

## Goals 16 & 17

# COMPREHENSIVE PLAN

## Goal 16 and 17 Element: Columbia River Estuary

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\* On File in Clatsop County Department of Planning and Development

# COLUMBIA RIVER ESTUARY LAND AND WATER USE PLAN \*

## P10. INTRODUCTION AND BACKGROUND

### THE ESTUARY PLANNING AREA

The Columbia River Estuary planning area includes aquatic areas and shorelands from the 3-mile limit offshore to the eastern boundary of Wahkiakum County in Washington (RM 53) and the eastern boundary of Clatsop County in Oregon (RM 45). All tributary streams to the head of tide and their adjacent shorelands are included within the estuary planning area. In Oregon, the coastal zone, as defined by the Land Conservation and Development Commission, extends only to the downstream end of Puget Island (RM 38). Although shorelands generally extend to the landward limit of the floodplain for planning purposes, jurisdictional boundaries of the shorelands zones define a much smaller area. This Plan's informational sections, such as descriptions of shoreland features and human uses, apply to the entire floodplain area. Regulatory sections, such as aquatic and shoreland designations and policies, apply to the narrower jurisdictional shoreland area.

The estuary is divided into 46 planning subareas. These subareas were drawn to represent distinct planning units with common features and needs. Land use patterns, physical and biological characteristics, and jurisdictional boundaries were used to determine subarea boundaries. The subarea plans which are under, or in part under Clatsop County jurisdiction are described in P 30.

### THE PLANNING PROCESS

The shorelands and estuary elements of the County's Comprehensive Plan that pertain to the Columbia River Estuary were prepared by the Columbia River Estuary Study Taskforce (CREST) and are the basis for managing these resources within a regional content. CREST, a bi-state organization of cities, counties, and port districts, was organized in 1974 to develop a coordinated, regional estuary management program. Clatsop County has been a participant in CREST since its inception.

CREST member jurisdictions and staff formulated a land and water use planning process in 1976, establishing a regional framework for local citizens, interest groups, governments, and state and federal agencies to integrate their efforts in creating an estuary-wide management plan. The impetus for developing the Plan came from growing conflicts between conservation, uses and developments of estuarine areas. The Regional Management Plan was also in response to state coastal zone management programs and federal funding under the 1972 Coastal Zone Management Act. The need for better management data, for long term protection of critical natural resource areas, and for estuarine development all contributed to the planning program. In 1977, CREST published an Inventory synthesizing existing scientific and management information on the physical, biological, and cultural characteristics of the Columbia River Estuary. Using this technical background information along with collaboration of specially created citizen planning committees, local jurisdictions and state and federal agencies, CREST staff produced the initial draft of a regional management plan.

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Amended 90-13, dated December 21, 1990



The final draft of the Columbia River Estuary Regional Management Plan was published in June of 1979. The 1979 Regional Management Plan was adopted into local shoreline master programs in Washington and comprehensive plans in Oregon and was implemented through the local zoning and permitting process. The plans have been fine-tuned through local plan amendments to meet changing development and conservation needs.

Revisions to the Regional Plan began in 1987 as a result of changes in local development needs as well as state and federal regulations and programs. In addition, the Oregon Department of Land Conservation and Development required that the Plan be updated through their Periodic Review process. The 1989 revisions to the regional plan reflect changes in development trends, local planning needs, new or updated state and federal programs and regulations, new information, and language changes to approve and streamline the Plan. The revised Regional Plan has no legal authority except as implemented by local governments in local comprehensive plans (Oregon) and local shoreline management master programs (Washington).

## COMPREHENSIVE PLAN CONTENT AND STRUCTURE

The Goal 16 and 17 element of the County's Comprehensive Plan pertaining to the Columbia River Estuary is intended to satisfy the requirements of the Estuarine Resources and Coastal Shorelands goals established by the Oregon Land Conservation and Development Commission and to function as part of the Oregon Coastal Zone Management Program as certified by the Department of Commerce under the Federal Coastal Zone Management Act. Under these programs, the Columbia River Estuary has been designated "development".

This Comprehensive Plan section (Goal 16 and 17 element) consists of the following parts:

- Definitions.
- Use and area designations.
- Use and Activity Tables.
- P 15 Cumulative Impacts.
- P 20 Columbia River Estuary Aquatic and Shoreland Regional Policies.
- P 21 Intergovernmental Coordination Policies.
- P 30 Columbia River Estuary Subarea Plans.
- P 40 Columbia River Estuary Dredged material Management Plan.
- P 50 Mitigation and Restoration Plan for the Columbia River Estuary
- P 60 Appendices

Land and Water Development and Use standards are in the County's Zoning Ordinance.

## DEFINITIONS

### 1. Aquatic Areas

Aquatic areas include the tidal waters, including subtidal areas and wetlands of the estuaries, and non-tidal sloughs, streams, and wetlands within the shorelands area boundary. The lands underlying these waters are also included. The upper limit of aquatic areas is the upper limit of aquatic vegetation or, where such a line cannot be accurately determined, Mean Higher High Water (MHHW) in tidal areas or Ordinary High Water (OHW) in non-tidal areas.

### 2. Coastal Shorelands

Those areas immediately adjacent to the ocean, estuaries, associated wetlands and coastal lakes. The extent of shorelands shall include at least:

1. Areas subject to ocean flooding and lands within 100 feet of the ocean shore or within 50 feet of an estuary or a coastal lake;
2. Adjacent areas of geologic instability where the geologic instability is related to or will impact a coastal water body;
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;
4. Areas of significant shoreland and wetland biological habitats whose habitat quality is primarily derived from or related to the association with coastal water areas;
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, dredged material disposal and mitigation sites, and areas having characteristics suitable for aquaculture;
6. Areas of exceptional aesthetic or scenic quality, where the quality is primarily derived from or related to the association with coastal water areas;
7. Coastal headlands;
8. Locations of archaeological or historical importance associated with the estuary; and
9. Dikes and their associated inland toe drains.

### 3. Columbia River Estuary

The estuary is defined for planning purposes, as all aquatic areas subject to tidal influence downstream of the Wahkiakum County line (RM 53) in Washington and to the eastern boundary of Clatsop County in Oregon (RM 45). In Oregon, the Coastal Zone, as defined by the Land Conservation and Development Commission, extends only to the downstream end of Puget Island (RM 38).

Tidal influence extends to Bonneville Dam (RM 145). Daily tidal range is 8.3 feet near the river mouth and decreases to about 5.5 feet near the upstream limit of the CREST planning area (Eagle Cliff - RM 53.3). See Section 203 of the "Columbia River Estuary Inventory of Physical, Biological and Cultural Characteristics" for a complete discussion of tides and tidal effect in the river.

### 4. Water-dependent

A use or activity which can be carried out only on, in, or adjacent to water areas because the use requires access to the waterbody for water-borne transportation, recreation, energy production, or source of water.

### 5. Water-related

Uses which are not directly dependent upon access to a water body, but which provide goods or services that are directly associated with water-dependent land or waterway use, and which, if not located adjacent to water, would result in a public loss of quality in the goods or services offered. Except as necessary for water-dependent or water-related uses or facilities, residences, parking lots, spoil and dump sites, roads and highways, restaurants, businesses, factories, and trailer parks are not generally considered dependent on or related to water location needs.

