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COOS BAY ESTUARY MANAGEMENT PLAN
~~2019~~ 2023 REVISION

Part 2 – Inventories and Factual Base

by:

Coos Bay Estuary Advisory Commission
Jack L. Beebe, Sr., Chairman

Staff assistance by:

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July, 1984

Coos Bay Estuary Management Plan

Part 2 Inventory and Factual Base

By:

COOS BAY ESTUARY ADVISORY COMMISSION (1983)

Jack L. Beebe, Sr., Chairman - Coos County

Staff assistance by: Coos County Planning Department

Bill Grile, AICP - Director

With special assistance from

Coos-Curry-Douglas Business Development Corporation
Oregon Economic Development Department
Oregon International Port of Coos Bay
Coos-Curry Council of Governments
Wilsey and Ham
CH_2M Hill

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1. INTRODUCTION

In 2019, Part 2 of the Coos Bay Estuary Management Plan was partially modified and updated to be consistent with the best information available at the time~~.~~. ~~The following section~~Sections 1 through 7 consist~~s~~ of original pieces of the Part 2 that have been conserved for the purposes of consistency and goal compliance~~.~~. Supplemental factual information is provided in Section 8: Communities, Lands & Waterways Data Source and in Section 9: Coos Estuary and Shoreland Atlas.

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 2~~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 3 addresses the Coastal Shoreland "Values" Requiring Mandatory Protection under State Planning Goal #17. ~~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.~~

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~~Section 46 presents a special moorage element that sets forth considerations related to long-range commercial recreational moorage development on Coos Bay.~~

Section ~~5~~46 presents beaches and dunes element based upon the requirements and considerations of LCDC Goal 18.

Section 5 presents a special moorage element that sets forth considerations related to long-range commercial recreational moorage development on Coos Bay.

Section 6~~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 7~~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 8 is the Communities, Lands & Waterways Data Source that presents an overview of the physical, environmental and socio-economic characteristics of the Coos Bay estuary region. It also 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. Furthermore, it 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 9 is an appendix which contains the Coos Estuary and Shoreland Atlas as supplemental materials that support Part 2.

~~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,

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social and economic considerations, which, in turn, provide a basis for the rational decisions that constitute the Coos Bay Estuary Management Plan.

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23. COASTAL SHORELAND BOUNDARY IDENTIFICATION AND FINDINGS

23.1 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".

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23.2 "PLANNING AREA"

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

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> "Aall 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 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. feet 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.

23.3 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 Department 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.

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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~~Instability." These include:

(a) Areas of slump topography~~ the Coos Bay Coastal Shoreland Boundary.]~~ [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: a; 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 is 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 make on-site determinations of the precise location of the boundary in many cases, particularly regarding riparian vegetation or flood hazard.

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23.4 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 Boat ramp 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

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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

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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

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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 the 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 ~~A1~~ 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 S~~s~~lough 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

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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 ~~waterdependent~~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

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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 waste holding 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

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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

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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~~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~~100-year floodplain or riparian vegetation the head of tide.

23.5 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.

4.3 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~~in the Identification section shall be protected." (Emphasis added) (LCDC Goal #17).

~~it~~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~~have:

(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~~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, ~~i~~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

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are a surface expression of the ~~aquifers~~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 marches north and south of the waste treatment lagoon about 200 and 250 acres respectively, ~~arena~~ and are an extension of similar and more extensive areas to the north ~~i~~in the Oregon Dunes National Recreation Area and outside the Coastal Shoreland Boundary of the Coos Bay Estuary. They are similarly ~~i~~important aquifers charge areas which fill with water ~~in~~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 ~~i~~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 C~~c~~reek watershed and is frequently filled with water during the rainy season. Extensive upstream and downstream areas have been filled for the Pony V~~v~~illage 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

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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 J communication, 12/81):

W~~w~~etlands 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.~~,~~ W~~w~~etlands 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.~~,~~ W~~w~~hile 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.

Wwetlands serve the needs of wildlife in different ways., Iinsects, amphibians and other small animal life thrive in wetlands. This abundant source of food attracts the birds and mammals., Wwetlands 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 tain which they probe with their bills for food. Some birds utilize both the estuary and freshwater wetlands, although 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 spitSpit., Wwildlife 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", lists 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., Ssmaller, 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 Weyerhauser 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, D3V.S Slough, North Slough and Catching Slough., certain Certain other areas are simply a continuation of tidal marshes, but are above head of tide and saline influence. Examples occur in south South Slough on Talbot and John B. creeksCreeks. One site on North Slough is a former estuarine marsh which has been isolated by the Southern Pacific railroad berm. Because of their locator and low elevation, a number of these wetlands have some potential for restoration to estuarine influence and are identified in the Special Mitigation/Restoration Element. ~~(Section 80. as mentioned" in section 4.3.2,~~ tThe 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~~ federal status is currently undetermined. The North Spit appears to support the largest snowy plover population on the Oregon Coast (Corps of Engineers, 1976). ~~I~~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 ~~i~~s unknown, broods of chicks have been sighted on the spoil areas north of the end of the North ~~S~~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 ~~i~~s 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). ~~I~~it has also been found necessary to exclude off-road vehicles from the beach at the southern tip of the Spit during nesting season.~~,~~ O~~o~~nly 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 ~~S~~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 heron 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~~ A~~a~~bandonment of rookeries~~y~~ 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

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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~~ contact 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~~ three federally recognized Indian Tribes ~~i~~in Coos County: the C~~c~~onfederated Tribes of Coos, Lower Umpqua, & Siuslaw Indians; ~~and~~ the Coquille Indian Tribe; and the Confederated Tribes of Siletz Indians. 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 are maintained by the Planning Department, in collaboration with the SHPO and the local Tribes, where such exact Information can be found. T~~;~~hey are 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~~ contact human occupation and use of the estuary environment was extensive~~,~~; occurring virtually everywhere along the shores of the bay. I~~i~~n 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 statues, 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~~ contact or historic human remains are buried.
- Fishweir. 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~~ contact human use or occupation is present, but not in sufficient amount to determine the exact nature or extent of use of the site.

