%	NA
TOTAL	5371	100%	6094	100%	5830	100.0%	8.5%
Up to 16'	NA		NA		3679	63.1%	NA
16' +	1941	36%	2234	36.9%	2151	36.9%	10.8%
16'-27'	NA		NA		2073	35.6%	NA
28' +	NA		NA		78	1.3%	NA

NOTE: This includes Coquille River & Lakeside.  
 NA = Not Available  
 [SOURCE: State Marine Board]

The preceding chart shows that 5830 recreational boats were registered in Coos County in 1981, yet the theoretical use capacity of the Coos Bay Estuary on any given day is only 1000 boats.

The largest and most populous estuary on the Oregon coast is thus able to accommodate less than 20% of the total recreational boat registration in the county. (The other major use areas are Lakeside/Ten Mile Lakes and the Coquille River.) This fact alone strongly indicates a severe deficiency in moorage provisioning within the Coos Bay Estuary, since it implies that visitors to the County might not find any moorage accommodation. What is needed next is some method for determining whether there is a deficiency in meeting regional moorage demands by recreational visitors to the County.

It was noted earlier that the Charleston Boat Basin waiting list has dropped substantially over the past several years. While waiting lists and similar devices serve as a more regional indicator of moorage problems and the demand for recreational boats, the true level of demand is much more difficult to assess. Further, a waiting list is directly affected by the fishing season, by a depressed economy, by potential users' expectations of the likelihood of acquiring a moorage space, and by the relative prices of moorage. Basing 20-year projections of demand on such indicators, especially during economic hardship, would not only be an inadequate representation of current problems but would also tend to guarantee the continuation of present low levels of moorage provisioning.

A more suitable indicator of deficiencies in meeting regional recreational moorage demand is simply to compare the Coos Bay estuary to other similar developed estuaries. "Commercial and Recreational Boating Facilities in Oregon Estuaries"[reference #1], a 1979 study prepared by Economic Consultants Oregon, Ltd. (ECO) for the Department of Land Conservation and Development (DLCDC), contained a survey of moorage and launch facilities as summarized below:

<u>COUNTY</u>	<u>ESTUARY</u>	<u>(CITY)</u>	<u>Permanent Recreational Moorage Slips (Ocean Access)</u>	<u>% OF TOTAL</u>
Tillamook	Tillamook Bay	Tillamook	742	18.5%
Lincoln	Yaquina Bay	Newport	1047	26.1%
Lane	Siuslaw	Florence	344	8.6%
Douglas	Umpqua	Reedsport	320	15.4%
Coos	Coos Bay	CoosBay/North Bend	201	5.0%
Curry	Rogue	Gold Beach	227	5.7%
Curry	Chetco	Brookings	684	17.0%
Others			150	3.7%
TOTAL			4,015	100.0%

[NOTE: Data excludes Astoria (Columbia River estuary)]

The Data becomes more interesting when population of coastal estuaries is taken into account. The Coos Bay estuary has the largest population concentration on the Oregon coast, accounting for roughly 35,000 people in 1980. By contrast, 1980 U.S. Census figures for the three next largest estuaries are as follows [Portland State University Center for Population Research & Census (PSU - CPRC)]:

<u>ESTUARY</u>	<u>COUNTY CENSUS DIVISION (&amp; CITY)</u>	<u>POP.</u>
Yaquina Bay	Agate Beach CCD (including Newport) & Toledo CCD (including Toledo)	<u>15,172</u>
Tillamook Bay	Tillamook CCD (including City of Tillamook)	<u>10,090</u>
Siuslaw	North Siuslaw CCD (including Florence)	<u>7,099</u>

These three estuaries accounted for more than half (53.2%) of the permanent recreational moorage with ocean access on the Oregon Coast (excluding Astoria) in 1979. Yet the Coos Bay estuary, with a roughly equivalent population, had only 1/10th the number of permanent (ocean access) recreational moorage as those three estuaries.

There are probably a number of causes for the largest and most populous estuary on the Oregon coast having only 5% of ocean access recreational moorage, but two factors in particular seem particularly relevant:

i. Travel time from the Willamette Valley.

While the other major estuaries are generally less than 2 hours travel time from the Willamette Valley urban corridor, the Coos Bay estuary is 2.5 to 5 hours travel time from that same corridor. It is reasonable to assume that a substantial portion of the other estuaries' recreational boat moorage responds to demands from the Willamette Valley.

ii. Historic ownership and use patterns in Coos Bay area.

The statistics merely confirm what is obvious to many residents and recreational boaters: the Coos Bay estuary has no destination resort complex, no high-value residential area adjacent to sports moorage, no large marina devoted to private moorage.

Three historic factors seem most significant in helping explain the severe lack of recreational moorage:

- The original layout of the major transportation corridor (U.S. Highway 101) followed the estuarine shoreline (as adjusted by substantial filling); in combination with the steep topography of the area, other minor roads, especially along the east side of the upper bay, have little back-up space for development and are not readily accessible to the main population areas because of distance from the highway bridges crossing Coos Bay.
- The primary thrust of development in Coos Bay has largely been related to the forest products industry. Major forest companies own large portions of the most buildable coastal shoreland areas, which severely reduces the availability of suitable vacant shorelands for development.
- Other than for portions of the North Spit, public services have not been extended north of the Bay. Public water is available in limited areas of East Bay, but no public sewer exists. This lack of urban services strongly discourages any consideration of immediate large-scale development in areas that might otherwise be suitable for recreational moorage development.

Certainly there are other factors that are likely to have contributed to the lack of recreational moorage in Coos Bay, but the listing is not intended to be exhaustive. What is important is that the identified lack of recreational moorage facilities is a cultural and economic disamenity for the Coos Bay estuary. The shift of potential recreational users and tourists to other areas represents substantial tourist income foregone. Newport's Embarcadero condominium/marina complex is a good "drawing card" that



improves and strengthens the Yaquina Bay economy; Coos Bay's lack of facilities even remotely approaching the attractiveness of the Embarcadero is, for many people, another good reason not to spend time and money in Coos Bay.

#### 6.3.4 Quantifying the Need for Moorage

The moorage problems outlined in the previous section serve as a non-numerical, or qualitative, indication that there is a lack of commercial and recreational moorage in the Coos Bay Estuary. The opportunities for economic improvement in the seafood industry and in recreation also suggest a potential future lack of moorage. Deciding whether this lack of moorage can simply be equated with a need for additional moorage is not easy: it first requires an understanding of the relationship between local planning and the statewide goals.

One of the most basic premises of any type of planning is that the planning process should not merely identify existing or potential #for whom the planning is done. For example, an area that desires rapid growth will view problems in housing supply--and the potential solutions--with a quite different perspective from that of a community wanting to halt rapid growth.

In Oregon, that first critical step in any planning process--determining one's goals--loses some of its meaning because of the presence of state goals. Instead of asking "What do we want to do?", "What do we want our area to become?", and "How shall we get there from here?", the local community must also ask itself, "Does what we want for ourselves conform with what we assume the State wants for us? If not, can we live with the state goals rather than our own goals?". What becomes increasingly important is proving to the state that local goals are legitimate, and that the proposed solutions to problems are "necessary" and, if not normally permitted under the goals, deserving of an exception to the goals.

To summarize, under the Oregon Planning system it is not sufficient for a community to point to qualitative indicators of moorage problems and say "let's provide for a lot more moorage than we now have"; instead the local area finds itself forced to quantify its needs if it hopes to achieve approval (acknowledgement) of its planning. LCDC

clearly stated its views on the need for quantification in a 1981 policy statement on the CREST plan:

"The identification of economic development needs must, at a minimum, relate to specific categories of water-dependent and water-related uses, such as port shipping, heavy industrial water-dependent, recreational or commercial fishing marinas or moorages, and fish handling or processing facilities. In addition, the development needs must, at a minimum, be expressed in terms of gross quantities of land (e.g., parcel sizes and quantity; approximate length of shorefront access)." [Emphasis added]

Not surprisingly, quantification of need for moorage is the focus of the remainder of this section.

#### 6.3.4.1 Commercial Fishing Moorage

Several studies performed in recent years regarding the future prospects of the fishing/seafood industry differ sharply in their conclusions about the future of the fish resource and the ability of the industry to expand in response to changing markets and resources. Each of the studies has a different geographical focus, although all of the studies collected concentrate on the Pacific Northwest.

Many of the statewide goals urge local communities to consider the carrying capacity of the resource so as not to exceed it. There are two main categories of resource that bear on moorage provisioning--the fish/shellfish resource and the land/water areas that provide a location for moorage and related facilities. The latter resource is the one being considered for expansion if need is shown. The future capacity of the fish resource is by no means certain.

Resource agencies attempt to conserve the resource (so that carrying capacity is not exceeded) through limitations on the length of the fishing season and on the maximum allowable catch. The resource can also be conserved by limiting the number of boats through licensing procedures. Limiting the number of moorage spaces through simple lack of space also helps conserve the resource. However, at the local level, this last method is not only relatively ineffectual but also economically harmful. Boats then simply locate in other more "spacious" estuaries, with the local area losing revenue, jobs and facilities in commercial fishing. Perhaps as costly, the local area also then experiences the loss of benefits in other economic sectors that would accrue from the multiplier effect of a "basic" industry.

Although improvements in the size of high-value fish resources such as salmon may be possible, nearly all of the recent studies have concluded that the only substantial increases in harvest will occur in the bottom fish resource (primarily Pacific whiting). While agreeing that the size of the non-harvested bottom fish resource is tremendous, the studies sharply differ on whether and in what manner the American fishing community can significantly increase its share of the harvest. While Combs [reference #2] foresees a positive shift in the demand curve for fish products and, along with the Washington Ports study [reference #3], predicts a substantially enlarged trawler fleet, the NRC report [reference #4] concluded that:

"Domestic processing of Pacific whiting is unlikely to prove attractive, feasible or profitable in any significant amount under existing technical and economic conditions..."

and

"The existing fleet, with normal improvements and replacements, will be adequate to make the catches and deliver them at sea to foreign processors."  
[Section IX, page 7].

The NRC report has the advantage of being very timely (August, 1981) so that it can compare short-term changes in economic conditions occurring since the writing of the other studies. As noted by NRC [page 22]:

"...in the more than two years that have passed since the Combs analysis was made, domestic ground fish development, except for joint ventures, has been minimal, largely because market prices are not adequate to pay the costs of catching, processing and marketing. Product prices have not advanced as rapidly as costs of fuel, interest and other essential inputs."

Further, NRC shares the concern of other Alaskan studies that substantial increased consumer demand for bottom fish is unlikely to occur, at least in the short-term, because the consumer will resist "paying prices that would be high enough to encourage aggressive American based development of these species". [University of Alaska, 1980; reference #]

Two factors limit the use of the NRC study for quantifying moorage needs:

- The study does not attempt quantification of vessel needs;

- The study, in NRC's own words "...does not extend to the year 2000. We have forecast joint ventures as the principal form of development to 1986. Beyond that time we have been guardedly optimistic but have not foreseen extensive development for land based processing of high-volume low-valued species of ground fish either in Alaska or the other coastal states primarily for economic reasons." [Emphasis added.]

Although the NRC study is the most recent and is thorough in attempting to refute the short-term optimism of some other studies, the emphasized quotation deserves careful consideration because of the difficulty of projecting economic needs.

This report is designed to fit within a greater comprehensive plan that projects needs for 20 years; given the volatility of the local and national economies in just the past two years, 20-year economic projections certainly qualify as long-term planning. Some long-term trend data is available for use in projections, but it must be used cautiously to estimate rather than to predict. It would obviously be preferable to have a clear representation of trends over several economic cycles; this helps avoid the unrealistic projections that would occur if the analysis considered only a period of dramatic upswing or downturn. Unfortunately, such cyclical trend data is not available.

One major problem with performing such cyclical analysis is that not only is the necessary data difficult to obtain, but also the analysis itself may be so time-consuming and expensive as to be prohibitive. Further, economic projection is an inexact science: even a single variable deemed insignificant at the time of analysis may later loom so large that it demolishes the most rigorously constructed projection. LCDC recognized these problems in a March 11, 1981 policy statement regarding the CREST (Columbia River Estuary) plan:

Although comprehensive plans generally deal with a 15-20 year time frame, the Department recognizes that the state of the art in economic planning and the extent of available information are usually limited to a 5-10 year time frame."

Another related issue is that projections contain certain inherent assumptions about the future; at their most basic level, projections assume either an optimistic or a pessimistic future. LCDC perhaps alluded to this issue in the same paragraph:

"Using the Goal 9 evaluation factors to analyze available information, however, estuarine

jurisdictions should be able to articulate the current make-up of their economy, and (2) identify a course of future economic growth and (3) where the proposed estuarine/shoreland uses and categories of uses will fit into that growth. It is not necessary for the Commission to identify a specific time frame for economic development evaluations. Rather, given available information and the Goal 9 evaluation factors, a reasonable attempt to anticipate and direct economic growth is all that should be expected."

The key quoted words are "...identify a course of future economic growth..." and "...a reasonable attempt to anticipate and direct growth." An individual deciding whether to invest in moorage construction (or any other development) must assess the risks realistically and may forego investment because of a healthy pessimism about the course of an economic cycle. Local governments, however, cannot afford to be pessimistic about the economic future when engaged in land use planning because of the nature of their role in the economic process.

Local governments do not usually create economic growth by themselves, but rather play a crucial role in determining whether to create the conditions necessary (but not sufficient) for economic growth. They do this by directly affecting the supply of approved land and water sites available for moorage (as well as all other uses). The proposed County Comprehensive Plan's Industrial Needs section recognizes this fact:

"In one sense, planning for the future can be affected by whether the future is viewed pessimistically or optimistically. A pessimistic view that accordingly allocates an insufficient amount of industrial land creates the expected dismal future and becomes a self-fulfilling prophecy. However, an overly optimistic view may create a false sense of well-being by glossing over current indicators of problems."

The C.C.D. Business Development Corporation, which collected most of the referenced studies in this section (for use within its report to the Board of Commissioners entitled "Industrial Land Needs Survey and Comparative Advantage Analysis--Coos Bay Estuary"), echoes the same concern:

"Notwithstanding the lack of agreement regarding further substantial development of the shore-based ground fish industry, estimates of industrial land needs for all types of shore-based developments--both the probable and less likely developments--are presented. It would seem to be a serious mistake

if land use planners interpret the mixed views and, in some instances, low probability of future occurrence as justification for ignoring potential land use requirements of certain facilities. If this were to occur, land use decision-makers will guarantee that development opportunities never unfold." [reference #5]

Selecting a projection for future moorage needs

It is important but not sufficient for a projection to envision a healthy economic future; the projection selected must also provide a reasonable basis for the optimism, preferably through a rigorous examination of available data. A recent study (1979) that has looked in great detail at the relationship of many variables potentially affecting the demand for boats is "Commercial and Recreational Boating Facilities in Oregon Estuaries", prepared for the Department of Land Conservation and Development (DLCD) by Economic Consultants Oregon Ltd. (ECO).

The study develops growth rate models for three different size classes each of commercial and recreational boats, comparing past trends in the growth of these boats with various economic characteristics, such as total salmon catch and the price of fuel, to determine the extent to which each of these economic characteristics affect (or "explain") the growth in the number of boats. The model also includes the use of several standard statistical tools that help assess the reliability and accuracy of the forecasts. The results of the models are consolidated as follows:

ESTIMATED PERCENTAGE GROWTH IN  
BOAT OWNERSHIP BY OREGONIANS DUE TO POPULATION  
GROWTH OF 45,000 (Base 1977) [page 152]

	Use of Boat						
	Up to 30'	Commercial		Up to 6'	Recreational		Sail- boats
Annual growth		30' to 50'	Over 50'		16' to 26'	Over 26'	
	7%	4.8%	6.3%	1.7%	5.5%	3.1%	18.1%

The following selected explanatory paragraphs are included from the study to better state ECO's conclusions from the model:

"General economic factors--population, employment, income, and prices--determine substantially the demand for boats. The number of commercial fishing vessels and recreational boats are strongly responsive to at least two of these general indicators. Fish harvest factors contribute to the demand for some categories of boats, by directly augmenting the demand for large sport vessels and, perhaps, by causing a shift in demand to larger commercial fishing vessels." [page 140, emphasis added.]

"The regression results for commercial fishing boats of all sizes suggest that general economic conditions have been the greatest determinants of the demand for boats. On the whole, changes in demand are explained best by population, employment, and the relative price of fish. Fish catch variables frequently contribute little to an explanation of the demand for boats while the costs of diesel and livestock show unreasonable relationships to the number of boats. Income is likely to have significant ability to add to the explanation of demand; when time series data on income are available for a sufficiently long period, this relationship should be tested further." [page 140]

"In general, the number of boats will increase with growth in population, employment, fish prices, and total catch. While we are confident about the direction of change in demand for boats with respect to each of these variables, the magnitude of change resulting from employment, price, or catch increases is not certain. The magnitudes resulting from population growth, however, are well established by the econometric analysis and provide valuable insight into the likely growth of the coastal fleet." [page 149]

The ECO study's use of past steady growth trends in state population makes it attractive for use in this moorage study because the projected continuation of steady population growth provides the essential aura of optimism about the future. Additionally, the ECO study rigorously analyzes a number of valuable economic characteristics and assesses the

relative significance of each. For these reasons, the ECO study is selected as the basis for projecting commercial fishing boat moorage needs for the Coos Bay Estuary. Projection of future numbers of boats first requires a summation of this inventory's total commercial boats (1981), as follows:

<u>Commercial boats</u>	-	<u>1981</u>
up to 30'	=	191 (a)
30' to 50'	=	207 (b)
+ 50'	=	<u>57</u>
TOTAL		455

(a) Includes 112 boats at Boat Basin and assumes 50% of boats at Hanson's Landing and all boats at Coos Bay docks are in this class; includes 50% of seasonal moorage.

(b) Includes 155 boats at Boat Basin and assumes remaining 50% of boats at Hanson's Landing are in this class; includes remaining 50% of seasonal moorage.

<u>Total length of commercial boats</u>	-	<u>1981</u>
up to 30'	=	4928' (c)
30' to 50'	=	8114' (c)
+ 50'	=	<u>3760'</u>
TOTAL		16802 feet

(c) Based on average length per class in Charleston Boat Basin.



Next, applying the ECO estimates to this inventory's total commercial boats (1981) yields the following:

Projected Number of Commercial Boats<sup>(d)</sup>-2000AD

up to 30'	=	181 x 3.617 <sup>(d)</sup>	=	691
30' to 50'	=	207 x 2.437 <sup>(d)</sup>	=	505
+ 50'	=	57 x 3.193 <sup>(d)</sup>	=	<u>182</u>
TOTAL	=			1378

Projected Total Length of Commercial Boats<sup>(d)</sup>-2000 A.D.

up to 30'	=	4928' x 3.617 <sup>(d)</sup>	=	17825'
30' to 50'	=	8114' x 2.437 <sup>(d)</sup>	=	19774'
+ 50'	=	3760' x 3.193 <sup>(d)</sup>	=	<u>12006'</u>
TOTAL	=			49605'

(d) Multipliers are based on the following formula:

$$(1+r)^n p^0 = p^n$$

where:

r = annually compounded growth rate (ECO)  
 (1.07 for boats up to 30')  
 (1.048 for boats 30' to 50')  
 (1.063 for boats + 50')

n = number of years (19)

P<sub>0</sub> = 1981 total

P<sub>n</sub> = 2000 A.D. total (n years)

(1+r)<sup>n</sup> = multiplier

The projections certainly are not a guaranteed picture of the year 2000, but they do represent the best long-term quantitative projection available. If the many other studies have one critical flaw for planning purposes, it is that they criticize available quantitative projections without providing an alternative quantitative projection. The ECO study itself provides an important word of caution to its projections:

"Factors other than population will combine to alter the growth patterns implied by population alone. In general, the data suggest that the demand for some boats, especially for large commercial boats, is likely to grow faster than the rate attributed to population alone. However, especially for commercial boats, the growth rate in the numbers of large boats may be reduced by growth in size within the "large boat" category. That is, past activity suggests a trend toward more boats 50 feet and over in length. Current activity may indicate that growth in the number of boats 90 feet and over actually is occurring. Thus, where population forecasts imply two new 50-plus footers, we may in fact observe only one new 90-plus foot long vessel" [page 149].

Finally, the following comment by DLCD Director Wes Kvarsten in an August 21, 1979 distribution memo is of more than passing interest:

"I am confident that you will find these reports both informative and useful in developing the estuary, shoreland and other elements of comprehensive plans."

6.3.4.2 Recreational Fishing Moorage

The arguments extensively employed in the previous section to set the stage for selection of the DLCDC-sponsored Economic Consultants Oregon Ltd. study are also sufficiently valid to justify selection of the ECO study for projecting recreational moorage needs. Applying the ECO estimates for recreational moorage to the 1981 moorage inventory yields the following results:

Inventory Totals

<u>Recreational boats (in-water moorage)</u>	-	<u>1981</u>
up to 16'	=	1
16' to 26'	=	117 (e)
+ 26'	=	54 (f)
<u>Sailboats</u>	=	<u>NA</u>
TOTAL	=	172

(e) Includes 87 boats at Charleston Boat Basin and 50% of boats at Hanson's Landing.

(f) Includes 24 boats at Boat Basin and remaining 50% of boats at Hanson's Landing.

Total Length of Recreational Boats (in-water) - 1981

up to 16'	=	14'
16' to 26'	=	2652' (g)
+ 26'	=	1754' (h)
<u>Sailboats</u>	=	<u>N.A.</u>
TOTAL	=	4420'

(g) Assumes that Boat Basin average of 22.7' per vessel applies to 50% of recreational boats at Hanson's Landing.

(h) Assumes that Boat Basin average of 32.5' per vessel applies to remaining 50% of recreational boats at Hanson's Landing.

ECO Multipliers Applied to Inventory Totals

Projected Number of Recreational Boats (in-water) - 2000 A.D.

up to 16'	=	1	x	1.378 <sup>(i)</sup>	=	Negligible
16' to 26'	=	117	x	2.766 <sup>(i)</sup>	=	324
+ 26'	=	54	x	1.786 <sup>(i)</sup>	=	97
<u>Sailboats</u>	=	<u>NA</u>	x	<u>23.591<sup>(i)</sup></u>	=	<u>(j)</u>

TOTAL = 421

Projected Total Length of Recreational Boats (in-water) - 2000 A.D.

up to 16'	=	14'	x	1.378 <sup>(i)</sup>	=	Negligible
16' to 26'	=	2652'	x	2.766 <sup>(i)</sup>	=	7335.4'
+ 26'	=	1754'	x	1.786 <sup>(i)</sup>	=	3132.6
<u>Sailboats</u>	=	<u>N.A.</u>	x	<u>23.591<sup>(i)</sup></u>	=	<u>(j)</u>

TOTAL = 10,468.0'

(i) Multipliers are based on the following formula:

$$(1+r)^n P_o = P_n$$

where:

r = annually compounded growth rate (ECO)

- (1.017 for boats up to 16')
- (1.055 for boats 16' to 26')
- (1.031 for boats +26')
- (1.181 for sailboats)

n = number of years (19)

P<sub>o</sub> = 1981 totals

P<sub>n</sub> = 2000 A.D. totals (n years)

(1+r)<sup>n</sup> = multiplier

(j) Sailboat moorage has been very sporadic on the Coos Bay Estuary; typically, the vessels have been in transient rather than in permanent moorage. Further, owners have complained of lack of available space and, before extension of the breakwater jetty at the Boat Basin, of potential damage from surge. In response, the Port of Coos Bay plans to convert "E" dock at the Boat Basin to sailboat use only. The expansion would not add spaces but rather would convert existing commercial and recreational spaces to approximately 30 sailboat spaces. [personal communication; 11/23/81]

The most thorough criticism to date of the ECO study comes from the "Recreational Moorage" section of "An Economic Evaluation of the Columbia River Estuary" (1981). The CREST study points out that, while a substantial waiting list for moorage existed in many estuaries at the time of writing of the ECO study, by 1981 the situation had changed dramatically: waiting lists had disappeared, and had been replaced in many estuaries by substantial vacancies. The "Economic Evaluation" further suggests that "a number of indications...point to the price of fuel as being the key factor in understanding the shift in moorage demand" [page 51, emphasis added]. Because of this, the CREST "Economic Evaluation" strongly questions the usefulness of the ECO study:

"In summary, there has been a recent break in the long-term trend of expanding demand for recreational moorage. It is too early to tell whether the decrease in demand is due to the economic recession in general or to a fundamental change in demand because of escalating fuel prices. Because of this uncertainty, extreme caution must be used in applying the moorage growth figures in either the Frazer or DLCDC studies which rely simply on the projection of past trends. For the purpose of this study, it is assumed that over the next 3-4 years there will be little demand for new moorage. Beyond 1984-1985, it is assumed that there will be renewed growth in demand for recreational boating moorage, but at rates of growth substantially less than those projected by the Commercial and Recreational Boating Facilities in Oregon Estuaries study. It is assumed that the cost of fuel will affect the demand for moorage and that the estuaries in closest proximity to major metropolitan areas will be at a locational advantage" [page 51].

The CREST criticisms of the ECO study are sufficiently serious to warrant a rebuttal. Fuel is a significant economic factor that affects moorage demand; it does not, however, appear certain to have the overwhelming impact that the CREST Economic Evaluation suggests. Several arguments can be made against some of the implied assumptions used by CREST to stress the importance of fuel costs:

- An economic recession does not necessarily affect all counties at the same rate nor at the same time.
- Moorage rates are different among the estuaries and are unlikely to be rising at the same rate. This factor alone would discourage the expectation of a uniform moorage vacancy rate.

- Tillamook and Lane Counties may be closer to major metropolitan areas than other coastal counties but they are still a significant distance away; further, Coos Bay has no vacancy even with a major recent expansion at the Charleston Boat Basin, yet Coos Bay is the major coastal estuary farthest from a major metropolitan area.
- Boat trip time (implied as a measure of fuel savings) may simply be a strong factor in itself. That is, the demand for estuaries is related to the amount of time needed to get from the moorage facility to the desired water recreation area.

The cost of fuel is probably less important than possible recurrences of shortage of fuel; as long as the cost of fuel merely keeps pace with inflation, it remains as a lesser consideration relative to other costs (such as moorage rental rates or the price of boats).

It is appropriate to conclude, therefore, that the ECO study is valid for projecting recreational moorage needs as well as commercial moorage needs. Some of the changes in demand over the past two years may simply reflect the spin-off effects of a major economic recession. Long-term fuel shortages and prohibitively high fuel prices are a matter of speculation. The ECO study recognized the possibilities:

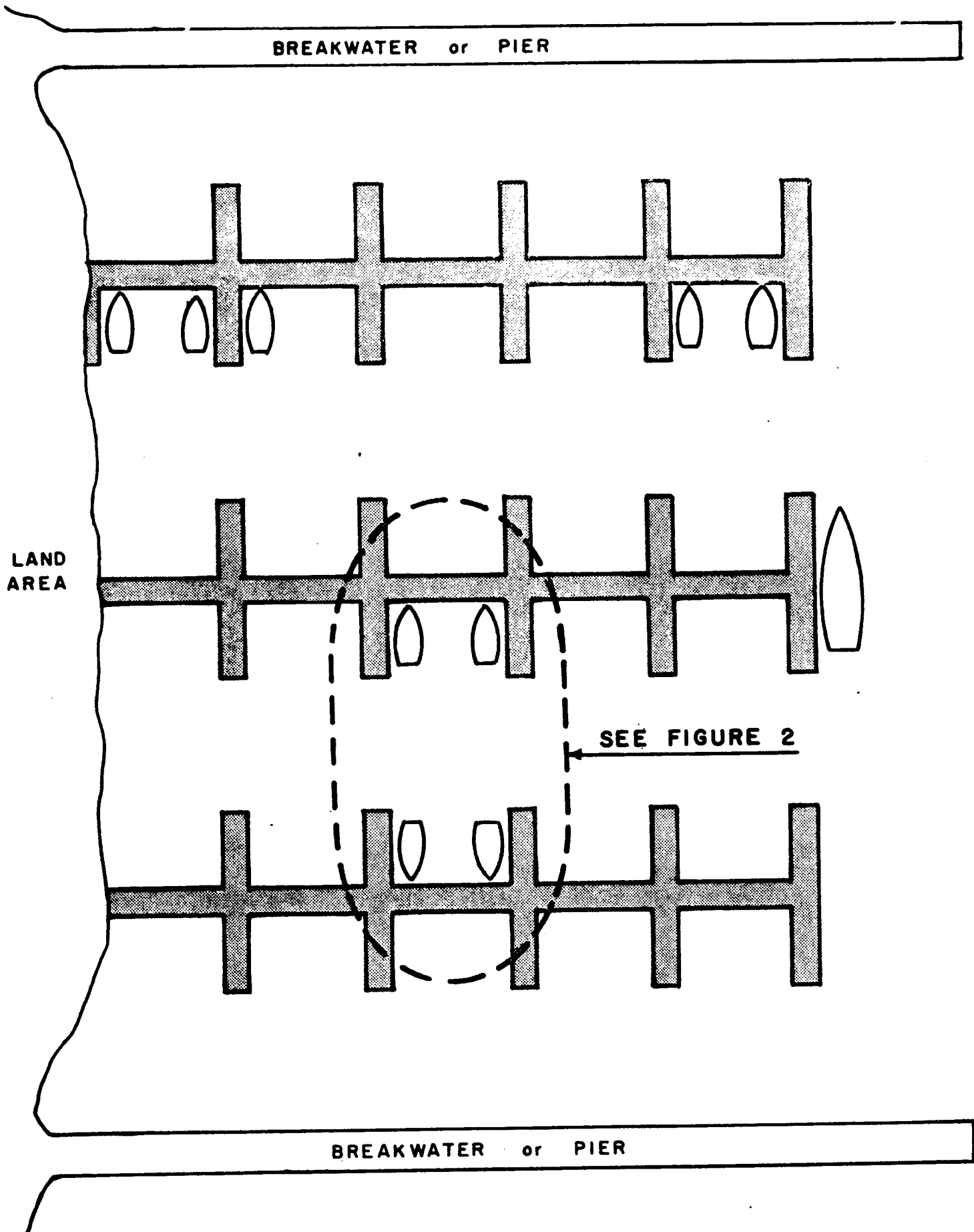
Transportation costs may well influence the location of future boating activities. While the statistical analysis shows no past relationship between the demand for boats and transportation costs as represented by the price of gasoline, extreme price increases or absolute scarcity of gasoline may determine where boats are used. Specifically, with markedly higher transportation costs, boating may occur closer to home (e.g., with Willamette Valley owners using their boats more often in Willamette Valley water bodies). However, higher transportation costs likely will encourage more seasonal moorage demand, with boaters hauling their boats only once or a few times during the season and leaving them moored. Thus, the impact of fuel shortages may be two-fold: to reduce the growth in demand for coastal facilities and to change the composition of demand to relatively less for transient moorage and launch and relatively more seasonal or permanent moorage demand. Yet, on the whole, because the Willamette Valley population center is less than a half-tank of gasoline from the coast, the relative size of these effects potentially is small." [ECO, page 152].

#### 6.3.4.3 Converting Boat Projections into Moorage Needs

Projections provided thus far have been based on the number and cumulative length of boats. Ensuring that adequate moorage area is made available through implementation requires that these figures now be converted to actual surface area requirements.

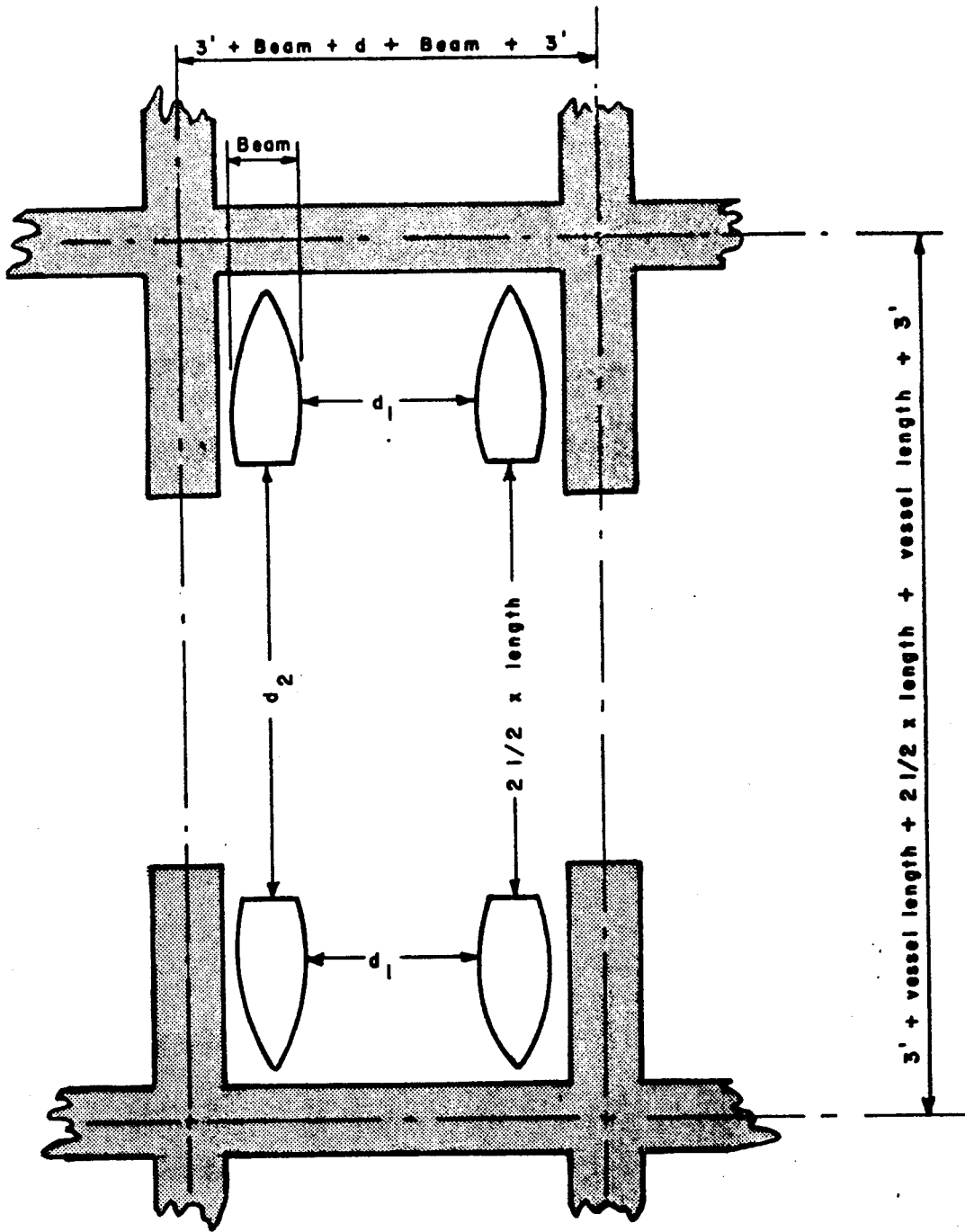
The variety of in-water moorage designs each have different total capacities, depending, for example, on the extent of use of finger piers versus pilings and on whether boats are moored bow/stern-on or side-on. The type of arrangement selected as sufficiently standard for use in converting the projections to spatial requirements is shown in the following two figures.

MOORAGE: FIGURE 1





MOORAGE: FIGURE 2



$d$  = distance between vessels

Figure #2 shows a typical section of the moorage area that will be used for converting to surface area needs. The Port of Coos Bay (Charleston Boat Basin office) has provided the following rule-of-thumb measurements for determining standards for minimum distances between vessels:

<u>Vessel Type</u>	<u>Average Length By Class</u>	<u>Assumed Beam Length</u>	<u>Minimum Distance Between Sides of Vessels (d)</u>	<u>Assumed Average Draft</u>	<u>Minimum Distance Behind Vessels (2.5 times length) (d<sub>2</sub>)</u>
<u>COMMERCIAL</u>					
Up to 30'	26'	8'	4'	2'	65'
30' to 50'	39'	12'	6'	6'	98'
+ 50'	66'	25'	10'	11'	165'
<u>RECREATIONAL</u>					
16' to 26'	23'	6'	3'	2'	58'
+ 26'	33'	10'	4'	4'	83'
Sailboats	30'	10'	6'	5'	75'

Combining the requirements of the preceding chart with the standards shown in Figure #2 yields water surface area requirement for every four vessels of each class. (It is assumed in Figure #2 that piers are 6 feet wide.) The formula thus becomes:

$$\text{Area/boat} = \frac{[2(\text{beam}) + 2(3') + d_1][2(\text{length}) + 2(3') + d_2]}{4 \text{ boats}}$$

#### SURFACE AREA MOORAGE REQUIREMENTS

<u>Commercial</u>	<u>Square Feet (rounded)</u>
Up to 30'	= 800/boat
30' to 50'	= 1638/boat
+ 50'	= 5000/boat
<u>Recreational</u>	
16' to 26'	= 578/boat
+ 26'	= 1163/boat
Sailboats	= 1128/boat

Finally, applying the preceding projections of numbers of boats to these derived spatial requirements yields the following:

WATER SURFACE MOORAGE NEEDS -- 2000 A.D.

1. COMMERCIAL

<u>Vessel Type</u>		<u>New boats</u>		<u>Sq. ft./boat</u>		<u>Acres needed</u>
Up to 30'	=	510	X	800	=	9.4 ac.
30' to 50'	=	302	X	1638	=	11.4 ac.
+50'	=	125	X	5000	=	<u>14.3 ac.</u>
COMMERCIAL SUBTOTAL						35.1 ac.

2. RECREATIONAL

16' to 26'	=	207	X	578	=	2.7 ac.
+26'	=	43	X	1163	=	1.1 ac.
Sailboats	=	678	X	1128	=	<u>17.6 ac.</u>
RECREATIONAL SUBTOTAL						21.4 ac.

TOTAL WATER SURFACE MOORAGE NEEDS = 56.5 acres

6.3.4.4 Summary

The water surface area need of 56.5 acres should also be complemented by approximately 11.3 acres of land area for parking (figuring 1/5th acre of parking per acre of water surface). Ancillary uses such as roads, offices, restrooms, repair services, and so on will also require a highly variable amount of land area, depending on whether the marina is an integral part of a larger land complex or is simply the primary use. It is emphasized again that the actual water surface area required will vary depending upon the specific configuration of the marina, the relationship to the channel, the need for breakwater protection, and other factors. Nevertheless, the projections serve as a good overall projection of total acreage needs.

The ECO study provides an important qualifier to fulfilling moorage needs that also highlights the importance of projections based upon an optimistic view of the future health of the local economy:

"The distribution of demand among estuaries and facilities within the estuaries will depend on the growth rate of different categories of boats; on

the characteristics of the estuaries particularly with respect to recreational opportunities, and upon the location of boating population. Where the demand will be satisfied depends to a considerable extent on the availability of land and water surface area for new or expanded facilities," [ECO page 153, emphasis added.]