### 6. Development or Use

**USE:** Use is the end to which a land or water area is ultimately employed. A use often involves the placement of structures or facilities for industry, commerce, habitation, or recreation. An accessory use is the use incidental and subordinate to the main use of the property and located on the same lot or parcel as the main use.

**ACTIVITY:** Activity is any action taken either in conjunction with a use or to make a use possible. Activities do not in and of themselves result in a specific use. Several activities — dredging, piling, fill — may be undertaken for a single use — a port facility. Most activities may take place in conjunction with a variety of uses.

## USE AND AREA DESIGNATIONS

The land and water use classification system separates aquatic from shoreland areas and defines management designations for each area. These designations provide for uses and activities ranging from preservation to intensive development.

1. Natural Aquatic areas are intended for resource protection, preservation and restoration, with severe restrictions on the intensity and types of uses. They are managed to preserve natural resources in recognition of dynamic, natural, geological and evolutionary processes. Natural Aquatic areas may include significant fish and wildlife habitats, tidal marshes and intertidal flats, sea grass, and algae beds, that, because of a combination of factors such as size, biological productivity and habitat value, play a vital role in the functioning of the estuarine ecosystem. Natural Aquatic areas may also include ecologically important subtidal areas.
2. Natural Shoreland areas are managed for resource protection, preservation, restoration and recreation, with severe restrictions on the intensity and types of uses. Natural Shoreland areas may include unique vegetative or wildlife habitat and critical habitat for endangered or threatened species. This area is intended to preserve those natural resource systems existing relatively free of human influence.
3. Conservation Aquatic areas are managed for the protection and conservation of the natural resources and benefits found in these areas. The designation is for long term uses of renewable resources that do not require major alterations of the estuary, except for the purpose of restoration. Areas that are partially altered or adjacent to existing development of low to moderate intensity and not possessing characteristics of other designated aquatic areas are also included. Minor alterations may be permitted in conjunction with approved uses. Conservation Aquatic areas may include open water portions of the estuary and areas needed for maintenance and enhancement of biological productivity, recreational resources, aesthetic values and aquaculture.
4. Conservation Shorelands are managed for the protection and maintenance of water quality, fish and wildlife habitat, water-dependent uses, economic resources, aesthetic values and recreation. Conservation Shoreland may include commercial forest lands, areas subject to severe flooding or other hazards, scenic recreation areas, and certain public shoreline areas. Conservation Shorelands are for the purpose of conserving shorelands which provide important ecosystem support functions and to designate certain areas for long term uses of renewable resources that do not require major alterations.
5. Development Aquatic areas are managed for navigation and other identified needs for public, commercial, and industrial water-dependent uses consistent with the level of development or alteration allowed in the aquatic area and the need to minimize damage to the estuarine ecosystem. The objective of Development Aquatic areas is to ensure optimum utilization of appropriate aquatic areas by providing for intensive development. Some water-related and other uses may be permitted. Development Aquatic areas may include: deep water areas adjacent to or near the shoreline, navigation channels, turning basins, subtidal areas for in-water disposal of dredged materials, mining or mineral extraction areas, and areas adjacent to developed or developable shorelines which may need to be altered to provide navigational access or create new land areas for water-dependent uses.

6. Development Shorelands are managed for a wide range of water-dependent, water-related, water oriented non-dependent, or other uses. Development Shorelands may include existing developed areas or areas suitable for future residential, commercial, industrial, or recreational development. Most such areas are within urban growth boundaries of existing towns or cities, but may include other development centers. Plans for development of such areas should provide public access to the shorelines.

7. Especially Suited for Water-dependent (ESWD) Development Shorelands are managed for water-dependent uses, with water-related uses allowed based on demonstration of need and analysis of alternative sites. ESWD Development Shorelands include areas of high potential for water-dependent commercial and industrial development and high intensity recreational use.

In formulating the Comprehensive Plan, the following general policies guided application of the land and water use classification system.

1. All major tracts of tidal marshes, tide flats, seagrass and algae beds were designated 'Natural Aquatic' because of their proximity and value as fish and wildlife habitat.

2. Tracts of significant habitat smaller or of less biological importance than those assigned as Natural Aquatic were designated Conservation Aquatic. These include most of the smaller fringing marshes along bays and streams.

3. Deep-water areas adjacent to or in proximity to the shoreline, navigation channels, subtidal areas for in-water disposal of dredge material and areas of minimal biological significance needed for uses requiring alteration of the estuary were designated Development Aquatic.

4. Dikes were designated the same classification as the adjacent shorelands.

5. Commercial forest lands within Coastal Shorelands are designated Conservation Shorelands.

6. Areas designated as especially suited for water-dependent uses were based on a consideration of the following factors:

- deep-water close to shore suitable for ship and barge facilities, with supporting land transportation systems;
- potential for aquaculture;
- protected areas subject to scour which would require little dredging for use as marinas;
- potential for high intensity recreational utilization;
- amount of vacant land available to support the anticipated water-dependent development;
- availability of public services, such as sewer and water;
- possibility for land use conflicts with existing or anticipated land uses in the area;
- projected demand for various water-dependent developments.

7. General priorities, from highest to lowest, for uses within all estuary zones shall be:

- a. Uses which maintain the integrity of the estuarine ecosystem;
- b. Water-dependent uses requiring an estuarine location, as consistent with the overall Oregon Estuarine Classification;
- c. Water-related uses which do not degrade or reduce the natural estuarine resources and values; and
- d. Non-water dependent, non-water related uses, which do not alter, reduce or degrade the estuarine resources and values.

## USE AND ACTIVITY TABLES

1. Permitted Developments: Uses and activities allowed in this category of review may be undertaken subject to:

- The general requirement that the use or activity be designed and conducted in a manner that will minimize, so far as practical, any resultant damage to the natural resource values of affected aquatic and shoreland areas and the public's use of the water;
- The standards set forth in the zoning ordinance; and
- Applicable state and federal regulations.

2. Review Developments: Uses and activities allowed under this category of review may be undertaken subject to:

- written findings by the Planning Director that the proposed use or activity is consistent with the policies of the Comprehensive Plan, appropriate zoning standards and, where required, findings of a Resource Capability Determination and Impact Assessment.

3. Conditional Developments: Uses and activities allowed under this category of review may be undertaken subject to:

- written findings, adopted after a public hearing (if required), that the proposed use or activity is consistent with the policies of the Comprehensive Plan, appropriate zoning standards and, where required, findings of a Resource Capability Determination and Impact Assessment.

The following tables are a summary of how the various uses and activities of each zone are treated: as a permitted use, a review use or conditional use. These tables are included as a guide only. The zone of interest should always be referred to for accuracy, and for a more thorough description of the use or activity allowed.