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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 i~~I~~nclude historic, geologic~~,~~ and botanical sites, which are~~;~~ also given numbers and indicated within highlighted map sections.)

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Table 3.3.4.1: Coos Bay Estuary Cultural Resources

Location Number	Township Range Section Number	Site Characteristic One	Site Characteristic Two	Site Characteristic Three
1	24S 13 W 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 12 W 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	
40	27S 13W 2	BURIAL		

4.3.5 HISTORIC SITES

There are four historic sites within the Coastal Shorelands Boundary of Ceoos 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 it is currently closed. This is the oldest continuously operating mill in Oregon, with the building dating from 1884.

• U.S. Life-Saving Sstation: This is the original Coast Guard life-saving station on the North Spit, about two miles north of Charleston. I, it dates from 1891. All that remains are the shell of the building and a dilapidated slip.

• U.S. Life-Ssaving Sstation Boat House: The boat house dates from 1916 and is located at the west end of the Charleston Mmain Sstreet., 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.

3.3.6 COASTAL HEADLANDS AND "EXCEPTIONAL"" AESTHETIC RESOURCES

There is only one coastal headland iidentified 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 Sspit, parts of the Barview shore, South Slough, Catching Slough and the Coos/Mlllicoma systems, none of them can be said to possess truly exceptional scenic qualities.

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4 BEACHES AND DUNES

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.

4.2. 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 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 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:

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"~~beaches~~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~~landforms to:

"~~sustain~~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.)

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

(i) ~~specifying~~ Specifying appropriate findings for quasi-judicial decisions, plans and ordinances,

(ii) ~~prohibiting~~ Prohibiting development in specific hazard areas,

(iii) ~~regulating~~ Regulating adverse actions, and

(iv) ~~providing~~ 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) T~~t~~ype of use and possible adverse effects of the use on the site and adjacent areas;~~,~~

b) ~~stabilization~~ Stabilization program and planned maintenance of new and existing vegetation~~,~~;

c) ~~methods~~ Methods of protecting surrounding areas from adverse effects of development; and

d) ~~hazards~~ 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~~ Destruction of desirable vegetation~~,~~;

b) ~~exposure~~ Exposure of stable and conditionally stable areas to erosion~~,~~;~~,~~ and

c) ~~construction~~ Construction of shore structures ~~which~~ that 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~~saltwater 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~~ federal agencies have administrative authority and/or permitting authority In these dune areas:

- ~~state~~ Oregon ~~water~~ Water Resources Department - Develops and administers State water resource policies.

- ~~Division~~ Department of State Lands - Manages State-owned waterways; administers removal and fill permit law; reviews beach improvement permits.

- U.S. Army ~~corps~~ 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~~ Spit which are under Federal ownership.

- ~~State~~ Oregon Department of Geology and Mineral ~~industries~~ Industries ~~-i~~ssues permits for certain surface mining activities and sets standards for reclamation.

- ~~State~~ Oregon 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.

4.3 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."]~~.~~

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Table 4.4.1 Sand Dune 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~~ which 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 commented 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

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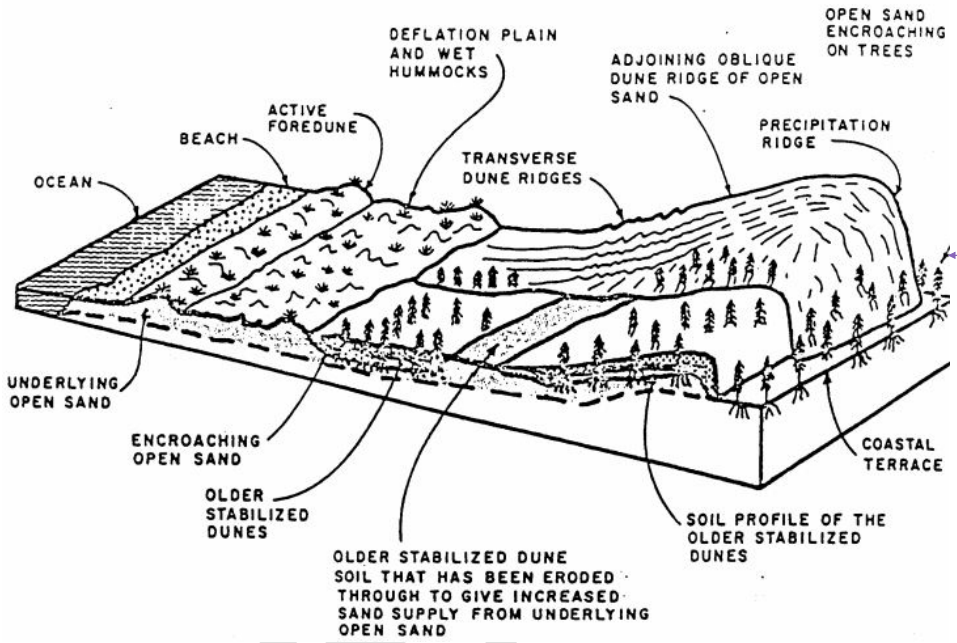
FIGURE 4.4.1
Typical dunes Units.



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As noted above, the source which identifies these dune forms and establishes the terminology is "Beaches and Dunes of the Oregon ~~coast~~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 C~~c~~oos Bay Estuary coastal shorelands boundary are found primarily on the North ~~spit~~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 westside 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 i~~I~~nterdune 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~~Marsh. Ridges of stabilized dune (DS) and open sand dune (OS) run north/south between the i~~I~~nterdune 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~~ that 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 Ft. 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 NATURAL HAZARDS AND PROTECTION MEASURES

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~~S~~and 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.