Availability of sufficient space is the key factor. For example, during October, 1981, when some of the statistics in this report were collected, a considerable number of boats from Washington State were in transient moorage at the Charleston Boat Basin; they had been chased into a safe harbor by a storm after completing fishing in California waters. This centrality of Coos Bay between the Alaska/Washington and California fishing grounds should not be underestimated, since there is a trend toward larger vessels that can travel to where the fish are, that stay out for longer periods, and that will be seeking moorage in ports that have moorage space available as well as other services, such as off-loading, fuel bunkering, and repair. Because of their obvious differences in space requirements, the largest vessels correspondingly place a much greater strain on existing facilities. Implementation of moorage needs will be effective to the degree that it recognizes these differences.

## 6.4 POTENTIAL MOORAGE SITES

### 6.4.1 Introduction

This section identifies sites that are potentially suitable for three types of moorage uses--marinas and other in-water moorage, boat ramps, and dryland moorage. Sites potentially suited for marinas occupy most of the discussion, not only because marinas are the most important type of moorage use but also because the number of potentially suitable sites is quite small. Some of the discussion about the sites is quoted directly from consensus decisions of the Moorage Work Group Report [CCCOG, November, 1980]. For ease of identification, IATF management unit numbers are included for each site. Approximate water surface area (AWSA) is given in acres for each site.

### 6.4.2 Marinas and Other In-water Moorage

#### 6.4.2.1 Large Potentially Suitable Sites

Criteria for assessing these sites are minimal; most of the sites have been identified at some time as having the potential for accommodating moorage. Sites in this particular category are assumed to have few conflicts with natural resource uses. None of the sites in this section

have been ranked by priority; this conforms with a  
November, 1980 consensus agreement of the Moorage Work  
Group:

"The Plan should not set priorities either by site suitability or by order of development for the sites identified for moorage." [Moorage Work Group Report, page 15].

- "Eastside Properties"/Isthmus Slouth (#27)

This site, owned by the Port of Coos Bay, has both a large adjacent undeveloped upland area and a large available water surface area. Distance from the ocean may limit use to vessels that are at-sea for days at a time. Actual moorage use is questionable, since the Port considers much of the property as a prime site for shipbuilding/repair facilities.

AWSA = ± 35 acres

- Sitka Dock (#56)

According to the Moorage Work Group, "the Work Group felt that this area would be best utilized by a recreation/commercial development. The parcel is small enough that not all of the ancillary facilities required by a commercial boat marina could be accommodated. It is large enough that a good size integrated tourist commercial facility could be developed here."

"The site has the potential for moorage marina development. The existing dock could be fortified and the arm extended to the north by means of floating docks. This would create a fairly large inner basin area for moorage of both recreational and commercial vessels."

AWSA = 21.5 acres

#### 6.4.2.2 Large Marginally Suitable Sites

Sites in this category may have few conflicts with natural resource values if marinas are developed, but have substantial physical deficiencies that may preclude marina construction.

- North Point (#48)

According to the Moorage Work Group, "of all of the areas designated as having suitability for moorage, this site is least suitable. It suffers from prevailing winds, current surge and swell problems and sloughing the upland area. Moorage could be put into the area but special design problems would be posed."

AWSA = 14.6 acres

- Empire Waterfront (#54)

This site suffers from exposure to high winds, surge/suction reaction from passing ships, and borders part of the channel turning basin.

According to the Moorage Work Group,

South portion

"The Empire waterfront area already is partially developed but it has back up space and aquatic area that it could accommodate additional development. The Work Group felt that this area would be a good location for the development of a boat ramp or some other sort of water access. The city dock could also be expanded by extending the dock out beyond the intertidal area and then building an arm to the south. This would provide inside and outside moorage of a protected nature and would cause minimal disruption of the highly productive intertidal area to the south. Moorage development here would be a compliment [sic] service to the North Spit marine park development by providing easily accessably [sic] short term moorage and access for fishermen to the retail services in Empire."

North Portion

"The Interagency Task Force did not make any provisions for moorage to occur at this area, however, it could accommodate limited linear moorage in the aquatic area though there are virtually no uplands. This site may be used for future moorage considerations at such time as other already designated sites have been utilized."

AWSA = 45.8 acres

6.4.2.3      Smaller Potentially Suitable Sites

Sites in this category are usually less than ten acres, or have a shape that would severely constrict marina development.

- Coastal Acres, Inc., "as approved" (#66B)

This parcel was granted a goal exception by LCDC to allow dredging of clam beds on 10% of the property. The approved size (about 1 acre) led former Port of Coos Bay Manager Steve Felkins to state that the LCDC compromise resulted in essentially an unusable facility. The Moorage Work Group had earlier "...agreed that the development of this site should proceed in accordance with agreements based on the Coastal Acres Boat Basin Exception."

AWSA = 1.1 acres

- Indian Point, Inc. (#63)

According to the Moorage Work Group, "a proposal has been developed for a substantial recreational development on the uplands of this site. A moorage area is included in the proposal which would be a compliment [sic] recreational service. The Moorage Work Group felt that the area was suitable for moorage and that it should occur within the framework laid out in the management unit description."

AWSA = 3.3 acres

- Weyerhaeuser "Old Town" Site (#46)

According to the Moorage Work Group, "this area has adequate upland and aquatic area to lodge a marina. The work group felt that because of its proximity to residential housing that a recreational development would be preferable to a commercial development."

AWSA = 13.3 acres

- Hanson's Landing (#61)

This site is the only large private marina in Coos Bay; water surface area and land surface area are already substantially committed to marine uses, especially shipbuilding, but some limited additional development is possible.

AWSA = ± 10 acres

#### 6.4.2.4 Large Potentially Suitable Sites Identified By Oregon Department of Fish and Wildlife (ODFW) as Having "Significant" Natural Resource Value

Resource values of these sites are discussed in the Biological Resources section of this inventory; geographic extent of every identified value is mapped.

- Coastal Acres, Inc. (entire portion) (#66B)

The proximity of this site immediately adjacent to the Port's Charleston Boat Basin and to the Charleston maintained channel caused the Port of Coos Bay to propose a major expansion into a portion of the area. Objections arose because the site is a popular clam digging area. LCDC



granted an exception for a portion of this site.

AWSA = 11.2 acres

● Port property south of Ore-Aqua (#2)

This natural cove has an upland back-up area of roughly 29 acres, is sheltered from the northwest winds, is on Port ownership (including tidelands), is sufficiently distant from the main ship channel to reduce the likelihood of surge/suction reaction from ship passage, and is very close to the bar. The site is at the north end of a large clam bed in Hungryman Cove, identified as the most productive (although not easily accessible) in Coos Bay.

AWSA = ± 30 acres

● North Boat Basin Breakwater (#67)

Before a storm completely washed it out, a sandspit along the north side of the breakwater protecting the inner Boat Basin at Charleston was the only identified accessible significant razor clam site in Coos Bay. The breakwater was recently extended by the Army Corps of Engineers (C.O.E.) to reduce surge problems in the Boat Basin that arose when the sandspit was washed away. The Port considered adding an additional breakwater to the north of the existing one, but rejected the idea when informed by C.O.E. of the cost and length of time to completion.

AWSA = variable, depending on location of new breakwater

● Pony Slough (portion) (#50)

The City of North Bend has often expressed its desire to develop a small portion of Pony Slough for a marina, based on a 1974 study by Stevens, Thompson and Runyan, Inc. The site is a large cove surrounded by urban development, identified as being a major mud flat and significant winter waterfowl habitat.

AWSA = ± 300 acres (entire cove) ± 35 acres (marina)

● Jordan Cove (#7)

This site is a major cove with road and rail access bordered by industrial development. It is sheltered from the northwest winds and is sufficiently distant from the main

shipping channel to prevent surge/suction reactions from ship passage. However, the site has also been identified as having significant natural resource values. Further, the proximity of rail and the site's location on the North Spit suggest that deep-water industrial development may be a more productive use rather than as a marina.

AWSA = 61 acres

● Jordan Point (#8)

This site has characteristics similar to Jordan Cove, except that its size may limit moorage configurations. According to the Moorage Work Group, "this area is a sandy beach area adjacent to a natural channel going into North Slough. There are no uses currently occurring there. Given the amount of upland acreage and the amount of linear water front, its proximity to the sloughs and the Horse Fall Creek recreation area, the group felt that this area would be ideally suited to the development of a small marina which could serve small recreational boat demand. The site does not have any significant wind or wave problems (such as are found directly across the bay at the Pierce property). There is a considerable intertidal area but it is not extremely productive. The site is large enough that it could accommodate a rather large moorage and marina development. The group felt that this would be undesirable, that a smaller facility would be more in keeping with the adjacent Conservation and Natural areas and the general low density levels of activity in this area."

AWSA = 12.9 acres

● "Eastside Properties" on Marshfield Channel (#26B)

According to the Moorage Work Group, "this section of the Eastside airport site has been viewed by the Port as having the potential for development of mid-water trawler size moorage along the Cooston [sic] channel side. The land slopes down towards the water on its western boundary lending access to the water area not afforded in other areas due to the high banks. The Port feels that this area could provide needs which can't be answered anywhere else on the bay."

"Development of the Marine Industrial Park complex on the North Spit will increase the need for large boat moorage, both temporary and permanent. It will also increase the demand for areas where boats can be serviced and repaired. Currently there are not ship repair facilities in the lower bay because companies do not wish to locate that close to the salt air. This area could be developed for this sort of

purpose."

"The Port also feels that having this area as a moorage site will increase their ability to put together an approvable federal grant request package."

"In reviewing local packages, the federal agencies like to see that there is the ability of the area to provide for the necessary infrastructure."

"The site is doubly valuable as a moorage site because smaller vessels could be moored in closer to shore in the shallower areas, and larger vessels moored out in the deep water channel."

AWSA = ± 40 acres

#### 6.4.2.5 Other In-water Moorage

Single-purpose docks for small craft have not been identified; given the LCDC Goal #16 requirement against proliferation of single purpose docks, these become insignificant in meeting long-term moorage needs.

#### 6.4.3. Boat Ramps

In a July, 1980 letter to the Coos County Board of Commissioners, the County Parks Department reported the recommendations of the Coos County Parks Advisory Board regarding boat ramp development. Portions of that letter are quoted as follows:

"Each site should be reviewed by the Board of Commissioners separately and valued on its own merit. In selecting any site, land acquisition,

development, and maintenance must be considered as the public dictates. The following list of sites was proposed:

1. Barview Wayside
2. North Spit
- \* 3. Empire
- \* 4. North Bend Airport
5. East Pony Slough
- \* 6. McCullough
- \* 7. California Street
8. Coalbank
9. Eastside
10. Catching
- \*11. Shinglehouse
12. Coos City
13. Upper Coos River (SNNW Sec. 33, T.25S,R11W)
- \*14. Charleston

\*Denotes existing facilities with potential for further development."

"In identifying the above-mentioned sites, it is not the intent of the Coos County Parks Advisory Board Subcommittee to limit the sites for public recreation, but recognize the value of the sites for access to Coos County Waterways for recreation and commercial uses. We therefore do not distinguish between public, private, or commercial developments but consider them equal." [letter from Gary Combs, Director]

Since that time, the Myrtle Tree boat ramp on the Coos River has been constructed. As noted by the County Parks Director, the list is not inclusive: some of the sites identified as having the potential for marina development (or for dryland moorage as discussed in the next section) could also support a boat ramp and parking area. Further, some identified sites may be unsatisfactory for boat ramp development for other reasons, as noted in the following letter from the Coos Bay Pilots Association to the Port of Coos Bay, regarding a boat ramp proposed on the North Spit by the Oregon Department of Fish & Wildlife (ODFW):

"The Coos Bay Pilots Association oppose and will continue to oppose any public launch ramp sites located on the North Spit shorelands, from the Oregon Aqua Foods Development to Jordan Cove. Dangerous surge and suction reactions occur with each ship passage, causing an extremely unpredictable shore side water condition. These surges are and have been, capable of hurling any trailerable boat in a fashion that would be destructive to the boat, and could cause serious

injury to anyone launching or retrieving the craft."

"The Coos Bay Pilots feel that the possibilities for serious injury are real and that any consideration for public launch ramps in the described area is inappropriate."

"Please contact us directly before any further evaluation of future public boat ramps. We would be happy to indicate areas of concern to us."  
[letter, Capt. John G. Davis, Nov. 18, 1981]

#### 6.4.4. Dryland Moorage

In association with appropriately designed launch facilities, dryland moorage (where boats are stored on land and mechanically lowered into the water) may help relieve some of the moorage demand for trailerable boats. The 16' to 26' range is normally considered trailerable, although the trend toward smaller, less powerful automobiles may be reducing the range of trailerable boats to those less than 20 feet in length [Paul Donheffner and Steve Felkins, separate personal communications, Nov. 1981].

The amount of dryland storage demanded or needed at a given time is fairly flexible, and is dependent on such variables as the price and proximity to the estuary of existing dryland storage, the cost and availability and perceived or actual safety of in-water moorage, and so on. According to Section 6.3.3.2 of this inventory, 5830 recreational boats were registered throughout Coos County in 1981. The Coos Bay estuary currently provides only a low proportion of in-water moorage opportunities for these boats. It would be appropriate therefore to select a small percentage (such as 5%) of this figure, or 290 boats, as an appropriate number of boats for which to provide dryland storage opportunities. Allowing 600 square feet for each boat (including temporary parking and offices), an appropriate amount of dryland moorage is

$$5\% \times 5830 \text{ boats} \times 600 \text{ sq. ft./boat} = \underline{4 \text{ acres.}}$$

The following sites are potentially suitable for dryland moorage because of the upland area available and their proximity to roads and natural or maintained channels.

- Indian Point, Inc.
- Peirce Point (Weyerhaeuser)
- "Old Town" site (Weyerhaeuser)

- Julius Swanson property/Empire
- North Point
- Bunker Hill at Isthmus Slough (Georgia-Pacific)
- Barview Wayside
- Hanson's Landing
- Jordan Point
- Christiansen Ranch
- Eastside Properties (Port of Coos Bay)

#### 6.4.5 Conclusions

Approximate water surface area (AWSA) for all in-water moorage is as follows:

● Large potentially suitable sites	=	56.5 ac
● Smaller potentially suitable sites	=	27.7 ac
● Large marginally suitable sites	=	60.4 ac
● Large potentially suitable sites identified by ODFW as having "significant" natural resource value	=	<u>190.1 ac</u>
TOTAL		<u>334.7 ac</u>

The first two categories above represent the most likely sites for marina development. It is particularly disturbing that the total acreage in these sites is just slightly greater (84.2 acres) than the projected in-water moorage needs to the year 2000 (56.5 acres). When the supply of sites is so limited, any one factor preventing use of a site will mean that future moorage needs cannot be met unless an exception is taken to the state goals to allow use of sites identified by resource agencies as having "significant" natural resource value.

Any number of factors may eliminate sites from use for moorage:

- Some sites such as the Port's Eastside Properties, may be earmarked for more intensive or more needed development, or both;
- Some sites are suitable for only specific types of moorage, because of their distance from the ocean or from fish processing areas, or because of surge problems in reaction to large ship passage;
- Suitability has only been estimated: some sites, such as the Empire Waterfront, might require massive and costly breakwater construction, while others, such as North Point, may be subject to such strong afternoon winds that they are unsafe;
- Public ownership is important: the high cost of land acquisition (if the owner, for example, does not want to develop the property for moorage) may effectively prohibit moorage development on the site.

## 6.5 Site Selection

This report has two central purposes:

- It analyzes moorage decisions of the Inter-Agency Task force (IATF) to determine whether commercial fishing and recreational moorage needs identified in Section 6 of the Coos Bay Estuary Management Plan Inventory have been adequately fulfilled.
- It proposes three alternative means for overcoming identified deficiencies in IATF moorage decisions.
- It selects sites to overcome moorage deficiencies.

### 6.5.1 IATF Moorage Decisions Analysis

This section analyzes tentative decisions by the IATF that affect commercial fishing and recreational moorage needs. The analysis is in two parts:

- First, definitions of "marinas" and "docks and moorage" are studied to determine whether each definition could reasonably provide for moorage needs.
- Second, each management unit where "marinas" are allowed is studied to determine how much water area should be subtracted from the total area of the management unit because the segment is either already occupied, is physically unsuitable, or presents other problems inhibiting the fulfillment of moorage needs.

### DEFINITIONS

As shown in the definitions below, the IATF allowed two types of uses that could provide for in-water moorage. The major distinction between the two uses--"marinas" and docks and moorage"--is that the latter is limited to moorages of less than 25 berths "with minimal shoreside services and no solid breakwater".

**"MARINAS:** Facilities which provide moorage, launching, storage, supplies and a variety of services for recreational, commercial fishing and charter fishing vessels. They are differentiated from docks/moorage by a marina's larger scale, the provision of significant landside services and/or the use of a solid breakwater (rock, bulkheading, etc.). Moorage facilities with less than 25 berths are excluded from this category."

**"DOCKS AND MOORAGE:** A pier or secured float or floats for boat tie-up or other water use, often associated with a specific land use on the adjacent shoreland, such as a residence, a group of residences, a commercial use or light



industrial facility. Small commercial moorages (less than 25 berths) with minimal shoreside services and no solid breakwater are included in this category. Floathouses, which are used for boat storage, netdrying and similar purposes are also included in this category."

Segments allowing these uses are shown on the map entitled "IATF Moorage Decisions". ("Docks and Moorage" were also allowed wherever "marinas" were allowed.) The map also shows those management segments where "Dryland Moorage" has been allowed by the IATF. However, these land areas are not analyzed in detail in this report because they are not expected to help fulfill in-water needs. This occurs because in-water moorage need projections of the Special Moorage element of the CBEMP Inventory are based strictly on existing in-water moorage.

Comparison of the two in-water moorage use definitions suggests the following conclusions:

i. The definition of "Docks and Moorage" will not provide suitable areas for the fulfillment of commercial fishing boat moorage needs, mainly because such areas would not provide for breakwater protection and necessary landside services.

ii. The definition of "Docks and Moorage" is vague enough that it cannot be stated with certainty that such areas will even provide suitable areas for fulfillment of recreational moorage needs. The major definitional problem is whether the 25-boat limitation means that a given management segment could have a number of docks, none of which can moor more than 25 boats, or whether a given management segment could only contain one pier of less than 25 boats. Obviously, if a particular management segment is sufficiently large (such as #26 CA, the area between the Marshfield Channel and the Port of Coos Bay Eastside Properties), it could sustain 10 docks of 24 boats each and thereby have an impact very similar to a marina without being so defined.

Perhaps the best solution to the problem is to ensure:

- that areas determined not to be suitable for substantial in-water moorage are considered for deletion or revision of the "Docks and Moorage" use. This would tend to comply with the general Goal #16 policy against the "proliferation of single purpose docks".
- that "Docks and Moorage" areas deemed potentially suitable for marinas are included in any consideration of areas to be allowed for marinas.

## MANAGEMENT SEGMENT ANALYSIS

This section examines each management segment in which the IATF allowed "Marinas" as a use, to determine how much water area is truly available for meeting identified in-water moorage needs. This determination of "available Water Area" requires:

- i. subtracting those water areas that are already occupied by existing uses;
- ii. subtracting areas that are not physically suited (as described below) for moorage; and
- iii. reviewing remaining areas for other problems that would prevent in-water moorage, such as a proposed commitment of a management segment to a use other than commercial fishing or recreational moorage.

### OCCUPIED AREAS

1. 66A (DA): Charleston Boat Basin  
Total area = 51 acres  
Available Water Area = 0-4 acres

Most of the area is now occupied (following the recent extension of the outer basin piers). Roughly 4 acres is potentially available in the subtidal portion of the "Charleston Triangle" (east of Coastal Acres, Inc.), although development of this area is expected to require dredging of at least 4 acres of Coastal Acres property (66B).

2. 61 [DA): Hanson's Landing/TAP Fisheries  
Total area = 43 acres  
Available Water Area = 5 acres

The southern portion is the site of the only large private marina in the bay, while some of the northern portion is occupied by the TAP Fisheries processing plant and docks. Infill available is roughly 5 acres (in several sites).

3. 44 (DA) : Downtown waterfront (Coos Bay/North Bend).  
Total area = 74 acres  
Available water area = 0 acres

The close proximity of the channel and the extent of existing development dictate that only minor infill is available for marina development.

4. 43 (DA) : Evans Wood Products Site

Total area = 19 acres  
Available water area = 0 acres

The proximity of the channel, the historic use of portions of the area for log storage, and the commitment of the adjacent land area to railroad yards collectively prohibit marina development at the site.

Total occupied area = 178-182 acres  
Total available = 5-9 acres

#### PHYSICALLY UNSUITED AREAS

1. Coalbank Slough (DA): (North Section).  
Total Area = 25 acres  
Available water area = less than 1/2 acre

Deletion of the central portion of the slough for navigation purposes, in combination with the narrow dimensions of the slough, renders the channel unsuitable for development of a large marina. (The IATF did not approve dredging of the marshes in segment 39NA.) However, a site exists immediately upstream of the Highway 101 bridge which is suitable for a small recreational marina. The scheduled replacement of the bridge will improve access for small craft with a height clearance of less than 20 feet.

2. Isthmus Slough A (DA)  
Total area = 120 acres  
Available water area = 0 acres

The extremely narrow area available, together with the historic (and Current) use of the area for log transportation and storage and for deep draft shipping, renders the segment unsuited for marina development. The "T-shaped" marsh historically used by Georgia-Pacific for log transport and storage could be used for access to dryland moorage, assuming that G.P. no longer needs the site for log storage and handling.

Total unsuited area = 145 acres  
Total available = 0 acres

#### OTHER PROBLEM AREAS

1. 27 (DA): Eastside Properties (west)  
Total area = 54 acres  
Available water area = 0 acres

As discussed in section 5.9 of the Inventory, this area is identified as being needed for Marine Industries development. The Port of Coos Bay, in "Request for

Planning Funds" (1980 NMFS grant application) has identified this water area as needed for marine development and ship yard leasing, and identifies aquatic segment 26 (CA) as needed for moorage.

2. 54 (DA): Empire Waterfront  
Total area = 51 acres  
Available water area = 0 acres

Part of this water area is utilized for navigational approach to three separate docks, (oil and gas, fish receiving, and lumber). Further, current barge use of the site demands sufficient water area to allow room for maneuvering. The land area available for marina support is therefore negligible since most of the land is currently occupied. The site also suffers from high winds.

3. 56 (DA): Sitka Dock  
Total area = 39 acres  
Available water area = 14 acres

Construction of a marina within this segment would require drilling and blasting of the rock substrate that lies close to the surface of this segment, and would require construction of a breakwater (by filling subtidal areas) to protect against surge. Project costs would be correspondingly high.

4. 48 (CA): North Point  
Total area = 100 acres  
Available water area = 0 acres

This was identified as a marginally suitable moorage site (section 6.4.2.2 of the Inventory) because of strong "prevailing winds, current surge and swell problems, and sloughing of the upland areas". Because of the serious conflicts that could arise with sea-going vessels in the northern water area (such vessels cannot maneuver to avoid small boats in the area without a substantial risk of ramming either bridge), even the inner shallow water area is only marginally suitable for marina development.

5. 46 (DA): Old Town Site  
Total area = 12 acres  
Available water area = 6 acres

The narrow configuration of both the aquatic and shoreland management units as well as the close proximity of the channel will partially limit the use of this area.

Total unavailable area = 236 acres  
Total available area = 20 acres

REMAINING SUITABLE AREAS

63B (DA):

Indian Point  
Total area = 6 acres  
Available water area = 6 acres

This site is fully suitable for recreational moorage in conjunction with development of a Recreational Planned Unit Development on the upland property.

Total unavailable area = 0 acres  
Total available area = 6 acres

6.5.2

CONCLUSIONS

1. The IATF allowed "Marinas" within approximately 743 acres of aquatic management segments. However, further analysis reveals that only 25-29 acres of available water surface exist to fulfill 56.5 acres of identified moorage needs.

This is an overall moorage deficiency of 27.5-31.5 water acres.

2. Some of the identified sites are not suited for meeting commercial fishing moorage needs, while other sites have been limited by the IATF to exclude recreational moorage. One site, (Hanson's Landing), could provide for either commercial fishing or recreational moorage or a mixture of both. One site (Indian Point) is suitable only for recreational moorage. All other sites were limited explicitly or implicitly to providing commercial fishing moorage only.

6.5.3 Alternative Methods for Overcoming Deficiencies

Decisions on how to overcome deficiencies in in-water moorage provision resolve ultimately to a question of whether needs should be satisfied "immediately", or "eventually". This can be stated in three alternatives:

Alternative #1

Identify additional potential sites suitable for in-water moorage until moorage deficiencies are eliminated, then allow "Marinas" as a use within the corresponding management segments.

Alternative #2

Accept IATF moorage decisions as deficient, but defer changing any management segments' allowed uses and activities. Instead, consider the identified deficiency as a banked reserve that is "immediately" available (until depleted) to the first moorage development proposals that successfully complete all permit processes (on a first-come, first-served basis).

Alternative #3

Through a combination of Alternatives #1 and #2, identify and designate for in-water moorage ("Marinas") the most suitable sites, and consider any remaining deficiency as a banked reserve that is "immediately" available.

Comparison of the alternatives must focus on the critical concept of availability; that is, the alternative selected should be the one that does the best job at making a sufficient number of moorage sites available for development so that moorage needs can be met. Availability of any particular site is, of course, always uncertain until development actually occurs, because the market system itself contains a number of uncertainties. The purpose of the plan is to ensure sufficient choices of legally available sites so that the market system has the freedom to operate efficiently.

If goal exceptions and plan amendments were either unnecessary or uncomplicated, then Alternative #2 would definitely be the most compatible with a normal market system. This is so because market processes would "propose" the most suitable sites for development (in this case, for moorage), knowing that a specified acreage has been set aside without artificially limiting the number of sites for consideration.

The actual situation is quite different. Goal exceptions will likely be required for many of the identified sites to allow for any necessary dredging and breakwater construction, depending upon the identified resource values of each site. Alternative #2 would actually provide less certainty than Alternatives #1 or #3, since development for moorage would require approval of not only a future goal exception but also of a corresponding plan amendment.

Alternative #1 has been selected by the Local Officials Advisory Group because it best follows the rationale of the CBEMP and the proposed Coos County Comprehensive Plan for meeting economic needs: identify 20-year needs and corresponding suitable sites, then make all such sites available for development now to allow some degree of market flexibility.

#### PROPOSED SITES

The CBEMP map entitled "Existing and Potential Commercial Fishing and Recreational Boat Moorage" lists several potential moorage sites that were not approved by the IATF for "Marinas" but which are considered suitable for meeting in-water moorage needs. These include:

26 (CA)	Eastside Properties: Marshfield Channel
8 (CA)	Jordan Point
50 (NA) & 50A (CA)	Pony Slough
7 (NA)	Jordan Cove
2 (NA)	Port South of Ore-Aqua

66B (CA) Coastal Acres (major portion)  
 67 (CA) North Boat Basin Breakwater

Of these, the first two sites deserve careful consideration because the IATF approved them for "Docks and Moorage". Given the definitional vagueness of that term, as discussed earlier, the allowing of "Marinas" on the sites would not seem to represent a significant departure from the IATF's intent.

#### 6.5.4 Site Selection

Sites now selected to fulfill the need for in-water moorage and dryland moorage are listed below. The asterisk denotes those sites where the resources present require the taking of a goal exception to allow marina use.

<u>Sites</u>	<u>Acreage</u>
Charleston Boat Basin Infill	0-4
Hanson's Landing/TAP Fisheries*	5
Old Town	6
Indian Point*	6
Eastside 26B*	22
Coalbank Slough*	0.5
Sitka Dock	14
Dryland Storage	4
	<hr/> 57.5-61.5

\*Goal Exception required

#### 6.5.5 New Definitions

The Local Officials Advisory Group revised the definitions of "Marinas" and "Docks" to read as follows:

Marinas: Facilities which provide moorage, launching, storage, supplies and a variety of services for recreational, commercial fishing and charter fishing vessels. Moorage facilities with five (5) or less berths are excluded from this category.

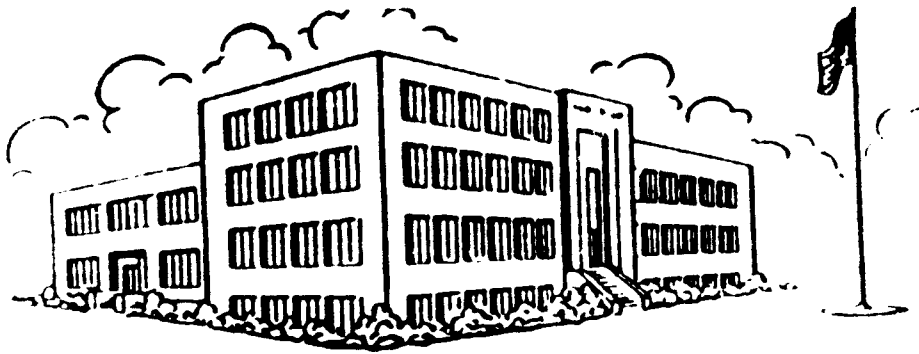
Docks: A pier or secured float or floats for boat tie-up or other water use, often associated with a specific land use on the adjacent shoreland, such as a residence or group of residences. Small commercial moorages (five berths or less) with minimal shoreside services and no solid breakwater are included in this category. Floathouses, which are used for boat storage, net-drying and



similar purposes are also included in this category.

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9. Kaspar, Jeff; Port of Coos Bay; Personal Communications, October & November 1981.
10. Matejka, Jim, Port of Coos Bay (Charleston Boat Basin); Personal Communications, November, 1981
11. Felkins, Steve, Ports Division Manager, Department of Economic Development; Personal Communication, November, 1981.



# County of Coos

PLANNING DEPARTMENT  
COURTHOUSE ANNEX  
COQUILLE, OREGON 97423

PH: 396-3121 EXT. 252

Bill Grile, AICP  
Director

## APPENDIX A

Marilyn Grannell  
757 Newmark  
Coos Bay, OR 97420

RE: Coastal Acres

Dear Mrs. Grannell:

Bill Grile asked that I respond to your request of Oct. 16 regarding the status of your property known as "Coastal Acres". The following points outline the Planning Department's understanding of your property's current status:

### DESIGNATION OF PROPERTY

- Current zoning: Interim Natural Resource (INR) for the land area; water area not zoned. The Zoning Ordinance generally does not zone water areas.
- 1975 Coos Bay Estuary Plan designation: "Marine Commercial" (major part) and "Marine Transport" (easternmost segment). Both designations would allow a marina, port facilities, etc.
- Draft Coos Bay Estuary Management Plan of the Inter-Agency Task Force (IATF) proposed designation: "Conservation Aquatic".

The "Management Objective" (as revised) for Aquatic segment 66B allows development of moorage facilities in accordance with the terms of the goal exception approved by LCDC in January, 1980 [LCDC #79-041].

### WHAT USES ARE ALLOWED?

In determining what a property owner can do with his or her property, a governing body under the Oregon planning system will ideally look to its "acknowledged" comprehensive plan for a listing of permitted uses and activities. Coos County, like most counties in the state, does not yet have a plan that has been acknowledged by LCDC to be in conformance with State-wide Goals. In the absence of an acknowledged comprehensive plan, we

#### COOS COUNTY PLANNING COMMISSION:

Howard Watkins, Chairman  
Roy Peters, Vice Chrm.  
Bill Leslie

Frances Ellen McKenzie  
Willis Sutton  
Jody McNeely

Timm Slater  
Jerry Phillips  
Monte Lund

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must rely instead on current zoning (which is irrelevant here because the site is tidelands), on work accomplished as part of a proposed plan, and on the goals themselves.

Your property is relatively unique, because it has been approved by LCDC as deserving of a goal exception to allow dredging on a major clam bed (which would otherwise be protected from dredging) so that moorage facilities can be created. This may sound very straight-forward, yet a number of unresolved problems have arisen since the LCDC approval, which tend to confuse rather than clarify the situation.

#### PROBLEMS

1. There has been some disagreement at the state level as to precisely which area of clam beds shall be permitted to be dredged. This department will attempt to resolve those disagreements within this letter.

The confusion over which area has been permitted for dredging arises partly because of the liberal use of the phrase "the area known as 'Coastal Acres' " throughout the Exceptions document (CCCOG) and Exception Order (LCDC). Page II-1 of the Boat Basin Exceptions document defines the site as follows:

The area known as "Coastal Acres" is a triangular-shaped, 11.2 acre area which is in a southwesterly direction immediately adjacent to the existing outer basin areas of the Charleston small boat basin.

The area described is, of course, your property, which is under the ownership of Coastal Acres, Inc. Our review of the Assessor's records suggest that you own all of the intertidal lands in this area. This department shall refer to the greater area, which also includes subtidal lands that are under the ownership of the State of Oregon, as the "Charleston Triangle". Our use of this term is based on the following sentence contained in the "Coastal Acres Boat Basin Exception Ordinance" prepared by the Coos County Board of Commissioners:

Context: Through the Task Force consideration, the situation was reviewed and found to be that the Port of Coos Bay was proposing to expand the Charleston Boat Basin into an area known as the Charleston Triangle partially on an intertidal property known as "Coastal Acres".

We use this definition of "Coastal Acres" and "Charleston Triangle" because the LCDC Final Order on the request referred to the "Exceptions Statement adopted by the respondents Board of Commissioners".

The original moorage and dredging proposal submitted by the Port of Coos Bay contained detailed drawings showing a fairly precise area where development was to occur. In approving the Goal

Exception, LCDC agreed to the very inspecific dredging area outlined according to what became known as the "Hosie-Laird" proposal that was adopted in an ordinance amendment by the Board of Commissioners. The first two points (a and b) on page 2 of LCDC's "Final Order" describe LCDC's understanding of the Hosie-Laird proposal:

- a. The only area to be altered is the area between a line running parallel to, coterminous with, and extending from the location of the proposed anchor pier (where the final design places it) and the Charleston channel.
- b. No more than the outermost 10% more or less of the clam beds within Coastal Acres shall be dredged. Dredging shall be accomplished without back filling and must leave the remaining 90% of the beds intact.

You will notice that LCDC referred to "the clam beds within Coastal Acres" as the area within which 10% more or less may be dredged. Because both the Exceptions document and the Board of Commissioners' adopted Ordinance amendment both refer precisely to Coastal Acres as the privately-owned intertidal property only (and not the subtidal lands owned by the State of Oregon), this Department shall assume that LCDC's use of the term "Coastal Acres" also refers just to your property and nothing more. This point is important because the Division of State Lands, in its Order of May 15, 1980 on the Port of Coos Bay Removal Permit Application No. 2867 states on page 11 that the condition regarding dredging of 10% of Coastal Acres:

...is not consistent with the physical conditions that exist at the expansion site. The proposed expansion would occupy about 6-7 acres of tide and sand flat. Almost all of that area supports a clam resource. If only 10% of the clam beds could be dredged as stated in Condition (b), the "Hosie-Laird" plan cannot be used.

It appears that there is a direct conflict between the general thrust of LCDC Order No. 79-041 and Condition (b) of that Order. Resolution of that conflict is necessary before the proposed project can begin.

What Division of State Lands (DSL) is saying is that your property and also the sub-tidal property owned by the state both contain clam beds; apparently, DSL believes that "Coastal Acres" refers not only to your property but to the state-owned subtidal lands as well. Because of the confusion arising from the misunderstanding of just exactly what "Coastal Acres" is, the Inter-Agency Task Force requested that the Department of Land Conservation and Development (DLCD) investigate the record and

help determine where a line for the proposed dock should be located. In response to this request Neal Coenen of DLCD wrote a memo on July 30, 1981 to Bill Grile that outlined a specific method for determining the limits of the new moorage area and the area that could be dredged. In his memo, Mr. Coenen prescribes a method for determining the area which can be dredged. Mr. Coenen responds to the DSL concern over the potential conflict by saying:

This observation misconstrues portions of the Commission's Order.

I believe that there is one more point which reinforces our belief that the area to be dredged is the easternmost 10% more or less of the privately-owned intertidal lands known as Coastal Acres. The major concern expressed throughout the entire process toward achieving the goal exception was that clam beds would be lost to recreational diggers. By definition, subtidal lands are not exposed even at low tide. As such, clam beds on subtidal lands are not typically used by recreational diggers although they can be used by commercial divers. This would seem to support the contention that the concern about the loss of clam beds and the 10% limitation on the area to be dredged both apply specifically and only to your intertidal lands which are owned by Coastal Acres, Inc.

2. The Port of Coos Bay feels that the modified design of the moorage facilities according to the "Hosie-Laird" proposal does not provide a suitable facility.

This major problem was expressed very plainly by Steve Felkins in a letter to this department dated 8/17/81 (attached). In his letter, Mr. Felkins states basically that the LCDC-approved modifications would result in an "unusable facility". I do not know whether Mr. Felkins had attempted to specifically outline the area that could be dredged or whether this was simply a well-informed guess on his part. Certainly, the "Hosie-Laird" proposal is a totally different moorage facility proposal than that originally proposed by the Port of Coos Bay. You may wish to pursue this further with Acting Manager Jeff Kaspar or with the Port of Coos Bay Commission.

3. The LCDC Exception Order's reliance on very specific statements in both the Exceptions document and the Board of Commissioners Ordinance Amendment will apparently force any moorage development on your property to be intimately tied to the immediate needs of, and future actions of, the Port of Coos Bay.

The LCDC Final Order on the Exception contained 12 conditions (a through l) that were based on very specific statements and agreed limitations contained within the Boat Basin Exceptions document and in the Board of Commissioners' Ordinance Amendment. (LCDC

Order is attached.) These conditions range from physical construction limitations, including those already mentioned concerning the area to be dredged, to a requirement that the total moorage provided on your property together with the recent expansion of the outer boat basin not exceed 180 moorage spaces, to a requirement that public access from shore to the clam beds be guaranteed in perpetuity, to a requirement that various public facilities such as further disposal of waste be provided, to a requirement that "the Port shall satisfy the mitigation requirements of Goal #16, as determined by the Division of State Lands". Although all of these requirements are serious, and may force development of your property to hinge on cooperation by the Port of Coos Bay, it is the last requirement (for mitigation) that is perhaps the most serious.

The "Order" statement of the Division of State Lands Permit Response dated May 15, 1980 explains fairly clearly what the present status of the property is:

The Port of Coos Bay's Removal Permit Application No. 2867 is amended so that the project proposed is the "Laird-Hosie plan" as set forth in LCDC Order no. 79-041. The Port is hereby ordered to submit design drawings showing location and proposed facilities as conditioned by LCDC Order no. 79-041 to establish project boundaries and scope and before the mitigation process begins. Removal permit no. 2867 will be issued, subject to appropriate operating conditions, after the Port offers and the Division accepts a satisfactory mitigation package.