# USE AND ACTIVITY TABLE - AQUATIC AREAS

Uses	AN	AC1	AC2	AD
<b>Aquaculture</b>				
• water-dependent portions not requiring estuarine alteration	R	R	R	
• water-dependent portions requiring estuarine alteration		C	C	
• facilities				C
<b>Boat ramps</b>				
• not requiring dredging or fill	R	R	R	
• requiring estuarine alteration			C	R
<b>Commercial, Industrial and Port Uses</b>				
• water-dependent				R
• water-related				C
• non-water-dependent				C
• water storage areas		C	C	R
<b>Docks and Moorages</b>				
• not requiring dredge or fill		R	R	R
• requiring estuarine alteration			C	R
<b>Land Transportation Systems</b>				
• bridge crossings	R	R	R	R
• bridge crossing support structures	R	C	R	C
<b>Log dump/sort/storage areas</b>		C	C	R
<b>Marinas</b>			C	C
<b>Mining and Mineral Extraction</b>		C	C	C
<b>Navigation</b>				
• navigational aids	P	P	P	P
• minor navigational improvements		C	C	R
• navigational structures				C
• new navigational projects or water transport channel improvements				C
<b>Recreation</b>				
• high intensity (excluding marinas in AD)			C	R
• low intensity	P	P	P	P
<b>Resource Enhancement</b>				
• passive restoration	P	P	P	P
• active restoration of fish and wildlife or water quality	C	C	R	R
• active restoration for other purposes		C	C	R
• estuarine enhancement	R	R	R	R
• projects for protection of habitat, nutrient, fish, wildlife and aesthetic resources	P	P	P	P
<b>Temporary Uses requiring minimal capital investment</b>		R	R	C
<b>Utilities</b>				
• communication facilities	C	R	R	R
• storm water and treated wastewater outfall		C	C	C
• pipelines, cables and utility crossings	C	R	R	R

# Aquatic Areas (cont'd)

Activities	AN	AC1	AC2	AD
Dikes				
• maintenance and repair	R	R	R	P
• emergency repair	P	P	P	P
• installation of tidegates	R	R	R	R
• temporary dike for emergency		P	P	P
• dredging as a source of fill for dike maintenance	R	R	R	R
Dredged Material Disposal				
• beach nourishment at designated sites		R	R	R
• in-water disposal at designated sites				R
Research and educational observations	P	P	P	P
Shoreline stabilization				
• vegetative	P	P	P	P
• structural (limited to riprap)	R			
• structural (riprap, bulkhead)		R	R	R
Temporary Alterations	R	R	R	R

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AN - Aquatic Natural Zone

AC1 - Aquatic Conservation One Zone

AC2 - Aquatic Conservation Two Zone

AD - Aquatic Development Zone

P - Permitted Development Uses and Activities

R - Development Uses and Activities Permitted with Review

C - Conditional Development Uses and Activities



# USE AND ACTIVITY TABLE - SHORELANDS

Uses	NS	CS	MI
Agriculture			
• uses involving no structures			P
• agriculture activities		P	
Aquaculture Facilities		C	C
Boat Ramps			
• recreational		R	C
• commercial		C	C
Commercial, Industrial, and Port Uses			
• water-dependent			R
• water-related			C
• non-water-dependent			C
Docks and Moorages			
• individual		R	
• recreational		C	C
• commercial		C	C
Forestry Activities and Manufacturing			
• forest activities		P	P
• forest manufacturing			C
Land Transportation Systems		C	C
Log Sorting/Storage Areas		C	C
Marinas		C	C
Marine research and education facilities	C	C	C
Mining and mineral extraction			C
Navigational aids	P	P	P
Recreation			
• low intensity	P	P	P
• high intensity		C	C
Resource enhancement			
• passive restoration	C	P	P
• active restoration	C	R	C
• mitigation	C	R	C
Temporary Uses requiring minimal capital investment			C
Utilities			
• communication facilities		R	R
• stormwater and treated wastewater fallouts		C	C
• cables sewer lines, pipeline landfalls	C	C	R
• public utility structures		C	R

# Shorelands (cont'd)

## Activities

NS CS MI

### Dikes

- new dike construction
- maintenance/repair
- emergency repair
- new tidegates
- temporary dikes

	C	C
R	R	P
P	P	P
	C	C
	P	P

### Dredged Material Disposal

- designated sites
- non-designated sites

P	P
R	R

### Excavation to create new water surface area

R	R
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### Research and educational observation

P

### Shoreline stabilization

- vegetative
- structural (limited to riprap)
- structural (riprap and bulkhead)

P	P	P
R		R
	R	R

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NS - Natural Shoreland Zone

CS - Conservation Shoreland Zone

MI - Marine Industrial Shoreland Zone

P - Permitted Development Uses and Activities

R - Development Uses and Activities Permitted with Review

C - Conditional Development Uses and Activities

## P15 CUMULATIVE IMPACTS

### INTRODUCTION

This Section addresses the potential combined effects of certain activities on the estuary. The primary reason for addressing cumulative impacts is that they cannot be adequately considered during most permit reviews, yet under certain conditions can become significant planning issues. The Columbia River Estuary Regional Management Plan recognizes that development activities generate cumulative impacts that cannot be readily addressed on a permit-by-permit basis. The plan identifies cumulative impacts and sets provisions, primarily in the Analysis section below, discouraging or limiting activities posing a cumulative impact problem. In addition, the Plan's management system, discussed in the Scope section below, limits most high impact activities to small geographic areas within the estuary.

A second reason for considering cumulative impacts in this plan is that Oregon and Washington local jurisdictions are required by state statutes to address them. Comprehensive Plan Requirement 5 of Oregon Statewide Planning Goal 16 states that local jurisdictions must "Consider and describe in the plan the potential cumulative impacts of the alterations and development activities envisioned."

### SCOPE

Discussion of cumulative impacts in this Plan is limited to seven major topic areas. Cumulative impacts on Public Access, Water Quality, Fisheries, Maritime Commerce, Recreation/Tourism, Circulation and Aquatic Habitat are identified and discussed. In many cases cumulative impacts are both positive and negative. Navigation channel maintenance dredging, for example, generates beneficial impacts with respect to maritime commerce, and some harmful impacts with respect to fisheries habitat. Public Access, as another example, is affected in a positive way by boat ramp construction, and negatively by riprap shoreline protection. Cumulative impacts that are significant in certain estuary subareas are described in the subarea plans in Policy P 30 of the County's Comprehensive Plan.

Cumulative impacts on the seven categories of estuarine resources identified above are generated by a number of activities. The following activities are considered in this section:

- Dredging, New and Maintenance;
- Dredged Material Disposal, Aquatic and Shoreland;
- Filling;
- Structural Shoreline Stabilization;
- Boat Ramps, New and Expanded;
- Marinas, New and Expanded;
- Moorages, Individual;
- Aquaculture and Fish Hatcheries;

- Port Development; and
- River Training.

Some activities with cumulative impacts on the estuary are not regulated by this plan, and are not considered in this section. Chief among these are:

- Forestry;
- Upstream Activities;
- Activities in the Ocean Outside of the Estuary Planning Area;
- Fisheries Harvest Allocations;
- Local Point Source and Nonpoint Source Discharge;
- River Flow Management; and
- Navigation.

## CUMULATIVE IMPACT ANALYSIS

### 1. Public Access

Activities generating cumulative impacts on public access can both enhance and reduce opportunities for public access to the waters and shorelines of the Columbia River Estuary. Public access is treated broadly here to include both physical and visual access.

The cumulative impact of maintenance dredging projects on public access is limited and to some extent beneficial. Main navigation channel maintenance dredging generates no identifiable cumulative impacts on public access opportunities. Boat ramp and marina access channel dredging has the cumulative effect of maintaining or improving small boat access. The cumulative impacts of new dredging on public access are similar to those of maintenance dredging.

Use of designated shoreland and aquatic dredged material disposal sites will have little measurable cumulative impact on public access in the Columbia River Estuary. Beach nourishment will have positive cumulative effects on public access, but only to the extent that enhanced beaches are used by the public.