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(ii) Ocean flooding of deflation plains due to undercutting or overtopping of foredunes.

(iii) High water tables.

Wind erosion and deposition:

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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~~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.

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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~~,~~ W~~but w~~ith 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.

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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~~,~~ ~~I~~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 and 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~~,~~ ~~I~~in C~~c~~oos 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 measures 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, although 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~~ are 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

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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 S~~s~~pit. 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 air photos with 5-foot interval contours produced by the Corps of Engineers [see also North Bay Marine industrial Park DEIS, Corps of Engineers, ~~19811~~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~~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 year~~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.~~,~~ W~~w~~hile 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.~~,~~ W~~w~~inds 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.

4.5 W~~W~~ATER 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 S~~s~~pit 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). T~~t~~he Coos Bay/North Bend ~~water~~ 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~~ Water Board currently pumps only 7 mgd or less from the dunes from 18 well~~-~~s 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.~~,~~ ~~i~~If this pressure is lowered too far, a wedge of

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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~~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 dune's 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~~ 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~~ 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~~ 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." ~~I~~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.

4.6 RECREATIONAL USES

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The dunes of the North Spit are a popular area for dispersed outdoor recreation use. C~~c~~ommon 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's future marine industrial site. Beyond this point, access is by trail only, or by boat. Alt~~T~~hough the road is partially county-maintained, access is controlled by Roseburg Lumber C~~c~~ompany, 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~~ 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.

4.7 OTHER ECONOMIC VALUES

~~sand~~ 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 ~~i~~is clean, high in silicon and of good quality for glass making. This use is expected to continue.

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4.8 WILDLIFE HABITATS

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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~~ Values Requiring Mandatory Protection."

4.9 GENERAL DEVELOPMENT POTENTIAL OF DUNES

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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, I~~i~~mplementation 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
		Unsuitable for Development
Active foredune	FDA	Highly unstable features; hazards include wave over-topping, undercutting and breaching of foredunes, ocean flooding of deflation plain~~.~~. Suitable for residential, commercial, or industrial structures.
Recently Stabilized foredunes*	FD	
Wet Deflation Plains + beaches	WDP	
		Limited Suitability for Development
Open dune sand	OS	Development can have adverse effects on adjacent area 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.
Active Dune Hummocks	H	
Open Dune Sand Conditionally Stable	OSC	
Dune Complex	DC	
Younger Stabilized Dunes	DS	
		Few or no constraints
Older Stabilized dunes	ODS	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

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5.0 SPECIAL MOORAGE ELEMENT

5.1 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

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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

5.2 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 the 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

Transient Moorage

[Length of a visit is less than one week; availability is variable, depending on season and other factors.]

Total commercial boat visits (Jan. - Sep. 1981)	535 visits
Total recreational boat visits (Jan. - Sep. 1981)	146 visits

HANSON'S LANDING (Charleston)

Commercial moorage	+- 40 boats
Recreational moorage	+- 60 boats

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 95 boats, although present covered boat storage in the storage building has 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.

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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'	2371	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%*

*Cumulative length is the sum of the lengths of all boats currently moored.

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CHARLESTON BOAT BASIN MOORAGE STATISTICS					
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%

CHARLESTON BOAT BASIN MOORAGE STATISTICS					
4. Cumulative length of Recreational Vessels in Permanent Moorage					
FOOT CLASS	1979	1981	2-YEAR % INCREASE (DECREASE)	% OF 1979 TOTAL	% OF 1981 TOTAL
Up to 16'	14'	14'	0	"1%"	"1%"
16'-26'	2481'	1971'	-21%	67%	71%
+26'	1190'	779'	-35%	32%	28%
TOTALS	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					
TYPE OF MOORAGE	1979	1981	2-YEAR % INCREASE (DECREASE)	% OF 1979 TOTAL	% OF 1981 TOTAL
Commercial boats (number)	305	324	6%	67%	74%
Recreational boats (number)	151	112	-26%	33%	26%
TOTAL	456	436	-4%	100%	100%
Commercial boats (cumulative length)	11398'	12719'	12%	76%	82%
Recreational boats (cumulative length)	3585'	2764'	25%	24%	18%
TOTAL	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 paces 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 high, boats can temporarily be tied alongside 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 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.

5.3. PROJECTION OF NEED

5.3.1 INTRODUCTION

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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."

5.3.2 THE STATE-WIDE GOALS

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5.3.2.1 COMMERCIAL FISHING

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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 States
- #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 a particularly direct requirement:

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> "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.

5.3.2.2 RECREATIONAL MOORAGE

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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.

5.3.3 PRESENT MOORAGE PROBLEMS AND OPPORTUNITIES

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5.3.3.1 COMMERCIAL FISHING MOORAGE

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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.

5.3.3.2 RECREATIONAL MOORAGE

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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 areas (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	0.1%	NA
TOTAL	5371	100%	6094	100%	5830	100%	8.5%
Up to 16'	NA	-	NA	-	3679	63.1%	NA
16' +	1941	36%	2234	36.90%	2151	36.9%	10.80%
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 (DLCD), contained a survey of moorage and launch facilities as summarized below:

COUNTY	ESTUARY	(CITY)	Permanent Recreational Moorage Slips (Ocean Access)	% OF TOTAL
Tillamook	Tillamook Bay	Tillamook	742	18.50%
Lincoln	Yaquina Bay	Newport	1047	26.10%
Lane	Siuslaw	Florence	344	8.60%
Douglas	Umpqua	Reedsport	320	15.40%
Coos	Coos Bay	Coos Bay/North Bend	201	5%
Curry	Rogue	Gold Beach	227	5.70%
Curry	Chetco	Brookings	684	17%
Others			4,015	100%

[NOTE: Data excludes Astoria (Columbia River estuary)]

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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)]:

ESTUARY	COUNTY CENSUS DEVISION (& CITY)	POP.
Yaquina Bay	Agate Beach CCD (including Newport) & Toledo CCD (including Toledo)	15,172
Tillamook Bay	Tillamook CCD (including City of Tillamook)	10,090
Siuslaw	North Siuslaw CCD (including Florence)	7,099

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 l/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~~,~~ and 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~~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.