LCDC Goal #16 requires mitigation to replace the clam bed resource that would be lost because of the dredging. The DSL Order provides an explicit requirement of how the mitigation effort shall proceed:

The Port of Coos Bay must take the lead in developing a satisfactory mitigation package. The Division of State Lands, Oregon Department of Fish and Wildlife and LCDC have a responsibility to assist the Port in developing a proposal.

The following steps are needed to develop a satisfactory mitigation package:

1. State and Federal agency biologists should inventory the expansion site to determine which resources and uses are present and will be affected by the project. Compensating impacts should also be identified and evaluated. Extensive, detailed inventories are not required -- it is only necessary to identify the important organisms present and determine the approximate extent, density, and vitality of the communities.

2. The Port, with agency assistance, must select and offer one or more mitigation proposals to replace the lost resources.

3. The agency biologists shall inventory and assess the resources and uses offered by the mitigation proposal and compare those resources with resources located at the proposed project site.

4. The Director shall accept or reject the proposal(s) with explanation.

5. A hearing on the final decision may be required under ORS 541.627.

Another major limitation on your property is also based on the combined effects of the LCDC reliance on specific statements in the Exceptions Order and Ordinance Amendment. It appears to me that a moorage facility on your property would have to be designed for commercial fishing vessels in the 30' to 90' length range. In other words, because of the specificity of all the documents, the Exception appears to have been designed not for recreational moorage but strictly for commercial fishing vessels and specifically those greater than 30'.

4. The IATF's draft Coos Bay Estuary Management Plan, page II-17, states in part as follows:

A 1978 survey by ODFW estimated a potential clam population of 10,000,000. Clam harvests by recreational diggers have been estimated at 2,000,000 clams per year (ODFW 1978).

The latter quoted sentence seems highly suspect.

The 1978 report, "Clam Resources in a Proposed Charleston Boat Basin Expansion Site" (Tom Gaumer/ODFW; January, 1978), estimated the total number of clams on the site as 10,078,000; of his total, the clams sought by recreational diggers (Gaper, Cockle, Native littleneck, Butter, and Softshell) were estimated to be 2,139,000. Dr. Gaumer's report did not attempt to estimate harvest figures at the site, but rather simply quoted a 1971 survey by the Oregon Fish Commission which showed that slightly less than 20,000 clams were harvested at the site in 1971. The draft plan's figure of 2,000,000 clams is therefore likely to be a typographical error; if not, then miracles are occurring daily at the "Charleston Triangle" in full view of thousands of happy clam diggers.



SUMMARY

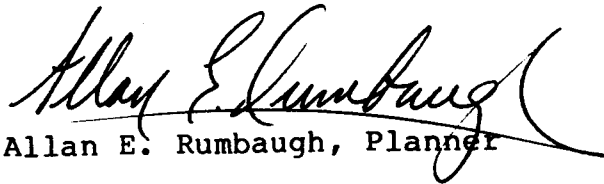
Part of your intertidal lands near Charleston can be dredged for a moorage facility that would help meet identified needs for the Coos Bay Estuary.

A number of limitations apply to the property, several of which will likely require action (or at least cooperation) by the Port of Coos Bay.

When next we discuss moorage needs and provisioning with the Inter-Agency Task Force, we will inform them of the problems described in this letter. It will, of course, be their decision as to how the problems should be resolved. By the time of that meeting, this Department will have prepared a map showing our understanding of the area permitted for dredging and moorage. The Task Force could decide that moorage on the property is unnecessary, or they could decide that the Hosie-Laird Plan is perfect as is, or they could decide that a new exception for a greater area of your property should be proposed.

Please call me (396-3121, ext. 252) if this whole issue seems murky. Or, better yet, call me if this all makes perfect sense: you can explain it to me.

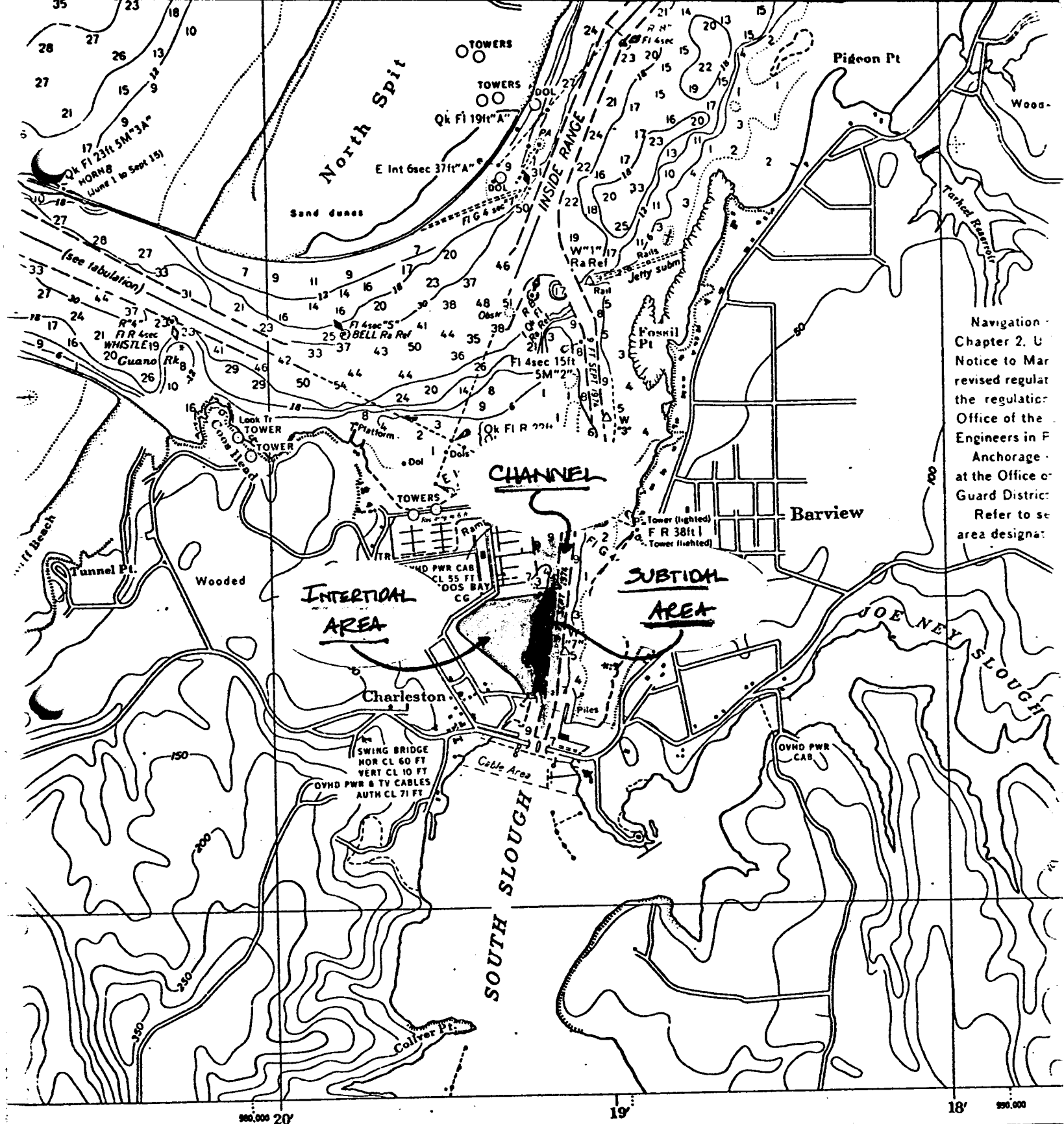
Sincerely,  
COOS COUNTY PLANNING DEPARTMENT

  
Allan E. Rumbaugh, Planner

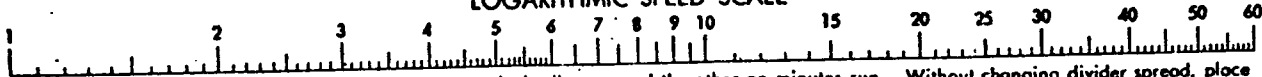
AER/lrs

cc: Bill Grile  
file

Enc. Steve Felkins letter  
Neal Coenen memo  
map



LOGARITHMIC SPEED SCALE



To find SPEED, place one point of dividers on nautical miles run and the other on minutes run. Without changing divider spread, place right point on 60 and left point will then indicate speed in knots. Example: with 4.0 miles run in 15 minutes, the speed is 16.0 knots.

SCALE = 1:20000

6.4-66



7. SPECIAL DREDGED-MATERIAL DISPOSAL ELEMENT

## 7. SPECIAL DREDGED-MATERIAL DISPOSAL ELEMENT

### 7.1 Introduction

This portion of the Coos Bay Estuary Management Plan outlines anticipated dredging needs and disposal options within the Coos Bay Estuary. Identified disposal options are those that can practicably meet the dredging needs and are consistent with the management decisions of the Plan. This plan is not expected to remain unchanged; indeed, the dredging needs and disposal options will undoubtedly change for economic as well as technological reasons. However, for long-range security, this plan does address anticipated need and generally identifies adequate disposal sites. The intent of the plan is to protect all identified sites for disposal use, so that intermittent uses will not preclude use of the sites for disposal purposes.

This plan summarizes public and private projects requiring dredging, the estimated quantities of material estimated to result therefrom, and disposal options. Summary tables are given to illustrate the "need" vs. "options" for each section of the estuary. Individual site descriptions and technical information are contained in Appendix 'A'.

### 7.2 Dredged Material Disposal Plan Process

Two previous dredge plan studies have been undertaken for Coos Bay prior to this estuary management plan: Management of Dredge Spoils In Coos Bay (STR, 1972) and Channel Maintenance Dredging, Coos Bay, Final EIS, (U.S. Army Corps of Engineers, 1975). These studies established a considerable information base from which dredging data was developed. Consequently, the planning effort focused primarily on quantities and disposal options to maintain bay operations. All data contained in the previous studies were re-evaluated for accuracy and consistency with the estuary management plan. In January 1994, the U.S. Army Corps of Engineers conducted a "Feasibility Report on Navigation Improvements with Environmental Impact Statement". Some estimates have been revised and many sites have been re-evaluated to assure consistency with revised state and federal regulations and the decisions reflected in the Estuary Management Plan.

A Functional Task Force (FTF) comprised of dredging operation technicians was formed to develop the dredge plan. All public and private bodies having involvement in dredging activities were contacted. Projections for the amounts of materials to be dredged were established and the valuable sites were updated. Sixty different potential disposal sites were evaluated for use within this planning process. Many of the sites were eliminated because they were in conflict with the estuary management plan decisions or local resource characteristics. Other sites were eliminated because of engineering constraints (particularly up Haynes, Willanch, and Kentuck Inlets). All sites were inventoried and thoroughly evaluated. In addition to individual contacts a public meeting was held to discuss issues with concerned citizens.

After reviews by the FTF, the dredged material disposal plan was presented to the Inter-Agency Task Force (IATF) for review and comment. This formed the basis of this element, including the final sites shown on the disposal options portion of this Plan. This element was drafted in its final form with technical assistance and agency coordination by CH<sub>2</sub>M Hill, and revisions by the Local Officials' Advisory Group (LOAG).

### 7.3 Project Descriptions and Dredging Requirements

Dredging projects for Coos Bay are divided into two categories: (i) federal projects, and (ii) other private projects. A summary of these projects are shown in Table 7.1, and on Figure 7.1. Notes on existing dredging and disposal methods and technology are contained in Appendix 'B'.

#### 7.3.1 Federal Projects

During the compilation and adoption of this plan the federal projects generated over 90% of the total maintenance needs for dredged material to be disposed in Coos Bay. These projects included the Coos Bay Project, and, the Coos and Millicoma Rivers Project.

(a) Coos Bay Project: As maintained, the navigation project consisted of two jetties at the entrance to the bay, a 45-foot-deep channel across the outer bar, and a 35-foot-deep, 300 to 400-foot-wide channel to the mouth of Isthmus Slough. Also included are turning basins opposite Coalbank Slough and at the City of North Bend, two anchorage basins in the lower bay, and a 10-foot-deep, 150-foot-wide connecting channel from deep water in Coos Bay to the Highway Bridge at Charleston. The Charleston area includes a mooring basin, breakwater, and a bulkhead. The jetties were completed in 1928-1929 with subsequent rehabilitation's in 1942 and 1965. The main channel was initially dredged to 24 feet in 1937, deepened to 30 feet in 1951, keep deepened to 35 feet in 1978, to 37 feet between 1994 and 1997. Maintenance dredging has occurred on an annual basis since 1951 to maintain the proper channel depths.

i) Between 1994 and 1997 the 45 foot-deep channel was deepened to 47 feet and the 35 foot-deep channel was deepened to 37 feet. The 10 foot-deep connecting channel was deepened to 17 feet.

The lower bay (from the bay entrance to the railroad bridge) generated roughly 200,000-300,000 cubic yards (c.y.) of material annually. All of this material is dredged by hopper equipment and is currently either ocean disposed or placed in a designated inbay disposal site. The upper bay (from the railroad bridge to Isthmus Slough) generated approximately 500,000 c.y. of material annually. All of this material was pipeline dredged, typically at three-to-four-year intervals. Maintaining an adequate number of disposal options is critical in this area.

The Charleston Channel has historically produced about 15,000 c.y. annually, but this quantity can vary considerably. The area has been dredged with small pipeline, hopper, clamshell, or sand bypasser. Disposal has occurred in upland sites and inbay disposal sites.

The 1.3 mile Charleston Channel was under a preliminary feasibility study by the Corps to determine whether the channel would be deepened to 16 feet from its 10-foot depth. The 1994 study conducted by the Army Corps of Engineers concluded that the 10 foot needed to be deepened. The channel was deepened to 17 feet. Precise figures for potential quantities were not available for the project but a preliminary estimate was at least 230,000 c.y. A letter from the Corps [March 2, 1982] to the Port of Coos Bay states that the project is considered feasible.

(b) Coos and Millicoma Rivers Project: The South Fork Coos River and the Millicoma River join to form the Coos River flowing 5.5 miles in to Coos Bay. A navigation channel 5 feet deep and 50 feet wide is maintained in the Coos River and extends up both tributaries. It is reduced to a 3-foot depth in the upper navigable reaches of South Fork Coos River. The navigation channels were completed in 1966, with maintenance dredging occurring annually since that time.

These channels typically generate about 20,000-25,000 c.y. annually, with a clamshell or bucket dredge doing most of the work. The area of greatest dredging requirement is Dellwood, with 12,000 c.y. removed annually. Dredged materials are placed along the riverbank and subsequently moved by bulldozer. Much of the disposal occurs adjacent to the dredging, with barging up or down the river to other local sites. Disposal site options appear to be more than adequate for the next 50 years in this area.

### 7.3.2 Other Projects

Several other projects, both private and public either exist or are proposed for the near future. Short descriptions and estimated dredging needs are discussed below.

(a) Charleston Boat Basin: The Oregon International Port of Coos Bay owns and operates the Charleston Boat Basin for use by commercial and recreational boats. The basin is dredged annually by a small pipeline, removing approximately 15,000 - 20,000 c.y. of material. The annual quantity of material for this area, including local smaller projects, is estimated at 20,000 c.y.

(b) Roseburg Lumber Company: The Roseburg Lumber Company requires periodic maintenance dredging to maintain proper dock-front depths. Their needs are estimated at 10,000 c.y. annually.

(c) North Bend-Coos Bay Waterfront Docks: A series of private docks line the North Bend-Coos Bay waterfront (including a portion of Eastside). These docks include Weyerhaeuser, Central Dock, Standard Oil, Union Oil and Al Pierce facilities. To estimate dredging needs, these projects have been combined and have a cumulative dredging requirement of 100,000 c.y. per year. The majority of this dredging is done by clamshell or bucket dredge and barged, trucked or both to a disposal site.

(d) Small River and Slough Projects: Several private operations on the rivers and sloughs require irregular dredging. These requirements are unknown because of sketchy records and inconsistent needs. However, this material is usually disposed on upland adjacent properties and spread around by bulldozers or trucked away.

(e) Proposed Charleston Boat Basin Expansion: The proposed Charleston Boat Basin expansion is not being considered by the Oregon International Port of Coos Bay at this time.

(f) Proposed North Spit Trawler Basin and Related Facilities: According to the Oregon International Port of Coos Bay the trawler basin is no longer feasible; however, the possibility of a deep-draft dock in this area is continuing to be considered.

(g) Proposed Union Oil Expansion: The Oregon International Port of Coos Bay contends that the proposed Union Oil expansion is no longer viable.

(h) Proposed Eastside Shipyard Facility: The Oregon International Port of Coos Bay contends that the proposed Eastside shipyard facility is no longer viable. This area is currently under review by the City of Coos Bay for rezoning to a residential use.

(i) Future Moorage Projects: The Special Moorage Element has identified other sites around the lower bay as potential areas for future moorage development. These sites will require additional dredging, but volumes cannot be established at this stage, as specific proposals have not been made.

## 7.4 DREDGED MATERIAL NEEDS AND DISPOSAL OPTIONS

### 7.4.1 Introduction

This section compares estimated dredged material disposal needs with available sites in each area of the bay. Proposed disposal sites are mapped generally at 1" = 3,000 feet and in detail at 1" = 800 feet showing property boundaries. The numbering system is taken from the Corps Final EIS (1976), the initial source from which the final list of selected sites was developed.

Actual site selection occurs in the planning stage for any dredge project, and involves the Army Corps of Engineers, the Port of Coos Bay, the project sponsor, their consulting engineer (if any), and other state and federal agencies. Inclusion in this inventory implies agency consensus on the general acceptability of the site. However, project procedures, safeguards, site design and any applicable special conditions need to be worked out in advance. (See Policy 20a on Disposal Guidelines). The site(s) selected will depend on dredging methods, volumes of material and the location of the project. Selection of a site not specifically included in this inventory will require compliance with the Plan: agency consensus on general acceptability may be assumed if dredged material disposal is a permitted use in the Plan.

### 7.4.2 Charleston Area

The Charleston/Barview Wayside had two upland disposal sites (#36 and #1b) which have been filled to their capacity. The Oregon International Port of Coos Bay has a "New" Barview site which has a capacity of 100,000 cubic yards.

The federal dredging project, which is expected to generate about 300,000 c.y. over 20 years, typically disposes materials at In-Bay Site G (off Coos Head) or is dredged by sand-bypass. The Port's and related local projects will require about 400,000 c.y. for maintenance over 20 years and potentially an additional 130,000 for new construction. These materials will typically be dredged by clamshell/bucket or small pipeline.

Port and private dredging projects utilize either ocean disposal or Site #4a on the North Spit (barge transport).

### 7.4.3 Lower Bay

The Lower Bay, from the mouth to the railroad bridge, includes In-Bay Sites 8.4 and G, upland Sites #4a, #4x, and #9y, and the beachfront and ocean sites.

The in-bay sites can handle large quantities of material but must be used only on a priority basis. In-Bay "G" is first priority when in-water disposal is used, because of its fewer environmental problems. In-Bay "8.4" is to be used only when "F" is inaccessible because of severe weather problems, and/or dredging above R.M. 6.

Upland sites are well distributed and can be best utilized for private projects especially since federal work is typically ocean-dumped. Site #4a is at the south end of North Spit and has a capacity of 1,670,000 c.y. Site 4x could take approximately 2,000,000 c.y., but the timing of its use

must be compatible with the Henderson Marsh Mitigation Plan. Site #9y, inside the North Bend Airport runway system, could receive 336,000 c.y. The airport extension project has been completed.

The beach disposal site includes all the area along the North Spit Beach. This option may have important applications in the future because of its unlimited capacity and anticipated minimal environmental impact if properly conducted. Large pipeline equipment can be used to pump the marine sands to the area west of the foredunes. Prior to permit issuance for disposal use, however, sand transport characteristics and seasonal near-shore biological considerations would need to be properly addressed by the appropriate sponsor. (see field sheet, Appendix A, under "Other considerations") Studies to determine these physical and biological impacts would probably be performed by the Corps of Engineers (or their contractor) and the National Marine Fisheries Service.

The major dredging quantities are generated by the federal channel work and this material (250,000/year; 5,000,000/20 years) is primarily ocean disposed at two sites immediately offshore; (in-bay disposal occurs when conditions prohibit ocean site). The federal work is expected to continue to be in-water disposed in the future. Currently, the Corps and Environmental protection Agency are examining alternative ocean disposal sites for lower bay sediments.

The Roseburg Lumber Company dredging will be done with clamshell or bucket and will be truck-hauled or barged away. Several sites would then be available. The Trawler Basin project has been deemed as not feasible by the Oregon International Port of Coos Bay. The North Bend Airport extension project has been completed.

#### 7.4.4 Upper Bay

The Upper Bay, from the railroad bridge to Isthmus Slough has five large upland disposal sites and two intertidal sites. Site #30b, north of Christianson Ranch, has a capacity of 696,000 c.y. However, this site is also identified as a "High priority" mitigation site. It must therefore be regarded as unlikely to be made available at this time.

Hopper dredging only occurs to RM 12 (near the northernmost disposal island). Large pipeline equipment is used for the federal project upstream of RM 12 and for the large private projects. In the past this material has gone to the available large upland sites because other disposal alternatives were not available. However, this plan now proposes the use of two intertidal sites. Smaller dock maintenance projects are often dredged with clamshell or bucket equipment to be barged away. This type of dredging requires sites immediately adjacent to the channel for appropriate access. These sites exist in Isthmus Slough but immediate availability is sometimes a problem.

The sites identified for upland and intertidal disposal in Upper Bay are essential for long-range maintenance dredging and should be preserved for disposal use. The large quantities of materials to be dredged from the federal channel cannot be rehandled by trucks or barges and therefore must be pipelined directly to these large disposal sites. Sites in Isthmus Slough could also theoretically be used for Upper Bay disposal needs by using pipeline boosters if an acute shortage of space were to develop, though the costs would be significantly higher than pipeline disposal to nearby sites.



The Army Corps of Engineers completed an Environmental Impact Statement (EIS) in 1986 and a Feasibility Report of Navigation Improvements with EIS in January, 1994 on ocean disposal. These reports and studies show that ocean disposal is a viable alternative for maintenance requirements of the bay.

#### 7.4.5 Isthmus Slough

This section includes disposal sites in Isthmus Slough south to the Coos City Bridge. Site #22 is located on Isthmus Slough south of Bunker Hill-Eastside Road and east of the railroad tracks. It has a capacity of 1,050,000 c.y. Site #23 is the intertidal area known as Kennedy Field, with a capacity of 1,755,000 c.y. Site #24 is at Millington and its capacity is 200,000 c.y. Site #25 is north of the Coos City Bridge on the east side of Isthmus Slough. It has an estimated capacity of 1,300,000 c.y.

These disposal sites will be used for dredging in both Isthmus Slough (all private at this time) and the Coos Bay Waterfront. They can be utilized for truck or barge transport operations and are therefore important for all small projects in the Upper Bay. Sites #22, #23, and #24 could also be used for pipeline disposal of Upper Bay channel maintenance materials from the Isthmus Slough reach, if Upper Bay sites reach capacity and in particular if Site #30b is unavailable in future. Theoretically, it is also possible to use sites #25 for pipeline disposal using boosters, though costs would be high.

A channel is federally authorized for Isthmus Slough from RM 15 (Eastside) to RM 17 (Millington). This channel is designated at 22 feet deep and 150 feet wide. It has never been developed or maintained. Rather, private industry has dredged inconsistently in the area in the past. This channel could be developed sometime in the future, though this is not planned at this time. It may be necessary in future to forego dredging to full authorized draft in order to reserve disposal sites for Upper Bay maintenance.

Coalbank Slough has no channel maintenance dredging, though the highway bridge and the railroad bridge were originally designed to insure navigability. (See Table 7.2)

As a compromise toward achieving plan acknowledgement, sites #22, #23, & #24 have been deleted, thereby lowering Isthmus Slough capacity by 3,005,000 cubic yards.

#### 7.4.6 The Rivers

The Coos and Millicoma Rivers are unique in dredge planning because of the physical characteristics of the channels and the shorelines. Dredging requirements are localized and have been clamshell or bucket dredged. Disposal is on nearby uplands, typically pasturelands, and spread about by bulldozer. Some barging does take place, however, the material is still disposed locally and distributed in a similar fashion. Disposal in adjacent uplands appears to be a viable option for another 50 years. Site specific disposal identification is not practical in this section. Disposal in this area is subject to typical permit requirements for safeguarding wetlands and riparian resources.

#### 7.5 Sediments

Sediments coming from the Upper Bay, RM 13-15, have been the only bay materials carrying significant pollutants. Since completion of the new channel depth dredging (35 feet, 1978), most polluted materials have been removed from the channels. That material was deposited on the Christianson Ranch site. Future dredging is expected to produce cleaner materials because the sediments will be deposited as natural riverine sands, gravels, and muds.

## 7.6 Summary

The selected sites are summarized in Table 7.6. The sites included in the Dredged Material Disposal Plan are both practical and consistent with the estuary management plan decisions. Not all sites have owner approvals for disposal. However, a majority of the sites do. The Port of Coos Bay is currently contacting owners to secure future disposal rights. Any sites which can not be secured will be removed from the list of approved Dredged Material Disposal sites and alternative sites which can be made available, will be designated.

Within each area, except for the Coos-Millicoma area, the balance between "needs" and "options" does not allow for the uncompensated loss of any sites, if it is assumed that Isthmus Slough sites may be needed for Upper Bay maintenance.

All sites in this plan should be protected for future disposal use, except where it can be proven that the site(s) is not essential to the expected needs because an alternative site is available.

Almost all proposed disposal sites will have no use conflicts prior to placement of dredged materials. Though present owners may not be amenable to disposal use, pre-emptory uses are not allowed because of Plan policies, management unit designations and agricultural lands protection.

It is highly probable that future dredging needs of the estuary can not be met with the identified disposal options, since the balance between needs and available sites has been upset by sites being found to be unavailable. For this reason, Intertidal sites were originally added at #18c, 18d, #22, #23 and #24, but were subsequently deleted.

Because of the probable shortage of future upland sites, it was originally deemed necessary to propose intertidal disposal. The only other alternatives for the Upper Bay are two-fold:

1. Ocean disposal of Upper Bay materials, per the present Corps of Engineers study. The issues involved are: the acceptability of these materials for ocean disposal and the future costs for transporting this material by small hopper or clamshell/barge.
2. Eliminate or curtail dredging of the Upper Bay and focus all water-dependent development activities in the Lower Bay. This situation was anticipated in the Oregon Ports Study (1980). The navigation problems inherent with the railroad bridge, the limited available future development land in the urban areas, and the tremendous dredging requirements and future costs suggest that future expansion of shipping facilities development for the estuary will occur in the Lower Bay. However, the heavy investment in shoreside facilities in the upper Bay will probably insure that cost/benefit ratios for some degree of maintenance will continue to be positive.

As discussed above, due to probable costs of ocean disposal, it may be cheaper to use Isthmus Slough disposal sites, even to pump spoils to Sites #25 and #25a, with the extra cost involved. Should Site #30b not become available, and ocean disposal prove too expensive to justify Upper Bay maintenance, it is estimated that there will be a shortfall of about 2,100,000 c.y., using all other site to full capacity, over the Plan period. If this critical situation develops following the ocean disposal study, other sites, preferably upland, must be identified and secured in a future Plan update.

TABLE 7.6

## SUMMARY: DREDGED MATERIAL DISPOSAL SITES\*

SITE NO.	LOCATION	CAPACITY [cu. yds.c.y.]	COMMENTS
4a	North Spit	1,670,000	Federally
4x	Henderson Marsh	2,000,000	Future project
9y	Airport Interior	336,000	FAA approved
E	Offshore	Unknown	Alternate site to site "F" [See Section 6.2.1(a)] approved by USACOE
F	Offshore	Unknown	See Section 6.2.1(b) approved by USACOE
H	Offshore	Unknown	See Section 6.2.1(c) approved by USACOE
Beachfront	North Spit	Unlimited	Biological/Engineering data required
[Ocean]	[Off Bar]	(Unlimited)	[Currently under study]
Inbay 8.4	Airport	Unknown	Limited use allowed
New	Barview	100,000	Port owned
Inbay G	Coos Head	Unknown	Regularly used
15a	East Bay Drive at Kentuck Inlet	200,000	School District #13
25	Lower Isthmus [East]	1,300,000	Private ag. Land
30b	North of Christensen Ranch	<u>696,000</u>	Private ag.
		6,302,000 c.y.	

TABLE 6.1 SUMMARY:  
DESIGNATED DREDGE MATERIAL DISPOSAL SITES\*

(See Appendix 'A' in Part 2, Section 8.6 of Special Dredged Material Disposal Element for detailed field sheets)

SITE NO.	LOCATION	CAPACITY (cubic yards)	COMMENTS
<del>1b</del>	<del>Bastendorff Beach</del>	<del>240,000</del>	<del>State owned</del>
<del>3b</del>	<del>Barview Wayside</del>	<del>507,000</del>	<del>Mostly state owned</del>
4a	North Spit	1,670,000	Federally owned
<del>4e</del>	<del>North Spit</del>	<del>290,000</del>	<del>Port property</del>
4x	Henderson Marsh	2,000,000	Future project
<del>9x</del>	<del>Airport Extension</del>	<del>1,000,000</del>	<del>Fill project</del>
9y	Airport Interior	336,000	FAA approved
Inbay D(8.4)	Airport	Unknown	Limited use allowed
Inbay G	Coos Head	Unknown	Regularly Used
<b>New *</b>	<b>Barview</b>	<b>100,000</b>	<b>Port owned</b>
15a	East Bay Drive	200,000	School District #13
18a	Middle Island	250,000	Fully prepared
18b	South Island	300,000	Fully prepared
19b	Eastside	3,800,000	Fully prepared
25	Lower Isthmus (East)	1,300,000	Private ag. land
<del>25a</del>	<del>Lower Isthmus (West)</del>	<del>220,000</del>	<del>Private ag. land; prepeped industrial</del>
30b	North of Christensen's Ranch	696,000	Private ag. land
		<b>6,302,000 cu.yds.</b>	
		<del>13,052,000 cu.yds.</del>	

\* New site is not part of the field sheets.

\*Plus beachfront, in bay and possible ocean disposal.

\*Protected from pre-emptory uses per plan Policy #20.

APPENDIX 'A'  
INVENTORY OF DREDGED MATERIAL DISPOSAL SITES. = FIELD SURVEY SHEETS

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

Field survey sheet

Site # 4a

Management Unit: #1 CS & #2 CS

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
24,35	25	14	100

Location: North Spit, south tip.

Physical Boundaries: Spit to north, bar to south, estuary to east, ocean to west.

Approximate Size: 100 acres

Ownership: Corps of Engineers

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Dune grass, shore pine.

Land Type: conditionally stabilized dunes.

Wildlife Use: Snowy plover, use of existing DMD area.

Aquatic Regime: Minor deflation plain wetland areas.

MAN-MADE FEATURES:

Existing Use: Some DMD use; dispersed recreation.

Structures: none

Access: via North Spit access road, trails.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: 10 feet

Est. Capacity: 1,670,000 c.y. at a 10' fill depth.

Existing DMD Dikes, Outfalls, etc. No dikes or outfalls.

Possible Means of Disposal: Pipeline.

Potential Conflicting Uses: Dispersed recreation.

Potential Future Use: As existing, possibly increased snowy plover use.

Other Considerations:

- Corps owned. Has been used for disposal in past. Disposal use could be utilized to enhance plover habitat, as required by DLCD for Port of Coos Bay project (see permit for McCall Dock). Disposal should be phased to permit habitat development.

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

Field survey sheet

Site # 4x

Management Unit: 5 WD

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
5	25	13	200

Location: Henderson Marsh [See "Henderson Marsh Agreement"]

Physical Boundaries: Dunes to northwest, bay to south, fill to east.

Approximate Size: 150 acres

Ownership: Formerly Menasha Corp., Now Weyco.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Willow scrub, freshwater marsh, diked high saltmarsh/upland meadow type.

Land Type: Deflation plain wetland.

Wildlife Use: Extension use by waterfowl, raptors, other typical marsh species.

Aquatic Regime: Saturated year round, seasonally ponded in some places.

MAN-MADE FEATURES

Existing Use: Vacant.

Structures: Dikes.

Access: via North Spit access road.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: 10 feet

Est. Capacity: 2,000,000 c.y. at a 10' fill depth.

Existing DMD Dikes, Outfalls, etc.: Dike to bay, (w/tidegate); dike in South part of site (breached); outfall channel on east side of site from existing DMD area.

Possible Means of Disposal: Pipeline dredge.

Potential Conflicting Uses: none

Potential Future Use: Industrial site.



Other Considerations:

- Use of this site is subject to the conditions stipulated in the Henderson Marsh Agreement, and is dependent upon its final signature.
- Can only be used in conjunction with a specific project. Incremental filling not permitted without phased mitigation actions, as provided for in agreement.

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

Field survey sheet

Site # 9y

Management Unit: NA

Section  
9

Township  
25

Range  
13

Tax Lot  
100

Location: North Bend Airport (between runways).

Physical Boundaries: Airport runways on all sides.

Approximate Size: 30 acres

Ownership: City of North Bend.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: grasses.

Land Type: filled land.

Wildlife Use: limited

Aquatic Regime: none.

MAN-MADE FEATURES

Existing Use: Municipal airport.

Structures: Runways on all sides.

Access: via airport.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: 7 feet

Est. Capacity: 3,360,000 c.y. at a 7' fill depth

Existing DMD Dikes, Outfalls, etc.: No dikes at present.

Possible Means of Disposal: Pipeline.

Potential Conflicting Uses: None: FAA has approved disposal site.

Potential Future Use: As existing.

Other Considerations:

- Consistent with the existing airport plan as approved by FAA.

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

Field survey sheet

Site # Beachfront

Management Unit: NA

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
12,13,23,24,35	26	14	

Location: Beachfront from Menasha Pond to tip of spit.

Physical Boundaries: Ocean to west, foredune to east.

Approximate Size: N.A.

Ownership: State of Oregon

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: None

Land Type: Beach

Wildlife Use: Shorebirds

Aquatic Regime: Direct tidal influence.

MAN-MADE FEATURES

Existing Use: Dispersed recreation.

Structures: None

Access: from North Spit access road

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: N.A.

Est. Capacity: Possibly unlimited.

Existing DMD Dikes, Outfalls, etc.: None.

Possible Means of Disposal: Pipeline.

Potential Conflicting Uses: None.

Potential Future Use: N.A.

Other Considerations:

- Disposal use should not interfere with lagoon outfall functions of fishery spawning activities (particularly crab). (See conditions McCall Dock permit). Further analysis of these considerations should be undertaken prior to disposal use.
- Disposal in south portion of spit would require sediment transport analysis to identify potential adverse impacts to bar and inner-channel.
- This site agreed to in principle by agencies, but amount and frequent of disposal not yet established.
- Could be used both for navigation channel work and private project. Study should be initiated to evaluate suitability for navigation of work.
- At present, agencies would not support "double handling" of spoils (barging from upper bay, then dumping in-bay and piping to beach).

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

Field survey sheet

Site # Inbay "8.4"

Management Unit: 51A DA

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
4,9	25	13	

Location: Opposite North Bend Airport.

Physical Boundaries: (Inbay)

Approximate Size: NA

Ownership: State.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: NA

Land Type: NA

Wildlife Use: Aquatic & benthic fauna (but "partially altered area").

Aquatic Regime: Subtidal.

MAN-MADE FEATURES

Existing Use: As DMD site.

Structures: None. (adjacent to shipping channel).

Access: Water only.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: NA

Est. Capacity: Unknown

Existing DMD Dikes, Outfalls, etc.: Shipping channel adjacent.

Possible Means of Disposal: Hopper.

Potential Conflicting Uses: None.

Potential Future Use: DMD site.

Other Considerations:

- To assure long term suitability, Corps of Engineers will need to study sediment transport, as required by ODFW/USFWS/NMFS.

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

Field survey sheet

Site # Inbay "G"

Management Unit: 67A DA

Section  
35

Township  
25

Range  
14

Tax Lot

Location: Off Coos Head

Physical Boundaries: (Inbay)

Approximate Size: NA

Ownership: State.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: NA

Land Type: NA

Wildlife Use: Aquatic & benthic fauna.

Aquatic Regime: Subtidal.

MAN-MADE FEATURES

Existing Use: None.

Structures: None.

Access: Water only.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: NA

Est. Capacity: Unknown

Existing DMD Dikes, Outfalls, etc.: Adjacent to shipping channel.

Possible Means of Disposal: Hopper.

Potential Conflicting Uses: None.

Potential Future Use: DMD site.

Other Considerations:



INVENTORY: DREDGED MATERIAL DISPOSAL SITES

Field survey sheet

Site # 11b

Management Unit: 48A DA

Section  
10

Township  
25

Range  
13

Tax Lot  
1000,1100

Location: "East Pony Slough" at North Point

Physical Boundaries: Railroad berm to southwest; spoil disposal areas to north, east.

Approximate Size: 30 acres.

Ownership: Al Pierce Lumber Co.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Typical of intertidal mud flat.

Land Type: Intertidal flat and saltmarsh.

Wildlife Use: Some wildfowl, wading birds, shorebirds. Mud Shrimp, some clams (Macoma, Tillina); flat fish habitat.

Aquatic Regime: Daily tidal inundation.

MAN-MADE FEATURES

Existing Use: None.

Structures: None, but flanked by railroad berm, 2 spoil areas.

Access: from North Point industrial area.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: 21 feet (9 feet on north side of western spoil area).

Est. Capacity: 980,000 c.y.

Existing DMD Dikes, Outfalls, etc.: None.

Possible Means of Disposal: Pipeline.

Potential Conflicting Uses: This has been identified as a potential mitigation/restoration site.

Potential Future Use: Industrial/commercial.

Other Considerations:

- An important site for future maintenance of upper bay navigation channel.
- When filled to height of existing spoil areas (+ 22 feet MLLW) would render the area a more readily usable development site.

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

Field survey sheet

Site # 25

Management Unit: 30B RS

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
13,14,23,24	26	13	1100,1000,1200,400,1800,100, 200,100,1000,1100

Location: East of Isthmus Slough, north of Coos City Bridge.

Physical Boundaries: Slough to west, upland to north, east.

Approximate Size: 82 acres

Ownership: 1100,1000,1200-Lyons, J. Stewart Et.Al.; 1200-Penas, David C. & J.L.; 400-Nelson, Daryle D. & J.S.; 1800,100,100,1000-McCauliffe, Susan, Lyons, Sally & Lyons, J. Stewart; 200-Pierce, Al & Hilda; 1100-Lyons, J. Stewart & Barbara A.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses.

Land Type: Diked marsh.

Wildlife Use: Typical of wet meadow (heron, egret).

Aquatic Regime: Local drainage, seasonally wet, occasionally flooded.

MAN-MADE FEATURES:

Existing Use: Pasture.

Structures: None.