Filling Columbia River Estuary aquatic areas along the shoreline will have a generally negative impact on public access. Only limited areas along the shoreline are designated for fills, so cumulative impacts on public access should not be great.

Riprap bank protection can, under certain circumstances, have significant negative cumulative impact on public access, especially physical shoreline access. Riprap can also have beneficial impacts on public access by protecting marinas and boat ramps. The County's estuarine construction policies and standards encourage nonstructural shoreline stabilization and require riprap proposals to be reviewed for their impacts on public shoreline access.

Boat ramps and marinas have a strongly beneficial cumulative impact on public access for the boating public. Private individual moorages on the other hand can have negative cumulative impacts with respect to public access if allowed to overcrowd particular waterways. Continuous development of individual moorages along a reach of the Columbia River Estuary or a tributary can block public shoreline access and inhibit small boat navigation, having a strongly negative cumulative impact. The County's estuarine construction policies and standards encourage community docks and piers and discourage individual moorages.

Aquaculture and hatchery development may, under certain circumstances, generate adverse cumulative impacts on public access. If large nearshore water areas are leased and used for net pens, for example, public access could be substantially reduced. Pond aquaculture facilities on shorelands, on the other hand, would be expected to have little or no adverse cumulative impact. The County's fisheries and aquaculture policies and standards require that aquaculture developments minimize impacts on public access and views from upland property.

Port development is often not fully compatible with public access; however, the cumulative impact of port development on public access is expected to be minor. Port development is limited to only a few sites in the estuary. Full development of all existing designated Development and Water Dependent Development shorelands would not significantly reduce public access opportunities in the Columbia River Estuary, but may have locally significant effects.

River training activities, including pile dikes and dredged material disposal islands, have had little or no cumulative impact on public access.

## 2. Water Quality

A number of parameters are considered here: turbidity, dissolved oxygen, biochemical oxygen demand, organic contaminants, metals, and other undesirable compounds. Both long-term and short-term water quality impacts are considered.

New and maintenance dredging projects can have cumulative short-term impacts, especially with respect to turbidity. Rarely, however, are more than a small number of dredging projects occurring at one time. Longer-term cumulative impacts tend to be less significant. Aquatic and shoreland dredged material disposal can generate significant cumulative impacts on Columbia River Estuary water quality. Pollutants associated with fine sediments can be re-suspended as a result of aquatic dredged material disposal. Land disposal can also generate water quality impacts by way of contaminated runoff. Rarely, however, are more than a small number of disposal projects occurring at one time. Because impacts associated with dredging and dredged material disposal tend to be short-lived, the potential for generating significant cumulative impacts on water quality is limited. The County's dredging and dredged material disposal policies and standards require that projects be timed so as to minimize impacts. These policies and standards also contain sediment testing provisions to ensure that disposed sediments meet state and federal water quality standards.

Filling of aquatic areas is expected to generate only minor, short-lived water quality impacts if conducted with clean material behind protective berms. Fills constructed without these protective measures do have the potential for generating water quality problems associated with leachates from contaminated fill material. Large waterfront areas in some parts of the estuary consist entirely of fill material: in these areas the potential for cumulative water quality impacts may be high.

Riprap constructed from clean non-erodible stone generates few potential water quality impacts. Inasmuch as it may displace riparian vegetation, riprap may result in more turbid runoff entering the river. The cumulative impact of riprap on water quality may be considerable to the extent that riparian vegetation is lost. The plan identifies shorelines with significant riparian vegetation and requires that they be protected. The County's estuary construction policies and standards encourage vegetative shoreline stabilization over riprap.

Boat ramps and individual moorages are expected to have no significant cumulative impact on water quality. Enclosed marinas, however, can generate local water quality impacts. To the extent that marinas are located near each other, or are concentrated in poorly flushed tributaries, cumulative impacts may be considerable. The County's water quality maintenance policies and standards alleviate some of these concerns by requiring that new or expanded marinas have facilities for emptying boat holding tanks and disposing of other waste materials and that new or expanded full docks have spill containment equipment.

Aquaculture and fish hatcheries are potentially detrimental for water quality if uneaten fish food and fish wastes accumulate and decompose on the site rather than dispersing. Significant cumulative impacts would be expected only to the extent that several operations are clustered together, or they occur in a small or poorly flushed waterway, or if a single operation is very large relative to the waterway's flushing volume. The County's fisheries and aquaculture policies and standards require that aquaculture facilities be located so as to minimize water quality problems and that facilities meet state and federal discharge standards.

Port development has occurred in the estuary without any significant cumulative water quality impacts. Increased port activity increases the likelihood of water quality degrading actions such as oil or chemical spills.

River training activities may affect water quality by changing flushing patterns. The cumulative impact of river training on flushing has been to decrease flushing away from the main navigation channel, and increase flushing near the channel. Because little is known about the relationship between flushing and water quality at specific locations on the Columbia River Estuary, the cumulative impact of river training on water quality is difficult to evaluate.

### 3. Fisheries

Discussion of cumulative impacts on fisheries includes impacts on commercial, recreational, and uneconomic nongame species. Impacts on their habitats are discussed in subsection 7 Aquatic Habitat.

Dredging can have measurable impacts on fish by disrupting feeding and shelter areas as well as migration routes. Also, dredging equipment can physically interfere with commercial fishing operations. Project scheduling can reduce some of these impacts. Long-term impacts which might generate significant cumulative impacts are not well understood. Crab entrainment resulting from bar

maintenance dredging may have significant impacts on the population of juvenile crabs at the bar, but its impacts on the overall estuary and offshore crab populations are unknown. The County's dredging policies and standards require that dredging operations be timed to minimize impacts on fish and commercial fishing operations.

Dredged material disposal can affect fish by affecting water quality. This is discussed in Subsection 2 Water Quality.

Filling can affect fish and their habitats by disrupting migration routes, and by eliminating benthic communities that are a component of their habitat. Lost habitat will presumably be replaced by way of compensatory mitigation measures. Potential fill sites in the Columbia River Estuary are not so numerous as to generate significant cumulative impacts if appropriate mitigation measures are applied.

Riprap may affect fish habitat by disrupting shallow water benthic communities and by eliminating nearshore shallow water areas. The benthic communities are a component of fish habitat. Nearshore shallow areas may be important as resting, shelter and migration routes for juvenile anadromous fish. Large reaches of shoreline are riprapped, so existing cumulative impacts may be high. However, to the extent that riprap projects tend to be placed on eroded or erodible shorelines, these impacts may be reduced somewhat. The County's estuarine construction standards require that structural shoreline stabilization projects maintain adequate shallow areas for juvenile fish shelter.

Boat ramps, marinas, and moorages are all essential components of the commercial and recreational fisheries support system in the Columbia River Estuary. To the extent that commercial and game harvests are subject to regulation, these facilities will not generate significant negative impacts on fish populations. Water quality impacts associated with small boat moorage may generate relatively minor, localized cumulative impacts on fish. The County's standards for marinas require that new or expanded marinas be designed to assure adequate water circulation and flushing.

Aquaculture and fish hatchery facilities have the potential for generating both positive and negative cumulative impacts on fisheries. Positive impacts can result from fisheries enhancement programs associated with hatcheries and with aquaculture release programs. Negative impacts can be generated from confinement aquaculture and hatchery operations that develop fish diseases which in turn infect wild stocks, or when introduced species out-compete desirable native stocks. Significant harmful cumulative impacts would be expected when operations are concentrated in small or poorly flushed waterways. Regulations and license procedures administered by state fish agencies address these concerns.