5.3.4 QUANTIFYING THE NEED FOR MOORAGE

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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.

5.3.4.1 COMMERCIAL FISHING MOORAGE

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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].

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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 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.

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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 CCD- 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						
	Commercial			Residential			
	Up to 30'	30'-50'	Over 50'	Up to 6'	16' to 26'	Over 26'	Sail-Boats
Annual Growth	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~~estuary. Projection of future numbers of boats first requires a summation of this inventory's total commercial boats (1981), as follows:

Commercial boats	-	1981
up to 30'	=	191(a)
30' to 50'	=	207(b)
+ 50’	=	57
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.

Total length of commercial boats	-	1981
up to 30'	=	4928’(c)
30' to 50'	=	8114’(c)
+ 50’	=	3760’
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(d) - 2000AD

up to 30'	=	181 x 3.617(d)	= 691
30' to 50'	=	207 x 2.437(d)	= 505
+ 50'	=	57 x 3.193(d)	= 182
TOTAL	=		1378

Projected Total Length of Commercial Boats(d)-2000 A.D.

up to 30'	= 4928' x 3.617(d)	= 17825'
30' to 50'	= 8114' x 2.437(d)	= 19774'
50'	= 3760' x 3.193(d)	= 12006'
TOTAL	=	49605'

(d) Multipliers are based on the following formula:

(l+r)nr) n Po = Pn

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)

Po = 1981 total

Pn = 2000 A.D. total (n years)

(l+r)nr) n = 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."

5.3.4.2 RECREATIONAL FISHING MOORAGE

The arguments extensively employed in the previous section to set the stage for selection of the DLCD-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

Recreational boats (in-water moorage) – 1981

up to 16'	=	1
16' to 26'	=	117(e)
+ 26’	=	54(f)
Sailboats	=	NA
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)
Sailboats	=	NA
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(i)	= Negligible
16' to 26'	= 117 x 2.766(i)	= 324
+ 26'	= 54 x 1.786(i)	= 97
Sailboats	= NA x 23.591(i)	= (j)
TOTAL		= 421

Projected Total Length of Recreational Boats (in-water) - 2000 A.D.

up to 16'	= 14' x 1.378(i)	= Negligible
16' to 26'	= 2652' x 2.766(i)	= 7335.4'
+ 26'	= 1754' x 1.786(i)	= 3132.6
Sailboats	= N.A. x 23.591(i)	= (j)
TOTAL		=10,468.0'

(i) Multipliers are based on the following formula:

(I+~~r)n~~r) n Po = Pn

Where:

r = annually compounded growth rate (ECO)
(1.017 for boats up to 16')

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(1.055 for boats 16' to 26')
(1.031 for boats +26')
(1 .181 for sailboats)

n = number of years (19)
Po = 1981 totals
Pn = 2000 A.D. totals (n years)
(I+~~r)n~~r) n = 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 exists in many estuaries at the time of writing of the ECO study, by 1981 the situation had changed ~~dramtiocally~~dramatically: waiting lists had ~~disappeared, and~~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 DLCD 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.

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- 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].