Access: via Coos City Road.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: 10 feet (theoretical maximum)

Est. Capacity: 1,300,000 c.y. at a 10' fill depth (theoretical maximum).

Existing DMD Dikes, Outfalls, etc.: Dike to slough, otherwise, unprepared for DMD.

Possible Means of Disposal: Pipeline, clamshell.

Potential Conflicting Uses: Agriculture use.

Potential Future Use: Return to agricultural use.

Other Considerations:

- Would be needed only for minor DMD for small private projects; unlikely to need entire site within Plan period.
- Agricultural uses should be restored.

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

Field survey sheet

Site # 30(b)

Management Unit 18 RS

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
18	25	12	200,300,600,1500,1100

Location: North of Christianson Ranch, off East Bay Drive.

Physical Boundaries: Cooston Channel to west, uplands to east, north.

Approximate Size: 36 acres.

Ownership: 200,600,1100-Lillenthal, Herman U.; 300-Weyerhaeuser; 1100-Kronsteiner, Joseph P.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses with some freshwater aquatics.

Land Type: Diked marsh.

Wildlife Use: Typical of wet meadow; heron, egret, some wildfowl.

Aquatic Regime: Local drainage, seasonally wet or flooded.

MAN-MADE FEATURES:

Existing Use: Pasture.

Structures: None.

Access: East Bay Drive.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: 12 feet

Est. Capacity: 696,000 c.y. at a 12' fill depth.

Existing DMD Dikes, Outfalls, etc.: Dikes to bay.

Possible Means of Disposal: Pipeline, clamshell.

Potential Conflicting Uses: Agricultural use; also designated as a high-priority mitigation site (#U-12).

Potential Future Use: Return to agricultural use.

Other Considerations:

- Currently, owner would like to use site for restoration.
- Agricultural uses should be restored, otherwise Goal #3 exception needed.

APPENDIX 'B'  
NOTES ON EXISTING DREDGING AND DISPOSAL METHODS

[Source: final EIS, Corps of Engineers, 1976]

1. HOPPER DREDGE

A hopper dredge is used to dredge the channel entrance. The hopper dredge works on a principle similar to a vacuum cleaner. The dredge has pipes called drag-pipes extending from each side of the hull. As the dredge moves along its course, a broad scraper (draghead) is dragged along the bottom. The scraper loosens a layer of bottom sediment. Pumps create suction in the drag-pipes and the silt or sand is drawn up through the pipes and deposited in bins or hoppers, in the mid-section of the dredge. Here the solid material sinks to the bottom of the hoppers while the excess water runs off and is piped back to the sea. The hoppers are sealed off from the rest of the ship so they can be opened along the ship's bottom to release the material in pre-selected deep-water areas.

2. PIPELINE DREDGE

Dredging of the upper channel is accomplished by pipeline dredges which are operated by private contractors who bid for government work on a competitive basis. A pipeline dredge has a rotating cutter head on the end of a suction pipe that excavates bottom material. The dredge discharges a mixture of water and dredged material through pontoon supported pipes to the shore. The normal pumping distance is approximately 5,000 feet but with a booster pump, distances up to 15,000 feet (2.8 miles) are attainable. A daily average of about 20,000 cubic yards can be dredged with a pipeline of 24" diameter.

3. CLAMSHELL BUCKET DREDGE

Clamshell bucket dredges are used on the Coos/Millicoma System and Isthmus Slough and in numerous small dredging projects at docks throughout the bay. A bucket dredge is a float-mounted hoist that utilizes a bucket to remove bottom materials. A clamshell bucket consists of two similar halves that are hinged at the top. The bucket can be opened or closed by the dredge operator. Chief advantage of a bucket dredge is its ability to operate in small confined areas.

4. SAND-BYPASSER

In recent years, the SANDWICK, a specially modified landing craft which removed materials from the bottom by an agitation-propeller wash process, has been utilized for Charleston Channel maintenance. Because the SANDWICK does not remove material by utilizing pumps or buckets, it is not considered a dredge, but is termed a sand bypasser. In operation, the SANDWICK is positioned over the shoal to be removed and four anchors are dropped, one opposite each quarter of the craft. With the anchors in place, a deflector door is lowered and the throttles opened to about three-quarters speed. This causes large volumes of water moving at relatively high velocity to be directed downward into the shoal, agitating the material so that it can be carried by the currents to settle in locations up to several hundred feet away. In sands, maximum operating depths are 15 to 20 feet with material being displaced 200 to 400 feet. In gravels, maximum working depths are 14 to 18 feet and the coarser material is displaced only 25 to 100 feet.

**8. SPECIAL MITIGATION/RESTORATION**

**ELEMENT**



## 8. SPECIAL MITIGATION/RESTORATION ELEMENT

### 8.1 Introduction - Statutory and Regulatory Framework

Mitigation and restoration considerations are requirements of LCDC Goals 16 and 17. Goal 16 Implementation Requirement (4) on mitigation, as modified by the 1979 legislative amendments (HB 2619) to the State Fill and Removal Law, requires that:

"Adverse impacts to estuarine resources resulting from dredge or fill activities permitted in intertidal or tidal marsh areas shall be mitigated by the creation, restoration or enhancement of an estuarine area(s) to maintain the functional characteristics and processes of the estuary, such as its natural biological productivity, habitats and species diversity, unique features and water quality (emphasis added).

Goal 16 also requires that, where appropriate, the long-term environmental, economic, and social values, diversity and benefits of estuaries be restored. Implementation Requirement (7) of Goal 16 states:

"State and federal agencies shall assist local government in identifying areas for restoration. Restoration is appropriate in areas where activities have adversely affected some aspect of the estuarine system, and where it would contribute to a greater achievement of the objective of this goal. Appropriate sites include areas of heavy erosion or sedimentation, degraded fish and wildlife habitat, anadromous fish spawning areas, abandoned diked estuarine marsh areas, and areas where water quality restricts the use of estuarine waters for fish and shellfish harvest and production, or for human recreation."

Goal 17, Implementation Requirement (3) states:

"Local government, with assistance from state and federal agencies, shall identify coastal shoreland areas which may be used to fulfill the mitigation requirement of the Estuarine Resources Goal. These areas shall be protected from new uses and activities which would prevent their ultimate restoration or addition to the estuarine ecosystems."

Oregon Law (ORS 541.626) provides the Division of State Lands (DSL) with the authority to require mitigation for dredging or filling waters of the state. For estuarine areas, DSL must require mitigation for any permitted alteration of intertidal and

tidal marsh areas as outlined in the LCDC Estuarine Resources Goal. The DSL may also require additional mitigation for alteration of productive subtidal areas. Certain projects can be exempted, wholly or in part, at the discretion of DSL as specified in ORS 541.626(4). The complete text of ORS 541.626 follows.

ORS 541.626 Mitigation as condition for fill or removal from estuary; considerations; other permit conditions. (1) As used in this section, "mitigation" means the creation, restoration or enhancement of an estuarine area to maintain the functional characteristics and processes of the estuary, such as its natural biological productivity, habitats and species diversity, unique features and water quality.

(2) Except as provided in subsection (4) of this section, the director shall require mitigation as a condition of any permit for filling or removal of material from an intertidal or tidal marsh area of an estuary.

(3) If the director requires mitigation, the director shall consider:

(a) The identified adverse impacts of the proposed activity;

(b) The availability of areas in which mitigating activities could be performed;

(c) The provisions of land use plans for the area adjacent to or surrounding the area of the proposed activity;

(d) The recommendations of any interested or affected state or local agencies; and

(e) The extent of compensating activity inherent in the proposed activity.

(4) Notwithstanding any provisions of ORS 197.005 to 197.430 or the state-wide planning goals adopted thereunder to the contrary, the director may:

(a) Waive mitigation in part for an activity for which mitigation would otherwise be

required if, after consultation with appropriate state and local agencies the director determines that:

(A) there is no alternative manner in which to accomplish the purpose of the project;

(B) there is no feasible manner in which mitigation could be accomplished;

(C) the economic and public need for the project and the economic and public benefits resulting from the project clearly outweigh the potential degradation of the estuary;

(D) the project is for a public use; and

(E) the project is water dependent or the project is publicly owned and water related; or

(b) Waive mitigation wholly or in part for an activity for which mitigation would otherwise be required if the activity is:

(A) filling for repair and maintenance of existing functional dikes and negligible physical or biological damage to the tidal marsh or intertidal areas of the estuary will result;

(B) riprap to allow protection of an existing bankline with clean, durable erosion resistant material when a need for riprap protection is demonstrated that cannot be met with natural vegetation and no appreciable increase in existing upland will occur;

(C) filling for repair and maintenance of existing roads and negligible physical or biological damage to the tidal marsh or intertidal areas of the estuary will result;

(D) dredging for authorized navigation channels, jetty or navigational aid installation, repair or maintenance conducted by or under contract with the Army Corps of Engineers;

(E) dredging or filling required as part of an estuarine resource restoration or enhancement project agreed to by local, state and federal agencies; or

(F) a proposed alteration that would have negligible adverse physical or biological impact on estuarine resources.

The DSL coordinates its permit issuance and mitigation requirements with the Oregon Department of Fish and Wildlife, other state agencies, and federal agencies.

Federal agencies, particularly the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency and the National Marine Fisheries Service, also seek mitigation as compensation for federally constructed, funded or permitted estuary development activities which destroy or degrade natural resources. The Fish and Wildlife Coordination Act (1934), the Endangered Species Act (1975), and agency policies and regulations provide a basis for federal decisions, which are implemented primarily through conditions on Corps of Engineers' permits for dredging, filling or other alterations. The basic policies of these agencies are:

- o Prevent natural resource losses, if possible;
- o Recommend site plan modifications which will lessen the impact of the proposed action; and
- o Require a mitigation plan for replacement of, or compensation for unavoidable losses.

In addition, the Corps of Engineers, under Section 150 of the Water Resource Development Act (1976) and Section III of the Rivers and Harbors Act (1968), provides funding for mitigating the adverse impacts of federal navigation projects.

## 8.2 Mitigation and Restoration - Discussion of terminology

The mitigation provision of Goal 16 addresses offsetting the adverse impact of dredging or filling activities in two specific areas of the estuary, intertidal and tidal marsh areas. The focus of the provision is on compensating for the effects that will result when approved dredging or filling activities occur. Mitigation can be accomplished through the restoration of a lost resource, the creation of a new resource or the enhancement of an existing resource.

Restoration, creation and enhancement activities and mitigation activities will of necessity resemble one another, but the following distinction can be made. Mitigation is an activity which proceeds as a part of a permitted alteration (or possibly

several alterations in the case of mitigation banking) which, considered with the negative impacts of the alteration, results in no net loss of estuarine values. Restoration, creation or enhancement activities are the means through which mitigation is accomplished. Restoration, creation and enhancement activities not performed for mitigation but undertaken voluntarily will result in a net increase of estuarine values, e.g., increased productivity, increased habitat and/or increased diversity. Such activities are collectively termed "Restoration". This term also includes activities on-shore which restore social or economic assets. A restoration activity for social or economic purposes, such as the rehabilitation of urban waterfronts, cannot be considered mitigative because it would not compensate for adverse impacts to natural values resulting from dredge or fill activity. However, a voluntary restorative action in the estuary could be placed in a "mitigation bank" [see further discussion below] and credited against future dredge or fill actions which would require mitigation.

### 8.3 Plan Development Methodology

The Mitigation Plan and the Restoration Plan were developed as a result of the Mitigation/Restoration Functional Task Force study efforts, technical research and review, and the Interagency Task Force review and revisions.

The Mitigation/Restoration Functional Task Force was created at the request of the IATF. This special task force comprised 15 citizens and technicians from the Coos Bay area. This group developed a study process by which preliminary inventories were undertaken to identify all potential mitigation or restoration sites or actions, and develop banking concepts and implementation plans. Data that was developed by this task force was sent out to a Technical Advisory Team for review and comments. An Inventory White Paper was also produced, discussing inventory procedures, site descriptions, and plan recommendations. An overall mitigation/restoration review was then presented to the IATF for overall estuary management consistency and conflict area resolution. This element was drafted in its final form with technical assistance and agency coordination by CH<sub>2</sub>M Hill, and further revisions by the Local Officials' Advisory Group (LOAG). Subsequent revisions have been made at the direction of the Coos Bay Estuary Advisory Commission (CBEAC) in response to various IOTC ("in order to comply") requirements of the Land Conservation and Development Commission's continuance order for the CBEMP.

The inventory for the Mitigation/Restoration Element was developed through following steps:

1. Aerial photographs were reviewed for all shorelands in the estuary. This was accomplished by the careful review of recent (1978-1979) color aerials taken at a 1" = 2000' scale, with magnifying glasses and stereoscopic

lenses. Any areas that appeared to experience limited or no tidal influence, but showed signs of existing or vestigial tide channels or tide flats, were mapped on a preliminary basis. Many of these sites were then "ground checked" for interpretive accuracy. All such sites were identified as having the potential for being either "restored" to the estuarine system or "enhanced" as an already functioning part of the estuary.

2. The National Wetlands Inventory (NWI, U.S. Fish and Wildlife Service 1978) was used to identify potential sites, utilizing two categories that appear in the NWI mapping system:
  - A. ENHANCEMENT SITES - All sites identified as Estuarine Intertidal Emergent Wetlands that are now partially diked, drained or ditched. These sites are saltmarsh areas that are partially obstructed from complete tidal influence and are potential enhancement sites.
  - B. RESTORATION SITES - All sites identified as Palustrine Emergent Wetlands which are either diked/impounded, but not farmed; or diked/impounded, farmed, but not partially drained/ditched. Suitability for restoration usually depends upon the feasibility of removing the dikes or some similar action.

All areas that conformed to the above designations on the NWI maps were then included in the preliminary list of potential mitigation/restoration sites.
3. The Oregon Department of Fish and Wildlife developed a list of 11 sites in May, 1977, that "may be potential mitigation sites". This list was developed as a response to a specific request by the Coos Bay-North Bend Water Board. The cover letter noted "We hasten to add that these sites have not been evaluated as to their suitability as mitigation for any specific project...". This status has not changed. The 11 sites were included in the overall list of potential sites, with nine of these sites already identified through previous criteria."
4. An inventory of past estuarine losses was undertaken, to identify those habitat types that have experienced the greatest impacts or losses. This inventory identified tentative habitat types, and fairly definitive areas of estuarine loss or degradation. This information was used to identify potential restoration actions.

5. An inventory of lost or degraded estuarine amenities (versus actual estuarine habitats) was also undertaken. This inventory looked at water quality problems, riparian vegetation losses, human uses which adversely impact the estuary, and cultural/social conditions which have adversely impacted the estuary. This information provided a basis for developing the concepts that are presented in the restoration section [see below].

The preliminary inventory of potential mitigation/restoration sites in the Coos Bay estuary identified over 160 sites. These inventory sites were then evaluated for:

1. Physical/engineering practicality;
2. Economic feasibility;
3. Potential social or economic conflicts;
4. Biological probability of "improving" the ecosystem; and
5. Estuarine management consistency.

This screening process, which included the Functional Task Force, the Interagency Task Force, the Coos Bay Estuary Advisory Commission, and the Coos County Board of Commissioners, refined the total list of potential sites to 85. This inventory represents a list of sites which are generally acceptable to the resource agencies. However, the Division of State Lands has the ultimate responsibility to determine the acceptability of each site within the context of a particular mitigation action. The IATF agreed that it was appropriate to rate the mitigation potential of these sites according to a "priority rating system" [See Section 8.5 below].

#### 8.4 Types of sites, possible actions and consequences.

##### 8.4.1 Introduction

The majority of the 85 potential mitigation sites are restoration sites (58). The remainder (25) are enhancement sites, except for one, which is classified as a restoration/creation site, (this site is apparently spoil placed upon a low natural promontory), and one strictly creation site. This inventory does not include the extensive mitigation actions which form part of the negotiated "Henderson Marsh Agreement", which are separately referenced in the Plan Provisions under Shoreland Management Segment 5. This is because this package is primarily for freshwater mitigation, and based upon USFWS mitigation policy rather than on Goal 16 requirements.

#### 8.4.2 Restoration Sites

Restoration sites are of two basic types:

- (i) Spoil islands that may be scalped down to intertidal level, and
- (ii) Diked former tidal marsh where there is an opportunity to restore to tidal influence.

However, a wide variety of conditions exist within these two categories. Spoil islands vary in size from an acre or so to twenty or more acres, and also vary considerably in height. In most instances, access is by water only, and excavating equipment would have to be barged into the site.

Diked former tidal marshes provide several sites, most of them in sloughs where massive alteration of the estuary took place in the past, particularly on Catching Slough. However, there is a wide variation in the current conditions. Several potential sites are currently well-managed improved pasture which contribute substantially to the local agricultural economy. Other sites exhibit varying degrees of colonization by fresh-marsh species, while remaining in active agricultural use. In a few cases, agricultural use has apparently been abandoned in the recent past, and the site has been taken over to a great extent by fresh marsh vegetation. Finally, a few sites, while still diked, show no traces of former agricultural use, and now are in more advanced stages of freshwater wetland vegetational succession. In some cases, too, salt water penetrates tidegate systems and has created communities of salt tolerant species like Lyngbye's sedge along drainage ditches. In most cases, the natural marsh channel systems have been replaced by artificial ditches, leaving only vestiges of channels visible on airphotos. In other cases, parts of the basic natural circulation system remain, converted to drainage ditches. The existence of natural channels suggests that these sites would return more rapidly to something more closely approximating their original condition, and in particular would become more efficient in transporting detrital material back into the estuarine system.

It is not known how rapidly a given site newly exposed to tidal action and salinity would convert to a saltmarsh community. Experimental work on the Salmon River estuary has shown that within two growing seasons, a substantial conversion from grasses or fresh marsh to saltmarsh can occur [Diane L. Mitchell, Report to Estuarine Mitigation Techniques Workshop, Newport, Jan. 1981]. Certainly, the rate of conversion could vary from site to site, depending on tidal range, salinity of the incoming water, responsiveness of existing channels and the degree to which the site is opened up to tidal action. Saline intrusion will kill off non-salt plant species rapidly within one growing season, as evidenced in Coalbank Slough where dikes have recently washed out. However, the rate of invasion by salt tolerant species will



depend on the proximity of a seed source and the existence of a suitable substrate for their establishment. It should be noted that even where fresh water wetland existed previously, most plant species (except types which are found in both fresh and salt marsh communities, like certain sedges) will experience die-back and replacement.

Engineering considerations are also widely variable. In a large number of cases, a highway (or railroad) runs along the dike separating the site from the estuary. This will greatly complicate the task of increasing tidal influence, adding to costs and restricting opportunities. All that is possible in many such cases is to remove a tidegate or increase the culvert size or possibly add another culvert. Complete removal of the dike would not be feasible. This would somewhat reduce the potential value of certain sites.

In other cases, a major tidegate has sealed off an entire slough, often under the auspices of a local drainage district. Restoration of sites above these tidegates to full tidal action would be very costly, requiring replacement of the major tidegate and often also requiring new dikes and additional tidegates to confine tidal action to the site itself and protect other surrounding farmland. Examples are found on Kentuck, Palouse, Larson, Willanch, Ross and Coalbank Sloughs. All except Kentuck and Willanch are maintained by property tax-supported local drainage districts. All sites above major tidegates are of very limited usefulness due to engineering difficulties, expense and conflict with existing agricultural use and the purpose of the drainage districts. Consequently, over 30 sites which were included in the preliminary inventory have been excluded from the final list of selected sites.

Other sites, particularly on Isthmus and Catching Sloughs, could easily be opened up directly to the estuary and are topographically separated from neighboring areas. Engineering requirements in these cases would be minimal and complete removal of dikes, while more expensive, might be feasible to introduce tidal action. Self-contained isolated sites of this type are much more usable than those which require protection of neighboring areas. However, even within sites with this desirable feature, there are wide variations in existing use, management and plant communities. For instance, site U-24 is currently intensively managed for pasture, while site U-30 (b) in upper Catching slough, has reverted to a mostly freshwater marsh condition. Other sites in the immediate area exhibit various intermediate stages of reversion.

While several of these sites appear to have been abandoned for agricultural use, due to the advanced stage of reversion to freshwater marsh, this is not necessarily the case. Some of these sites may become reclaimed for agricultural use following a change in ownership, management objectives, availability of capital or improved market conditions for farm products. While

these apparently abandoned sites may be more likely to become available for restoration, it should be remembered that landowners' objectives cannot always be anticipated.

#### 8.4.3 Enhancement Sites

There are two basic types of enhancement site.

- (i) Similar in nature to diked restoration sites, except that there is already a breach in the dike permitting estuarine influence, but with circulation impaired, and
- (ii) Sites where removal of driftwood, old pilings or other debris would enhance vegetative growth and tidal circulation.

The majority of the identified sites are of the first type. They often occur where agriculture was formerly extensive but has since been largely abandoned. Main examples are found in South Slough, North Slough and in one site on Davis Slough. Remnants of dikes are found at Sites SS-1, SS-2(a) and (b), and SS-10(a) and (b) for example, which could be further breached or entirely removed to improve estuarine circulation in areas basically already under tidal influence. The removal of the dike might possibly increase the upstream extent of tidal influence, by increasing the volume of tidal inflow, for instance on Talbot Creek (SS-2(a)), but the magnitude of change is open to conjecture. Similarly, the biological value of improved circulation, in terms of greater nutrient transport is without doubt. However, quantitative data are lacking for Coos Bay on the exact effects of enhancement actions of this type. There may also be changes in plant communities and fauna which are not readily apparent. The grosser changes in plant community following restoration actions, by contrast, are much more obvious. Consequently, the true value of enhancement actions are harder to assess. However, in most cases the engineering requirements are minimal.

Due to the location of many of these sites, access will often be by water only, and excavation equipment will need to be barge-mounted. Several of the sites in the South Slough are remote from roads, and shallow water conditions may pose access problems.

Two sites for debris removal have been identified, one on upper Isthmus Slough (site U-55(a)) and one on North Slough (site M-9(c)). In addition, the Kennedy Fieldsite (U-40) could involve some debris removal. These sites are by no means the only ones where driftwood, pilings and other debris have buried marsh vegetation and restricted circulation. Driftwood is found throughout the bay on salt-marshes and along the high water line, particularly on the East Bay shore. Other similar enhancement sites could be proposed by sponsors and assessed for their

potential value by DSL. Removal could be done either by barge-mounted crane or from the land depending on road access. The benefits would be increased primary productivity, benthic organisms and circulation. It should be mentioned that storm tides during the winter cause gradual accretion of debris, so these actions would probably need to be followed up each year to be fully effective. It must also be noted that in some places along the shoreline, driftwood accumulations have a useful function in helping to prevent erosion and stabilize the bank. These factors would need to be accounted for in determining the net benefit of debris removal actions for estuarine enhancement.

#### 8.4.4 Geographic distribution of sites and relationship to future development areas

Goal 16 Implementation Requirement 4 requires mitigation for intertidal dredge or fill. Goal 17 Implementation Requirement 3 requires the identification of "coastal shoreland areas which may be used to fulfill the mitigation requirement of the Estuarine Resources Goal." Neither Goal 16 nor Goal 17 specifically require the County to ensure that a potential mitigation site exists for each potential project that might ever be developed because of a Plan designation. In fact, it would be extremely difficult, if not impossible, to guarantee in the Plan that "like-for-like" mitigation sites exist to offset the impacts of future projects of which the nature and scope is unknown.

The Division of State Lands, which is responsible for implementing Oregon's Fill and Removal Law (ORS 541) and LCDC's mitigation requirements, comments about the difficulty in planning for mitigation since mitigation is an implementation, project-oriented function:

"It is difficult to determine at the time of plan development how much mitigation might be required in the future for projects ... without knowing the specific nature and scope of the proposed action -- ie., without a project (Personal Communication with Mr. Bill Parks, DSL, June 3, 1983.)"

And further: "Practically speaking, the designation of specific mitigation for hypothetical projects would not be worth the time invested in analysis (letter from Ed Zajonc, Director, DSL, June 13, 1983)"

Coos County concurs fully with DSL's observation. Nevertheless, the County does believe prudent planning requires a general assessment in the Plan addressing the question of whether or not sufficient mitigation sites have been designated in the Plan and protected against pre-emptory uses.

Section 4.0 in the "Linkage Document" presents a "Cumulative Effects Statement" that addresses the environmental impacts expected to result from uses and activities allowed in the Plan's "development" management units. Mitigation planned to offset these impacts must consider the amount of development that may occur and the nature and extent of that development. Again, this is nearly impossible to do without foreknowing at the present about projects which may materialize in the future. Certain general conclusions can be made now, however.

The Plan's "development" management units comprise an estimated 1,451 acres, or only about 10.8% of Coos Bay's total estuarine surface area. Most of this acreage consists of subtidal areas, and dredge or fill activities in subtidal areas do not require mitigation pursuant to Goal 16. Goal 16 requires mitigation for "dredge or fill activities permitted in intertidal or tidal marsh areas." An estimated 212 acres of intertidal and tidal marsh areas are contained within "development" units. Stated otherwise, less than 15% of the 1,451 acres in "development" units are subject to Goal 16 mitigation requirements. This information is presented in greater detail in the "Cumulative Effects Statement."

The "Cumulative Effects Statement" also addresses the general nature and extent of fill and removal actions planned for "development" units, by bay segment. It notes that fill and removal actions and impacts are generally limited to a few major projects, such as the North Bend Airport runway extension project and limited moorage development, and also a number of less extensive actions (because the fill would be mostly subtidal) such as bulkheading out to water depths sufficient for deep-draft vessels. The environmental effects of these fill and removal actions is not as great as might first be assumed because:

- (i) most of the area in "development" units is subtidal, and hence less valuable habitat than that found in intertidal and tidal areas; and
- (ii) the greater part of the acreage in "development" units is in areas where past alteration has occurred, or is classified by Goal 16 as "areas of minimal biological significance."

To assess Goal compliance, the question is then posed:

"Are adequate sites protected in the Plan against pre-emptory uses and activities, so that they can be used to mitigate for environmental losses that may occur in 'development' management units?"

The mitigation/restoration sites inventory map shows clearly that the vast majority of potential mitigation sites are located in the extremities of the bay, particularly in Isthmus, Catching and

other sloughs. However, future development will occur in areas with a relative shortage of potential sites: the North Spit, Charleston, Empire, the Coos Bay-North Bend waterfront and Lower Isthmus Slough. This means that the few sites that lie close to "development" management units are particularly valuable, all other factors being equal. Particularly valuable sites, therefore, are M-5 (a) and (b) due to their proximity to the proposed airport extension, and L-4 which lies adjacent to the Charleston Boat Basin.

The Plan protects all of the 18 potential mitigation sites in the South Slough Sanctuary and Lower Bay (Charleston Vicinity) from pre-emptory uses which might limit or preclude use of these valuable sites for mitigation. Similarly, the Plan protects 40 sites in the Mid-Bay and Upper Bay from pre-emptory uses. The 58 protected sites (40 + 18) comprise a total of 604.6 acres which may be used for mitigation. It is reasonable to conclude that these are more than adequate to offset fill and removal impacts in the 212 acres of tidal and intertidal areas in "development" management units. Certainly, not all of the 212 acres will be subject to dredge and fill impacts.

Another factor which needs to be considered is the type of estuarine habitat area which is most likely to be altered by dredge or fill during the course of development provided for in the Plan. Most dredge or fill actions will be occurring in subtidal or intertidal flat or shore areas. Only fairly minor areas of salt marsh are included in Development management units and are therefore likely to be affected by development. For instance, construction of the proposed trawler basin off the North Spit will involve dredging of a subtidal area and adjacent intertidal shores. The 32-acre fill proposed for extension of the North Bend Airport will affect intertidal flats and clam beds. The most appropriate mitigation sites would be those which have "similar biological potential." Diked former saltmarsh areas could be restored to the estuarine system in the absence of sites with similar potential that could be made available when needed.

To further assess Goal compliance, a second question is posed:

"Are the 604.6 acres of protected sites adequate to also provide for mitigation needed to compensate for environmental losses that may occur in 'conservation' management units?"

As noted earlier, it is problematic to guess how much mitigation could be required for some future project that might occur because of a Plan designation allowing the project. The majority of Coos Bay's major fill and removal actions will occur in "development" units, although the precise nature and extent of these can not be detailed until a specific project is proposed. In addition, an unknown number of fill and removal actions will occur in "conservation" and "natural" units. It is even more

difficult to guess how much mitigation might be required for future projects that might occur in these units because:

- (i) Baywide Plan Policy #6 limits fill in "conservation" and "natural" units, as specifically required by state law;
- (ii) The Plan similarly limits dredging in "conservation" and "natural" units, also as required by state law; and
- (iii) It seems likely that the vast majority of dredging and fill actions in "conservation" and "natural" units will involve less than 50 cubic yards of material and thus be exempt from mitigation pursuant to ORS 541.605.

As previously stated, the Plan protects 604.6 acres of potential mitigation sites. Even if all of the 212 acres of tidal and intertidal areas in "development" management units are subject to mitigation for dredge or fill actions, and 212 acres are used from the 604.6 acres of protected sites, nearly 400 acres of protected sites would remain available for use in mitigating fill and removal actions in tidal and intertidal "natural" and "conservation" aquatic management units. It is reasonable to conclude that 392.6 acres of potential mitigation sites are more than adequate to compensate for fill and removal impacts likely to occur in non-development management units.

The Director of the Division of State Lands, as the individual responsible for implementing Goal 16's mitigation requirements, feels very positive about the Coos Bay Estuary Plan's Mitigation Element:

"Coos County has developed an excellent list of mitigation proposals that will provide satisfactory mitigation for a wide range of potential removal-fill actions.

...

We (DSL) are satisfied that the mitigation 'sites' and actions described in the Plan will provide DSL with sufficient mitigation alternatives to handle almost any combination of intertidal removal-fill projects (letter from Ed Zajonc, Director, Division of State Lands)."

The following data summarize the relationship between priority mitigation sites protected against pre-emptory uses and other, low-priority sites not protected:

Bay Segment	Protected Sites (1)		Other Sites (2)	
	Number	Acres	Number	Acres
South Slough				
Estuarine Sanctuary	15	138.0	0	0
Lower Bay	3	16.0	0	0
Mid-Bay	8	84.8	8	252.5
Upper Bay	30	361.2	21	293.8
TOTALS :	56	600.0	29	546.3

(1) High and medium priority sites protected from pre-emptory uses

(2) Low priority sites not protected.

SOURCE: Mitigation Site Worksheet

Section 7.3 of the Plan explains the considerations used in determining which potential sites are given "high" and "medium" priority ratings and thus protected against pre-emptory uses, versus "low" priority sites not protected by the Plan. To repeat, the Plan recognizes that "low" priority sites may not be appropriate for mitigation, but may instead be better-suited to estuarine restoration actions at the initiative of the landowner.

Some have suggested that diked property at the head of Joe Ney Slough should be designated as a high-priority mitigation site to offset impacts from Lower and Mid-Bay development. Coos County rejects this suggestion, as the subject property is needed for municipal water resource development. As noted in the Plan's management objective for Shoreland Segment 63A-CS:

"The area from the dike upstream has been identified as a promising domestic water source and should be protected for this purpose until its resource is developed."

The importance of the Joe Ney water resource area is addressed in the Inventory Document.

#### 8.4.5 The South Slough Estuarine Sanctuary - An area especially suited to Mitigation/Restoration actions

A number of restoration or enhancement sites have been identified in the South Slough Estuarine Sanctuary. As this is an area set aside for its natural values and for research, it is ideally suited for mitigation or restoration actions. Mitigation could occur for dredge/fill actions (especially small projects) in the

Charleston area as appropriate. Secondly, voluntary restoration actions could occur there independently of any specific alteration. Improvements in primary productivity, flushing and nutrient transport and fauna could be conducted in conjunction with the development of a "mitigation bank". The Division of State Lands could play a key role in such a program, due to its statutory control over mitigation actions and administrative function and ownership in the Sanctuary. The knowledge gained from a restoration/enhancement and monitoring program, together with the advantage of State ownership of most of the sites and the development of a Mitigation Bank, could greatly facilitate development elsewhere in the bay, particularly in the Charleston area. Though several of the actions are small and may have relatively minor effects, the cumulative effect on the system is likely to be substantial. Therefore, these sites are accorded a higher priority than they would otherwise have.

## 8.5 Priority Rating System

### 8.5.1 Criteria

The following criteria are proposed as a basis for a priority rating system for mitigation sites. It should be stressed that the priority rating applies to the site's value for mitigation only. Certain sites in the sloughs which may receive a low rating for mitigation due to a combination of agricultural use conflicts, distance from development areas, and dissimilarity of biological potential, may nevertheless have high potential for purely voluntary restorative actions. Where this is the case, it is noted on the individual field sheets for each site [See Appendix 'A'].

Each group of criteria is given equal weight, with the exception that group (5) "Potential to replace habitats subject to greatest historical loss" is of lower general importance than group (4). "Similarity, or similar potential, to development sites", as suggested by the Goal #16 guideline on Mitigation. Criteria within each group, are, however, arranged in general order of importance.

- Group (1)      Biological gain: (in order of importance)
- a) Gain in overall primary production. (area, increase in biomass)
  - b) Degree of improvement in tidal flushing.
  - c) Existence of natural channels.

- Group (2)      Use conflicts: (in order of importance)
- a) Conflict with other proposed development.
  - b) Existing agricultural practices including



grazing (vs. partial or full reversion to wetland)

c) Drainage district.

Group (3) Engineering requirements. (in order of importance)

a) Removal of major tidegate, replacement elsewhere. (vs. simple breaching of dike or removal of small tidegate.)

b) Road or railroad involved.

c) Extra diking required.

d) Access problems for heavy equipment.

e) Follow-up maintenance actions required.

Group (4) Similarity, or similar potential, to development sites (in order of importance)

a) Proximity and "Similar ecological characteristics."

b) Similar salinity regime, elevation, substrate, current velocity patterns, solar orientation, slopes. (in order of importance.)

Group (5) Potential to replace habitats subject to greatest historical loss (in order of importance)

a) Saltmarsh [Catching Slough the area of greatest historical loss, followed by Coalbank and Isthmus Sloughs]

b) Tidal flat/aquatic bed.

Group (6) In South Slough Estuarine Sanctuary

#### 8.5.2 Priority Rating System: Description of Priority Categories

The following priority rating system is proposed, based on the application of the above criteria, using three broad categories, which are as follows:

a) HIGH PRIORITY

b) MEDIUM PRIORITY

c) LOW PRIORITY

HIGH PRIORITY SITES have the following general characteristics:

- 1) Clear biological gain.
- 2) Essentially no use conflicts.
- 3) Engineering requirements either minimal, or no serious difficulties if more substantial action required (e.g. scalping of spoil islands)

and either:

- 4) Close proximity to, or similar ecological characteristics to potential development sites, or
- 5) A site with good potential for salt marsh restoration.

High priority sites are the best available options for potential mitigation use, as stated in the Plan.

MEDIUM PRIORITY SITES also appear to have realistic mitigation potential. However, they are of generally lower value, or have more problems than High Priority sites. They may have values which would normally place them in the High Priority category, but use conflicts or engineering problems reduce their overall usefulness. They have the following general characteristics:

- 1) Biological gain may vary from moderate to high.
- 2) Potential use conflicts, but unlikely to rule out site completely: e.g. a site where agricultural practices are very marginal or recently abandoned, and dikes/tidegates and drainage ditches in poor state of repair.
- 3) Engineering requirements may be minimal, or moderate difficulties may exist. (e.g. culverts may need to be enlarged beneath road).
- 4) Not generally in close proximity to, or with similar ecological characteristics to, potential development sites.
- 5) May have moderate to good potential for salt marsh restoration.

LOW PRIORITY SITES are included in the inventory because it is theoretically possible to use them for mitigation. However, at this time they have very limited potential; they are most unlikely to become available due to conflicting uses or ownership, or because of severe engineering problems. However, they may otherwise have good biological potential for restoration. Their general characteristics are as follows:

- 1) Biological gain may vary from low to high.
- 2) Use conflicts are severe, e.g. where there is land in current agricultural use with improved pasture, functioning dikes and tidegates and evidence of on-going maintenance of drainage ditches. Where dikes have breached in the past, or tidegates are not entirely water-tight, the general management of the site indicates the intention to retain agricultural use.
- 3) Engineering requirements may be minimal, but normally moderate to severe difficulties exist [e.g. major tidegates need to be removed and replaced upstream, new diking required]
- 4) Not in proximity to, or with similar ecological characteristics to, potential development sites.
- 5) May have low to high potential for salt marsh restoration.

A number of sites on Catching Slough have good biological potential for salt marsh restoration and minimal engineering requirements (simple breaching of dike) and are in an area of substantial historic loss of tidal marsh habitats. However, agricultural use is well established and in many cases, sites are rated "Low Priority" for mitigation in spite of otherwise good restoration potential. The great distance from potential development areas elsewhere in the bay is another consideration which suggests generally lower priority for mitigation for these sites.

The proposed priority rating for each site is shown in Table 8.1. Detailed data on the characteristics of each site are found in the field sheets. (See Appendix A) The overall assessment at the end of the field sheet summarizes the relevant facts used to assign the priority rating.