Port development's expected impacts on fisheries are more associated with dredging and filling than with port activity by itself. Some potential impacts are described in subsection 2. Fish populations, distribution, and diversity may be related to port activity, but significant cumulative impacts have not been identified. Impacts associated with dredging and filling are minimized on a project-by-project basis under the county's regional policies and standards on dredging and filling.

River training affects fisheries by altering migration routes. Upstream migrant anadromous fish follow strong currents in the main navigation channel. Significant cumulative impacts on fisheries may be associated with river training. New navigation structures must be reviewed against plan policies that address impacts on fisheries and their habitat.

#### 4. Maritime Commerce

Cumulative impacts on maritime commerce are considered in this subsection. Included are deep draft moorage, navigation and associated activities.

Dredging has had beneficial cumulative impacts on maritime commerce. A large share of all dredging in the estuary is carried out to accommodate maritime commerce. The cumulative impacts of channel maintenance dredging on navigation are significant. Reduced dredging at any of the numerous shoals or at the bar would significantly impede deep draft commerce in the Columbia River Estuary.

Land disposal of dredged material has had no measurable cumulative impact on maritime commerce. Aquatic disposal can affect navigation to the extent that some of this material may settle in the channel and contribute to shoaling. This impact is cumulatively small if frequent and thorough maintenance dredging of the channels is considered. However, dispersion of material disposed in the aquatic environment may not be fully known, increasing the need for the dredging due to reshaling of the channel.

Filling of the Columbia River Estuary has few significant impacts on navigation and maritime commerce. Shoreline fills are evaluated for impacts on navigation. The bulkhead and pierhead lines established on the river are intended to avoid fill and pier-related impacts on navigation. The cumulative impacts of fill on maritime commerce are negligible.

Riprap has few significant impacts on navigation, except those beneficial ones associated with protecting shorelines from ship wakes. The cumulative effect of protected shorelines is that they allow deep draft navigation close to shore without causing shoreline erosion.

Boat ramps and marinas have no significant cumulative impact on maritime commerce. Deep draft moorage opportunities in the Columbia River Estuary have a direct beneficial impact on maritime commerce.

Aquaculture and fish hatcheries are expected to have no measurable impacts on maritime commerce.

Port development has direct, positive impact on maritime commerce in the Columbia River Estuary. The cumulative impact of port development in the Columbia River Estuary is related to the stimulation of maritime commerce.

River training efforts generate direct positive cumulative impacts on navigation by keeping navigation channels relatively free of obstructions, and by lowering maintenance costs.

#### 5. Recreation/Tourism

Discussion of cumulative impacts on recreation and tourism includes estuary-oriented recreation undertaken by both local residents and by visitors from outside the region. Many impacts may be largely aesthetic in nature.



Dredging results in changes that are for the most part invisible, unless intertidal areas are dredged. Dredging for small boat access and maintenance dredging of small boat facilities is beneficial with respect to some segments of the recreation and tourism sector.

Dredged material disposal at upland sites generates both positive and negative impacts. Beach nourishment may have beneficial impacts on recreation and tourism, but only to the extent that nourished beaches are accessible. Other types of upland disposal may yield negative aesthetic impacts, depending on location. Aquatic dredged material disposal could have impacts on recreation and tourism with respect to water quality and recreational fisheries, discussed in subsections 2 Water Quality and 3 Fisheries. Dredged material disposal's cumulative impacts are not expected to be significant with respect to recreation and tourism.

Filling Columbia River Estuary aquatic areas may negatively impact recreation and tourism if the fill is used for facilities that do not support these activities. Because filling in the Columbia River Estuary is limited by this plan to a few sites, cumulative impacts are expected to be minor.

Riprap may have cumulative impacts on recreation or tourism. Extensive riprap protection of otherwise undeveloped shorelines will yield undesirable aesthetic impacts, and impede public access. On the other hand, riprap may be needed to protect important recreational and visitor-oriented facilities (such as marinas). Large stretches of shoreline in the estuary are riprapped, and cumulative impacts may be significant. Regional policies and standards for estuarine construction and public access address these concerns.

Boat ramps, marinas, and moorages have a generally positive impact on recreation and tourism, though there may also be a negative aesthetic component. The net cumulative impact is probably positive, however, because the estuary is large relative to the extent of existing recreational boat facilities.

Aquaculture and fisheries generate both beneficial and harmful impacts on recreation and tourism. Benefits are realized to the extent that hatcheries produce game fish, and inasmuch as the hatcheries and aquaculture facilities have a visitor-oriented component. Negative impacts are mainly aesthetic, and related to water quality. Cumulative negative impacts are expected only when facilities become concentrated in small waterways, or when very large facilities are developed. Regulations and license procedures administered by state fish agencies address these concerns.

Port development may generate both positive and negative impacts with respect to tourism and recreation. The passage of deep draft vessels up and down the Columbia River Estuary, together with associated tug, barge and wharf activities, are significant elements of the Columbia River Estuary's attractiveness for visitors. Port development may also, however, generate negative impacts on recreational fishing and public access (see subsections 3 and 1). Net cumulative impacts are believed to be positive.

River training probably has little cumulative impact on recreation and tourism outside of minor aesthetic detractors such as pile dikes.

## 6. Circulation

Discussion of cumulative impacts on circulation includes erosion, accretion, flooding, salinity intrusion, and related phenomena.

Dredging projects have had significant cumulative impacts on circulation, particularly larger projects like the main navigation channel. New projects will generate larger impacts than maintenance projects, other parameters being comparable. The cumulative impact of smaller dredging projects is probably minor unless several small projects are concentrated in an area. The Impact Assessment requires consideration of a dredging project's impact on circulation.

Dredged material disposal in the water should have relatively minor cumulative impacts on circulation. Land disposal practices should have no measurable cumulative impact on circulation.

Filling has had a substantial impact on circulation. Shoreline fills alter nearshore currents and can create eddies and other current aberrations. Diking on tributaries can reduce the tidal prism, substantially lowering flushing and thus increasing shoaling rates. Small shoreline fills are not expected to have significant cumulative impacts on circulation unless concentrated along a single reach of shoreline. The Impact Assessment requires consideration of a fill's impact on circulation.

Riprap is intended to reduce shoreline erosion, so its net cumulative impact on this component of circulation is probably significant and positive. Depending on slope and rubble size, riprap projects can, in some instances, generate unintended impacts on adjacent unprotected shorelines. There is no evidence, however, of a significantly negative cumulative effect of riprap along shorelines with respect to this aspect of circulation.

Boat ramps and marinas are so small and widely spaced that cumulative circulation impacts are not anticipated. Individual moorages can, when concentrated along a shoreline, have undesirable negative impacts on currents. Their cumulative impact is potentially significant, but there are no data verifying this. Plan policies require that alternative moorage alternatives be investigated before individual moorages are approved.

Aquaculture and fish hatcheries have little impact on circulation. They are generally designed to take advantage of flushing waters, rather than interfere with them. Cumulative impacts, if there are any, are not expected to be significant.

Port development's impact on circulation is probably restricted to associated dredging and filling. Where the main navigation channel is close to shore, erosion may result from ship wakes. Navigation and maritime commerce are not expected to generate, by themselves, cumulative circulation impacts.