5.3.4.3 CONVERTING BOAT PROJECTIONS INTO MOORAGE NEEDS

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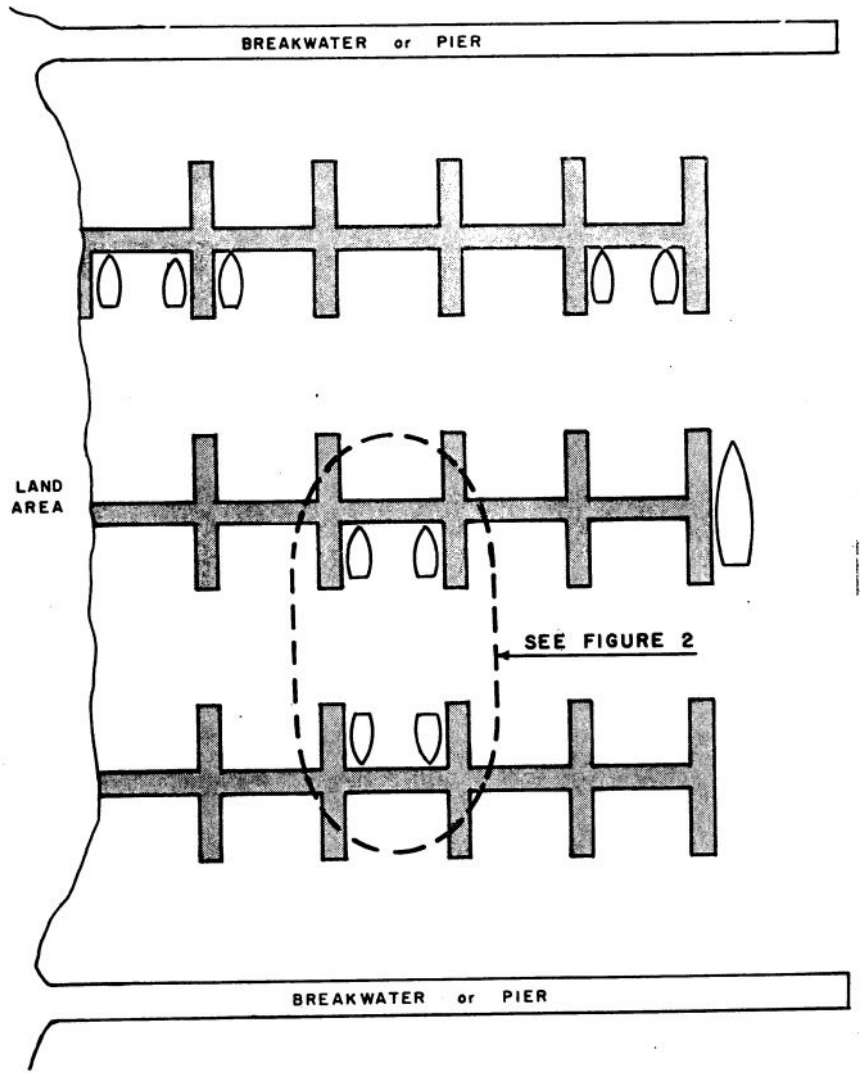
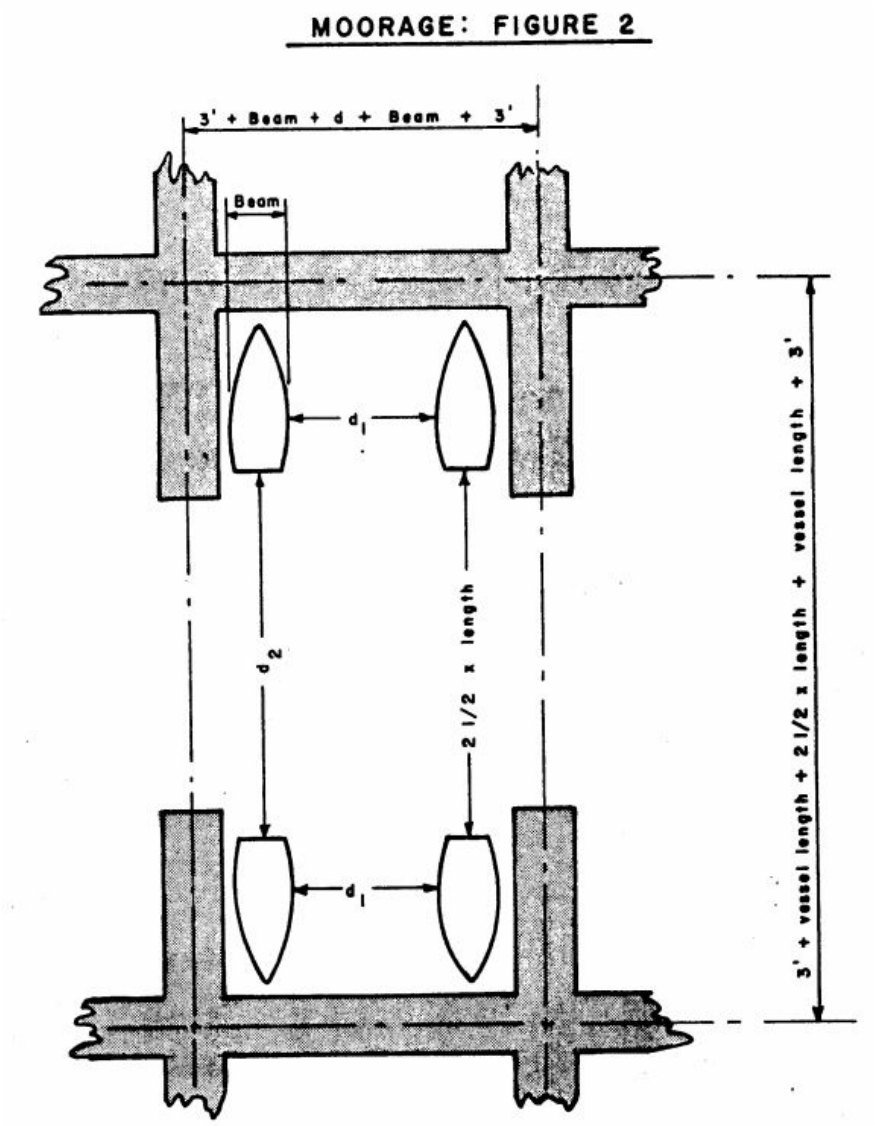
Projections provided thus far have been based on the number and cumulative length of boats. Ensuring that adequate moorage area is made available through implementation requires that these figures now be converted to actual surface area requirements.

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:

Vessel Type	Average Length By Class	Assumed Beam Length	Minimum Distance Between Sides of Vessels (d)	Assumed Average Draft	Minimum Distance Behind Vessels (2.5 times length) (d_2)
COMMERCIAL					
Up to 30'	26'	8'	4'	2'	65'
30' to 50'	39'	12'	6'	6'	98'
+ 50'	66'	25'	10'	11'	165'
RECREATIONAL					
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:

SURFACE AREA MOORAGE REQUIREMENTS

		Square Feet (rounded)
Commercial		
Up to 30'	=	800/boat
30' to 50'	=	1638/boat
+ 50'	=	5000/boat
Recreational		
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

Vessel Type		New boats		Sq. ft./boat		Acres needed
Up to 30'	=	510	X	800	=	9.4 ac.
30' to 50'	=	302	X	1638	=	11.4 ac.
+50'	=	125	X	5000	=	14.3 ac.
			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	=	17.6 ac.
			RECREATIONAL SUBTOTAL			21.4 ac.

TOTAL WATER SURFACE MOORAGE NEEDS = 56.5 acres

5.3.4.4 SUMMARY

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The water surface area need of 56.5 acres should also be complemented by approximately 11.3 acres of land area for parking (figuring l/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.

5.4 POTENTIAL MOORAGE SITES

5.4.1 INTRODUCTION

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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.