TABLE 8.1 MITIGATION SITES INVENTORY: PRIORITY RATINGS

[See Maps: "Selected Mitigation and Restoration Sites", at 1"-3000' and 1"-800' for general and specific locations]

SITE #	ACTION	PRIORITY RATING
SOUTH SLOUGH ESTUARINE SANCTUARY		
<u>SS-1 (a)</u>	<u>Enhancement</u>	<u>Medium</u>
<u>SS-1 (b)</u>	<u>Restoration</u>	<u>Medium</u>
<u>SS-2 (a)</u>	<u>Enhancement</u>	<u>Medium</u>
<u>SS-2 (b)</u>	<u>Enhancement</u>	<u>Medium</u>
<u>SS-3 (a)</u>	<u>Enhancement</u>	<u>Medium</u>
<u>SS-3 (b)</u>	<u>Enhancement</u>	<u>Medium</u>
<u>SS-4</u>	<u>Restoration</u>	<u>Medium</u>
<u>SS-5</u>	<u>Restoration</u>	<u>Medium</u>
<u>SS-6 (a)</u>	<u>Restoration</u>	<u>Medium</u>
<u>SS-7</u>	<u>Restoration</u>	<u>Medium</u>
<u>SS-9</u>	<u>Restoration</u>	<u>Medium</u>
<u>SS-10 (a)</u>	<u>Enhancement</u>	<u>Medium</u>
<u>SS-10 (b)</u>	<u>Enhancement</u>	<u>Medium</u>
<u>SS-10 (c)</u>	<u>Restoration</u>	<u>Medium</u>
<u>SS-11</u>	<u>Enhancement</u>	<u>Medium</u>
LOWER BAY		
<u>L-1</u>	<u>Enhancement</u>	<u>High</u>
<u>L-4</u>	<u>Restoration</u>	<u>High</u>
<u>L-5</u>	<u>Enhancement</u>	<u>High</u>
MID-BAY		
<u>M-1 (a)</u>	<u>Restoration</u>	<u>Medium</u>
<u>M-1 (b)</u>	<u>Restoration</u>	<u>Medium</u>
<u>M-3</u>	<u>Creation</u>	<u>High</u>
<u>M-4</u>	<u>Restoration/Creation</u>	<u>Low</u>
<u>M-5</u>	<u>Restoration</u>	<u>High</u>
<u>M-8 (a)</u>	<u>Enhancement</u>	<u>Low</u>
<u>M-8 (b)</u>	<u>Enhancement</u>	<u>Low</u>
<u>M-9 (a)</u>	<u>Restoration</u>	<u>Medium</u>
<u>M-9 (b)</u>	<u>Enhancement</u>	<u>Medium</u>
<u>M-9 (c)</u>	<u>Enhancement</u>	<u>Low</u>
<u>M-10</u>	<u>Enhancement</u>	<u>Low</u>
<u>M-11 (b)</u>	<u>Enhancement</u>	<u>Low</u>
<u>M-12</u>	<u>Restoration</u>	<u>Low</u>
<u>M-13</u>	<u>Restoration</u>	<u>Low</u>
<u>M-22</u>	<u>Restoration</u>	<u>Medium</u>

SITE #

ACTION

PRIORITY RATING

UPPER BAY

<u>U-1</u>	<u>Restoration</u>	<u>Low</u>
<u>U-8 (a)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-8 (b)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-9 (a)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-9 (c)</u>	<u>Enhancement</u>	<u>Low</u>
<u>U-10</u>	<u>Restoration</u>	<u>Low</u>
<u>U-11</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-12</u>	<u>Restoration</u>	<u>High</u>
<u>U-13</u>	<u>Restoration</u>	<u>High</u>
<u>U-14 (c)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-16 (a)</u>	<u>Restoration</u>	<u>High</u>
<u>U-16 (b)</u>	<u>Restoration</u>	<u>Low</u>
<u>U-17 (a)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-17 (b)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-21 (b)</u>	<u>Restoration</u>	<u>Low</u>
<u>U-22</u>	<u>Restoration</u>	<u>Low</u>
<u>U-23</u>	<u>Restoration</u>	<u>Low</u>
<u>U-24</u>	<u>Restoration</u>	<u>Low</u>
<u>U-26</u>	<u>Restoration</u>	<u>Low</u>
<u>U-27</u>	<u>Restoration</u>	<u>Low</u>
<u>U-28</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-29 (a)</u>	<u>Restoration</u>	<u>Low</u>
<u>U-29 (b)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-30 (a)</u>	<u>Enhancement</u>	<u>Medium</u>
<u>U-30 (b)</u>	<u>Restoration</u>	<u>High</u>
<u>U-31</u>	<u>Enhancement</u>	<u>High</u>
<u>U-32 (a)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-32 (b)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-32 (c)</u>	<u>Restoration</u>	<u>Low</u>
<u>U-33</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-34 (a)</u>	<u>Restoration</u>	<u>Low</u>
<u>U-34 (b)</u>	<u>Restoration</u>	<u>Low</u>
<u>U-34 (c)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-34 (d)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-40</u>	<u>Enhancement</u>	<u>High</u>
<u>U-41 (b)</u>	<u>Restoration</u>	<u>Low</u>
<u>U-42</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-44</u>	<u>Restoration</u>	<u>High</u>
<u>U-45 (a)</u>	<u>Enhancement</u>	<u>Low</u>
<u>U-45 (b)</u>	<u>Restoration</u>	<u>Low</u>
<u>U-51 (a)</u>	<u>Enhancement</u>	<u>High</u>
<u>U-51 (b)</u>	<u>Restoration</u>	<u>High</u>
<u>U-52 (a)</u>	<u>Restoration</u>	<u>Low</u>
<u>U-52 (b)</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-53</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-54</u>	<u>Restoration</u>	<u>Medium</u>
<u>U-55 (a)</u>	<u>Enhancement</u>	<u>Low</u>
<u>U-55 (b)</u>	<u>Restoration</u>	<u>Medium</u>

SITE #

ACTION

PRIORITY RATING

Upper Bay, continued

U-59 (a)

Enhancement

High

U-59 (b)

Enhancement

High

U-60 (a)

Restoration

Low

U-60 (b)

Restoration

Low

## 8.6 Restoration Concepts

### 8.6.1 Inventory of past losses to biological productivity

A major responsibility of the Restoration Plan is to inventory the past losses of various estuarine amenities. This helps to identify those areas or habitat types that would be most appropriate for restoration action. Inventory considerations included erosion and sedimentation areas, degraded fish and wildlife habitat, fish spawning areas, diked marsh areas, water quality degradation areas, and areas of riparian vegetation disturbance.

Several of these considerations were found to be difficult to assess regarding past losses vs. existing values. Fish spawning areas and erosion and sedimentation areas have very sketchy historical records. Inventory data has not yet been able to identify areas or actions that could clearly improve these resources within Coos Bay. However, there is overwhelming evidence of the loss of tidal marshes and associated fish and wildlife habitat.

Hoffnagle and Olson (1974) estimated that for six slough areas that they examined, approximately 2,053 ac. of the original 2408 ac. of tidal marshes have been lost to filling or diking, or about 85% of the total [See Table 4.1.7]. This figure does not represent the whole picture, however. They also estimate that 3,942.9 ac. of what they term "diked marsh" (former tidal marsh now diked and used for farmland) exists around the bay. Part of this figure is included in the 2,053 ac. mentioned above. However, as pointed out in Section 4.2.3.4 (c), this figure is an underestimate, because it does not include substantial areas of former tidal marsh (either salt marsh or tidally influenced fresh marsh) on Isthmus, Haynes, Larson, Palouse and Kentuck Sloughs and Coos River. It is not possible to reach an accurate estimate of the total area of former tidal marsh lost to diking and filling in the entire estuarine system based on existing data, without further detailed studies. However, it is clear that in the parts of the estuary where salt marshes were formerly most extensive, approaching 90% of the original acreage is now gone. The areas of greatest historic loss are Catching Slough/Coos River, Coalbank Slough/Isthmus Slough (including the town site of Marshfield), Pony Slough (including the North Bend Airport and Pony Village sites), Kentuck Slough, Willanch Slough, Larson Slough and Palouse Slough, in decreasing order of magnitude. See also the inventory map "Historical Analysis of Bay Changes", showing approximate areas of diking and filling, and compare with current salt marsh acreage in "Estuarine Wetlands Habitat".

The cumulative impact of so great an alteration in the estuary is substantial. Marshes provide tremendous amounts of nutrients to the estuary, prime habitat for fish and wildlife, water quality maintenance, and floodwater retention and hydraulic control. Besides the loss of nutrient supply (detritus) and habitats, this

also represents a tremendous decrease in total surface area of the estuary, and the total amount of primary productivity. This loss of marshlands is the single greatest impact the estuary has experienced.

Other biological losses of the estuary include riparian vegetation and water quality degradation. Riparian vegetation once lined all shorelands of the estuary except where slides or floods denuded the plant growth, or where unvegetated sand dunes border the shore.

Presently large portions of the rural areas of Haynes, Palouse, Larson, Kentuck, Catching and Ross Sloughs, and the Coos and Millicoma Rivers lack riparian vegetation. This represents degradation in shoreland stability and sedimentation, wildlife habitat, water quality maintenance, nutrient production, and aesthetic values. Water quality degradation has also occurred through human development of residential areas (septic system runoff), agricultural uses (animal wastes), and industrial/urban areas (heavy metals and chemicals from industrial plants or surface runoff). Water quality problems have appeared in monitoring studies of the bay for several years. Also, until recently the estuary (from below Empire) was closed to commercial shellfish production [See section 4.1.8, Water Quality].

#### 8.6.2 Possible restoration actions

A diversity analysis was also undertaken for the estuary to help identify key estuarine habitats that could be restored, improved, or created. Estimates for salt marsh types or acreages of various other estuarine habitats are not wholly accurate but will indicate a general breakdown and percentage relationship.

The existing 1,962 acres of saltmarsh, can be generally broken down into:

Low sand marsh	289
Low silt marsh	71
Immature High Marsh	1,000
Mature High Marsh	98
Sedge Marsh	354
Bullrush/Sedge Marsh	150

(Hoffnagle & Olson, 1974)



Other estimates for estuarine acreages are as follows:

Tidelands (total)	6,200*
Submerged lands	6,180*
Tideflats (variety)	3,500
Total Algal/Seagrass	2,100
Total Eelgrass	1,400x

Unfortunately, how much of each of these habitat types has been lost cannot be determined. It is also very difficult to determine which habitat types are most productive, or most important to further enhance. All alterations within the estuary will represent a trade-off. If more eelgrass beds are to be established or enhanced some mini-ecosystem must be sacrificed for the eelgrass. This becomes especially difficult to judge when a restorative action considers lowering or raising an estuarine area. Any contour alteration will be at the expense of the existing habitat.

The only restoration action in the estuary that is assured of biological gain is the return of non-tidal areas to tidal marshes. This is true because: 1) this is clearly the area of greatest historic estuarine losses, and 2) any efforts to increase the surface area of the estuary, as opposed to the modification of the existing estuarine area, will provide the greatest net gain.

Specific estuarine restoration sites are listed throughout the Mitigation inventory. The majority of these sites represent a return of marshland to the estuary. Any such action will be helping to restore past amenities of the estuary. A "restoration" use of any of these sites is done when no mitigation requirement is involved (i.e., the act is not compensatory in nature but represents all gain).

Restoration concepts include two additional types of restorative efforts: riparian revegetation and water quality improvements.

Riparian revegetation can be accomplished by individuals, agencies, industry, volunteer groups, or other efforts. This simply represents the planting and management of shrubs and trees along the shorelines of the estuary. Much of the vegetation removed in the river and slough systems has occurred through farming practices although erosion has removed some parts of the banks. Significant gains can occur by allowing a 25-50 foot setback from the waterline where vegetation will be planted or encouraged to develop. This should not adversely impact existing or future land uses, and can help to stabilize the bank where erosion is a problem. Revegetation in urban or other development

\* Source - Division of State Lands

x Source - Akins and Jefferson (1973)

areas should be undertaken as a part of site design. Revegetation is not appropriate, however, where it may interfere with shoreland/water uses.

Water quality improvements can be most readily accomplished in the agricultural areas of the sloughs and in residential areas. Water quality in the sloughs may be impacted because of the potential for concentration of fecal coliform bacteria due to animal waste runoff. However, this is considered to be a relatively less serious problem in Coos Bay than problems with run-off and septic tank seepage from residential areas. Water quality near residential areas can be improved by developing community sewerage systems or repair or replacement of failing septic systems. Sewerage improvements in the Coos Bay estuary are only applicable to the cities and to the Charleston/Barview area inside the planned urban growth boundary. Plans to reduce infiltration and separate storm water from sewage lines in Coos Bay could be considered a form of restoration. This could result in improvement to water quality due to reduced discharges of raw sewage to the bay during high run-off periods. Local septic tank failures have caused water quality problems in Joe Ney Slough and parts of South Slough [See Section 4.1.8.7]. Other areas of the estuary, including North Slough, Glasgow, and East Bay, are not planned for urban level sewerage development. DEQ programs like the planned Coos Bay Water Quality Shellfish Study and federally-funded sewerage system improvements in the Charleston-Barview area will help to realize some of these long-term restoration objectives.

### 8.6.3 Cultural Restoration Concepts

The past losses of estuary-related cultural amenities have primarily been associated with waterfront developments. The losses pertain to public access limitations and aesthetic degradation. This is evidenced throughout the Coos Bay-North Bend waterfront. Development has severely limited public access, and construction has occurred with little regard to visual impacts on Highway 101 or downtown areas.

Potential restoration actions include the improvement of public access and the aesthetic rehabilitation of the urban areas of the estuary. Public access could be improved by making more areas available for public use, through purchase, easement, or design standards. A greenway concept for Charleston, North Bend, Coos Bay, and Eastside could greatly improve future development along these waterfronts. Pathways, small parks, benches, and landscaping could be incorporated into existing uses and facilities to greatly improve public utilization of the resource.

Docks and wharves along the Coos Bay-North Bend waterfront could be consolidated whenever possible. This could concentrate dock usage into specific areas to lower operating costs and possibly improve in-base facilities and services. This could lessen dredging requirements and subsequent disposal needs in the

area. It could also decrease the number of areas where debris can enter the water. Ultimately, this could provide several new areas along the waterfronts for public access or other culturally beneficial actions.

APPENDIX "A"

FIELD SURVEY SHEETS: POTENTIAL MITIGATION/RESTORATION SITES

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # SC-2 (a) and (b)

Potential Mitigation Action

(a) Enhancement  
(b) Restoration

Management Segment:

(a) 61 WA  
(b) 65 NC

Section	Township	Range	Tax Lot
(a) 24	26	14	500
(b) 19	26	13	

Location

Elliott Creek, South Slough Estuarine Sanctuary

Physical Boundaries

Slough to west, slopes to north and south; floodplain to east

Approximate Size

(a) 23 acres (b) about 10 acres

Ownership

State of Oregon

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: a) tidal flat with salt marsh; (b) salt/fresh marsh mixture above dike.

Wildlife Use: Shorebirds, crustaceans in tide flats

Slope/Topography: Flat, rising slightly to east

Aquatic Regime: Tides submerge most of site (a) regularly; creek flows thru sites from east.

Channels: Yes, main channel through tidal flat, creek channel to east

MAN-MADE FEATURES:

Existing Use: Vacant

Structures: Intact dike at east end of site, breached dike at west end

Access: by boat, old logging roads

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidal influence above breached (first) dike. Upstream tidal influence DSL shows former head of tide to be about 1,500 feet upstream.

Possible Actions, Consequences: Remove lower dike, remove tidegate or entire upper dike. Improve flushing, increase total area of tidal influence.

Approximate Construction Requirements: Barge-mounted backhoe or similar earth mover. Barge to remove spoils to disposal site. Access to lower dike by water-to upper dike by land (difficult)

Potential Habitat Type: Tideflat, increased salt marsh

Potential Conflicting Uses: None

Overall Assessment: Restoration area relatively small, but high value to increase knowledge of mitigation actions. Access to (b) may be very difficult. Relatively low value for in-kind mitigation except for small projects in Charleston area.

86-25A

MAN-MADE FEATURES:

Existing Use: Vacant

Structures: Two breached dikes

Access: By water, also old logging road to (b)

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidal action through breaches in sites

Possible Actions, Consequences: Remove dikes to improve tidal flushing. Possibly increase extent of tidal action.

Approximate Construction Requirements: Barge-mounted excavator; bar; remove spoils for disposal.

Potential Habitat Type: Same as existing, salt marsh

Potential Conflicting Uses: None

Overall Assessment: Enhancement effects uncertain, but has experimental/research value. However, relatively low mitigation value, for small projects in Charleston area.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # SS-2 (a) and (b) Potential Mitigation Action

Management Segment: 69 NA Enhancement

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
25	26	14	100
30	26	13	

East arm of Talbot Creek, South Slough Estuarine Sanctuary

Physical Boundaries

- (a) Slough to north, south and west, slopes to east
- (b) Slough to west, slopes to north and south, creek to east.

Approximate Size

(a) 10 acres (b) 4 acres

Ownership

State of Oregon

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Salt marsh

Wildlife Use: Typical of high salt marsh

Slope/topography: Flat, gradually rising above intertidal level

Aquatic Regime: Tidal action through most of sites

Channels: Yes, one major channel and numerous small channels in each site

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # SS-3 (a) and (b) Potential Mitigation Action

Management Segment: 69 NA Enhancement

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
(a) west side and (b) east side Upper Winchester Arm	26	26	14	1600, 1000

Physical Boundaries (a) uplands to west, slough on other sides.  
(b) uplands to east, slough on other sides.

Approximate Size

(a) 11 acres (b) 1.5 acres

Ownership

State of Oregon

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Tidal flat with salt marsh

Wildlife Use: Shorebirds, crustaceans, other typical species

Slope/Topography: Flat

Aquatic Regime: Tidally influenced throughout

Channels: Minor channels in salt marsh

MAN-MADE FEATURES:

Existing Use: None

Structures: Two breached dikes

Access: from water

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidal influence through breach in dikes

Possible Actions, Consequences: Remove dikes to enhance tidal flush:  
return area beneath dikes to intertidal level.

Approximate Construction Requirements: Barge-mounted excavator,  
barge removal of spoils.

Potential Habitat Type: Same as existing, plus some intertidal f:

Potential Conflicting Uses: None

Overall Assessment: Valuable improvement to tidal flushing;  
experimental/research value. However, relatively low  
mitigation value, except for small projects in Charleston  
area.

8.6-25C

MAN-MADE FEATURES:

Existing Use: Pasture

Structures: Dike, two tidegates

Access: by water, also old logging road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: None, tidegated and diked

Possible Actions, Consequences: Remove tidegates and/or remove dike to open up to tidal influence. Would require new diking to prevent flooding of Kunz portion.

Approximate Construction Requirements: Minimal (for tidegates)

Barge-mounted excavator. Barge spoils to disposal site.

Potential Habitat Type: High salt marsh

Potential Conflicting Uses: Existing agricultural use.

Overall Assessment: This is considered a valuable addition to estuarine system, and research area. The SSES has discussed possible use for restoration action. However, action needed to avoid affecting neighboring property. High value for restoration, but relatively low value for in-kind mitigation, except for small projects in Charleston area.

INVENTORY POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # SS-4

Management Segment: 69 NS, 72 RS

Potential Mitigation Action

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
26	26	14	2000	

west side of lower end of Winchester Cr., South Slough Estuarine Sanctuary

Physical Boundaries

Uplands to south & west. Slough to north and east.

Approximate Size

12 acres

Ownership

State of Oregon (small part also owned by Dieter Kunz)

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses, freshwater marsh

Wildlife Use: Probably some wildfowl, shorebird use

Slope/Topography: Flat, with some depressions

Aquatic Regime: Local drainage and seasonal standing water

Channels: None apparent on aerial photo



INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # SS-5

Management Segment: 72 RS

Potential Mitigation Action

Restoration

Section  
35

Ship

Range  
14

Tax Lot  
200

Location

west side of Winchester Cr., north of Hinch Road Bridge, SSES

Physical Boundaries Uplands to north and south, slough to east,

bottomland pasture to west.

Approximate Size

9 acres.

Ownership

Dieter Kunz

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture with freshwater aquatics

Wildlife Use: Typical, probably some wildfowl, shorebirds.

Slope/Topography: Flat

Aquatic Regime: Local drainage, seasonally inundated

Channels: No natural channels apparent on aerial photo, drainage ditches

MAN-MADE FEATURES

Existing Use: Pasture

Structures: Dike, tidegates, ditches

Access: Via Hinch Road

Utilities: Telephone poles?

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: None (diked and tidegated)

Possible Actions, Consequences: Remove tidegate and/or remove

dike to permit tidal influence

Approximate Construction Requirements: Minimal (for tidegate)

or excavator. Spoils could be trucked to disposal site.

Potential Habitat Type:

High salt marsh, with transition to fresh marsh to west of site.

Potential Conflicting Uses: Existing agricultural use. This is in

private ownership and is likely to be retained in existing use.

Overall Assessment: Could be valuable addition to estuary and

important research site. However, potential conflicting uses may be difficult to resolve. High restorative value but relatively low value for in-kind mitigation, except for small projects in Charleston area.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # SS-6 (a) Potential Mitigation Action

Management Segment: 71RS Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	35,36	26	14	100,400

East side of Winchester Cr., north of Hinch Rd. Bridge, S.S.E.S.

Physical Boundaries

Upland to south and east, slough to west and north

Approximate Size

(a) 10.5 acres

Ownership 100,400 V. Mingers (leased by Tracy)  
40 State of OREGON

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: (a) salt marsh grading into fresh marsh.

Wildlife Use: (a) Typical for marsh

Slope/Topography: Flat

Aquatic Regime: (a) frequently inundated by incoming stream, may be some tidal influence.

Channels: (a) well developed system of natural channels

MAN-MADE FEATURES

Existing Use: (a) marginal pasture

Structures: Dikes and tidegates, including road dike in east part of 55-6(a)

Access: Via Hinch Road and Tracy property

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: (a) may be some tidal influence via tidegate loc

Possible Actions, Consequences: Remove tidegate and/or remove dike to permit tidal influence.

Approximate Construction Requirements: Minimal for tidegates. Excavation trucking of spoils to disposal site.

Potential Habitat Type: High salt marsh, grading to fresh marsh

Potential Conflicting Uses: Existing grazing use. This site is part of the Tracy Ranch.

Overall Assessment: Site (a) would be a valuable addition

to the estuarine system due to its size and well developed channel system. The site has ownership/lease considerations. High restorative value, but relatively low value for in-kind mitigation except for small projects in Charleston area.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # SS-7

Management Segment: 69 NS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Taxship</u>	<u>Range</u>	<u>Tax Lot</u>
35	2	14	1300

West of Winchester Cr., South of Hinch Rd. Bridge, S.S.E.S.

Physical Boundaries

Uplands to west, marsh to south, slough to east and north

Approximate Size

5 acres

Ownership

State of Oregon

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Fresh marsh, grasses

Wildlife Use: Probably some wildfowl, shorebirds, typical fresh marsh species.

Slope/Topography: Flat, abrupt rise to west of site

Aquatic Regime: Seasonally inundated

Channels: none visible on aerial photos

MAN-MADE FEATURES

Existing Use: None

Structures: dike

Access: via Hinch Rd.

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: None

Possible Actions, Consequences: Remove dike to permit tidal action

Approximate Construction Requirements: Excavator to remove dike.

Trucking of spoils to disposal site.

Potential Habitat Type:  
High salt marsh

Potential Conflicting Uses:  
None

Overall Assessment: Despite its small size, this site is relatively valuable restoration site because of its easy access and State ownership. Potentially good addition to the estuarine system and research site. However, relatively low value for in-kind mitigation except for small projects in Charleston area.

MAN-MADE FEATURES

Existing Use: Some grazing

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Potential Mitigation Action

Structures: Dike with road, tidegate

Site #: SS-8

Management Segment: 71 RS Restoration

Access: Road from Tracy ranch

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	35	26	14	700

**DELETED SITE**

Utilities: None

East side of Winchester Cr., at mouth of Cox Canyon, S.E. of

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Physical Boundaries

Dike to west, uplands to north and south, marsh to southeast

Existing Conditions: No tidal influence

Approximate Size

about 4 acres.

Possible Actions, Consequences:

Remove tidegate and/or dike to permit a tidal influence

Ownership

State of Oregon (leased to George Tracy)

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Fresh marsh, pasture

Approximate Construction Requirements:

Minimal (tidegate only) or excavator. Trucking spoils to disposal site.

Wildlife Use:

Typical of fresh marsh, maybe some shorebirds, (heron, egret, etc.)

Potential Habitat Type:

Transitional salt/fresh marsh ?

Slope/Topography:

Flat, abrupt slopes to north and south

Potential Conflicting Uses:

Existing grazing - road.

Aquatic Regime:

Seasonally flooded from creek

Channels:

Maint channel winds through site.

Overall Assessment: Due to lease situation, this site may not be available in near future. It is of questionable value as natural tidal inflow may not extend far past the dike. Relatively low value for in-kind mitigation, except for small sites in Charleston area.

8.6-25H

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # SS-9

Potential Mitigation Action

Management Segment: 69 NS

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
West side of Winchester Cr., near large barn on S.S.E.S. access road.	35	26	14	1200

Physical Boundaries

road to west, upland to north, slough to south and east.

Approximate Size

2 acres

Ownership

State of Oregon

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Fresh marsh, grasses

Wildlife Use: Typical of fresh marsh

Slope/Topography: Flat

Aquatic Regime: Seasonally flooded

Channels: None visible on aerial photo.

MAN-MADE FEATURES

Existing Use: Vacant

Structures: Dike

Access: Via S.S.E.S. access road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: No tidal influence

Possible Actions, Consequences: Remove dike to permit tidal influence.

Approximate Construction Requirements: Excavator. Trucking of spoils to disposal site.

Potential Habitat Type: High salt marsh or salt/fresh transition

Potential Conflicting Uses: None

Overall Assessment: Though very small, this site has some value due to accessibility. It might form part of an overall restoration program for the S.S.E.S. Low value for in-kind mitigation, except for small projects in Charleston area.

MAN-MADE FEATURES

Existing Use: vacant

Structures: (a) & (b) breached dikes (c) none

Access: water (or logging road, educational trail)

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: (a) & (b) Tidal influence  
(c) above tidal influence

Possible Actions, Consequences: (a) & (b) remove remains of dikes to enhance tidal flushing (c) scalp spoil islands down to intertidal level.

Approximate Construction Requirements: Barge-mounted excavator.  
barging of spoils to disposal site.

Potential Habitat Type: (a) & (b) Same as present, plus tidal flats in area of dikes. (c) tidal flats or low salt marsh depending on grade level.

Potential Conflicting Uses: The dikes are presently used by S.S.E.I. as an educational feature. They may wish to retain them for this purpose.

Overall Assessment: Enhanced tidal flushing may have beneficial effect valuable for research purposes. However, area of tidal influence would probably not be increased. Educational value may be more important. Scarping of spoil islands may be valuable item in overland restoration program for S.S.E.I. Relatively low value for in-kind mitigation, except for small projects in Charleston area.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Potential Mitigation Action

(a) & (b) Enhancement  
(c) Restoration

Site # SS-10 (a) (b) (c)

Management Segment: 69 NA

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
west side of Winchester Arm, opposite Long Is. Point. S.S.E.S.	23	26	14	1200, 1300

Physical Boundaries  
(a) & (b) Uplands to west, slough to north, south and east.  
(c) slough on all sides

Approximate Size  
(a) & (b) 20 acres (c) 3.5 acres

Ownership

State of Oregon

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: (a) & (b) Mudflats and high salt marsh.  
(c) upland shrubs

Wildlife Use: Shorebirds, wildfowl, crustaceans, soft shell clams.

Slope/Topography: (a) & (b) Flat (c) 2 small upland islands

Aquatic Regime: (a) & (b) tidal influenced (c) occasional seasonal flooding

Channels: (a) & (b) natural channels (c) none

8.6-25J

MAN-MADE FEATURES  
Existing Use: Vacant

Structures: Breached dike

Access: Water only

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidal influence through breach in dike

Possible Actions, Consequences: Remove remainder of dike to enhance tidal flushing

Approximate Construction Requirements: Barge-mounted excavator, barging of spoils to disposal site.

Potential Habitat Type: Same as at present, plus mudflat in area of dike.

Potential Conflicting Uses: None

Overall Assessment: Site has good potential for enhancement and research value. Due to small size of breach, removal of dike should greatly enhance flushing and detritus transport. However, relatively low value for in-kind mitigation, except for small projects in Charleston area.

INVENTORY: POTENTIAL MITIGATION SITES  
Field Survey Sheet

Site # SS-11 Potential Mitigation Action Enhancement

Management Segment: 69 NA

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
23	26	14	200	

On west side of South Slough, to southwest of Valino Island, S.S.E.S.

Physical Boundaries

Slough to north, uplands to south, east and west

Approximate size

16.5 acres

Ownership

State of Oregon

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: mudflat, salt marsh

Wildlife Use: Shorebirds, wildfowl, crustaceans.

Slope/Topography:

Flat

Aquatic Regime:

Tidal

Channels: Minor natural salt marsh channels

8.6-257

MAN-MADE FEATURES:

Existing Use: Vacant

Structures: No buildings. Road dike at west end and been breached with 5' opening several years ago. Also second road dike at east end of site.

Access: Adjacent to Oxford Way Rd. and private drive.

Utilities: None apparent

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tide enters through breach in berm. Grades in: fresh marsh in upper part of site, apparently west of upper road dike.

Possible Actions, Consequences: Open breach or remove dike to improve flushing action.

Approximate Construction Requirements: Minimal equipment (backhoe). Upland disposal immediately adjacent.

Potential Habitat Type: Same as existing, though salt marsh vegetation may increase due to improved tidal action.

Potential Conflicting Uses: None

Overall Assessment: An easy action due to accessibility. Enhanced tidal flushing would increase nutrient transport considerably. Suitable for small project, especially in Charleston area.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # L-1

Potential Mitigation Action

Management Segment: 63C, NA

Enhancement

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
13	26	14	2400	

Abuts northeast boundary of S.S.E.S., at end of Oxford Way Road

Physical Boundaries

Slopes to south and north. Slough to west. Road to east

Approximate Size

6 acres.

Ownership

Ivy, Larry O. & Judith

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Salt/fresh grasses mixed. Riparian on both side-slopes

Wildlife Use: Many kinds. Typical high marsh situation. Riparian high in wildlife value.

Slope/Topography:

Generally flat and slowly rising in east portions North and south boundaries abruptly rise to hills.

Aquatic Regime:

Tides submerge much of site, but not all. Creek flows into site from east drainage.

Channels:

Yes. Two major channels. Rest are minor and difficult to locate.



INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # L-4

Management Segment: 60 UW

Potential Mitigation Action

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
1	26	14	6800,5800	

Across slough from Charleston Boat Basin

Physical Boundaries

Bay to north, slough to west and south, slopes to east

Approximate Size 5.5 acres

Ownership

6800-State of Oregon; 5800-Lillienthal, Richard

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Recently stabilized sand with fresh marsh and alder groves 5-15 years old on east portions.

Wildlife Use: Mixture of shorebirds, waterfowl and upland types

Slope/Topography: Varies from beach front to low marshy area.

Acoustic Regime: One tide channel enters from south to 100' with debris (driftwood) clogging channel. Sand substrate

Channels: One, no real fingers, 100' long

MAN-MADE FEATURES

Existing Use: Recent dredge disposal area immediately to south of s. Minor recreation activity.

Structures: None

Access: Dirt road enters from east (highway)

Utilities: None observed

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidal action restricted to channel

Possible Actions, Consequences: Remove sand to permit tidal action

Approximate Construction Requirements: Earth movers

Spoils could be disposed on adjacent DID site to south

Potential Habitat Type: High salt marsh

Potential Conflicting Uses: None, but site to south is identified as dredged material disposal site.

Overall Assessment: This site is valuable due to its proximity to actions in teh Charleston area. There is considerable potential for restoration action. Some opportunity for in-kind mitigation for small projects in Charleston area.

MAN-MADE FEATURES

Existing Use: Vacant

Structures: Breached dike

Access: By water

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidal influence via breach in dike

Possible Actions, Consequences: Remove dike to improve tidal flush:  
and nutrient transport.

Approximate Construction Requirements: Barge-mounted excavator.  
Barging of spoils to disposal site

Potential Habitat Type: Same as existing. Salt marsh or mudflat -  
in area of dike, depending on finished grade level.

Potential Conflicting Uses: Possible conflict with adjacent  
docking and unloading of oysters.

Overall Assessment: Value of enhanced flushing may be considerable  
due to small opening in dike, but possible conflict with adjacent  
docking may preclude complete removal of dike. Desirable for  
mitigation for project in immediate area.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # L-5 Potential Mitigation Action  
Enhancement

Management Segment: 64, CS

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
11	26	14	300, 400

In lower South Slough, west of oyster docking site.

Physical Boundaries

Upland to west, north and south, Oyster Dock in slough to east

Approximate Size

4.5 acres

Ownership

Metcalf, Henry A. Jr.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Salt marsh

Wildlife Use: Typical of salt marsh

Slope/Topography: Flat, rises rapidly to west, north and south

Aquatic Regime: Tidal influence

Channels: Extensive natural channel system

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-1 (a)

Management Segment: 58, UD

Section  
36

Township  
25

Range  
14

Tax Lot  
1300,1100,1000,600,500

Potential Mitigation Action

Restoration

Location

Pigeon Point

Physical Boundaries

Bay to west, north and east. Slopes to south

Approximate Size

5.7 acres

Ownership 500-Lovejoy, Carrol L. & D.L.; 600-Coos Head Timber Co.;  
1000-Jackson, Laurie E. & H.E.; 1100-Windred, Kenneth R. & D.L.;  
1300-Machida, Yoshizo, Shirley

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Recently stabilized sand

Wildlife Use: Resting/loafing area for some birds

Slope/Topography: Rises from beach to about 10-12' above MHHW

Aquatic Regime: No tidal influence except on beaches

Channels:

None seen

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: Boat or foot. Dirt road from Cape Arago Hwy to mudflats

Utilities: None seen

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: No tidal influence

Possible Actions, Consequences: Reduce elevation to restore to tidal influence.

Approximate Construction Requirements:

Removal of sands to barge; be transported for disposal. Could also be trucked. Dredging b. Pipeline questionable.

Potential Habitat Type: Salt marsh or mudflat, depending on grade.

Potential Conflicting Uses: None

Overall Assessment: Relatively accessible. Some questions as to net benefits due to value for bird-resting area.

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: By water

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: No tidal influence

Possible Actions, Consequences: Reduce elevation to restore tidal influence

Approximate Construction Requirements: Barge-mounted excavator. Barge spoils to disposal site.

Potential Habitat Type: Depends on finished grade-salt marsh or tidal

Potential Conflicting Uses: None

Overall Assessment: Relatively valuable due to proximity to future development at Empire docks. Lack of suitable land access may be a problem. However, some question as to net benefits, due to existing bird use.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-1 (b)

Potential Mitigation Action

Management Segment: 55A, CA

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	19	25	14	300,900,3500, 3700,4100,4200 400,600,700,800

Adjacent to Travis St. sewage treatment plant. 500,3600

Physical Boundaries

Bay on all sides. Barview shore to east

Approximate Size

5 acres

Ownership 300,400,3500-3700,4100-Swanson, Julius M. Violet L.; 500-City of Coos Bay; 600,700-Coos Head Timber; 800,900-Hillar, Walter M. Sylvia J.; 4200-Nelson, Lee J.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Beach grasses

Wildlife Use:

Nesting area for birds

Slope/Topography:

Rises to about 8' above MHHW

Aquatic Regime:

No tidal influence

Channels:

None

MAN-MADE FEATURES

Existing Use: Vacant. Some dispersed recreational uses.

Structures: None

Access: Dune road or water

Utilities: NO

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: (tidal): No tidal influence

Possible Actions, Consequences: Lower elevation to permit tidal influence

Approximate Construction Requirements: Sand removal equipment, disposal of spoils.

Potential Habitat Type: Depends on grade: Salt marsh or tidal flat.

Potential Conflicting Uses: None

Overall Assessment: Access difficult. Could restore habitat in very productive area. Could mitigate Port development to North.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site #: M-3

Management Segment: 2 CS

Potential Mitigation Action

Creation

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
19	25	13	200

Location: At North Spit, 3000 feet south of Ore-Agus facilities. Old disposal site

Physical Boundaries

Dunes to west; bay to north, east, and south

Approximate Size  
7.3 acres

Ownership  
Port of Coos Bay

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Upland grasses, shrubs

Wildlife Use: Dune/shore-front habitat

Slope/Topography: Slopes throughout

Aquatic Regime: None

Channels: No

MAN-MADE FEATURES

Existing Use: Vacant. Some recreational use

Structures: None

Access: Dune road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Elevation above tidal influence.

Approximate Size  
5.5 acres

Ownership  
Port of Coos Bay

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Upland grasses and shrubs

Wildlife Use: Dune/shore-front habitat

Slope/Topography: Slopes throughout - about 5 feet above MHHW.

Aquatic Regime: No tidal influence

Channels: No

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-4 Potential Mitigation Action

Management Segment: 2CS Creation/Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
19	25	13	200

Location  
North Spit, 1000 feet south of Ore-Aqua facilities

Physical Boundaries

Dunes to west and north, bay to east and south.

Possible Actions, Consequences: Lower elevation to permit tidal influence (about 5 feet)

Approximate Construction Requirements: Removal of large quantities of sand.

Potential Habitat Type: Depends on finished grade. low salt marsh (Salicornia)

Potential Conflicting Uses: None

Overall Assessment: Access easier than for M-3. Could not replace habitat lost due to Port development to north due to differences in width and slope of intertidal flat, different communities

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-5 (a) (b)

Management Segment: 52 CS

Potential Mitigation Action  
Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
8	25	13	100

Location

West of North Bend Airport - old spoils islands.

Physical Boundaries

Bay on all sides

Approximate Size

(a) 2.3 acres  
(b) 20 acres

Ownership

City of North Bend

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Upland grasses and shrubs

Wildlife Use: Wildfowl and shorebird use.

Slope/topography: Abrupt slopes from waterline

Aquatic Regime: None

Channels: No

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: Boat

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Elevation above tidal influence

Possible Actions, Consequences: Lower elevation to allow tidal infl.

Approximate Construction Requirements: Barge-mounted dredging and disposal required.

Potential Habitat Type: Depends on finished grade: salt marsh or tidal flat.

Potential Conflicting Uses: None

Overall Assessment: Has been proposed as suitable mitigation site if proposed fill for airport extension. Would restore habitat in productive area. However, would reduce valuable wildfowl/shorebird habitat.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site I M-8a

Management Segment: ~~Statewide~~ **BCA** Potential Mitigation Action  
Enhancement

Section 34      Range 13      Tax Lot

Location

West end of North Slough Causeway

Physical Boundaries

Bay to north and south. Jordan Cove Road to east, slopes to west

Approximate Size  
100 ± wide

Ownership

Coos County (road)

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: n/a

Wildlife Use: n/a

Slope/Topography: n/a

Aquatic Regime: All water

Channels: n/a

MAN-MADE FEATURES

Existing Use: Span for county road and only access to North Spit road.

Structures: Piles and span structure

Access: Jordan Cove Co. Road

Utilities: Road right-of-way. Utility lines running along north side of span.

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Piles and dike

Possible Actions, Consequences: Widen span to increase tidal flows into North Slough.

Approximate Construction Requirements: Replace span, remove dike and fill under existing road bed.

Potential Habitat Type: same as existing

Potential Conflicting Uses: Disruption of main North Spit access road

Overall Assessment: Potential benefits not well understood. Would require costly action, disruptive to traffic.



INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # N-8b

Management Segment: 11 NA/13A.NA

Section  
35

Township  
24

Range  
13

Tax Lot

Potential Mitigation Action

Enhancement

Location

Mouth of Haynes Inlet

Physical Boundaries

Inlet to east, 101 to north, bay to west, slopes 101 to south

Approximate Size

600 linear feet

Ownership

Federal Highway

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: n/a

Wildlife Use: n/a

Slope/Topography: n/a

Aquatic Regime: All aquatic

Channels: n/a

MAN-MADE FEATURES

Existing Use: 101 bridge

Structures: Piles and span structure

Access: Hwy 101

Utilities: Road right of way, utility lines

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Piles and dikes

Possible Actions, Consequences:

Widen span to increase tidal flows into Haynes Slough

Approximate Construction Requirements:

Replace span, remove dike and fill under existing road bed.