River training efforts are directly related to circulatory changes in the Columbia River Estuary. They have produced intentionally significant cumulative impacts.

## 7. Aquatic Habitat

Discussion of cumulative impacts on aquatic habitat includes impacts on the benthic environment, the surface and the water column that affect aquatic plants and animals.

Dredging has resulted in cumulative impacts on aquatic habitat. Large dredging projects, like maintenance of the main navigation channel, can generate substantial negative impacts on benthic habitat in the dredging area. New dredging projects will yield more significant negative impacts on an aquatic habitat than maintenance dredging, other factors being comparable. The Impact Assessment addresses the impact of dredging on aquatic habitat.

Dredged material disposal in the water can have cumulative impacts on aquatic habitat. Flowlane disposal and sump disposal, two kinds of in-water disposal allowed in the estuary, are comparable with respect to their impacts on the water column. Sump disposal probably has a larger impact than individual flowlane disposal projects on benthic habitats. In-water dredged material disposal must meet policy requirements regarding impact minimization.

Filling has affected aquatic habitats, especially shallow water benthic habitats since most fills are in intertidal or shallow subtidal areas. Fills are subject to impact minimization requirements and Impact Assessment review for effects on aquatic habitat.

Riprap has had some impact on aquatic habitats, particularly nearshore shallow water habitat. Riprap bank protection may interrupt shallow water shelter areas needed by juvenile fish, thus subjecting them to increased predation. The cumulative impact of riprap on juvenile fish habitat in some areas may be significant. The County's estuarine construction standards require that structural shoreline stabilization projects maintain adequate shallow areas for juvenile fish shelter.

Boat ramps and marinas are not so large or so numerous in the estuary as to have a significant cumulative impact on aquatic habitat. Individual moorages, where concentrated along a small waterway, may have a cumulative impact on aquatic habitats.

Aquaculture and fish hatcheries potentially have three types of negative impacts on aquatic habitats. Water quality and benthic communities can be affected by the accumulation of feces and surplus fish food. This generally will not result in cumulative water quality or benthic impacts if facilities are not placed closely together. The second possible negative impact associated with fish hatcheries and aquaculture is disease. The concern is that fish raised in confinement are more susceptible to disease than naturally occurring populations. Diseases may not be confined to the hatchery or aquaculture facility, and may spread to naturally occurring stocks. The potential for this type of occurrence may increase as hatchery and aquaculture facilities are concentrated in a single waterway. The third potential negative impact on aquatic habitat associated with hatchery and aquaculture facilities is that species introduced to the estuary could out-compete native stocks. The County's fisheries and aquaculture standards and the license procedures administered by state fisheries agencies address these concerns.

Port development and marine terminal activity has had a substantial cumulative impact on aquatic habitat, primarily as a result of dredging and filling.

River training projects have probably affected aquatic habitat by changing the distribution of shallow water, shoal and deep water habitats in the Columbia River Estuary. The overall cumulative impact of river training on aquatic habitats is not well understood.

### P20.1. AGRICULTURE AND FORESTRY

Policies in this subsection are applicable to agricultural and forestry activities on Columbia River Estuary shorelands. Activities outside of the coastal shorelands boundary are not covered by this subsection. Certain activities associated with agriculture and forestry, such as log storage, dike maintenance, and shipping facilities for agricultural and forestry products, are covered under different subsections.

1. Continued use of productive agricultural land is encouraged. Conversion to non-agricultural uses, except in urban areas, is discouraged.
2. Existing dikes and tide gates and drainage systems protecting productive agricultural land shall be maintained consistent with dike maintenance policies and standards, unless part of an approved restoration or mitigation project.
3. Potential water quality degradation of estuarine aquatic areas and associated tributaries resulting from agricultural or forest management practices shall be controlled by Oregon Forest Practices Act and Administrative Rules, Soil Conservation Service programs, and state water quality programs.
4. Conversion of productive agricultural or forestry shoreland to tidal or non-tidal wetland for a restoration project requires an exception to the applicable statewide planning goal if the restoration project is not proposed as mitigation for a development project.
5. In undiked areas bordering estuarine aquatic areas, a buffer strip of riparian vegetation shall be maintained to preserve water quality, trap sediment and nutrient runoff, for fish and wildlife habitat and aesthetic resources.

### P20.2. AQUACULTURE AND FISHERIES

The policies in this subsection apply to all projects that could conceivably affect fisheries (either commercial or recreational) or aquaculture in the Columbia River Estuary. This subsection is also applicable to the development of aquaculture facilities and to fisheries enhancement projects.

1. Traditional fishing areas shall be protected when dredging, filling, pile driving or when other potentially disruptive in-water activities occur.
2. Sufficient space for present and anticipated needs shall be reserved for the following uses:
  - Fishing vessel moorage;
  - Seafood receiving and processing;
  - Boat repair;
  - Net storage and repair;
  - Ice making;
  - Cold storage;
  - Other seafood industry support facilities.

3. Increased hatchery production and other fish enhancement efforts shall be supported where feasible, and when consistent with other applicable plan provisions.
4. Aquaculture and hatchery facility location, design and operation shall minimize adverse impacts on estuarine and shoreland habitat, navigation channels and public access points, and not interfere with commercial or recreational navigation.
5. Existing aquaculture and hatchery facilities and areas identified as having significant aquaculture potential shall be protected from conflicting uses.

### P20.3. DEEP-WATER NAVIGATION, PORT AND INDUSTRIAL DEVELOPMENT

The policies in this subsection apply to port and industrial development occurring in and over Columbia River Estuary waters, and on adjacent shorelands. This section also applies to navigation projects related to deep-draft maritime activities, such as channel, anchorage and turning basin development or expansion.

1. Shorelands with adjacent deep-water access, adequate rail or road access, and sufficient backup land shall be reserved for water-dependent recreational, commercial, industrial, or port development.
2. Federally designated channels, anchorages and turning basins, including necessary side slopes, shall be in Aquatic Development designations.
3. Development, improvement and expansion of existing port sites is preferred prior to designation of new port sites.
4. Aides to navigation, including range markers, buoys, channel markers and beacons, shall be protected from development impacts that would render them ineffective. This policy does not preclude development subject to U.S. Coast Guard approved reorientation or relocation of navigation aides.
5. Permit review for proposals involving treated or untreated waste-water discharge into the estuary will rely on the point source water pollution control program administered by the Oregon Department of Environmental Quality.

#### P20.4. DIKING

The policies in this subsection apply to the construction, maintenance and repair of flood control dikes in Columbia River Estuary shoreland and aquatic areas. These policies do not apply to dredged material containment dikes.

1. Deliberate dike breaching or removal may be permitted as part of a restoration or mitigation project. Productive agricultural land, significant wildlife habitat, and major marshes shall not be lost as a result of dike breaching activities unless an exception is approved.
2. New dike alignment or configuration shall not cause an increase in erosion or shoaling in adjacent areas, or an appreciable increase in seasonal water levels behind dikes. Waterway channelization shall be avoided.
3. New dikes shall be placed on shorelands rather than in aquatic areas unless part of an approved fill project, as a temporary flood protection measure, or subject to an exception.
4. Maintenance of existing dikes using uncontaminated dredged material from maintained channels or suitable material from other sources (i.e., excess roadworks excavation material, material from ditch cleaning) shall be encouraged.
5. Maintenance of dikes by means other than dredging of aquatic areas is encouraged, however, dredging of the adjacent subtidal aquatic areas to obtain fill material for dike maintenance may be permitted when necessary, subject to the Dredging and Dredged Material Disposal Standards, Section S4.232, and when coordinated with state and federal resource agencies, and private interests.