5.4.2 MARINAS AND OTHER IN-WATER MOORAGE

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5.4.2.1 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:

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> "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 Slough (#27)**

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  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

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- **Sitka Dock (#56)**

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  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

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5.4.2.2 Large Marginally Suitable 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.

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- **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."

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AWSA = 14.6 acres

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- **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.

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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

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5.4.2.3 Smaller Potentially Suitable Sites in this category are usually less than ten acres, or have a shape that would severely constrict marina development.

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- **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

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- **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 = 13.3

- **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

5.4.2.4 Large Potentially Suitable Sites Identified ~~By~~ 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

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- **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."

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"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

5.4.2.5 OTHER IN-WATER MOORAGE

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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.

5.4.3 BOAT RAMPS

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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 (SWW Sec. 33, T.255, 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]

5.4.4. DRYLAND MOORAGE

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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% X 5830 boats X 600 sq. ft./boat = 4 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)

5.4.5 CONCLUSIONS

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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 = 190.1 ac

TOTAL = 334.7 ac

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.

5.5 SITE SELECTION

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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~~ 5 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.

5.5.1 IATF MOORAGE DECISIONS ANALYSIS

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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 AMD 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, net drying 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 definitions 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 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:

- ~~that a~~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."~~.~~
- t~~hat~~ "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~~ Subtracting those water areas that are already occupied by existing uses;

ii. ~~subtracting~~ Subtracting areas that are not physically suited (as described below) for moorage; and

iii. ~~reviewing~~ 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 ½ 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

63 (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

5.5.2 CONCLUSIONS

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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.

5.5.3 ALTERNATIVE METHODS FOR OVERCOMING DEFICIENCIES

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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.

5.5.~~6~~ 4 SITE SELECTION

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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.

Sites	Acreage
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
TOTAL	57.5-61.5

*Goal Exception required

5.5.5 NEW DEFINITIONS

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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.

6. SPECIAL DREDGED-MATERIAL DISPOSAL ELEMENT

6.1 INTRODUCTION

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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'.

6.2 DREDGED MATERIAL DISPOSAL PLAN PROCESS

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Two previous dredge plan studies have been undertaken for Coos Bay prior to this estuary management plan: Management of Dredge Spoils ~~In~~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 ~~I~~in the previous studies were re-evaluated for accuracy and consistency with the ~~estuary~~ Estuary ~~management~~ Management ~~plan~~Plan., ~~I~~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 (RF) comprised of dredging operation technicians was formed to develop the dredge plan. All public and private bodies having ~~I~~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~~in conflict with the E~~e~~stuary ~~management~~ Management ~~plan~~ 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., ~~I~~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 CH2M Hill, and revisions by the Local Officials' Advisory Group (LOAG).

6.3 PROJECT DESCRIPTIONS AND DREDGING REQUIREMENTS

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Dredging projects for Coos Bay are divided into two categories: (i) federal projects and (ii) other ~~1~~ private projects. A summary of these projects are shown in Table 7.1, and on Figure 7.1. Notes on ~~A~~ existing dredging and disposal methods and technology are contained in Appendix 'B'.

6.3.1 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~~ Coos Bay. These projects included the Coos Bay Project~~,~~ and~~,~~ the Coos and Millicoma Rivers Project.

(a) C~~c~~oos 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, and 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 in bay 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 by passer. Disposal has occurred in upland sites and in bay disposal sites.

The 1.3 mile Charleston Channel was under a preliminary feasibility study by the ~~corps~~ 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 Ccoos 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 Ccoos 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.

6.3.2 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~~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~~ 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~~ Standard Oil, ~~union~~ Union Oil and Al Pierce facilities., Tto 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) ~~(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.

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(f) Proposed North ~~spit~~ Spit Trawler Basin and Related Facilities: According to the Oregon ~~international~~ 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~~ Union Oil Expansion: The Oregon ~~international~~ International Port of ~~coos~~ Coos Bay contends that the proposed Union Oil expansion is no longer viable.

~~_____~~ ~~_____~~(h) Proposed Eastside Shipyard Facility: The Oregon ~~international~~ International Port of ~~coos~~ 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~~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.

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6.4 DREDGED MATERIAL NEEDS AND DISPOSAL OPTIONS

6.4.1 INTRODUCTION

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This section compares estimated dredged material disposal needs with available sites in each area of the bay. Proposed disposal sites are mapped generally at r = 3,000 feet and in detail at r = 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.~~,~~ I~~i~~nclusion 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~~ Agency consensus on general acceptability may be assumed if dredged material disposal is a permitted use i~~i~~n the Plan.

6.4.2 CHARLESTON AREA

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The Charleston/~~Bar view~~Barview wayside had two upland disposal sites (#36 and fib) which have been filled to their capacity. The Oregon I~~i~~nternational Port of Coos Bay has a "New" ~~Bar view~~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 c.y. 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).

6.4.3 LOWER BAY

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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~~ Bay sites can handle large quantities of material but must be used only on a priority basis. ~~I~~in-Bay "G" is first priority when in-water disposal is used, because of its fewer environmental problems. ~~I~~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~~ 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~~ 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~~ 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 ~~I~~international Port of Coos Bay. The North Bend Airport extension project has been completed.

6.4.4 UPPER BAY

The ~~upper~~ Upper Bay, from the railroad bridge to ~~i~~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 ~~i~~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~~,~~ ~~i~~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~~ 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 re-handled by trucks or barges and therefore must be pipelined directly to these large disposal sites. Sites in ~~i~~Isthmus Slough could also theoretically be used for ~~upper~~ 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 ~~1~~ of the bay.

6.4.5 ISTHMUS SLOUGH

This section includes disposal sites in ~~i~~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 eastside of ~~i~~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 U~~u~~pper Bay channel maintenance materials from the Isthmus Slough reach, if U~~u~~pper Bay sites reach capacity and in particular if site #30b is unavailable in future. Theoretically, it is also possible to use site~~s~~ #25 for pipeline disposal using boosters, though costs would be high.