Potential Habitat Type:

Same as existing

Potential Conflicting Uses:

Disruption of Hwy 101 traffic

Overall Assessment: Potential benefits not well understood. Would be costly action, disruptive to traffic.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-9a & b

Management Segment: (a) 9 CS  
(b) 10 NA

Potential Mitigation Action

(a) Restoration  
(b) Enhancement

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
15 622	24	13	(a) 700, 300, 100 (b) 400, 500, 600 1500, 1400

Location  
West of North Slough, south of Bayview Manufacturing Plant.

Physical Boundaries

RR to west; North Slough to east

Approximate Size

(a) 11 acres  
(b) 28 acres

Ownership (a) 100 - Coos Head Timber Co; 200 - Hauser Wood Product Inc.  
300 - Wright, D.H. & Sharp, Ora. (b) 400 - Wright, Dana & Lucille;  
500 - CBB Investment Co.; 600 - U.S. Nat'l Bank of OR.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: (a) fresh marsh, old cranberry bog.  
(b) salt marsh.

Wildlife Use: Typical for salt and fresh marshes

Slope/Topography: Flat

Hydrologic Regime: (a) local drainage, seasonal inundation.  
(b) regular tidal influence

Channels: (a) Natural channel (fresh water) on east side  
(b) Some natural tidal channels, old ditches

HUMAN-MADE FEATURES

Existing Use: Vacant

Structures: (a) Dike to south and east sides, railroad dike to west.  
(b) Partially breached dike to east, railroad dike to west. Old fence lines and ditches within marsh.

Access: from North Slough and Hwy 101

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: (a) Old cranberry bog, diked, but tidegate on east side is in disrepair.  
(b) Existing high salt marsh; dike to east is breached in several places.

Possible Actions, Consequences:

(a) Remove or breach dikes to permit salt water influence.  
(b) Widen breaches in dike to increase flushing.

Approximate Construction Requirements:

Barge-mounted earth-mover; barging or trucking to disposal site

Potential Habitat Type:

(a) high salt marsh  
(b) same as existing

Potential Conflicting Uses:

None

Overall Assessment:

Potentially useful sites with minimal problems. Easy to achieve. However, not of high mitigative value since dredge/fill actions are not foreseen in North Slough.

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: railroad, Hwy 101

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: tidally influenced, but flushing action restricted by logs

Possible Actions, Consequences: Remove two areas of drift logs to improve tidal flushing and allow revegetation

Approximate Construction Requirements: log handling equipment, bar;

Potential Habitat Type: High salt marsh

Potential Conflicting Uses: None

Overall Assessment: This project would have beneficial effect on marine vegetation and nutrient production. Relatively easy to achieve. However, only a valid project with annual maintenance.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-9c

Management Segment: 10 NA

Potential Mitigation Action

Enhancement

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
East of RR, west of Hwy 101, on both sides of North Slough	22	24	13	1200, 1600

Physical Boundaries

RR bank to west, Hwy 101 to east, marsh to N & S

Approximate Size

6 acres

Ownership

1200-Pierce, Al & Hilda; 1600-Day, Ruth

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: High salt marsh but thickly covered by drift logs

Wildlife Use: Typical

Slope/Topography: Flat

Aquatic Regime: Tidally influenced, but inundated only by highest tides

Channels: natural channels

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: RR

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Two channels into site beneath RR tracks

Possible Actions, Consequences: Add culvert beneath RR tracks to increase amount of flow.

Approximate Construction Requirements: Removal of part of RR dike, installation of culvert.

Potential Habitat Type: same as existing, would increase tidal action.

Potential Conflicting Uses: Would temporarily disrupt RR traffic

Overall Assessment: This action would have questionable benefits, due to presence of two substantial tidal inlets. Engineering would be costly.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-10 Potential Mitigation Action

Management Segment: 10 NA Enhancement

Section 22, 27 Township 24 Range 13 Tax Lot 2200, 900

Location  
North Slough, 6000' south of Bayview Manufacturing Co.

Physical Boundaries

Dunes to west, north, and south, RR to east.

Approximate Size

15 acres

Ownership

2200-State of Oregon; 900-U.S.A.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Salt marsh

Wildlife Use: typical of salt marsh habitat

Slope/Topography: Flat

Aquatic Regime: Tidal influence regular

Channels: Throughout

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # H-11 b

Management Segment: 10 NA

Potential Mitigation Action

Enhancement

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	22	24	13	1600

North slough, 5500' south of Bayview Manufacturing Co., west of RR tracks.

Physical Boundaries

Dunes to north, west and south. RR dike to east.

Approximate Size

4 acres

Ownership

Day, Ruth

PHYSICAL/BIOLOGIC CHARACTERISTICS

Vegetation Type:

salt marsh with some fresh marsh on fringes

Wildlife Use:

Isolated area, riparian vegetation on north, west, south borders. Diverse.

Slope/Topography:

Flat

Aquatic Regime:

Tidal influence

Channels:

one main channel with some minor channels

MAN-MADE FEATURES

Existing Use:

None

Structures:

Railroad berm, culvert

Access:

No roads

Utilities:

Railroad

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Wood box culvert 2' x 2' through dike.

Possible Actions, Consequences:

Increase culvert size to increase culvert size to increase amount of tidal volume into area.

Approximate Construction Requirements:

Bore through RR bedding. New culverts. May require additional work in channels on east side of RR.

Potential Habitat Type:

Perhaps increased salt marsh vegetation.

Potential Conflicting Uses:

Temporary disruption of RR traffic

Overall Assessment:

Increasing tidal action in the site may not have significant effect on nutrient transport. Questionable benefits, considering engineering

8.6-25 X

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-12

Management Segment: 11 RS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
23,24	24	13	100, 800, 2600, 1200

Location

North Shore of Haynes Slough

Physical Boundaries

Slopes to west, north and east. Private road berm to south

Approximate Size

82 acres

Ownership

100-Rempelos, William & Antonia; 800 & 1200- Barker, Earl;  
2600-Freude, Clifford V. & P.A.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pastureland with some freshwater aquatics

Wildlife Use: Limited (some heron, egret)

Slope/Topography: Flat

Aquatic Regime: local drainage, seasonal ponding

Channels: Artificial drainage ditches. No natural channels visible

MAN-MADE FEATURES

Existing Use: Grazing

Structures: Fences, dike, tidegate

Access: Private road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidegate on culvert (dimensions unknown)

Possible Actions, Consequences: Remove tidegate

Approximate Construction Requirements: Minor

Potential Habitat Type: Probably high salt marsh

Potential Conflicting Uses: Agriculture

Overall Assessment: Agricultural use and ownership conflicts may be difficult to resolve. However, restoration would be biologically valuable.

MAN-MADE FEATURES

Existing Use: pasture

Structures: None

Access: Private road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Dike, tidegate to Haynes Slough

Possible Actions, Consequences: Breach berm, remove tidegate

Approximate Construction Requirements: Nominal

Potential Habitat Type: Probably high salt marsh

Potential Conflicting Uses: Existing agricultural use.

Overall Assessment: Use and ownership conflicts may be difficult to resolve. However, restoration would have biological value.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-13

Management Segment: 11RS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
26	24	13	300

Location

North side of Haynes Slough

Physical Boundaries

Slopes to north; berms to west, south and east

Approximate Size

40 acres

Ownership

Jensen, Clarence

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses

Wildlife Use: limited

Slope/Topography: Flat

Aquatic Regime: Local drainage, seasonally wet

Channels: Drainage ditches

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # M-22

Management Segment: 11 RS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Tax Map</u>	<u>Range</u>	<u>Tax Lot</u>
25,36		13	200-500

Location  
Cove on south side of H. Jones Inlet, 2000' northeast of boat launch

Physical Boundaries

Driveway berm on north, open field to east, wooded slope to south, North Bay Drive berm to west.

Approximate Size

4 acres on south side, 1.5 acres on north (driveway separates two)

Ownership

200-Stovall, George & G.V.; 300-Kolody, J.P. & M.E.;  
400-Scott, Marion C.; 500- Ingersoll, William J. &  
Shirley & Utterback, William R. & Marion.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Upland grasses, cattail patch, small shrubs, scattered freshwater aquatics

Wildlife Use: Grass and low shrub habitat. Open and exposed to road

Slope/Topography: Flat

Aquatic Regime: Small creeks (seasonal?) enter from east slopes

Channels: Yes. Small 1'x1' deep covered over and meander through west portions.

MAN-MADE FEATURES

Existing Use: Vacant, some pasture use.

Structures: None

Access: North Bay Drive and driveways

Utilities: Power poles on edge of driveways

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: 16" culvert underneath road, bermed at east terminus to restrict tide activity in field. Two small road dikes cross site.

Possible Actions, Consequences: Remove tidegate and/or grade culverts and enlarge; remove dikes and obstructions

Approximate Construction Requirements: Possible new culvert under paved road, new riprap, etc., Removal of berm and obstructions - minor. Attaining necessary grade for good tidal action may require special attention.

Potential Habitat Type: High salt marsh

Potential Conflicting Uses: None

Overall Assessment: May be problems with grade, which would limit tidal action. May have good potential for mitigating local activity, e.g. boat work.



INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-1

Management Segment: 13 ~~14-15~~

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
2	24	13	2100, 2300, 2600

BRS

Location

Glasgow

Physical Boundaries

Slopes to north and east, berm to south

Approximate Size

3.6 acres

Ownership

2100-Saling, Merton W.E. & M.; 2600-Prentice, Irwin & Virginia;  
2300-Freudenberg, Kenneth R. & Betty Ann

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Upland grasses and some marsh mixture. Scattered  
alders and brambles

Wildlife Use: Limited

Slope/Topography: Slight fluctuations

Aquatic Regime: High water influence from bay. Creek runs through site.

Channels: None

MAN-MADE FEATURES

Existing Use: Vacant except transmitting tower

Structures: Transmitting tower and fences

Access: from bay only

Utilities: No, except tower

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Low berms face bay and separate portions of site

Possible Actions, Consequences: Clear bay frontage to encourage tidal activity. May need to grade beach front (sand has developed into sloping beach)

Approximate Construction Requirements: Barge-mounted earth moving equipment. Off-site disposal may be a problem. Must protect tower.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Radio tower

Overall Assessment: May be a problem with protecting radio tower. Tendency for berm to re-establish naturally limits usefulness of this site.

MAN-MADE FEATURES

Existing Use: Pasture (marginal)

Structures: Recently excavated drainage ditch

Access: East Bay Drive

Utilities: None

RESTORATION/ENHANCEMENT/CREATION/POTENTIAL

Existing Conditions: Dike, tidegate on 30" culvert

Possible Actions, Consequences: Remove gate. Possibly increase size of culvert.

Approximate Construction Requirements: New culvert would require going under paved arterial. Otherwise, minimal

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing grazing use.

Overall Assessment: Site would be relatively simple to restore. Pasture is small, marginal, but recent excavation indicates attempt to keep it drained. This may indicate use conflict would be difficult to resolve.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-2

BR

Management Segment 13

Potential Mitigation Action

Restoration

Section 12

Township 25

Range 13

Tax Lot 2300, 300

**SITE  
SELECTED**

Location

North side of cove at Kentucky Slough

Physical Boundaries

Slopes to east, north and west. Road berm to south.

Approximate Size

4.6 acres

Ownership

School District #13

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grass with some freshwater aquatics

Wildlife Use: Minimal

Slope/Topography: Flat

Aquatic Regime: Local drainage: seasonal with water table

Channels: 1 drainage ditch

8.6-25 CC

MAN-MADE FEATURES

Existing Use: (a) vacant & pasture  
(b) marginal pasture

Structures: None

Access: East Bay Drive

Utilities: Power poles adjacent to road

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Culverts into sites. Have tidegates but ineff.

Possible Actions, Consequences: (a) Remove tidegate, clear obstruction; possibly increase culvert size to improve tidal flow. Could scalp of 1.5 acre pasture to increase area.  
(b) Remove tidegate, increase culvert size.

Approximate Construction Requirements: Minimal unless new culvert is put under paved road

Potential Habitat Type: Salt marsh, as at present, but increased in

Potential Conflicting Uses: Marginal grazing use in (b)

Overall Assessment: Minimal action would increase tidal flushing considerably.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-8 (a) (b)

Management Segment: 15 RS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
12	25	13	(a) 1200, 1300, 1500 (b) 2000, 301, 300

Location:  
(a) junction of East Bay Drive & Carlson Heights Road  
(b) 1500' southwest of that junction.

Physical Boundaries

Slopes to south and east. Road dike to north

Approximate Size

(a) 3.6 acres  
(b) 3.5 acres

Ownership

(a) 1200, 1300-K.Romminga, Menne J. & H.E.; 1500-Ingram, Betty J.  
(b) 2000-Smith, Lorell H. & N.J.; 300-Miller, Millard R. & P.D. 301-Lortie, Guy J. & W.P.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: (a) salt marsh and upland grasses mixed with 1.5 acre pasture  
(b) fresh, salt marsh & pasture

Wildlife Use: Typical

Slope/Topography: Flat

Aquatic Regime: Tidal influence and local drainage

Channels: Natural channels and drainage ditches

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: East Bay Drive

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidegate to east of site. Channel leading to major tidegate at mouth of slough. Road dike.

Possible Actions, Consequences: Place culvert under road to permit direct tidal influence, reverse existing tidegate at east end of site to prevent tidal action upstream.

Approximate Construction Requirements: Excavation under county road, placement of culvert

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: None

Overall Assessment: Could be valuable addition to estuarine production. No apparent conflicts.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-9a

Management Segment: 15 RS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
13	25	13	1000, 200-500

Location  
At Willanch Inlet

Physical Boundaries

Slopes to north and east, road to south

Approximate Size

6 acres

Ownership

1000-Finell, Robert B. & D.L.; 200, 300-Petitt, Floyd J. Jr;  
400-Raulerson, Bert & Jane; 500-Veder, Eldon

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Fresh marsh with some transitional salt/fresh species. (Potentilla, Carex)

Wildlife Use: Typical of fresh marsh (heron, egret, etc.)

Slope/Topography: Flat-appears low enough for tidal influence

Aquatic Regime: Standing water, local drainage

Channels: Drainage ditches & vestigial natural channels

8.6-25 EE

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-9c      Potential Mitigation Action

Enhancement

Management Segment: 15 NA

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
13	25	13	100

Location

On Willanch Slough

Physical Boundaries

Slough to north, east; upland to west, south

Approximate Size

5 acres

Ownership

Meyerhaeuser Company

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Salt marsh; upland species on dikes

Wildlife Use:

Typical for salt marsh

Slope/Topography:

Flat with three (3) dikes

Aquatic Regime:

Tidally influenced, but flushing impaired

Channels:

Natural channels

MAN-MADE FEATURES

Existing Use:

Vacant

Structures:

None

Access:

Via East Bay Drive or by water

Utilities:

None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Tidal influence, circulation impaired

Possible Actions, Consequences:

Remove dikes to improve tidal flushing, increase area of tidal influence.

Approximate Construction Requirements:

Earthmoving (barge-mounted in part), trucking of spoils

Potential Habitat Type:

Salt marsh (as existing), but increased area

Potential Conflicting Uses:

None

Overall Assessment:

Improvement of flushing would make only minor contribution.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-10

Management Segment: 17 RS

Potential Mitigation Action

Restoration

Section  
19

Township  
25

Range  
13

Tax Lot  
700

Location

1 mile south of Crawford Point

Physical Boundaries

Slopes to north, road dike to south.

Approximate Size

2.3 acres

Ownership

Lilienthal, Herman V.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture (with some fresh and transitional aquatics)

Wildlife Use: Limited

Slope/Topography: Flat

Aquatic Regime: Local drainage, some seepage through tidegate

Channels: Vestigial

MAN-MADE FEATURES

Existing Use: Pasture

Structures: Fencing

Access: East Bay Drive

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidegate on culvert, road dike

Possible Actions, Consequences: Remove tidegate and/or put in new culvert to permit tidal influence.

Approximate Construction Requirements:

county road. Minimal or excavation unde:

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing grazing use.

Overall Assessment: Would be simple to restore tidal influence by removing tidegate. Existing grazing use is not extensive; conflict may be possible to resolve.

MAN-MADE FEATURES

Existing Use: Marginal pasture

Structures: None

Access: East Bay Drive

Utilities: Power lines along south border

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidegate, dike road

Possible Actions, Consequences: Remove tidegate and/or increase cul size to permit tidal action.

Approximate Construction Requirements: Minimal (or excavation under county road)

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing grazing use (marginal)

Overall Assessment: Minimal requirement to restore to tidal influence. Due to small area and extensive reversion to marsh, use conflict may be possible to resolve.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site #: U-11 Potential Mitigation Action

Management Segment: 17 RS Restoration

Section: 13 Township: 25 Range: 13 Tax Lot: 1300

Location: 1 1/4 miles south of Crawford Point

Physical Boundaries

Slopes to north and east, road dike to south

Approximate Size

2 acres

Ownership

Sause, Dale C. & Heidi N.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses with fresh and salt marsh species

Wildlife Use: Limited

Slope/Topography: Flat

Aquatic Regime: Local drainage, some leakage through tidegate

Channels: some vestigial natural channels

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-12

Management Segment: 18 RS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
30	25	12	200, 300, 600
			30(D): 1100 (part), 1500

North of Christianson Ranch, west of East Bay Drive.  
("Lillienthal Boom Site")

Physical Boundaries

Estuary to west, Christianson Ranch to south, upland to east.

Approximate Size

36 acres

Ownership 200, 600, 1500: Lillienthal, Herman  
300: Weyerhaeuser  
1100: Kronsteiner J & P

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Pasture grasses with some freshwater aquatics

Wildlife Use:

Limited - typical of diked pasture.

Slope/Topography:

Flat

Aquatic Regime:

Seasonally flooded: local drainage

Channels:

Two large drainage ditches

MAN-MADE FEATURES

Existing Use:

Grazing

Structures:

None, except dike, tidegates.

Access:

From East Bay Drive

Utilities:

None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Diked pasture with drainage ditches, tidegates.

Possible Actions, Consequences:

Breach dike, remove tidegates or remove part or all of dike.

Approximate Construction Requirements:

Minimal, or substantial earth removal, truckings to spoils disposal: site (nearby).

Potential Habitat Type:

High salt marsh

Potential Conflicting Uses: selected

Agricultural use: Also proposed as dredged material disposal site.

# 30b.

Overall Assessment:

Owner has expressed desire to use as restoration site; however, it has also been identified as DMD site vital for upper bay dredging needs.

Size and closeness to large natural marsh area contribute to high biological value for restoration. Would be appropriate as a 'mitigation bank' area for upper bay projects.

250-20



INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-13

Management Segment:

45 CS

Potential Mitigation Action

Restoration

Range

13

Township

Section

14

Range

13

Tax Lot

-

Location

Physical Boundaries

Bay on all sides.

Approximate Size

20 ac.

Ownership

State

PHYSICAL/BIOLOGIC CHARACTERISTICS

Vegetation Type:

Unvegetated

Wildlife Use:

None

Slope/Topography:

Raised dredge spoil island

Aquatic Regime:

None

Channels:

None

MAN-MADE FEATURES

Existing Use:

DMD site (full)

Structures:

None

Access:

From bay

Utilities:

None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Diked DMD site.

Possible Actions, Consequences:

Scalp DMD site down to intertidal level.

Approximate Construction Requirements:

Heavy earth-removal equipment and barging of materials.

Potential Habitat Type:

Intertidal flats or salt marsh.

Potential Conflicting Uses:

None

Overall Assessment:

A high value site for project in the mid and upper bay, but expensive to remove material. Disposal site needed.

8.6-25 II (5)

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-14(c)

Potential Mitigation Action

Management Segment: 24 CS

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
25	25	13	100	

North of W-shaped marsh, north of Eastside peninsula

Physical Boundaries

Marsh, tidal flats on all sides.

Approximate Size

4 acres

Ownership

Coos County

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Upland shrubs

Wildlife Use:

Probably some shorebird, waterfowl use.

Slope/Topography:

Narrow curved dike.

Aquatic Regime:

No aquatic influence: - above tidal level.

Channels:

None

MAN-MADE FEATURES

Existing Use:

None

Structures:

None

Access:

Bay water only

Utilities:

None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Narrow curved dike above tidal level.

Possible Actions, Consequences:

Remove dike down to intertidal level to improve tidal flushing of W-shaped marsh.

Approximate Construction Requirements:

Barge-mounted excavator, barging of spoils for disposal. (dikes nearby)

Potential Habitat Type:

Salt marsh (or tidal flat)

Potential Conflicting Uses:

None

Overall Assessment:

Minor project which should improve tidal flushing and nutrient transport in W-shaped marsh.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-16a

Management Segment: 18 RS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
30	25	12	1500

Location

Immediately north of Christianson's Ranch

Physical Boundaries

Channel to south and north, berms to west and east (road)

Approximate Size

3.7 acres

Ownership

Lillienthal, Herman V.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Mixed fresh and salt marsh

Wildlife Use: Limited-some shorebird, wildfowl use

Slope/Topography: Flat

Aquatic Regime: Local drainage plus overflow from drainage ditches  
(with salt content)

Channels: None

HAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: East Bay Drive

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Dikes, tidesgates, exclude tidal action.  
Tidesgated channels overflow into area (especially on north side) over berms

Possible Actions, Consequences: Remove tidesgate and/or breach berm on north side of site (could also remove tidesgate, breach berm on south side, but this would affect site 16b on other side of East Bay Drive).

Approximate Construction Requirements: Minimal. Local spoils dispos.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses:

None

Overall Assessment: Would be a valuable small site, easily restored. Accessible, spoil disposal site adjacent.

OK

8.6 - 25KK

MAN-MADE FEATURES

Existing Use: Pasture

Structures: None

Access: from East Bay Drive

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidedgated, but salt water leakage has caused invasion by salt species. May also have been affected by run-off from nearby dredged material disposal

Possible Actions, Consequences: Remove main tidegate, breach dike to creek.

Approximate Construction Requirements: Minimal

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing grazing, which appears to be impacted by recent salt species invasion.

Overall Assessment: Would not be practical to use as restoration if sites on west side of road are used for DMD. Also, owner(s) may prefer to retain grazing use. Problems with grade.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # 16b Potential Mitigation Action

Management Segment: N.A. Restoration

Section 30 Township 25 Range 12 Tax Lot 900, 200-600

Location

East of East Bay Drive near Christianson Ranch

Physical Boundaries

East Bay Drive to west, slopes to north and south

Approximate Size

5 acres (dependent on area of potential tidal influence)

Ownership 900-Dowd, William E. & Patricia N.; 200-Herman, Walter A. & J.L.; 300-Sappington, Sherman W. & Nancy L.; 400-Gebhardt; George, E. Et Al; 500-Thorne, Leon H. & G.A.; 600-McCarthy, Dennis, C. & Joy L.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses, colonization by salt tolerant species

Wildlife Use: Limited

Slope/Topography: Flat, rising slightly to east.

Aquatic Regime: local drainage, ponding, some salt water intrusion

Channels: None

8.6-25LL

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-17 (a) and (b) Potential Mitigation Action  
 (a) Restoration  
 (b) Enhancement

Management Segment: 20 RS

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
29	25	12	(a) 400, 200 (b) 1400, 200

Northwest and northeast of Coos River Drawbridge

Physical Boundaries

Slopes to north, berm to south

Approximate Size

(a) 9 acres (b) 4 acres

Ownership

(a) 400-Smith, Norman & Greta; 200-Russell, Charles V. & F.I.  
 (b) 1400-Weyerhaeuser Co.; 200-Jacobson, Jack W. & D.R.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

(a) Pasture and fresh marsh. (b) salt marsh

Wildlife Use:

Typical

Slope/Topography:

Flat

Aquatic Regime:

(a) local drainage. (b) Some tidal influence via break in dike.

Channels:

(a) drainage ditches. (b) some natural channels

MAN-MADE FEATURES

Existing Use: (a) marginal pasture (b) vacant

Structures: None

Access: (a) river or private driveway (b) river or Allegheny Highway.

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: (a) berms, tidegate & ditches. (b) dilapidated

Possible Actions, Consequences: (a) remove tidegate and/or breach

(b) Remove berm or increase breach to increase tidal flushing

Approximate Construction Requirements: Minimal, or minor excavation

(probably barge-mounted)

Potential Habitat Type: (a) salt marsh. (b) as existing, salt marsh

Potential Conflicting Uses: (a) existing marginal grazing use.

(b) none

Overall Assessment: (a) A relatively simple project. However, grazing

use/ownership problems may be difficult to resolve. (b) Simple project

but extent of improvement to tidal flushing not known.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-21 (b)

Management Segment: 21 RS

Potential Mitigation Action  
Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	5	26	12	700,801,800

Physical Boundaries

Slopes to north, east and south; road dike to west

Approximate Size

4.6 acres

Ownership

700 - Morgan, John D. & Louise G.; 800 - Peck, Gayle; 801 - Messerle, Lloyd G. & Ada L. and S.M.; 1000 - USA

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: salt and fresh marsh with some pasture grasses

Wildlife Use:

typical

Slope/Topography:

flat

Aquatic Regime:

Local areas of salt marsh

Channels:

Natural channels, one main channel in good condition

MAN-MADE FEATURES:

Existing Use: Some marginal grazing

Structures: None

Access: Catching Slough Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Has dikes within area

Possible Actions, Consequences:

Remove tidegates, possible breach berms to restore tidal influence

Approximate Construction Requirements:

Would involve going under county road.

Potential Habitat Type:

Salt marsh

Potential Conflicting Uses:

Marginal grazing; might also affect nearby dwelling

Overall Assessment:

Already partially reverted to salt marsh, despite tidegate; owners may prefer to retain grazing use.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-22

Potential Mitigation Action

Management Segment: 21 RS

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
Mouth of Stock Slough	8	26	12	700, 500, 100, 1000

Mouth of Stock Slough

Physical Boundaries

Dikes to west, north and east; slopes to south

Approximate Size

22 acres

Ownership

100-Burnett, M.L.; 500-Parks, Evalyn M. & Robert T.; 100-Fors, John Chester; 1000-Lentz, Gustave G. & Gladys M.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses

Wildlife Use: Limited

Slope/Topography: Flat

Aquatic Regime: Local drainage

Channels: Ditches

MAN-MADE FEATURES

Existing Use: Pasture

Structures: Farm building in east corner

Access: Stock Slough Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Dikes and tidegates on culverts

Possible Actions, Consequences: Culvert directly into Catching Slough or remove tidegate on Stock Slough and breach dike on north boundary re-introduce tidal influence. May also need to raise dike at E. end. Approximate Construction Requirements: Culvert under paved county road; or remove main tidegate and replace further up slough - major action.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing agricultural use. Possible interference on upstream land, unless dike is raised at east end of site.

Overall Assessment:

Existing use and ownership conflicts would be difficult to resolve. However, of high biological potential for restoration.

MAN-MADE FEATURES

Existing Use: Pasture

Structures: None

Access: West Catching Slough Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Berms along Catching Slough with culverts and tidegates

Possible Actions, Consequences: Remove tidegate; or breach berm to re-introduce tidal action

Approximate Construction Requirements: Minimal - or earth moving, trucking to disposal site

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing agricultural use

Overall Assessment:

Use and ownership conflicts would be difficult to resolve. However, of high biological potential for restoration.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-23 Potential Mitigation Action Restoration

Management Segment: 21 RS

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
7 & 8	26	12	1000

West bank of Catching Slough, across from mouth of Stock Slough

Physical Boundaries

Slope to west, berms to north, east, and south

Approximate Size

25.7 acres

Ownership

Liles, Richard and Betty

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Pasture grasses (fresh marsh in S.W. corner)

Wildlife Use:

Limited

Slope/Topography: Flat

Aquatic Regime: Local drainage

Channels: One drainage ditch



INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-24

Management Segment: 21 RS

Restoration

Potential Mitigation Action

Location	Section	Township	Range	Tax Lot
	8	26	12	1100, 1300, 1200, 1500, 1700, 1800

East side of Catching Slough, 1500' south of mouth of Stock Slough

Physical Boundaries

Dike to north, west and south; slopes to east

Approximate Size

48 acres

Ownership 1700-Olsen, Irl C. & Margaret; 1800-State of Oregon; 1100-Everett, Robert L. & H.L.; 1200-Burroughs, Larry A.; 1300-Poole, Charles & S.A.; 1500-Fors, John Chester

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Pasture grasses and hay crops

Wildlife Use:

Limited

Slope/Topography:

Flat, dissected by series of ditches

Aquatic Regime:

Local drainage and seasonal standing water

Channels:

Several drainage ditches (altered)

MAN-MADE FEATURES

Existing Use: Farming

Structures: Farm buildings slightly elevated from rest of site

Access: Catching Slough Road

Utilities: Utility poles

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Dike, culverts, and tidegates along Catching Slough under county road

Possible Actions, Consequences: Remove tidegates, possibly replace culverts (widen) to re-introduce tidal action

Approximate Construction Requirements: Minimal or culvert work involving excavation of county road.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing farm use, several farm build.

Overall Assessment:

Existing use and ownership conflicts would be difficult to resolve. However, of high biological potential for restoration.

8.6-25QQ

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-25

Potential Mitigation Action

Management Segment: 21 RS

Restoration

Section

-7

Township

X

Range

12

Tax Lot

700

Location  
1 mile south of Stock Slough, west bank of Catching Slough

Physical Boundaries

Slopes to north and west, dikes to south and east

Approximate Size

60 acres

Ownership

Messerie and Sons, Inc.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses

Wildlife Use:

Limited

Slope/Topography:

Flat

Aquatic Regime:

Local Drainage

Channels:

Only main drainage ditches

MAN-MADE FEATURES

Existing Use: Pasture

Structures: None

Access: private road

Utilities:

Dikes, culverts, and tidegates along Catching Slough.

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidegates and dikes

Possible Actions, Consequences: Remove tidegates; possibly breach or add more culverts to re-introduce tidal action.

Approximate Construction Requirements: Not significant, except possible relocation of dikes.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing farm use

Overall Assessment:

Existing use and ownership conflicts would be difficult to resolve. However, of high biological potential for restoration.

DELETED SITE

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-26

Management Segment: 21 RS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
17	26	12	300

Location On Eastside/Sumner Road just south of where road meets Catching Slough

Physical Boundaries

Slopes to west; dikes to north, east and south

Approximate Size

16 acres

Ownership

Irvine, Lottie

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Pasture grasses mixed with freshwater marsh

Wildlife Use:

Limited

Slope/Topography:

Flat

Aquatic Regime:

Seasonal standing water

Channels:

Drainage ditches (some recently excavated)

MAN-MADE FEATURES

Existing Use: Marginal pasture land

Structures: None

Access: Eastside/Sumner Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Dikes, culverts, and tidegates along Catching S

Possible Actions, Consequences:

Remove tidegates and/or breach berms

to re-introduce tidal influence

Approximate Construction Requirements:

Nominal, or minor excavation c

berms.

Potential Habitat Type:

Salt marsh

Potential Conflicting Uses:

Existing agricultural use. New, excavated

ditches indicated effort to improve drainage.

Overall Assessment:

Has biological potential for restoration. However, existing use/ownership conflicts would be difficult to resolve.

MAN-MADE FEATURES

Existing Use: Pasture land

Structures: None

Access: Catching Slough Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Dikes and culverts with tidegates to  
Catching Slough.

Possible Actions, Consequences: Remove tidegates, possibly breach.

Approximate Construction Requirements: Nominal, or minor earth-move.  
Road may need reinforcement.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing agricultural use

Overall Assessment:

Existing use/ownership conflicts would be difficult to resolve. Hope of high biological potential for restoration.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-27 Potential Mitigation Action

Restoration

Management Segment: 21 RS

Section 17 Township 26 Range 12 Tax Lot 300,200

Location 3000' downstream of Matson Creek on east shore of Catching Slough

Physical Boundaries

Road berm to east, dikes to west and south

Approximate Size

14.5 acres

Ownership

300-Irvine, Lottie; 200-Cole, William C. & Ellen B.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses

Wildlife Use: Limited

Slope/Topography: Flat

Aquatic Regime: Local drainage

Channels: Two drainage ditches

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-28

Management Segment: 21 RS

Potential Mitigation Action

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	17	26	12	600

3000' downstream of Matson Creek on west shore of Catching Slough

Physical Boundaries

Slopes to north, west, and south; dike to east

Approximate Size

3.7 acres

Ownership

Franzen, Donald D. & Bernice I.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses in west portion; east portion and

majority of site is fresh water marsh.

Wildlife Use: Limited

Slope/Topography:

Slopes gradually upward to west

Aquatic Regime:

Seasonal standing water

Channels:

Vestigial

MAN-MADE FEATURES

Existing Use: Pasture (marginal at east end)

Structures: None

Access: Eastside/Summer Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Road dike, culvert (24") and tidegate at

Catching Slough

Possible Actions, Consequences:

Remove tidegate; culvert may

need to be lowered.

Approximate Construction Requirements:

Minimal; otherwise lowering

of culvert would require new bedding for road.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing grazing use.

Overall Assessment: Relatively easy small project. However, owner's

goals may conflict.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-29 (a)

Potential Mitigation Action

Management Segment: 21 RS

Restoration

Section	Township	Range	Tax Lot
17 & 20	26	12	700, 400

Across Catching Slough from mouth of Matson Creek

Physical Boundaries

Slope to west, dikes to north, east and south

Approximate Size

37 acres

Ownership

700-Cole, William C. & Ellen B; 400-Huntley, Harry & Esta A.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses, and some fresh water aquatics

Wildlife Use: Limited

Slope/Topography: Flat

Aquatic Regime: Seasonally wet

Channels:

Drainage ditches (several)

MAN-MADE FEATURES

Existing Use: Pasture land (marginal in places)

Structures: None

Access: Eastside/Summer Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Dike with tidegates and culverts

Possible Actions, Consequences: Remove tidegates, possibly breac.

Approximate Construction Requirements: Nominal or minor earth movi.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing farm use

Overall Assessment:

Large project. Relatively easy to accomplish.

Existing use/ownership conflicts would be difficult to resolve. However, of high biological potential for restoration.

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MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: Catching Slough Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Dike, tidegate to slough

Possible Actions, Consequences:

Remove tidegate or increase culvert size to re-introduce tidal influence

Approximate Construction Requirements:

county road

Potential Habitat Type: Salt marsh (probably sedgr/bullrush type)

Potential Conflicting Uses: None

Overall Assessment: A useful site for small project. Easy to accomplish. No apparent conflicts.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-29 (b)

Potential Mitigation Action

Restoration

Management Segment: 21 RS

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
East of Catching Slough Road, south of Matson Creek	20	26	12	100

Physical Boundaries

Road, slough to north, slopes on other sides

Approximate Size

3 acres

Ownership

Cotton, Raymond II.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Fresh marsh

Wildlife Use: Typical of fresh marsh

Slope/Topography: Flat, steep slopes on three sides

Aquatic Regime: Saturated, seasonally flooded

Channels: One main natural channel, other smaller natural channels

MAN-MADE FEATURES

Existing Use: (a) vacant (b) marginal pasture

Structures: None

Access: Eastside/Summer Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: (a) remains of dike, fills (b) dike to slough

Possible Actions, Consequences: (a) remove dike/fills to allow better tidal action (b) breach dike to re-introduce tidal action

Approximate Construction Requirements: Minor earth moving

Potential Habitat Type:

(a) As existing (b) Tidal marsh (probably transitional between salt and freshwater types)

Potential Conflicting Uses: None apparent

Overall Assessment: (a) Removal of dike/fill would increase tidal circulation - tidal marsh area - useful site.  
(b) diked pasture in advanced stage of reversion to fresh marsh - would be useful addition to estuarine production. Probably no conflicts.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-30 (a) and (b) Potential Mitigation Action  
ANA (a) Enhancement  
Management Segment: (a) 21 (b) 21 RS (b) Restoration

Section 20 Township 26 Range 12 Tax Lot  
(a) 900 (b) 1900

Location  
East side of Eastside/Summer Road approximately 3000' upstream of Matson Creek on Catching Slough

Physical Boundaries

Road berms to west, slough and berms to east.

Approximate Size  
(a) 2.7 acres (b) 4.8 acres

Ownership

(a) 900-Hunsaker, Raymond O. & F.: (b) 1900-Hongell, John E. Jr.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: (a) low salt marsh (ODFW) (mainly sedge/bullrush) with some fresh marsh species.  
(b) mixture of freshwater marsh vegetation and upland grasses

Wildlife Use: (a) good tidal marsh habitat (thick and high vegetation)  
(b) average habitat value

Slope/Topography: Flat

Aquatic Regime: (a) estuarine influence (b) seasonal standing water

Channels: (a) natural channels (b) old drainage ditches, maybe vestigial natural channels

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INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-31

Potential Mitigation Action

Management Segment: 21 ~~22~~ **A NA**

Enhancement

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
20	26	12	2000

Location  
2500' upstream of Matson Creek on Catching Slough, eastside of channel

Physical Boundaries

Slough to north, west and south, road berm to east

Approximate Size  
2.7 acres

Ownership  
Stevens, S. Duana L. & G.M.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Transitional fresh marsh/salt marsh

Wildlife Use:

Typical salt marsh habitat

Slope/Topography: Flat

Aquatic Regime: Wetland, source primarily from slough

Channels: Yes

HAN-MADE FEATURES

Existing Use: Not in use

Structures: None

Access: East Catching Slough Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Berms along slough, partially breached

Possible Actions, Consequences: Increase breaches in berm to improve flushing of marsh

Approximate Construction Requirements: Minor earth movement

Potential Habitat Type: Same as existing

Potential Conflicting Uses: None

Overall Assessment: Would be useful improvement of tidal action.

Would increase nutrient transport.

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INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-32 (a) (b) (c)

Potential Mitigation Action

Management Segment: 21 RS

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
20	26	12	(a) 2300 (b) 2400, 2600 (c) 2700

Location

Approximately 5000' south (upstream) of Matson Cr. on Catching Slough, both sides of channel

Physical Boundaries (a) & (c) slough berms to north, west and south; road berm to east. (b) road berm to west; berms to north, east and south

Approximate Size (a) 3.7 acres (b) 3.5 acres (c) 12 acres

Ownership (a) 2300-Deronden; Pos. Lionel & Priscilla; (b) 2400-Millikin, David R.; 2600-Mcnasha Corp.; (c) 2700-Wood, Graham

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: (a) freshwater marsh (b) & (c) fresh marsh/pasture mix

Wildlife Use: Typical of fresh marsh (egret, heron, etc.)

Slope/Topography: Flat

Aquatic Regime: Seasonal standing water

Channels: (a) & (b) vestigial natural channels. Drainage ditches in (a) & (c).