#### P20.5. DREDGING AND DREDGED MATERIAL DISPOSAL

Policies in this subsection are applicable to all estuarine dredging operations and to both estuarine shoreland and aquatic dredged material disposal in the Columbia River Estuary.

1. Dredging shall be allowed only:
  - (a) If required for navigation or other water-dependent uses that require an estuarine location or if specifically allowed by the applicable management unit requirements and,
  - (b) If a need (i.e., a substantial public benefit) is demonstrated and the use or alteration does not unreasonably interfere with public trust rights; and,
  - (c) If no feasible alternative upland locations exist; and,
  - (d) If adverse impacts are minimized.

2. Dredging and dredged material disposal shall not disturb more than the minimum area necessary for the project and shall be conducted so as to minimize impacts on wetlands and other estuarine resources. Loss or disruption of fish and wildlife habitat and damage to essential properties of the estuarine resource shall be minimized by careful location, design, and construction of:

- (a) Facilities requiring dredging,
- (b) Sites designated to receive dredged material, and
- (c) Dredging operation staging areas and equipment marshalling yards.

Dredged materials shall not be placed in intertidal or tidal marsh habitats or in other areas that local, state, or federal regulatory agencies determine to be unsuitable for dredged material disposal. Exceptions to the requirement concerning disposal in an intertidal or tidal marsh area include use of dredged material as a fill associated with an approved fill project or placement of dredged materials in the sandy intertidal area of a designated beach nourishment site. Land disposal shall enhance or be compatible with the final use of the site area.

3. The timing of dredging and dredged material disposal operations shall be coordinated with state and federal resource agencies, local governments, and private interests to protect estuarine aquatic and shoreland resources, minimize interference with recreational and commercial fishing operations, including snag removal from gillnet drifts, and insure proper flushing of sediment and other materials introduced into the water by the project.

4. The effects of both initial and subsequent maintenance dredging, as well as dredging equipment marshalling and staging, shall be considered prior to approval of new projects or expansion of existing projects. Projects will not be approved unless disposal sites with adequate capacity to meet initial excavation dredging and at least five (5) years of expected maintenance dredging requirements are available.

5. Dredging subtidal areas to obtain fill material for dike maintenance may be allowed subject to Columbia River Estuary Dredging Standard S4.232(10).

6. Dredging for mining and mineral extraction, including sand extraction, shall only be allowed in areas deeper than 10 feet below MLLW where the project sponsor demonstrates that mining and mineral extraction in aquatic areas is necessary because no feasible upland sites exist and that the project will not significantly impact estuarine resources. The estuary bottom at the project site shall be sloped so that sediments from areas shallower than 10 feet below MLLW and other areas not included in the project do not slough into the dredged area. Dredging as part of an approved dredging project which also provides fill for an approved fill project shall not be subject to the mining and mineral extraction policies and standards.

7. Where a dredged material disposal site is vegetated, disposal should occur on the smallest land area consistent with sound disposal methods (e.g., providing for adequate dewatering of dredged sediments, avoiding degradation of receiving waters). Clearing of land should occur in stages and only as needed. It may, however, be desirable to clear and fill an entire site at one time, if the site will be used for development immediately after dredged material disposal. Reuse of existing disposal sites is preferred to the creation of new sites provided that the dikes surrounding the site are adequate or can be made adequate to contain the dredged materials.

8. Disposal of dredged materials in intertidal areas shall only be allowed at designated beach nourishment sites or to provide fill material for an approved intertidal fill project.

9. When identifying land dredged material disposal sites, emphasis shall be placed on sites where (not in priority order):

- (a) The local comprehensive plan land use designation is development provided that the disposal does not preclude future development at the site;
- (b) The potential for the site's final use will benefit from deposition of dredged materials;
- (c) Material may be stockpiled for future use;
- (d) Dredged spoils containing organic, chemical, and/or other potentially toxic or polluted materials will be properly contained, presenting minimal health and environmental hazards due to leaching or other redistribution of contaminated materials;
- (e) Placement of dredged material will help restore degraded habitat; or where
- (f) Wetlands would not be impacted.

Important fish and wildlife habitat, or areas with scenic, recreational, archaeological, or historical values that would not benefit from dredged material disposal and sites where the present intensity or type of use is inconsistent with dredged material disposal shall be avoided. The use of agricultural or forest lands for dredged material disposal shall occur only when the project sponsor can demonstrate that the soils can be restored to agricultural or forest productivity after disposal use is completed. In cases where this demonstration cannot be made, an exception to the Agricultural Lands Goal or Forest Lands Goal must be taken and included as an amendment to the Comprehensive Plan prior to the use of the site for dredged material disposal. The use of shoreland water dependent development sites for dredged material disposal shall occur only when the project sponsor can demonstrate that the dredged material placed on the site will be compatible with current or future water dependent development. Dredged material disposal shall not occur in significant Goal 17 shorelands or wetlands habitats.

Engineering factors to be considered in site selection shall include: size and capacity of the site; dredging method; composition of the dredged materials; distance from dredging operation; control of drainage from the site; elevation; and the costs of site acquisition, preparation and revegetation.



10. Estuarine in-water disposal sites shall be in areas identified as low in benthic productivity, unless the disposal is to provide fill material for an approved fill project, and where disposal at the site will not have adverse hydraulic effects. Estuarine in-water disposal sites shall only be designated and used when it is demonstrated that no feasible land or ocean disposal sites can be identified and biological and physical impacts are minimal. An in-water disposal site shall not be used if sufficient sediment type and benthic data are not available to characterize the site.

11. Flow lane disposal sites shall only be allowed in development designated areas within or adjacent to a channel where:

- (a) Sediments can reasonably be expected to be transported down-stream without excessive shoaling,
- (b) Interference with recreational and commercial fishing operations, including snag removal from gillnet drifts, will be minimal or can be minimized by applying specific timing restrictions,
- (c) Adverse hydraulic effects will be minimal,
- (d) Adverse effects on estuarine resources will be minimal, and
- (e) The disposal site depth is between 20 and 65 feet below MLLW.

12. Beach nourishment sites shall only be designated on sandy beaches currently experiencing active erosion. Dredged material disposal at beach nourishment sites shall only be used to offset the erosion and not to create new beach or land areas. Beach nourishment sites shall not be designated in areas where placement or subsequent erosion of the dredged materials would adversely impact tidal marshes or productive intertidal or shallow subtidal areas. Designation of new beach nourishment sites shall require an exception to Statewide Planning Goal 16.

13. Dredged material disposal sites with adequate capacity to accommodate anticipated dredging needs for at least a five year period shall be identified and designated. Additional sites may also be designated. All dredged material disposal sites shall receive a Priority I or II designation with respect to its suitability and importance for meeting five-year dredging needs.