A channel is federally authorized for Isthmus Slough from ~~rm~~ 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 ~~i~~Inconsistently ~~i~~In the area in the past. This channel could be developed sometime in the future, though this is not planned at this time~~,~~ ~~i~~It may be necessary

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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 ensure navigability. [see Table 6.2].

As a compromise toward achieving plan acknowledgement, sites #22 and #23 have been deleted, thereby lowering Isthmus Slough capacity by 3,005,000 cubic yards.

6.4.6 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.

6.5 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.

6.6 SUMMARY

The selected sites are summarized in Table 6.6. 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 cannot 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.

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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~~It is highly probable that future dredging needs of the estuary cannot be met with the ~~i~~identified disposal options, since the balance between needs and available sites has been upset by sites being found to be unavailable. For this reason, ~~i~~intertidal sites were originally added at #18c, I8d, #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 U~~u~~pper 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~~ensure 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 ~~i~~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~~s~~ to full capacity~~,~~ over the Plan period~~,~~ ~~i~~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	orth of Christensen Ranch	696,000	Private ag.
		6,302,000 c.y.	

SECTION 6 - 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 & #2Cs

Section	Township	Range	Tax Lot
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

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Field survey sheet

Site # 4x

Management Unit: 5 WD

Section	Township	Range	Tax Lot
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

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Field survey sheet Site # 9y

Management Unit: NA

Section	Township	Range	Tax Lot
9	25	13	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: V~~v~~ia 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

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Field survey sheet

Site # Beachfront

Management unit: NA

Section	Township	Range	Tax Lot
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~~ 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(~~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

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Field survey sheet

Site # Inbay—"8.4"

Management Unit: 51A DA

Section	Township	Range	Tax Lot
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~~dmd~~ site.
Structures: None, (adjacent to shipping channel).
Access: W~~w~~ater only.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: NA
Est. Capacity: U~~u~~nknown.
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, C~~c~~orps of Engineers will need to study sediment transport, as required by ODFW/USFWS/NMFS.

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

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Field survey sheet

Site # Inbay "G"

Management unit: 67A DA

Section	Township	Range	Tax Lot
35	25	14	

Location: Off Coos Head

Physical Boundaries: (Inbay)

Approximate Size: NA Ownership: ~~state~~State.

PHYSICAL/BIOLOGICAL CHARACTERISTICS

Vegetation Type: NA
Land Type: NA
Wildlife Use: Aquatic & benthic fauna.
Aquatic Regime: Subtidal.
MAN-MADE FEATURES

Existing ~~use.~~ use:~~.~~ - None.
Structures: None.
Access: Water only.

DREDGED MATERIAL DISPOSAL POTENTIAL

Est. Avg. Fill Depth: NA
Est.~~,~~ capacity: U~~u~~nknown.
Existing DMD Dikes. Outfalls, etc.: Adjacent to shipping channel.
Possible Means of Disposal: Hopper.
Potential conflicting uses: None.
Potential Future use: DMD site.

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INVENTORY: DREDGED MATERIAL DISPOSAL SITES

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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/BIOLOGICALCHARACTERISTICS

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

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Field survey sheet

Site # 25 Management unit: 30B RS

Section	Township	Range	Tax Lot
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~~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: V~~v~~ia 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 J site within Plan period.
• Agricultural uses should be restored.

INVENTORY: DREDGED MATERIAL DISPOSAL SITES

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Field survey sheet

Site # 30(b) Management Unit 18 RS

Section	Township	Range	Tax Lot
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-Lilienthal. 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 121-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)

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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~~ 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 ~~l~~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. ~~l~~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., ~~l~~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.

7. SPECIAL MITIGATION/RESTORATION ELEMENT

7.1 INTRODUCTION

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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~~ Department of State Lands W (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) Tthere is no alternative manner in which to accomplish the purpose of the project;
(B) Tthere is no feasible manner in which mitigation could be accomplished;
(C) Tthe 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) Tthe project is for a public use; and
(E) Tthe 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) Ffilling 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) Rriprap 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) Ffilling 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) Ddredging or filling required as part of an estuarine resource restoration or enhancement project agreed to by local, state and federal agencies; or
(F) a 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.

7.2 MITIGATION AND RESTORATION - DISCUSSION OF TERMINOLOGY

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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.

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7.3 PLAN DEVELOPMENT METHODOLOGY

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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 CH2M 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~~ Department 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 7.5 below].

7.4 TYPES OF SITES, POSSIBLE ACTIONS AND CONSEQUENCES~~.~~

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7.4.1 INTRODUCTION

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The majority of the ~~85~~ 58 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.

7.4.2 RESTORATION SITES

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Restoration sites are of two basic types:

(i) ~~(i)~~ Spoil islands that may be scalped down to intertidal level, and

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(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~~ that 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 airpohotos. 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 dieback 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~~ Upper Catching ~~slough~~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.

7.4.3 ENHANCEMENT SITES

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There are two basic types of enhancement sites:

(i) ~~(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

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(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-lO(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~~ is 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 M9(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.

7.4.4 GEOGRAPHIC DISTRIBUTION OF SITES AND RELATIONSHIP TO FUTURE DEVELOPMENT AREAS

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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~~ Department 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.,~~i.e., 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~~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 ~~cc~~"Cumulative Effects Statement~~"~~ that addresses the environmental impacts ~~A~~ 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~~ are not as great as might first be assumed because:

> (i) ~~most~~ Most of the area in "development" units is subtidal, and hence less valuable habitat than that found in intertidal and tidal areas; and
>
> (ii) T~~t~~he 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 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~~ that 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" ~~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~~cannot 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~~ Department 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~~ Department 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:

	Protected Sites (1)		Other Sites (2)	
Bay Segment	Number	Acres	Number	
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 preemptory 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.