MAN-MADE FEATURES

Existing Use: Marginal pasture land (a) new drainage ditch just

recently dug around perimeter

Structures: None

Access: East Catching Slough Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Berms along slough (c) has tidegate

Possible Actions, Consequences: breach berms and/or remove tidegate in (c)

Approximate Construction Requirements: minor earth removal

Potential Habitat Type: Tidal, marsh-probably salt/fresh transition.

Potential Conflicting Uses: Existing grazing use

Overall Assessment: These sites are in various stages of reversion to fresh marsh, with (a) the most advanced and (c) still mainly pasture with rushes. Construction of new ditches in (a) indicates desire of owner to improve drainage. Owner's goals may conflict with restoration.

All have high biological potential for restoration, however.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-33

Management Segment: 21 RS

Section  
20, 29

Township  
26

Range  
12

Tax Lot  
100, 1600

Location

2000' downstream of Sumner, east side of slough

Potential Mitigation Action

Restoration

Physical Boundaries

slopes to north, east and south; road dike to west

Approximate Size

18 acres

Ownership

Walker, George E., Etal.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Fresh marsh/pasture mix

Wildlife Use:

Open marsh characteristics

Slope/Topography:

Flat

Aquatic Regime:

Local drainage & seasonal standing water

Channels:

Drainage ditches, vestigial natural channel

MAN-MADE FEATURES

Existing Use: Marginal pasture land

Structures: None

Access: East Catching Slough Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Dike, tidegate and culvert to slough

Possible Actions, Consequences:

Remove tidegate and/or increase culvert size, add culvert

Approximate Construction Requirements:

Minimal, or excavation under county road

Potential Habitat Type:

Tidal marsh, but probably mostly freshwater

Potential Conflicting Uses:

Existing grazing use

Overall Assessment:

A large site which could be restored to estuarine influence. Reversion to fresh marsh almost complete at west end of slough. However, use conflicts may be difficult to resolve. Has high biological potential for restoration.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-34 (a) (b)

Management Segment: 21 RS

Potential Mitigation Action

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	29	26	12	a) 200, 300, 1000 b) 200, 300, 400

East side of Catching Slough, at Lone Tree Bridge and Seelander Creek.

Physical Boundaries

- a) slopes to north and east; road berms to south and west.
- b) road berms to north and east; slopes to south

Approximate Size

(a) 4.6 acres (b) 6.4 acres

Ownership a) 200, 1000-Seelander, O. 300 - State of Oregon  
 b) 200, Seelander, O. 300 - State of Oregon, 400 - Menasha Corp.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

- a) Pasture grasses with minor freshwater aquatics
- b) Pasture grasses with fresh-water aquatics.

Wildlife Use:

Limited - possible waterfowl area.

Slope/Topography:

Flat

Aquatic Regime:

Local drainage - seasonally flooded

Channels:

none

MAN-MADE FEATURES

Existing Use:

- a) Pasture
- b) Marginal pasture.

Structures:

None

Access:

East Catching Slough Road

Utilities:

None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Tidegates and culverts to slough through road

Possible Actions, Consequences:

Remove tidegates, increase size of culverts to permit tidal influen.

Approximate Construction Requirements:

Minimal, or excavation beneath road to install culverts.

Potential Habitat Type:

Tidal marsh, probably freshwater type

Potential Conflicting Uses:

Agricultural use

Overall Assessment:

May be very little salinity at this point on Catching Slough.

Existing use/ownership conflicts would be difficult to resolve.

However, has some biological potential for restoration.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-34 (c) & (d)

Management Segment: 21 RS

Potential Mitigation Action

Restoration

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
29	26	12	(c) 400, 300, 200 (d) 300, 500

Location

(c) 1000' north of Lone Tree Bridge, east of slough.  
(d) 1500' north of Lone Tree Bridge, west of slough.

Physical Boundaries

(c) road to east, pasture north & south and slopes to east  
(d) road to west, slopes on other sides.

Approximate Size

(c) 2.8 acres (d) 2.5 acres

Ownership

(c) 400-Manasha Corp.; 300-State of Oregon; 200-Selander, Owen;  
(d) 300-State of Oregon; 500-Evonuck, Louie & C.F.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Fresh marsh (c) also has woody scrub/shrub vegetation)

Wildlife Use: Typical of fresh marsh

Slope/Topography: Flat

Aquatic Regime: Normally standing water or saturated

Channels: (c) none visible on aerial photo  
(d) natural channels

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: Via Eastside/Summer Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Diked, culverts with tidegates (tidegate on (d) permits substantial inflow)

Possible Actions, Consequences: Remove tidegates and/or increase culverts to re-introduce tidal circulation

Approximate Construction Requirements: Minimal, or excavation under county road for culvert

Potential Habitat Type: Tidal marsh, probably freshwater type.

Potential Conflicting Uses: None apparent

Overall Assessment: Both areas are well-developed freshwater marshes

Opening up to tidal influence would improve nutrient transport.

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INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-35

Potential Mitigation Action

Management Segment 21 RS

Restoration

Section

Township

Range

Tax Lot

29

26

12

900

Location

Eastside/Sumner County Road

Physical Boundaries

Berns on all sides: road to west, slough to east

Approximate Size

20 acres

Ownership

Messerle, Fred & Sons, Inc.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses with some freshwater aquatics

Wildlife Use:

Limited

Slope/Topography:

Flat

Aquatic Regime:

Local drainage

Channels:

Drainage ditches

MAN-MADE FEATURES

Existing Use: Pasture land

Structures: One in far southwest corner

Access: Eastside/Sumner Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION/POTENTIAL

Existing Conditions: Tidegate at north end of site. Dike along slough

Possible Actions, Consequences: Remove tidegate and/or breach dike

Approximate Construction Requirements: Minimal or minor earthwork

except reinforcement for road bedding at tidegate.

Potential Habitat Type: Tidal marsh, freshwater type

Potential Conflicting Uses: Existing agricultural use.

Overall Assessment:

Existing use/ownership conflicts would be difficult to resolve. Has some biological potential for restoration: however, tidal action may be relatively weak.

DELETED SITE

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-40

Potential Mitigation Action

Enhancement

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
1	26	13	600, 100

Location

East side of Isthmus Slough 3000' south (upstream) of the Eastside/  
Bunker Hill Bridge

Physical Boundaries

Slough to west, slopes to east

Approximate Size

60 acres

Ownership

Coos Head Timber

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Limited tideflat vegetation

Wildlife Use: Shorebird use

Slope/Topography: Flat

Aquatic Regime: Completely tidal

Channels: Natural mudflat channel

Existing Use: In past used for log storage, presently vacant

Structures: Berm, pilings along slough channel

Access: Olive Barber Road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tideflat/salt marsh area with some log debris.  
Berm along channel, breached at south end.

Possible Actions, Consequences: Remove debris to restore tideflat.  
to functioning benthic communities, remove or breach berm to  
improve tidal flushing.

Approximate Construction Requirements: Barge-mounted crane, earth-  
moving equipment. Disposal of spoils

Potential Habitat Type: As existing

Potential Conflicting Uses: None

Overall Assessment: A high priority site, with little work  
required and immediate gains.

8.6-26d(2)

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-41 (b)

Potential Mitigation Action

Restoration

Management Segment: N.A.

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
1600' north of mouth of Shinglehouse Slough.	1, 12	26	13	5000, 5700, 5600, 5900, 6000, 5800, 6100

Physical Boundaries

Immediately south of Millington, west of Hwy. 101

Approximate Size

4.6 acres

Ownership

500, 5600, 5700, 5800, 5900 - Young, Wayne & Carol K., James F.;  
600, 6100 - Greeby, Sharon J. Gatzke

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Pasture land with some fresh marsh vegetation

Wildlife Use:

Minimal

Slope/Topography:

Flat

Aquatic Regime:

Local drainage, seasonally flooded

Channels:

Drainage ditch, vestigial natural channels

MAN-MADE FEATURES:

Existing Use:

Pasture

Structures:

None

Access:

Hwy. 101

Utilities:

None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Tidegate on culvert.

Possible Actions, Consequences:

Remove tidegate.

Approximate Construction Requirements:

Minimal

Potential Habitat Type:

Salt marsh

Potential Conflicting Uses:

Existing grazing use

Overall Assessment:

May be conflict with grazing use. Highway 101 would make excavation to increase diameter of culvert impractical.



8.6 + 26F

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-42

Management Segment: 34 RS (part)

Potential Mitigation Action

Restoration

Section  
11

Township  
26

Range  
13

Tax Lot  
2400

Location

1800' up Shingle House Slough, north side

Physical Boundaries

Road dike to south, fills to east and west, slopes to north

Approximate Size

5 acres

Ownership

Kuehn, Norbert, H. & L.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Mixture of grasses and fresh marsh with some evidence of salt marsh species.

Wildlife Use: Limited because of local land uses.

Slope/Topography: Flat

Aquatic Regime: Creek running through middle

Channels: Vestigial natural channel, creek

MAN-MADE FEATURES

Existing Use: Fill for open storage, marginal grazing

Structures: None

Access: Private road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidegate on 24" culvert. Land fill in side c:

Possible Actions, Consequences: Remove tidegate to introduce tidal influence. Remove fills to increase total acreage

Approximate Construction Requirements: Earth moving, protection of surrounding slopes to prevent erosion/slumping

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Minor conflicts with grazing

Overall Assessment: Easy to achieve tidal action. Potentially value addition to Shinglehouse Slough marshes

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Potential Mitigation Action

Site # U-44

Management Segment: 30 (b) RS

Restoration.

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>1/40 Tax Lot</u>
13,14	26	13	A 200,1200,1000, 1100

Location  
East side of Isthmus Slough, 5500' south of Shinglehouse Slough

Physical Boundaries

Slopes to north, east and south (partial); berms to west and south (partial)

Approximate Size

20 acres

Ownership

Lyons, J. Stewart Et Al, Georgia - Pacific Corp.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grasses with fresh marsh vegetation especially in east portion of site.

Wildlife Use: Typical of fresh marsh/grazing (heron, egret, etc.)

Slope/Topography: Flat

Aquatic Regime: Local drainage with seasonal standing water

Channels: One major natural channel, vestiges of others

MAN-MADE FEATURES

Existing Use: Pasture land, some marginal

Structures: None

Access: Private road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Berms and tidegates along slough

Possible Actions, Consequences: Remove tidegate and/or breach or remove berm to introduce tidal action.

Approximate Construction Requirements: Minimal, or major earth moving (barge-mounted) with spoils disposal.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Possible conflict with agricultural uses.

Overall Assessment: Due to isolation, could become valuable for wildlife. Would be valuable addition to system without impacting area to south. Conflict with ag. use may be difficult to resolve; however, has high biological potential for restoration.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-45 (a)

Potential Mitigation Action

Management Segment: ~~300-Sharp~~ <sup>30</sup> CA Enhancement

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
14	26	13	200-400

Location

North of Bandon/Coquille junction. West side of Hwy 101

Physical Boundaries

101 to east, slope and development to north, slope and woods to west and south.  
Approximate Size  
3.5 acres

Ownership

200- Hanson, John E. Jr. & M.G.; 300-Sharp, Gordon L.; 400-Crescent City Marine Ways & Drydock Co. Inc.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Salt marsh/upland mix.

Wildlife Use:

Typical of salt marsh (heron, egret, etc.)

Slope/Topography: Flat

Aquatic Regime: Open to tidal action.

Channels: Main natural channel

MAN-MADE FEATURES

Existing Use: Vacant, adjacent to light industrial use.

Structures: Hwy berm to east. Wood box culvert 30" x 12". Conn. to slough through 101 and railroad.

Access: Road to north (borders)

Utilities: Power poles along east border (between site and Hwy 101)

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Open culvert to slough

Possible Actions, Consequences: Enlarge culvert to increase tidal flow

Approximate Construction Requirements: Excavation under Hwy 101 and railroad to place new culvert.

Potential Habitat Type: As existing

Potential Conflicting Uses: Neighboring industrial use may propose to fill, expanding this area.

Overall Assessment: Highly questionable whether biological gain would warrant disruption of highway and railroad.

8.6-265

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # 0-45 (b)

Management Segment: 32 AD

Potential Mitigation Action

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
Southport Road, west of highway 101	23	26	13	

Southport Road, west of highway 101

Physical Boundaries

Hwy. 101 to east, Southport Road to N.  
Slopes to southwest

Approximate Size

5 ac

Ownership

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Fresh marsh and swamp (cattails, alder)

Wildlife Use:

Typical for fresh marsh/swamp.

Slope/Topography:

Flat, rising gradually to west.

Agatic Regime:

Local drainage. Wet year round, seasonally flooded.

Channels:

Main channel only visible.

MAN-MADE FEATURES

Existing Use:

Vacant

Structures:

Current, tidegate under Hwy. 101

Access:

via Southport Road

Utilities:

None.

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Culvert tidegate exclude tidal action from Isthmus Slough.

Possible Actions, Consequences:

Remove tidegate to permit tidal action.

Ownership

Approximate Construction Requirements:

Minimal. (Increasing size of culvert is not feasible due to disruption of Hwy. 101)

Potential Habitat Type:

Probably salt marsh, bullrush/sedge type.

Potential Conflicting Uses:

None.

Overall Assessment:

A minor action which might have beneficial results. However, an involved is small, and some reversion to upland vegetation type 1 occurring.

8.6-26

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-51 (a)

Potential Mitigation Action

Management Segment: ~~Letburne Slough~~ NA Enhancement

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	27	26	13	1100, 100

West of Bandon-Coquille junction on Hwy 101 across Davis Slough

Physical Boundaries

Slopes to west, man-made berms to south, east, and north

Approximate Size

24 acres

Ownership

Menasha Corp.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Salt marsh predominantly. Brambles and few trees on berms

Wildlife Use: Typical of mature salt marsh

Slope/Topography: Flat

Aquatic Regime: Appears to have full tidal water intrusion. Some local drainage entering from west slopes

Channels: well developed natural channel system

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: Hwy 101 and maintained gravel road on near southwest border. Log roads locally

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Dikes. Possible tidegate on culverts in portions.

Possible Actions, Consequences: Breach or remove dikes, remove gate (if there) to increase tidal action

Approximate Construction Requirements: Minimal or earth moving equip. (e.g. bucket-shovel) in selected areas.

Potential Habitat Type: As existing, with more salt marsh area if dike removed.

Potential Conflicting Uses: None

Overall Assessment:

Easy to accomplish enhancement. No conflicts Could be done in conjunction with U-51 (b) to north. Would increase nutrient transport-biological important area.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-51 (b)

Management Segment: 31 R5

Potential Mitigation Action

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	25.26	26	13	100, 400

North of Davis Slough diked salt marsh

Physical Boundaries

Slopes on all sides except dike, road to southeast

Approximate Size  
16 acres

Ownership

Menasha Corp.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Fresh marsh

Wildlife Use: Typical of well developed fresh marsh (heron, egret, rails, etc.)

Slope/Topography:

Flat

Aquatic Regime: Saturated, seasonally flooded by local drainage. Probably some saline intrusion. Northern half appears to be more frequently ponded.

Channels: Natural channels throughout

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: Hwy 101, dike road, logging road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Main dike with tidegate at southeast end; road dike halfway up.

Possible Actions, Consequences: Remove tidegate and/or breach/redo dike at southeast end, breach dike to north to re-introduce tidal a-

Approximate Construction Requirements: Minimal, or minor earth removal, spoil disposal

Potential Habitat Type: Salt marsh, (grading into fresh marsh, as existing at north end)

Potential Conflicting Uses: None

Overall Assessment: A potentially valuable restoration site in a biologically important area. Could significantly increase nutrient transport into Davis Slough and open biological link.

8.6-26k

MAN-MADE FEATURES

Existing Use: Pasture land (marginal in some places)

Structures: None

Access: Private road off Hwy 101

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidegates at slough terminus and again at field

Hwy 101 dike isolates portion to south

Possible Actions, Consequences: Remove tidegates, breach berms around field, place culverts under private road and/or Hwy 101 to re-introduce tidal action

Approximate Construction Requirements: Minimal, or earth moving, excavation to place culverts

Potential Habitat Type: Salt marsh (possibly grading into fresh mar

Potential Conflicting Uses: Existing agricultural use

Overall Assessment: Potentially valuable addition to estuarine production circulation in biologically important area. However, existing use ownership conflicts would be difficult to resolve.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-52 (a)

Management Segment: 31 RS

Potential Mitigation Action

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
26	26	26	13	100, 300, 400

West of upstream terminum of Davis Slough, part is south of Hwy 101

Physical Boundaries

Slopes to north and south; road berms to east & (partially) south

Approximate Size

22 acres plus 5 acres to south of Hwy 101

Ownership

100-Manasha; 300-Pacific Power & Light; 400-Dixon, Lois J.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Salt marsh along channels most of site pasture grasses

Wildlife Use: Typical

Slope/Topography:

Flat. Elevation change of 2' from channel to field

Aquatic Regime: Local drainage. Some seasonal ponding, saline intrusion along channels.

Channels:

Main drainage channels, creek

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-52(b)

Management Segment: 30 (E) CS

Potential Mitigation Action

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Range</u>	<u>Tax Lot</u>
	27	26	13		1700

Wall Gulch, south of Hwy. 101/42 junction

Physical Boundaries

Hwy. 42 to east, slopes on other sides.

Approximate Size

10 ac.

Ownership

Boots, Dean S.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Fresh marsh.

Wildlife Use:

Typical for fresh marsh.

Slope/Topography:

Flat, sloping slightly upwards to west.

Aquatic Regime:

Local drainage; wet year-round. Seasonally flooded.

Channels:

Extensive natural channels.

HAN-MADE FEATURES

Existing Use:

Vacant

Structures:

Culvert, tidegate beneath Hwy. 42

Access:

from Hwy. 42

Utilities:

None.

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions:

Culvert & tidegate beneath Hwy. 42 prevents tidal influence.

Possible Actions, Consequences:

Remove tidegate to permit tidal influence

Approximate Construction Requirements:

Minimal.

Potential Habitat Type:

High salt marsh (probably sedge/bullrush type)

Potential Conflicting Uses:

None

Overall Assessment:

A simple action which would increase nutrient transport of culvert, which would enhance flushing, would not be feasible due to disturbance of Hwy. 42.



INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-53

Management Segment: 30 (E) CS

Potential Mitigation Action

Restoration

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
3	27	13	100	

West of Hwy 42, at Ken Kel Park.

Physical Boundaries

Slopes to south, road dike to east, Ken Kel Park to north & west.

Approximate Size

5 acres

Ownership

Spaght, Melvin & Eileen

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Some salt marsh vegetation gradually encroaching on open unvegetated area.

Wildlife Use:

Minimal

Slope/Topography: Flat, sloping gradually to north

Aquatic Regime: Open to tidal influence. Occasional flooding

Channels: Two altered ditches

MAN-MADE FEATURES

Existing Use: Vacant, but apparently could be used as parking area.

Structures: None on site itself, race track to west

Access: from Hwy 101

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Tidal action exists on creek beneath Hwy 42. Graded and filled area is mostly above level of tidal influence.

Possible Actions, Consequences: Scalp off graded/filled area down to level of tidal influence.

Approximate Construction Requirements: Earth-moving, grading

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Area maybe used for overflow parking for race track.

Overall Assessment: Despite location, could be a valuable small addition to estuarine production. However, marsh development probably would be slow due to low organic content of substrate

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-54

Management Segment: ~~settlement strength~~ Restoration

Potential Mitigation Action

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
2,3	27	13	100, 1400

North side of Isthmus Slough 1500' downstream from Green Acres Bridge

Physical Boundaries

Slopes to north, east and west, private road dike to south.

Approximate Size

12 acres

Ownership

Siglin, Michael W. & Leona A.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: Pasture grass and freshwater marsh.

Wildlife Use: Typical of wet meadow (heron, egret, etc.)

Slope/Topography: Slightly rising to east

Aquatic Regime: Local drainage, seasonally wet

Channels: Drainage ditch, numerous smaller natural channels

MAN-MADE FEATURES

Existing Use: Marginal pasture land

Structures: None

Access: Private road

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Dike (road) and tidegate to slough.

Possible Actions, Consequences: Remove tidegate and/or breach dike.

Approximate Construction Requirements: Minimal, or minor earth removal

Potential Habitat Type: Salt marsh (probably sedge/bullrush)

Potential Conflicting Uses: Existing grazing use.

Overall Assessment:

Natural

channels still exist. Would aid re-establishment of good circulatory channels. Existing use conflict may be difficult to resolve. However, has some biological potential for restoration.

MAN-MADE FEATURES

Existing Use: (a) none (b) some grazing

Structures: (a) old piles (b) none

Access: (a) Hwy 42, Railroad berm or slough  
(b) private road from Greenacres or slough

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: (a) Piles and wood debris in channels  
(b) dike to slough

Possible Actions, Consequences: (a) Enhance area by removing pile:  
(interfering with circulation) and cleaning up debris. (b) Breach  
or remove dike to improve tidal circulation, increase salt marsh a:

Approximate Construction Requirements: Barge-mounted crane,  
excavator. Removal of spoils.

Potential Habitat Type: As existing, Increase salt marsh area in (1

Potential Conflicting Uses: (a) None (b) grazing use

Overall Assessment: (a) a useful minor enhancement project, typical  
other places in bay. (b) Relatively simple minor project.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-55 (a) and (b) Potential Mitigation Action

Management Segment: ~~St Johns Slough~~ (C)- Enhancement  
5/ NA

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
3	27	13	(a) 300 (b) 1300	

On both sides of Isthmus Slough, about 3000' downstream from  
Green Acres Bridge (opposite "House of Confusion")

Physical Boundaries

(a) Railroad berm to west and south; slough to north and east.  
(b) Slopes to north, slough to south.

Approximate Size

(a) 5 acres (b) 5 acres

Ownership

(a) 300-Georgia Pacific; (b) 1300-Coos County

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: (a) high salt marsh (b) high salt marsh with upland  
species on dike.

Wildlife Use: Typical of salt marsh.

Slope/Topography: Flat

Aquatic Regime: Tidal influence, partially obstructed in (b)

Channels: Natural channels

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-59 (a)

Management Segment: 39 N.A.

Potential Mitigation Action

Enhancement

<u>Location</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
	35	25	13	see attached sheet
	2	26	13	

1200' south of Coos Bay-Bunker Hill Bridge on east side of Coalbank Slough.

Physical Boundaries

Slopes to east, south and west; road dike to north.

Approximate Size

25 acres

Ownership

see attached sheet

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

High salt marsh (mainly *Deschampsia* with *Salicornia* near channels)

Wildlife Use:

Typical of high salt marsh

Slope/Topography:

Flat with a few slight berms.

Aquatic Regime: Open to tidal influence through culvert under road

Channels:

Well developed natural channel system

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: County Road from Hwy 101

Utilities: Power poles along roadway

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: 36" culvert beneath road/dike

Possible Actions, Consequences: Replace culvert for more tidal volume; or add culvert. Level a few low berms.

Approximate Construction Requirements:

road bedding and repaving. New culvert would require

Potential Habitat Type: As existing

Potential Conflicting Uses: None

Overall Assessment: A functioning and productive marsh. Improved tidal action could increase nutrient transport to rest of system.

TAX LOT NUMBERS: 100, 200, 700, 800, 1100, 1200, 1400, 1500,  
1600, 1800, 1900, 2000, 2100, 2200, 2400, 2500, 2600,  
2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500,  
3600, 3700, 3800, 3900, 4000

OWNERSHIPS: 100, 200- Barner, I.N. & Helen E.;  
1800, 700, 800, 3700, 3500- Coos County;  
1200, 1100- Engebretson, Eddie & F.;  
1900- Cambell, Maxine H.  
2000- Gibson, Jessie H.  
2100- Salem United Methodist Church  
2200, 3600- Edin Properties Corp.  
2400, 2600- Chapman, Irene V.  
2800- Pankratz, Victor D. & B.  
2900- Apling, Maurice E. & S.S.  
3000- Corbin, John E. & F.C.  
2700, 3100, 3300- Chapman, George P.  
3200, 3400- Howley, Marvin  
3500- Perin, Warren  
3800- Osborn, Clifford & M.L.  
3900- Ray, Robert H. & Geneva D.  
1200, 1400, 1500, 1600- Scott, Gordon R. & P.G.  
2500- Eugene Television Inc.

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-59 (b)

Potential Mitigation Action

Management Segment: 39 NA

Enhancement

<u>Section</u>	<u>Township</u>	<u>Range</u>	<u>Tax Lot</u>
34, 35	25	13	1900, 2000, 6100, 700,
2, 3	26	13	1800, 800

2500' southwest of Coalbank Slough Bridge, east side of slough

Physical Boundaries

Slough to north, west and south; slopes to east.

Approximate Size

35 acres

Ownership

6100, 700, 1800-Edin Properties Corp. & Buffum, Edmond & Bessie;  
1900-Camball, Maxine H.; 2000-Gibson, Jessie H. & Perin, Warren;  
700, 800, 1800-Anthony, Fred S. & R.F.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type:

Salt marsh vegetation throughout

Wildlife Use:

Typical marsh communities, well protected on east side

Slope/Topography:

Flat

Aquatic Regime:

Tidal influence throughout, except for dikes

Channels:

Natural channels throughout

MAN-MADE FEATURES

Existing Use: Vacant

Structures: None

Access: County road (dead end) from Bay 101

Utilities: None

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Inflow restricted by old berm around n. et of s.

Possible Actions, Consequences: Breach berm at strategic points to increase amount of tidal flushing, (particularly where existing channels)

Approximate Construction Requirements:

Minimal, some disposal requ:

Potential Habitat Type: As existing

Potential Conflicting Uses: None, though proposal for marina has

been discussed in past.

Overall Assessment: Another highly productive marsh, breaching of which would increase tidal flushing and nutrient transport, minimal construction requirements

INVENTORY: POTENTIAL MITIGATION SITES

Field Survey Sheet

Site # U-60 (a) and (b) Potential Mitigation Action  
Restoration

Management Segment: 40 RS

Section 3 Township 26 Range 13 Tax Lot  
(a) 2100, 3100, 100, 300,  
500, 400, 4500  
(b) 4000, 3900, 700

Location  
West side of Coalbank Slough, east and south  
of Englewood

Physical Boundaries  
Slopes & county road to west; berms to east

Approximate Size  
(a) 40 acres (b) 7 acres

Ownership (a) 2100-Warzecha, Zigmund J. & M.A.; 3100, 100-Casey, Milton  
& Eisemas; 400-Rhodes, Nora T., L/E Ave, Carl U & M.A.; 500, 300-Harris,  
William W. Jr. & Kathleen; 4500- Hoegen, Gary H. & N.L.;  
(b) 4000, 3900, 700-Hoegen, Gary H. & N.L.  
PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: (a) predominantly pasture grasses, some aquatics scattered  
(b) pasture with fresh marsh mixture

Wildlife Use: Limited

Slope/Topography: Flat

Aquatic Regime: Local drainage and seasonally standing water

Channels: Drainage ditches

MAN-MADE FEATURES

Existing Use: (a) pasture land (b) marginal pastureland

Structures: Farm structures separate (a) from (b)

Access: Southwest Boulevard

Utilities: Power poles

RESTORATION/ENHANCEMENT/CREATION POTENTIAL

Existing Conditions: Berms and tidegates to Coalbank Slough

Possible Actions, Consequences: Remove tidegates and/or breach berms

to permit tidal influence

Approximate Construction Requirements:

(could be barge-mounted). Possible re-diking to keep tidal influ-  
away from certain areas. Minimal or minor earth movir.

Potential Habitat Type: Salt marsh

Potential Conflicting Uses: Existing pasture use. May conflict wit-  
dwellings (e.g. intrusion into walls)

Overall Assessment:

Existing use/ownership conflicts would be difficult to resolve.  
However, has high biological potential for restoration.

**9. ANNOTATED BIBLIOGRAPHY**



## ANNOTATED BIBLIOGRAPHY

[EDITOR'S NOTE: This bibliography is incomplete and will be updated in time.]

This bibliography lists all sources referred to in the Coos Bay Estuary Plan, with selected annotation. A complete annotation was not possible because not all material cited was readily available for annotation. Also, in some cases the title of the material was sufficiently detailed to describe the subject and contents.

The bibliography is organized under 4 headings: Physical Characteristics; Biological Resources (Estuarine/Shoreland); Economic Resources and Social Characteristics.

### I. PHYSICAL CHARACTERISTICS INCLUDES:

1. General
2. Hydrological Characteristics
3. Water Quality
4. Physical Alterations

### II. BIOLOGICAL RESOURCES-ESTUARINE/SHORELAND includes:

1. General
2. Fish
3. Birds
4. Invertebrates, Plant Life and Other Aquatic Life
5. Habitats
6. Mitigation

### III. ECONOMIC RESOURCES includes:

1. Log Storage
2. Developmental Resources, Need, Plans  
- includes moorage

### IV. SOCIAL CHARACTERISTICS includes:

1. General
2. Recreation

References are listed by author, title, date, publisher and pages (if available). There were a few sources that had only a title and these are listed at the end of the appropriate sections.

Attached is a chronological listing of sources listed by year, author, and section. Only the first author is listed, although in the bibliography there may be more than one.

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Salem. 1963 439 pp.

Description of the physical characteristics of the  
drainage basins in the south coast.

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data to determine impact on biological and physical  
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sectors of the economy and to quantify economic impact  
of losing air service.

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Airport Final Environmental Impact Statement. 1977

Contains an appendix of documents concerning the airport  
fill permit issued to the City of North Bend.

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Deals with productivity in lumber, fish, agriculture,  
tourism, mineral industries and employment.

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Management Alternatives. 1974 34 pp. and appendices.

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Inventory. 1976

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Analysis results of survey to determine value of air service to southern Oregon coast.

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Oregon State Highway Division. Coos Bay, Oregon - Economic Growth Center Before Study. 1972

Profiles the Coos Bay economy and the role played by highway outlets.

Ogden, Beeman and Assoc. Oregon Ports Study - 1980 1980.

Deals with port facilities in Oregon and their future roles in land and water requirements.

Oregon Dept. of Economic Development Coos County Economic Information, Economic Information Clearing House.

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Parametrix, Inc. Environmental Impact Assessment. North Bend Municipal Airport Modifications 1975

Assessment of environmental impacts anticipated from airport development.

Public Health Service, Economics Studies Group. Coos County, Preliminary Economic Reconnaissance and Estimate of Growth 1960-2010. 1962. 12 pp.

Riley, E.W. North Bend Airport Master Plan 1974

Discusses extent, type and nature of development needed at the North Bend Airport.

Seaton, Johnson and Odell, Inc. Supplement to: Environmental Feasibility of Port Development of Coos Bay. 1977. Port of Coos Bay Commission. Sections and appendices.

Summary of suitability of shoreland sections for port facilities.

Stanford Research Institute. A Study of Industrial Development Possibilities for the Coos Bay Port District, 1956.

Stevens, Thompson and Runyan. Coos-Curry Environmental Protection Program: An Interim Report 1980 Sewage Plan. 1971

Stevens, Thompson and Runyan. Pony Slough Small Boat Marina Feasibility Study. 1974

U.S. Army Corps of Engineers. Coastal Reconnaissance Study - Oregon and Washington. 1974

Survey of coastal projects to determine their potential for recreation and conservation while taking into account the biological, physical and social characteristics.

U.S. Army Corps of Engineers. Coos County, Oregon - Economic Survey and Analysis.

Review of natural, economic and industrial resources for Coos County.

U.S. Army Engineers District. Charleston Breakwater Extension and Groin Structure Draft Environmental Impact Supplement, No. 1 to the Coos Bay Operation and Maintenance Dredging Final EIS, Coos Bay, Oregon. 1978

Discussion of proposed project and the physical and biological characteristics of the project area.

U.S.D.A. Report on Water Related Land Resources - South Coast Drainage Basin, Oregon. 1962. 120 pp.

#### IV. SOCIAL CHARACTERISTICS

##### 1. GENERAL

Feichtinger, J.R. A Geographic Study of the City of Coos Bay and Its Hinterland. 1950. M.S. Thesis, Univ. of Ore., Eugene 198 pp.

Hawley, J.R. The Travel Industry -- Its Role in the Economy of Coos County, Oregon 1970 Portland State Univ.

McConnaughey, E.A. Coos Bay Study: An Interdisciplinary Study of Man and the Estuary. 1971 Ore. Instit. of Marine Biology.

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Morgan, J.B. and R.L. Holton. A Bibliography of Estuarine Research in Oregon. 1977. Oregon Estuarine Research

Council. Ore. State Univ., Corvallis, 141 pp.  
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Landscape Evaluation of the Coos Bay Estuarine Area,  
Oregon. 1971

Oregon Coastal Conservation and Development Comm.  
Historical and Archaeological Site Inventory 1973

Oregon Coast Conservation and Development Comm. Historical  
and Archaeological Resources of the Oregon Coast. 1974

Survey and descriptions of sites on the Oregon coast.

Oregon Parks and Recreation. Statewide Inventory of  
Historic Sites and Buildings - Coos County. 1976.

Survey and descriptions of sites and buildings  
throughout Coos County.

Peterson, E.R., and A. Powers. A Century of Coos and  
Curry. 1952. Coos-Curry Pioneer and Historical Assoc.

Stevens, Thompson and Runyan, Inc. Coos-Curry Environmental  
Protection Program, and Interm Report: Citizens  
Participation. 1973

## 2. RECREATION

Coos Curry Council of Gov't./Coos Bay Interagency Task  
Force. Public Access/Recreation White Paper. 1980

Identification of existing recreation and access areas  
and possible sites for future development.

Combs, G. Coos County Parks Dept.

Survey of county parks and facilities.

Dept. of Transportation - Parks and Recreation Branch.  
Oregon Outdoor Recreation Supply Bull. 1976

Tabulation of Oregon's outdoor recreation resources.

Oregon State Marine Board. Boating in Coastal Waters.  
1976 52 pp.



Chronological listing of annotated bibliography - listed by: year; author; and section of bibliography.

<u>YEAR</u>	<u>AUTHOR</u>	<u>SECTION</u>
1901	Diller, J.S.	Phys. - General
1914	House, H.D.	Biol. - General
1918	House, H.D.	Biol. - Habitat
1922	Kirkbridge, W.H.	Phys. - Physical Alteration
1923	Kirkbridge, W.H.	Phys. - Physical Alteration
1930	Queen, J.C.	Biol. - Invertebrate
1931	Yocum, H.G.	Biol. - Invertebrate
1942	Shearer, G.M.	Biol. - Invertebrate
1943	Daniels, A.S.	Phys. - Physical Alteration
1943	Riechers, M.	Biol. - Invertebrate
1944	Allen, J.E.	Eco. - Development
1944	Sanborn, E.I.	Biol. - Invertebrate
1944	Daniels, A.S.	Phys. - Physical Alteration
1949	Reish, D.J.	Biol. - Invertebrate
1949	Sowell, R.R.	Biol. - Invertebrate
1949	Tollefson, R.D.	Biol. - Invertebrate
1950	Feichtinger, J.R.	Social - General
1950	James, E.L.	Biol. - Invertebrate
1950	Hartman, O.	Biol. - Invertebrate
1950	Morgan, A.R.	Biol. - Fish
1951	Cleaver, F.C.	Biol. - Fish
1951	Harry, G.Y.	Biol. - Fish
1952	Peterson, E.R.	Social - General
1954	Barnard, J.L.	Biol. - Invertebrate
1954	Marriage, L.D.	Biol. - Invertebrate
1955	Univ. of Washington	Phys. - General
1956	Burt, W.V.	Phys. - Hydrological Char.

<u>YEAR</u>	<u>AUTHOR</u>	<u>SECTION</u>
1956	Smith, H.S.	Biol. - Fish
1956	Stanford Research Instit.	Eco. - Development
1957	Burt, W.V.	Phys. - Hydrological Char.
1958	Burt, W.V.	Phys. - Hydrological Char.
1958	Wood, J.W.	Biol. - Fish
1959	Bali, J.M.	Biol. - Fish
1959	Burt, W.V.	Phys. - Hydrological Char.
1960	Ore. Fish Commission	Biol. - Invertebrate
1960	Coos Bay Planning Comm.	Eco. - Development
1961	Breuser, R.N.	Biol. - Fish
1961	Dicken, S.N.	Phys. - Physical Alteration
1961	Kilburn, P.D.	Biol. - Invertebrate
1961	Jones, W.G.	Biol. - Fish
1961	Nat'l. Marine Consultants	Phys. - Physical Alteration
1961	North Bend Planning Commission	Eco. - Development
1962	Public Health Service	Eco. - Development
1962	U.S.D.A.	Eco. - Development
1962	Hutchison, J.M.	Biol. - General
1963	McAlister, W.B.	Phys. - Physical Alteration
1963	Ore. State Water Resource Board	Phys. - General
1963	Coos County	Eco. - Development
1964	Blanton, J.O.	Phys. - Hydrological Char.
1964	Matson, A.L.	Phys. - Hydrological Char.
1964	MacNab, J.A.	Phys. - Water Quality
1966	Baldwin, E.M.	Phys. - General
1966	Cornell	Eco. - Development
1966	Evans, J.W.	Biol. - Invertebrate
1966	Harper, S.A.	Biol. - General
1966	Ore. Dept. Environmental Quality	Phys. - General

<u>YEAR</u>	<u>AUTHOR</u>	<u>SECTION</u>
1967	Ore. State Sanitary Auth.	Phys. - Hydrologic Char.
1967	Evans, J.W.	Biol. - Invertebrate
1967	Coos County Economic Dev. Commission	Eco. - Development
1968	Evans, J.W.	Biol. - Invertebrate
1968	Evans, J.W.	Biol. - Invertebrate
1968	Pacific N.W. River Basin Comm.	Phys. - Hydrologic Char.
1968	Pathman, S.	Biol. - Fish
1968	U.S. Army Corps of Engineers	Phys. - General
1968	U.S. Army Corps of Engineers	Phys. - General
1969	Darby, R.L.	Biol. - Invertebrate
1969	Blanton, J.	Phys. - Hydrologic Char.
1970	Blanton, J.	Phys. - Hydrologic Char.
1970	Cummings, T.E.	Biol. - Fish
1970	Gaumer, T.F.	Biol. - Invertebrate
1970	Cornell	Phys. - Water Quality
1970	Hall, W.C.	Biol. - Fish
1970	Hanson, A.W.	Biol. - Invertebrate
1970	James, W.	Phys. - General
1970	Hawley, J.R.	Social - General
1970	U.S. Army Corps of Engineers	Biol. - General
1971	Coos-Curry Council of Government	Eco. - Development
1971	Glanzmen, C.F.	Phys. - Hydrologic Char.
1971	National Parks Service	Social - General
1971	Skeesick, D.G.	Biol. - Fish
1971	Stevens, Thompson & Runyan	Eco. - Development
1971	U.S. Army Corps of Engineers	Eco. - Dredging
1971	Aagaard, K.	Phys. Hydrologic Char.
1971	Cummings, T.E.	Biol. - Fish
1971	McConnaughey, E.A.	Social - General
1971	U.S. Dept. of Interior	Biol. - General
1971	U.S. Army Corps of Engineers	Eco. - Development

<u>YEAR</u>	<u>AUTHOR</u>	<u>SECTION</u>
1971	U.S. Army Corps of Engineers	Phys. - Physical Alteration Eco. - Development
1971	Laird, J.C.	
1972	Dept. of Geol. Mineral Indust.	Phys. - General
1972	Ore. State Highway Division	Eco. - Development
1972	Stevens, Thompson, Runyan	Eco. - Dredge
1972	Arbus, W.D.	Biol. - General
1972	Johnson, J.W.	Phys. - Hydrologic Char.
1972	Johnson, S.	Biol. - General
1972	Pinto, C.	Biol. - Habitat
1972	Thompson, K.E.	Biol. - General
1972	Coos-Curry-Douglas Econ. Assoc.	Eco. - Development
1972	Hartman, M.C.	Biol. - Invertebrate
1972	Hawley, J.R.	Social - General
1972	McGie, A.M.	Biol. - Fish
1972	Ore. Division of State Lands	Eco. - Dredge
1972	Stevens, Thompson, Runyan	Eco. - Dredge
1972	Touchey, R.J.	Phys. - Water Quality
1972	U.S. Army Corps of Engineers	Phys. - Hydrologic Char.
1972	U.S. Army Corps of Engineers	Phys. - General
1973	Coos Bay Estuary Comm.	Eco. - Development
1973	Coos Bay Estuary Comm.	Eco. - Development
1973	Coos-Curry Council of Government	Eco. - Development
1973	Coos-Curry Council of Government	Eco. - Development
1973	Coos-Curry-Douglas Econ. Assoc.	Eco. - Development
1973	Coos-Curry-Douglas Econ. Assoc.	Eco. - Development
1973	Daniel	Eco. - Development
1973	Pacific N.W. Laboratory	Eco. - Development
1973	Peterson, P.E.	Phys. - Hydrologic Char.
1973	Skeesick, D.G.	Biol. - Fish
1973	Stevens, Thompson, Runyan	Social - General
1973	Stevens, Thompson, Runyan	Biol. - General

<u>YEAR</u>	<u>AUTHOR</u>	<u>SECTION</u>
1973	Zirges, M.H.	Biol. - Fish
1973	Akins, G.J.	Biol. - Habitat
1973	Gaumer, T.	Biol. - General
1973	Johnson, J.W.	Phys. - Hydrologic Char.
1973	McGowan, J.A.	Biol. - Invertebrate
1973	Mullen, R.E.	Biol. - Fish
1973	Oregon Division of State Lands	Phys. - General
1973	Slotta, L.S.	Eco. - Dredge
1973	U.S. Army Engineering District	Eco. - Dredge
1973	Ore. Coastal Conserv. Dev. Comm.	Social - General
1973	Towner	Phys. - Physical Alteration
1974	Riley, E.W.	Eco. - Development
1974	Coos-Curry Council of Government	Eco. - Development
1974	Ore. Coastal Conser. Dev. Comm.	Social - General
1974	U.S. Army Corps of Engineers	Eco. - Development
1974	Stevens, Thompson, Runyan	Eco. - Development
1974	Greenacres Consulting Corp.	Eco. - Development
1974	Division of State Lands	Phys. - General
1974	Coos-Curry Council of Government	Eco. - Development
1974	Daniel	Biol. - General
1974	Greenacres Consulting Corp.	Eco. - Log Storage
1974	Jackson, A.	Eco. - Log Storage
1974	Montague & Associates	Eco. - Development
1974	National Workshop on Sanctuaries	Biol. - General
1974	Odum, H.T.	Biol. - General
1974	Ore. Dept. of Land Conser. & Dev.	Biol. - General
1974	Slotta, L.S.	Biol. - General
1974	Tabor, J.E.	Biol. - General
1974	Thompson, K.	Biol. - General
1974	Skeesick, D.G.	Biol. - Fish
1974	Hoffnagle, J.	Biol. - Habitat
1974	McMahon, E.	Biol. - Birds
1974	Mullen, R.E.	Biol. - Fish
1974	Parr, R.A.	Biol. - General
1974	Percy, K.L.	Phys. - General
1974	Stevens, Thompson, Runyan	Phys. - General

<u>YEAR</u>	<u>AUTHOR</u>	<u>SECTION</u>
1975	Gaumer, T.F.	Biol. Invertebrates
1975	Hostick, G.A.	Biol. - Fish
1975	Jefferson, C.A.	Biol. - Habitat
1975	Lizarraga - Aryniega, J.R.	Phys. - Physical Alteration
1975	Todd, A.	Biol. - General
1975	U.S. Army Engineering District	Eco. - Dredging
1975	Parametrix, Inc.	Eco. - Development
1975	Coos County Board of Commissioners	Eco. - Development
1975	Dept. of Geol. Mineral Indust.	Phys. - General
1975	Ore. Coastal Conserv. Dev. Comm.	Phys. - General
1975	U.S. Army Corps of Engineers	Eco. - Dredge
1975	U.S. Army Corps of Engineers	Eco. - Dredge
1975	U.S. Geol. Survey	Phys. - Hydrologic Char.
1975	Wilsey & Ham	Biol. - General
1976	McGie, A.M.	Biol. - Fish
1976	Ore. State Marine Biology	Social - Recreation
1976	U.S. Army Engineering District	Eco. - Dredge
1976	U.S. Army Engineering District	Eco. - Dredge
1976	Gaumer, T.F.	Biol. - Invertebrate
1976	Gaumer, T.F.	Biol. - Invertebrate
1976	Hartman, G.L.	Phys. - General
1976	Hoffnagle, J.	Biol. - Habitat
1976	Osis, L.	Biol. - Invertebrate
1976	U.S. Army Engineering District	Eco. - Dredge
1976	North Bend, City	Eco. - Development
1976	Oregon Parks & Recreation	Social - General
1976	North Bend - City	Eco. - Development
1976	Department of Transportation	Social - Recreation
1976	Dugan, P.	Eco. - Development
1976	Dugan, P.	Eco. - Development
1977	Port of Coos Bay	Biol. - Fish
1977	Coos-Curry-Douglas Eco. Dev. Assoc.	Eco. - Development
1977	Coos-Curry-Douglas Eco. Dev. Assoc.	Eco. - Development
1977	Fed. Aviation Adminis- tration	Eco. - Development

<u>YEAR</u>	<u>AUTHOR</u>	<u>SECTION</u>
1977	Gonde, J.J.	Biol. - Mitigation
1977	Beeman, O	Eco. - Development
1977	Cummings, T.E.	Biol. - Fish
1977	Fawver, B.	Biol. - Birds
1977	Jambor, N.H.	Biol. - General
1977	Jefferts, K.	Biol. - General
1977	Morgan, J.B.	Phys. Biol. Eco. Social
1977	Mullarkey, W.G.	Biol. - General
1977	National Oceanographic Atmosph. Adm.	Phys. - General
1977	Seton, Johnson, Odell	Eco. - Development
1977	Slotta, L.S.	Phys. Hydrologic Char.
1977	U.S. Geol. Survey	Phys. - General
1978	Baker, C.A.	Phys. - Water Quality
1978	Butler, H.L.	Phys. - Hydrologic Char.
1978	Cummings, E.	Biol. - Fish
1978	Fawver, B.	Biol. - Birds
1978	Gaumer, T.F.	Biol. - Invertebrate
1978	Gaumer, T.F.	Biol. - Invertebrate
1978	Gaumer, T.F.	Biol. - Invertebrate
1978	Graybill, M.R.	Biol. - Birds
1978	Johnson, J.A.	Biol. - Fish
1978	Miller, B.A.	Biol. - Fish
1978	Ore. Dept. of Environ- mental Quality	Phys. - Water Quality
1978	Pisciotta, R.J.	Biol. - Invertebrate
1978	Univ. of California Scripts Instit.	Phys. - Hydrologic Char.
1978	Zegers, P.	Biol. - General
1978	State Soil & Water Conser. Comm.	Phys. - Physical Alteration
1978	Ore. Coastal Zone Mgt. Assoc.	Biol. - General
1978	Roye, C.	Biol. - General
1978	Division of State Lands	Phys. - General
1978	Laderman, R.	Biol. - Mitigation
1978	Coos-Curry-Douglas Eco. Assoc.	Eco. - Development
1979	Giglio, D.	Eco. - Development
1979	Coos-Curry-Douglas Eco. Dev. Assoc.	Eco. - Development
1979	Hancock, D.R.	Biol. - Invertebrate
1979	Harris, D.W.	Phys. - Hydrologic Char.

<u>YEAR</u>	<u>AUTHOR</u>	<u>SECTION</u>
1979	McGie, A.	Biol. - Birds
1979	Thornburgh, L.	Biol. - Birds
1979	Coos-Curry-Douglas Eco. Dev. Assoc.	Eco. - Development
1980	Ogden, Beeman & Associates	Eco. - Development
1980	Coos-Curry-Douglas Eco. Dev. Assoc.	Eco. - Development
1980	Coos-Curry Council of Gov't/Coos Bay Inter-Agency Task Force	Eco. - Development
1980	Coos-Curry Council of Gov't/Coos Bay Inter-Agency Task Force	Social - Recreation
1981	OSC Marine Science	Biol. - Mitigation



10. COMMITTED AREA FINDINGS

(Note: the reduced pages are read in the numerical order shown in the chart below.)

1	3
2	4

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 24, R. 13, S. 02, 11, 14, 15  
B. Study Area E-2  
C. Acreage 44.5 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses  
 Generally Developed or  
 Generally Undeveloped

COMMENTS

Area consists of small developed parcels and encircled larger parcels adjacent to U.S. Highway 101. Several industrial parcels are also present in the area which attributes to the degree of development for commitment. A zoned Rural Center (RC) is also a large portion of the committed area.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES  
 NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- YES  
 NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

3. Public Facilities and Services

YES Is public water generally available to the subject area?

NO

YES Is public sewer generally available to the subject area?

NO

YES Is the subject area within a fire protection district?

NO

COMMENTS

Havey RFPD. Public water lines will probably be present in the area within the next ten years according to the Lees Bay North Bend Water Board.

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES  
 NO

6. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:  
 NO
- other "built or committed areas", or
  - "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is encircled by committed areas to the North and South.

CONCLUSION

Is the area generally "encircled"?

- YES  
 NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?  
 NO

5-10 acres

10-20 acres

more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

10-20 acres

20-40 acres

more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES  
 NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

Area consists of very small ownerships as well as larger (5-10 acres) parcels which are built upon for residential uses.

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

YES

Is the subject area generally surrounded on 3 or more sides by:

NO

i. other "built or committed area", or

ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by committed areas to the North and South. Haynes Slough to the north further acts as a buffer from the adjacent forest lands and agricultural lands.

CONCLUSION

Is the area generally "encircled"?

YES

NO

2. Neighborhood and Regional Characteristics

YES

Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

NO

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

A. Description Township 24, Range 13, S. 14, 15, 13, 22, 23, 24, J 12

B. Study Area E-3

C. Acreage 1100 acres

II. INFORMATION BASE

A. Existing Adjacent Uses

Generally Developed; or

Generally Undeveloped

COMMENTS

Area consists of developed parcels and encircled non-developed parcels along North Bay Drive and Haynes Slough Triplinton Co. Road. Parcels are generally less than 2 acres in size.

Tax lot 503 located in Section 24 has been proposed by Mike Rupp to be committed as well. The county has zoned this property Exclusive Farm Use and it does not appear to meet the criteria established in OAR 660-04-025 for commitment.

CONCLUSION

Do existing adjacent uses meet uses allowed by LCDC Goal 3 or 4 (practicable)?

YES

NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

YES

NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

3. Public Facilities and Services

YES

Is public water generally available to the subject area?

NO

YES

Is public sewer generally available to the subject area?

NO

YES

Is the subject area within a fire protection district?

NO

COMMENTS

North Bay RFD.

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

YES

NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

less than 5 acres

- 5-10 acres
- 10-20 acres
- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

- 10-20 acres
- 20-40 acres
- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

- 1 du per 2 acres or less

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 24, Range 13, Section 26
- B. Study Area E-5
- C. Acreage 40 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses 
  - Generally Developed; or
  - Generally Undeveloped

COMMENTS

Area consists of parcels ranging from 3 to 13 acres in size which are all built upon with the exception of Tax Lot 900.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES
- NO

Is the area physically developed or built upon to the extent that it satisfies the O.R. 660-04-025 standard?

- YES
- NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

- 1 du per 5 acres
- 1 du per 10 acres or more

COMMENTS

Generally there are 1 du per 2 acres or less occurring in the area. Larger parcels are present in the area but are lost to their value as resource lands due to the encirclement of existing development.

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES
- NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES
- NO

Is the subject area generally surrounded on 3 or more sides by:

- i. other "built or committed areas", or
- ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is encircled on two sides by Haynes Slough. Further, there are committed areas located to the North and South of the subject area.

CONCLUSION

Is the area generally "encircled"?

- YES
- NO

2. Neighborhood and Regional Characteristics

- YES
- NO

Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS  
North Bay RFPD.

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

- 5-10 acres
- 10-20 acres
- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

- 10-20 acres
- 20-40 acres
- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

- 1 du per 5 acres

- 1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES
- NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

BUILT OR COMMITTED LANDS WORK-SHEET

- I. DESCRIPTION OF AREA
  - A. Description Township 24, Range 13, Section 26, 35, 136
  - B. Study Area E-6
  - C. Acreage 144 acres
- II. ADJACENT USES
  - A. Existing Adjacent Uses
    - Generally Developed; or
    - Generally Undeveloped

COMMENTS

Area consists of developed parcels located adjacent to Old U.S. Highway 101. Approximately 77% of the parcels are presently in residential uses. Most of the lots are part of an old subdivision known as Glasgow Shore Acres.

CONCLUSION

- 1. Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 practicable?
  - YES
  - NO
- 2. Is the area physically developed or built upon to the extent that satisfies the OAR 660-04-025 standard?
  - YES
  - NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:
- NO
- i. other "built or committed areas", or
  - ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

The committed area is separated by Haynes Slough on one side and the other side consists of large commercial timber holdings (Weyerhaeuser Co).

CONCLUSION

Is the area generally "encircled"?

- YES
- NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?
- NO

5-10 acres

10-20 acres

more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

10-20 acres

20-40 acres

more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

YES

NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

1 du per 2 acres or less

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS

North Bay RFPD.

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

less than 5 acres

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of CAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of CAR 660-04-025.

BUILT OR COMMITTED LANDS WORK-SHEET

1. DESCRIPTION OF AREA

- A. Description Township 24, Range 13, Section 26, 27, 34
- B. Study Area E-7
- C. Acreage 90 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses
  - Generally Developed; or
  - Generally Undeveloped

COMMENTS

Area consists of a built and developed subdivision known as Sherwood Addition. A few parcels outside the subdivision are also included within the committed area due to their development.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES
- NO

Is the area physically developed or built upon to the extent that it satisfies the DAR (60-04-C25) standard?

- YES
- NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

3. Public Facilities and Services

Is public water generally available to the subject area?

YES

NO

Is public sewer generally available to the subject area?

YES

NO

Is the subject area within a fire protection district?

YES

NO

COMMENTS

North Bay RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

Is the subject area generally surrounded on 3 or more sides by:

- YES
- NO
  - i. other "built or committed areas", or
  - ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

The area is surrounded by Haynes Slough and North Slough.

CONCLUSION

Is the area generally "encircled"?

- YES
- NO

2. Neighborhood and Regional Characteristics

Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

- YES
- NO

5-10 acres

10-20 acres

more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

10-20 acres

20-40 acres

more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of CAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of CAR 660-04-025.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

YES

Is the subject area generally surrounded on 3 or more sides by:

NO

i. other "built or committed areas", or

ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

The area is surrounded on three sides by the Coos River Tidelands.

CONCLUSION

Is the area generally "encircled"?

YES

NO

2. Neighborhood and Regional Characteristics

YES

Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

NO

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

A. Description Township 25, Range 12, Section 19, 20, 29, & 31

B. Study Area 6-2

C. Acreage 345 acres

II. INFORMATION PAGE

A. Existing Adjacent Uses:  
 Generally Developed; or  
 Generally Undeveloped

COMMENTS

Area consists of generally developed parcels located adjacent to Coos River Tidelands. Parcels are for the most part quite small and do have dwellings on them. The area incorporates five different subdivisions all of which are developed.

Mike Rapp has prepared that a portion of this area which is within the Coos Bay Estuary Management Plan to be committed, but it does not meet the findings of CAR 660-04-025.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

YES

NO

Is the area physically developed or built upon to the extent that it satisfies the CAR 660-04-025 standard?

YES

NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

3. Public Facilities and Services

YES

Is public water generally available to the subject area?

NO

YES

Is public sewer generally available to the subject area?

NO

YES

Is the subject area within a fire protection district?

NO

COMMENTS

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

YES

NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

less than 5 acres



- 5-10 acres
- 10-20 acres
- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

- 10-20 acres
- 20-40 acres
- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

- 1 du per 2 acres or less

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 25, Range 12, Section 23, 26, 27, 28, 4-29
- B. Study Area G-3
- C. Acreage 0 acres committed

II. INFORMATION BASE

- A. Existing Adjacent Uses
  - Generally Developed; or
  - Generally Undeveloped

COMMENTS

Area consists of relatively undeveloped parcels adjacent to Caos River Tidelands. This area has been proposed by Mike Rupp to be committed but does not meet the requirements of OAR 660-04-025 to be committed.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES
- NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- YES
- NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

1

- 1 du per 5 acres
- 1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES
- NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES
- NO

Is the subject area generally surrounded on 3 or more sides by:

- i. other "built or committed areas", or
- ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

CONCLUSION

Is the area generally "encircled"?

- YES
- NO

2. Neighborhood and Regional Characteristics

- YES
- NO

Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

2

3. Public Facilities and Services

- YES Is public water generally available to the subject area??
- NO
- YES Is public sewer generally available to the subject area??
- NO
- YES Is the subject area within a fire protection district??
- NO

COMMENTS

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres.

- 1 du per 5 acres

- 1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES

- NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

- 5-10 acres

- 10-20 acres

- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

- 10-20 acres

- 20-40 acres

- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES

- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 25, Range 12, Section 26, 27, 34, 435
- B. Study Area G-4
- C. Acreage 292 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses- Generally Developed; or  Generally Undeveloped

COMMENTS

Area consists of parcels approximately five or so acres in size which are for the most part developed for residential purposes. Small ownerships of resource lands surround the committed area. Tax Lot 200 located in Section 27D has been requested by the property owner not to be included within the committed area due to its swamp-like characteristics.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES

- NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- YES

- NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:
- NO
- i. other "built or committed areas", or
  - ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by the Coos River Tidelands and other committed areas.

CONCLUSION:

Is the area generally "encircled"?

- YES  
 NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?
- NO

5-10 acres

10-20 acres

more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

10-20 acres

20-40 acres

more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

YES

NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

1 du per 2 acres or less

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS

CONCLUSION:

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES  
 NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

less than 5 acres

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 26, Range 13, Section 01, 02, & 13  
B. Study Area H-1  
C. Acreage 340 acres; 37% acres Committed

II. INFORMATION BASE

- A. Existing Adjacent Uses  
 Generally Developed; or  
 Generally Undeveloped

COMMENTS

Area consists of relatively small parcels which are developed to residential uses. Glasgow subdivision is included in the area.

Parcel located Section 01C, TL 2600 has been proposed by Mike Rupp for commitment. The 12 acre parcel does not have a dwelling on it and does not meet the requirements of OAR 660-04-025 for commitment.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES  
 NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- YES  
 NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

3. Public Facilities and Services

- YES Is public water generally available to the subject area?  
 NO  
 YES Is public sewer generally available to the subject area?  
 NO

- YES Is the subject area within a fire protection district?  
 NO

COMMENTS

North Bay RFPD.

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES  
 NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:

- NO  
i. other "built or committed areas", or  
ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded on the West and South by Coos Bay (Coos Bay) and to the South east by another committed area. There is also a committed area to the North of the subject area.

CONCLUSION

Is the area generally "encircled"?

- YES  
 NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?  
 NO

- 5-10 acres  
 10-20 acres  
 more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

- 10-20 acres  
 20-40 acres  
 more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES  
 NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

YES

Is the subject area generally surrounded on 3 or more sides by:

NO

i. other "built or committed areas", or

ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by the City of Coos Bay, Tidelands of Coos Bay and an adjacent committed area.

CONCLUSION

Is the area generally "encircled"?

YES

NO

2. Neighborhood and Regional Characteristics

YES

Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

NO

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

A. Description Township 25, Range 13, Section 12, 13, 1 24

B. Study Area H-2

C. Acreage 540 acres; 500 acre committed

II. INFORMATION BASE

A. Existing Adjacent Uses

Generally Developed; or

Generally Undeveloped

COMMENTS

Area consists of very small developed parcels many of which are portions of existing subdivisions. Area is adjacent to the City of Coos Bay and the Tidelands of Coos Bay.

Section 12 DC has been prepared by Mike Rupp for commitment, but due to the lack of development in the area it does not meet the requirements of OAR 660-04-025 for commitment.

CONCLUSION

Do existing adjacent user like uses allowed by LCDC Goal 3 or 4 impracticable?

YES

NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

YES

NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

3. Public Facilities and Services

YES

Is public water generally available to the subject area?

NO

YES

Is public sewer generally available to the subject area?

NO

YES

Is the subject area within a fire protection district?

NO

COMMENTS

North Coos RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

YES

NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

less than 5 acres

- 5-10 acres
- 10-20 acres
- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

- 10-20 acres
- 20-40 acres
- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

- 1 du per 2 acres or less

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 25, Range 13, Section
- B. Study Area H-3
- C. Acreage 160 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses 
  - Generally Developed; or
  - Generally Undeveloped

COMMENTS

Area consists of three developed subdivisions and a few adjacent small parcels which have for the most part been built upon.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES
- NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- YES
- NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

- 1 du per 5 acres
- 1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES
- NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:
  - i. other "built or committed areas", or
  - ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?
- NO

COMMENTS

Area is surrounded by the City of Coos Bay, Tidelands of Coos Bay and other committed areas.

CONCLUSION

Is the area generally "encircled"?

- YES
- NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?
- NO

3. Public Facilities and Services

YES Is public water generally available to the subject area?

NO

YES Is public sewer generally available to the subject area?

NO

YES Is the subject area within a fire protection district?

NO

COMMENTS

North Bay RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

YES

NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominantly:

less than 5 acres

5-10 acres

10-20 acres

more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

10-20 acres

20-40 acres

more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the land's actual use, contribute to a conclusion that the area is "committed"?

YES

NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

1 du per 2 acres or less

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

A. Description Township 24, Range 12, Section 06, 06, 07, 10 &

B. Study Area K-3

C. Acreage 310 acres

II. INFORMATION BASE

A. Existing Adjacent Uses

Generally Developed; or

Generally Undeveloped

COMMENTS

Area consists of parcels which are developed to residential uses. Two subdivisions are included within the study area.

Area proposed by Mike Rupp for commitment does meet the OAR 660-04-025 standards. It has been zoned residential by the County and is surrounded by developed residential areas.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

YES

NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

YES

NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:
- NO
- other "built or committed areas", or
  - "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by Catching Slough on the North and East. The South constitutes another committed area.

CONCLUSION

Is the area generally "encircled"?

- YES  
 NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?
- NO

5-10 acres

10-20 acres

more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

10-20 acres

20-40 acres

more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

YES

NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

1 du per 2 acres or less

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS

Summer RFD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES  
 NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

less than 5 acres

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.



BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

A. Description Township 26, Range 12, Section 07, 17, & 18

B. Study Area K-4

C. Acreage 450 acres, 431 acres committed

II. INFORMATION BASE

- A. Existing Adjacent Uses
- Generally Developed; or
  - Generally Underdeveloped

COMMENTS

Area consists of developed parcels located west of Catching Slough off of Eastside Sumner Co. Road. Parcels are generally 5 acres or less in size and built upon.

Mike Rupp has prepared committed for a few parcels located East of Catching Slough. Tax Lots 100, 200, and 400 which are zoned RR-5 by the county do meet the requirements of OAR 660-04-025 while Tax Lot 200 (NEM, NUY) zoned Exclusive Farm Use (EFU) does not.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES
- NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- YES
- NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS

Sumner RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:
  - i. other "built or committed areas", or
  - ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?
- NO

COMMENTS

Area is surrounded by Catching Slough to the East, a committed area to the North, and a committed area to the South.

CONCLUSION

Is the area generally "encircled"?

- YES
- NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?
- NO

- 5-10 acres
- 10-20 acres
- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

- 10-20 acres
- 20-40 acres
- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

- 1 du per 2 acres or less

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III.

ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

YES Is the subject area generally surrounded on 3 or more sides by:

NO

i. other "built or committed areas", or

ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

The area is surrounded by Catching Slough to the West, a committed area to the Northwest and a committed area to the Southwest.

CONCLUSION

Is the area generally "encircled"?

YES

NO

2. Neighborhood and Regional Characteristics

YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

NO

BUILT OR COMMITTED LANDS WORK-SHEET

DESCRIPTION OF AREA

A. Description <sup>Sections</sup> 20, 21, and 28 (T26, R12)

B. Study Area N-5

C. Acreage 265 acres

II. INFORMATION BASE

A. Existing Adjacent Uses

Generally Developed; or

Generally Undeveloped

COMMENTS

Area consists of parcels approximately 5 acres or less in size which are for the most part developed to residential uses. Area is located East of Catching Slough with the exception of a small development west of the Slough.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

YES

NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

YES

NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in 1. above.

3. Public Facilities and Services

YES Is public water generally available to the subject area?

NO

YES Is public sewer generally available to the subject area?

NO

YES Is the subject area within a fire protection district?

NO

COMMENTS

Summer RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

YES

NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

less than 5 acres

BUILT OR COMMITTED LANDS WORK-SHEET

- 5-10 acres
- 10-20 acres
- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

- 10-20 acres
- 20-40 acres
- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

- 1 du per 7 acres or less

I. DESCRIPTION OF AREA

- A. Description Township 26, Range 12, Section 29130
- B. Study Area K-6
- C. Acreage 105 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses
  - Generally Developed; or
  - Generally Undeveloped

COMMENTS

Area consists of small developed parcels located adjacent to Coos City Summer Co. Road.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES
- NO

Is the area physically developed or built upon to the extent that it satisfies the CAR 660-04-025 standard?

- YES
- NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

- 1 du per 5 acres
- 1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES
- NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of CAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of CAR 660-04-025.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES
- NO

Is the subject area generally surrounded on 3 or more sides by:

- i. other "built or committed areas", or
- ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by Catching Slough to the East, a committed area to the North, and a committed area to the SouthEast.

CONCLUSION

Is the area generally "encircled"?

- YES
- NO

2. Neighborhood and Regional Characteristics

- YES
- NO

Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS

Summer RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES
- NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

- 5-10 acres
  - 10-20 acres
  - more than 20 acres
- The parcel size and ownership pattern of the adjacent surrounding area is predominately:
- 10-20 acres
  - 20-40 acres
  - more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 26, Range 12, Section 29, 32, and 33
- B. Study Area K-7
- C. Acreage 90 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses <sup>1</sup>
  - Generally Developed; or
  - Generally Undeveloped

COMMENTS

Area consists of small developed groups of parcels located adjacent to small resource land holdings. Generally, the committed parcels have dwellings on them. The town of Summer is included in this area (form RD)

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES
- NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- YES
- NO

<sup>1</sup> NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:
- NO
- other "built or committed areas", or
  - "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by Catching Slough on the West, a committed arm on the South, and a committed area to the North.

CONCLUSION

Is the area generally "encircled"?

- YES
- NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?
- NO

- 5-10 acres
- 10-20 acres
- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

- 10-20 acres
- 20-40 acres
- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

- 1 du per 2 acres or less

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS

Summer RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

6. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

- 1 du per 5 acres
- 1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES
- NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

A. Description Township 26, Range 13, Section 02, 03, 10, 11, & 14

B. Study Area L-1

C. Acreage 932 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses
[checked] Generally Developed; or
[ ] Generally Undeveloped

COMMENTS

Area consists of areas which are built and developed to residential uses as well as areas which are not developed but have lost their resource value due to the encirclement of residential and urban uses.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- [checked] YES
[ ] NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- [checked] YES
[ ] NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

3. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- [checked] YES Is the subject area generally surrounded on 3 or more sides by:
[ ] NO
i. other "built or committed areas", or
ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by urban growth areas on 3 1/2 sides as well as the Isthmus Slough to the East. The small southwest uncircled area is a large commercial timber holding which would inhibit future development in that area.

CONCLUSION

Is the area generally "encircled"?

- [checked] YES
[ ] NO

2. Neighborhood and Regional Characteristics

- [checked] YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?
[ ] NO

3. Public Facilities and Services

- [checked] YES Is public water generally available to the subject area?
[ ] NO
[checked] YES Is public sewer generally available to the subject area?
[ ] NO
[checked] YES Is the subject area within a fire protection district?
[ ] NO

COMMENTS

Libby RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- [checked] YES
[ ] NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- [checked] less than 5 acres

- [ ] 5-10 acres
[ ] 10-20 acres
[ ] more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

- [checked] 10-20 acres
[ ] 20-40 acres
[ ] more than 40 acres

COMMENTS

Parcels that are developed tend to be less than five acres in size, while undeveloped parcels are much larger. Adjacent surrounding parcels tend to be at urban densities.

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- [checked] YES
[ ] NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- [checked] 1 du per 2 acres or less

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

I. DESCRIPTION OF AREA

A. Description Township 26, Range 13, Section 01, 12, 13, 24, & 25

B. Study Area L-2

C. Acreage 1055 acres

II. INFORMATION BASE

A. Existing Adjacent Uses

Generally Developed; or

Generally Undeveloped

COMMENTS

Area consists of several small parcels and subdivisions along Oliver, Barber Co. Road. Most parcels are less than five acres in size and are developed to residential uses.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

YES

NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

YES

NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

YES

Is the subject area generally surrounded on 3 or more sides by:

NO

i. other "built or committed areas", or

ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by Isthmus Slough and other committed areas.

CONCLUSION

Is the area generally "encircled"?

YES

NO

2. Neighborhood and Regional Characteristics

YES

Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

NO

3. Public Facilities and Services

YES

Is public water generally available to the subject area?

NO

YES

Is public sewer generally available to the subject area?

NO

YES

Is the subject area within a fire protection district?

NO

COMMENTS

Libby RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

YES

NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

less than 5 acres

- 5-10 acres
- 10-20 acres
- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

- 10-20 acres
- 20-40 acres
- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

YES

NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

- 1 du per 2 acres or less

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

BUILT OR COMMITTED LANDS WORK-SHEET

DESCRIPTION OF AREA

- A. Description Township 26, Range 13, Section 22, 23, 24, 27, 134
- B. Study Area L-3
- C. Acreage 266 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses
  - Generally Developed; or
  - Generally Undeveloped

COMMENTS

Area consists of scattered developed parcels located adjacent to Highway 42 and U.S. Highway 101. Most parcels are built upon and thus committed to residential uses.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

YES

NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

YES

NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

YES Is the subject area generally surrounded on 3 or more sides by:

NO

- i. other "built or committed areas", or
- ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Areas are surrounded by Tethymus Slough and large commercial timber holdings which would make future inland development difficult.

CONCLUSION

Is the area generally "encircled"?

YES

NO

2. Neighborhood and Regional Characteristics

YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

NO



3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS  
Green Acres RFPD.

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

- 5-10 acres
- 10-20 acres

more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

- 10-20 acres
- 20-40 acres

more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

- 1 du per 5 acres

- 1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES
- NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 26, Range 14, Section 02, 03, 04, 10, 11
- B. Study Area M-1
- C. Acreage 474 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses
  - Generally Developed; or
  - Generally Undeveloped

COMMENTS

Area consists of several small parcels which are built and developed to residential uses as well as areas which are not developed but have lost their resource value due to the encroachment of residential and urban uses. A couple of developed subdivisions are included in the area.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES
- NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- YES
- NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:
- NO
- i. other "built or committed areas", or
  - ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by urban development to the East, the Pacific ocean to the North and large resource land holdings to the South.

CONCLUSION

Is the area generally "encircled"?

- YES  
 NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?
- NO

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS

Charleston RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES  
 NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

- 5-10 acres  
 10-20 acres  
 more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

- 10-20 acres  
 20-40 acres  
 more than 40 acres

COMMENTS

Developed areas are of an urban density.

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES  
 NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

- 1 du per 5 acres  
 1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES  
 NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

BUILT OR COMMITTED LANDS MORE-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 26, Range 14, Section 01, 11, 12, 13, 14
- B. Study Area M-2
- C. Acreage 535 acres

II. INFORMATION BASE

- A. Existing Adjacent Uses
- Generally Developed; or
- Generally Undeveloped

COMMENTS

Area consists of several small parcels which are built and developed to residential uses as well as areas which are not developed to but have lost their resource value due to the encirclement of residential and physical features.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES
- NO

Is the area physically developed or built upon to the extent that it satisfies the O.A. 660-04-025 standard?

- YES
- NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

- YES Is the subject area generally surrounded on 3 or more sides by:
- NO
- i. other "built or committed areas", or
  - ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

Area is surrounded by the South Slough on three sides.

CONCLUSION

Is the area generally "encircled"?

- YES
- NO

2. Neighborhood and Regional Characteristics

- YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?
- NO

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS

Charleston RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

5-10 acres

10-20 acres

more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

10-20 acres

20-40 acres

more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES
- NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

- 5-10 acres
- 10-20 acres
- more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominantly:

- 10-20 acres
- 20-40 acres
- more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

YES

NO

Dwelling Unit Density

The existing dwelling unit density of the subject area is predominantly:

- 1 du per 3 acres or less

- 1 du per 3 acres
- 1 du per 10 acres or more

COMMENTS

Dwelling unit density is less for the developed parcels than the non-developed parcels.

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

- Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.
- Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

- A. Description Township 27, Range 13, Section 01, 02 & 11
- B. Study Area P-1
- C. Acreage 520 acres Committed

II. INFORMATION BASE

- A. Existing Adjacent Uses
  - Generally Developed; or
  - Generally Undeveloped

COMMENTS

Area consists of developed parcels approximately 5 acres and less in size surrounding and including the town of Green Acres. A portion of the area (30 acres) has been prepared by Mike Rapp for commitment. The area has been zoned S-40 by the County and does not meet the requirements of OAR 660-04-025 for commitment.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

YES

NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

YES

NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

B. OTHER RELEVANT FACTORS CONTRIBUTING TO COMMITMENT

1. Encirclement

YES

NO

Is the subject area generally surrounded on 3 or more sides by:

- i. other "built or committed areas", or
- ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

CONCLUSION

Is the area generally "encircled"?

YES

NO

2. Neighborhood and Regional Characteristics

YES

NO

Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?

3. Public Facilities and Services

- YES Is public water generally available to the subject area?
- NO
- YES Is public sewer generally available to the subject area?
- NO
- YES Is the subject area within a fire protection district?
- NO

COMMENTS  
Green Acres RFPD.

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?

- YES
- NO

4. Parcel Size and Ownership Patterns

The parcel size and ownership pattern of the subject area is predominately:

- less than 5 acres

5-10 acres

10-20 acres

more than 20 acres

The parcel size and ownership pattern of the adjacent surrounding area is predominately:

10-20 acres

20-40 acres

more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership patterns of the subject and adjacent surrounding area, when considered together in relation to the lands' actual use, contribute to a conclusion that the area is "committed"?

- YES

NO

5. Dwelling Unit Density

The existing dwelling unit density of the subject area is predominately:

- 1 du per 2 acres or less

1 du per 5 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

- YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.

BUILT OR COMMITTED LANDS WORK-SHEET

I. DESCRIPTION OF AREA

A. Description Township J7, Range 13, Section 02, 03, 09, & 10

B. Study Area P-2

C. Acreage 310 acres

II. INFORMATION BASE

A. Existing Adjacent Uses

- Generally Developed; or
- Generally Undeveloped

COMMENTS

Area consists of developed parcels located adjacent to Highway 42.

A portion of the area (approximately 310 acres) has been proposed by Mike Rupp for commitment. This area has been zoned SW-10 and EF-10 by the County and do not meet the requirements of OAR 660-04-025 for commitment.

CONCLUSION

Do existing adjacent uses make uses allowed by LCDC Goal 3 or 4 impracticable?

- YES

NO

Is the area physically developed or built upon to the extent that it satisfies the OAR 660-04-025 standard?

- YES

NO

NOTE: "Existing Adjacent Uses" includes all uses in the subject area described in I. above.

**1. Public Facilities and Services**

YES Is the subject area generally surrounded on 3 or more sides by:  
 NO  
i. "built or committed areas", or  
ii. "natural boundaries or other buffers separating the exception area from adjacent resource land"?

COMMENTS

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?  
 YES  
 NO

**2. Neighborhood and Regional Characteristics**

YES Do general neighborhood and regional characteristics contribute to a conclusion that the area is "committed"?  
 NO

**1. Public Facilities and Services**

YES Is public water generally available to the subject area?  
 NO  
 YES Is public sewer generally available to the subject area?  
 NO  
 YES Is the subject area within a fire protection district?  
 NO

COMMENTS

Green Acres RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?  
 YES  
 NO

**3. Parcel Size and Ownership Patterns**

The parcel size and ownership pattern of the subject area is predominantly:  
 less than 5 acres

YES  
 NO  
 YES Is public sewer generally available to the subject area?  
 NO  
 YES Is the subject area within a fire protection district?  
 NO

COMMENTS

Green Acres RFPD

CONCLUSION

Do available public facilities and services contribute to a conclusion that the area is "committed"?  
 YES  
 NO

**4. Parcel Size and Ownership Patterns**

The parcel size and ownership pattern of the subject area is predominantly:  
 less than 5 acres

**3. Parcel Size and Ownership Patterns**

The parcel size and ownership pattern of the subject area is predominantly:  
 less than 5 acres  
 5-10 acres  
 10-20 acres  
 20-40 acres  
 more than 40 acres

COMMENTS

CONCLUSION

Does the parcel size and ownership pattern of the subject area, when considered in relation to the land's actual use, contribute to a conclusion that the area is "committed"?  
 YES  
 NO

**5. Dwelling Unit Density**

The existing dwelling unit density of the subject area is predominantly:  
 1.50 per 2 acres or less

1 du per 10 acres

1 du per 10 acres or more

COMMENTS

CONCLUSION

Does the predominant dwelling unit density of the subject area contribute to a conclusion that the area is "committed"?

YES

NO

III. ULTIMATE CONCLUSION

Based upon a careful consideration of the information base outlined above, it is concluded that the subject area is:

Irrevocably committed to an extent that satisfies the standards of OAR 660-04-025.

Physically developed or built upon to an extent that satisfies the standards of OAR 660-04-025.