7.4.5 THE SOUTH SLOUGH NATIONAL ESTUARINE ~~SANCTUARY~~ RESEARCH RESERVE - AN AREA ESPECIALLY SUITED TO MITIGATION/RESTORATION ACTIONS

A number of restoration or enhancement sites have been identified in the South Slough National Estuarine ~~Sanctuary~~Research Reserve (SSNERR). 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~~ Department 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~~SSNERR. The knowledge gained from a restoration/enhancement and monitoring program, together with the advantage of State ownership of most of the sites and the

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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.

7.5 PRIORITY RATING SYSTEM

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7.5.1 CRITERIA

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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,~~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

7.5.2 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.~~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.

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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,~~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~~ that suggests generally lower priority for mitigation for these sites.

The proposed priority rating for each site is shown in Table 7.1. Detailed data on the characteristics of each site are found in the field sheets. ~~(See Attachment 7 ppendix A)~~[See Section 7 – Appendix A.] The overall assessment at the end of the field sheet summarizes the relevant facts used to assign the priority rating.

TABLE 7.1 MITIGATION SITES INVENTORY: PRIORITY RATINGS

[See Maps: "Selected Mitigation and Restoration Sites", at l"-3000' and l"-800' for general and specific locations]

SITE #	ACTION	PRIORITY RATING
South Slough Estuarine Sanctuary		
SS-1 (a)	Enchancement	Medium
SS-1 (b)	Restoration	Medium
SS-2 (a)	Enchancement	Medium
SS-2 (b)	Enchancement	Medium
SS-3 (a)	Enchancement	Medium
SS-3 (b)	Enchancement	Medium
SS-4	Restoration	Medium
SS-5	Restoration	Medium
SS-6 (a)	Restoration	Medium
SS-7	Restoration	Medium
SS-9	Restoration	Medium
SS-10 (a)	Enchancement	Medium
SS-10 (b)	Enchancement	Medium
SS-10 (c)	Restoration	Medium
SS-11	Enchancement	Medium
LOWER BAY		
L-1	Enchancement	High
L-4	Restoration	High
L-5	Enchancement	High

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MID-BAY		
M-1 (a)	Restoration	Medium
M-1 (b)	Restoration	Medium
M-3	Creation	High
M-4	Restoration/Creation	Low
M-5	Restoration	High
M-8 (a)	Enchancement	Low
M-8 (b)	Enchancement	Low
M-9 (a)	Restoration	Medium
M-9 (b)	Enchancement	Medium
M-9 (c)	Enchancement	Low
M-10	Enchancement	Low
M-11 (b)	Enchancement	Low
M-12	Restoration	Low
M-13	Restoration	Low
M-22	Restoration	Medium
UPPER BAY		
U-1	Restoration	Low
U-8 (a)	Restoration	Medium
U-8 (b)	Restoration	Medium
U-9 (a)	Restoration	Medium
U-9 (c)	Enchancement	Low
U-10	Restoration	Low
U-11	Restoration	Medium
U-12	Restoration	High
U-13	Restoration	High
U-14 (c)	Restoration	Medium
U-16 (a)	Restoration	High
U-16 (b)	Restoration	Low
U-17 (a)	Restoration	Medium
U-17 (b)	Restoration	Medium
U-21 (b)	Restoration	Low
U-22	Restoration	Low
U-23	Restoration	Low
U-24	Restoration	Low
U-26	Restoration	Low
U-27	Restoration	Low
U-28	Restoration	Medium
U-29 (a)	Restoration	Low
U-29 (b)	Restoration	Medium
U-30 (a)	Enchancement	Medium
U-30 (b)	Restoratiom	High

U-31	Enchancement	High
U-32 (a)	Restoration	Medium
U-32 (b)	Restoration	Medium
U-32 (c)	Restoration	Low
U-33	Restoration	Medium
U-34 (a)	Restoration	Low
U-34 (b)	Restoration	Low
U-34 (c)	Restoration	Medium
U-34 (d)	Restoration	Medium
U-40	Enchancement	High
U-41 (b)	Restoration	Low
U-42	Restoration	Medium
U-44	Restoration	High
U-45 (a)	Enchancement	Low
U-45 (b)	Restoration	Low
U-51 (a)	Enchancement	High
U-51 (b)	Restoration	High
U-52 (a)	Restoration	Low
U-52 (b)	Restoration	Medium
U-53	Restoration	Medium
U-54	Restoration	Medium
U-55 (a)	Enchancement	Low
U-55 (b)	Restoration	Medium
U-59 (a)	Enchancement	High
U-59 (b)	Enchancement	High
U-60 (a)	Restoration	Low
U-60 (b)	Restoration	Low

7.6 RESTORATION CONCEPTS

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7.6.1 INVENTORY OF PAST LOSSES TO BIOLOGICAL PRODUCTIVITY

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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].

7.6.2 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 _____l,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

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farming practices although erosion has removed some parts of the banks. Significant gains can occur by allowing a 25-50 foot set back 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 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~~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~~Barview area will help to realize some of these long-term restoration ~~I~~objectives.

7.6.3 CULTURAL RESTORATION CONCEPTS

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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.

SECTION 7 - APPENDIX 'A'

FIELD SURVEY SHEETS:

POTENTIAL MITIGATION/RESTORATION SITES

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Section 8:

COMMUNITIES, LANDS & WATERWAYS DATA SOURCE

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Click the link below to access an online version of the Data Source:

http://www.partnershipforcoastalwatersheds.org/lands-and-waterways/

Section 9:

COOS ESTUARY AND SHORELAND ATLAS

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Click the link below to access an online version of the Coos Estuary and Shoreland Atlas:

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