#### 14. Priority I Dredged Material Disposal Sites

Sites which are essential for meeting anticipated five-year disposal needs shall receive a Priority I designation. Priority I shoreland sites shall be protected from incompatible and preemptive uses to ensure adequate sites will remain available to accommodate five-year disposal needs. Incompatible and preemptive uses include:

- (a) Uses requiring substantial structural or capital improvements (e.g., construction of permanent buildings, water and sewer service connections);

(b) Uses that require alteration of the topography of the site, hereby affecting the drainage of the area or reducing the potential useable volume of the dredged material disposal site e.g., extensive site grading or excavation, elevation by placement of fill materials other than dredged spoils);

(c) Uses that include changes made to the site that would prevent expeditious use of the site for dredged material disposal. Such uses would delay deposition of dredged material on the site beyond the period of time commonly required to obtain the necessary federal, state and local dredging and dredged material disposal permits (approximately 90 days);

(Note: Examples of non-preemptive or compatible uses of shoreland dredged material disposal sites are: unimproved parking lots, equipment storage yards, materials marshalling yards, log storage and sorting yards, and undeveloped recreation areas, campgrounds or recreational vehicle parking areas.)

Incompatible or preemptive uses shall not be allowed at shoreland Priority I dredged material disposal sites unless the site is removed from the dredged material disposal plan by ordinance amendment upon demonstration that either:

(d) The site has been filled to capacity and is available for other uses, or

(e) The site is, in fact, not required to accommodate anticipated five-year disposal needs, or

(f) A new Priority I site has been designated to replace the site being removed.

#### 15. Priority II Dredged Material Disposal Sites

(a) Dredged material disposal sites which are not required for anticipated five-year disposal needs but which may be required to meet longer range needs shall be given a Priority II designation. The importance of these sites, as compared with Priority I sites, does not justify efforts to reserve all or portions of each site from possible preemptive uses.

(b) A 30-day freeze shall be placed on preemptive development requests (as defined in 15(a), above), for the purpose of allowing affected government agencies or private interests to negotiate for the use of the property as a disposal site. The County may choose to run this freeze concurrently or in addition to the normal permit process. If there is no expressed interest in use of the site for dredged material disposal during the freeze period, the development request shall be reviewed under normal procedures. If the request is approved, the entire site or affected portions of the site shall be removed from the dredged material disposal plan by ordinance amendment.

16. In order to ensure the adequacy of identified dredged material disposal site capacities for anticipated five-year disposal requirements, an analysis of the dredge material disposal site inventory shall be completed every five years. The analysis shall include:

(a) A determination of the Priority I sites utilized for dredged material disposal and the volume received by each site during the preceding period, noting also the project source of the dredged material and the interval separating the most recent from the next anticipated dredging event.

(b) A determination of the number and usable volume of Priority I sites remaining in the inventory, and the relationship between these sites and present or expected navigation-related dredging or water-dependent development projects in the following five year period, and the number and useable volume of Priority II sites identified in the inventory.

(c) An identification of the Priority II or other additional sites to be added to the Priority I inventory.

(d) An analysis of the adequacy of the dredged material site inventory shall include notification of, and communication of up-dated inventory information to affected property owners and local, state and federal governmental agencies. Of particular importance is the addition, deletion, or change in priority of dredged material disposal sites.

(e) The County shall cooperate with other jurisdictions on the Columbia River Estuary in monitoring of dredged material site availability and in dredged material disposal plan update.

17. New dredging in Aquatic Conservation management units may be permitted for the following if the dredging is consistent with the resource capabilities of the affected management unit:

(a) Aquaculture;

(b) High intensity water-dependent recreation, including boat ramps and marinas;

(c) Minor navigational improvements;

(d) Mineral extraction;

(e) Obtaining fill material for dike maintenance where a Goal 16 exception has been approved;

(f) Active restoration;

(g) Bridge crossing support structures;

(h) Pipelines, cables, and utility crossings;

(i) Maintenance and installation of tidegates and associated drainage channels;

(j) Projects for the protection of habitat, nutrient, fish, wildlife and aesthetic resources;

- (k) Structural shoreline stabilization;
- (l) Navigational aids;
- (m) Communication facilities;
- (n) Stormwater and treated wastewater outfalls;
- (o) Research and educational observations.

18. New dredging in Aquatic Natural management units may be permitted for the following if the dredging is consistent with the resource capabilities of the affected management unit:

- (a) Maintenance or installation of bridge crossing support structures;
- (b) Obtaining fill material for dike maintenance where a Goal 16 exception has been approved;
- (c) Maintenance and installation of tidegates and associated drainage channels;
- (d) Pipelines, cables, and utility crossings;
- (e) Projects for the protection of habitat, nutrient, fish, wildlife and aesthetic resources; and
- (f) Active restoration;
- (g) Navigational aids;
- (h) Communication facilities.

#### P20.6. ESTUARINE CONSTRUCTION: PILING AND DOLPHIN INSTALLATION, SHORELINE STABILIZATION AND NAVIGATIONAL STRUCTURES

The policies in this subsection apply to over-the-water and in-water structures such as docks, bulkheads, moorages, boat ramps, boat houses, jetties, pile dikes, breakwaters and other structures involving installation of piling or placement of riprap in Columbia River Estuary aquatic areas. Also covered under these policies are shoreline stabilization and aquatic area fills. This section does not apply to structures located entirely on shorelands or uplands, but does apply to structures, such as boat ramps, that are in both aquatic and shoreland designations.

1. Proper streamside vegetation management is the preferred method of shoreline stabilization, followed by planting of new vegetation, installation of riprap and installation of a bulkhead.
2. Navigational structures, such as breakwaters, jetties, groins, and pile dikes are major estuarine alterations with long term biological and physical effects. Proposals for new or enlarged navigational structures, or for removal of existing structures, must demonstrate that expected benefits outweigh potential adverse impacts on estuarine productivity.

3. New uses in aquatic areas and in shoreland areas especially suited for water-dependent development that are not water-dependent, if permitted, shall not preclude or pose any significant conflicts with existing, proposed or probable future water-dependent uses on the site or in the vicinity.
4. Where structural shoreline stabilization is shown to be necessary, an impact assessment is required and will include consideration of effects on shoreland and aquatic habitats, effects on fishing areas, uses of the adjacent shoreland and aquatic areas, and potential for adverse impacts in adjacent areas due to the project.
5. Proliferation of single-purpose docks and moorages is discouraged. Public or commercial multi-vessel moorage is preferred.

(PREVIOUS POLICY P20.7 - ENERGY FACILITIES WAS DELETED)

#### P20.7 FILLING OF AQUATIC AREAS AND WETLANDS

This subsection applies to the placement of fill material in the tidal wetlands and waters of the Columbia River Estuary. These policies also apply to fill in nontidal wetlands in subarea descriptions.

1. New uses in aquatic areas and in shoreland areas especially suited for water-dependent development that are not water-dependent, if permitted, shall not preclude or pose any significant conflicts with existing, proposed or probable future water-dependent uses on the site or in the vicinity.
2. Reduction of surface area and volume of aquatic areas and significant non-tidal wetlands in shoreland areas shall be minimized in the location and design of uses or activities requiring fill.
3. Construction on piling is preferred over construction on fill.

#### P20.8 FISH AND WILDLIFE HABITAT

This subsection applies to uses and activities with potential adverse impacts on fish or wildlife habitat, both in Columbia River estuarine aquatic areas and in estuarine shorelands.

1. Endangered or threatened species habitat shall be protected from incompatible development.
2. Measures shall be taken to protect nesting, roosting, feeding and resting areas used by resident and migratory bird populations.
3. Major marshes, significant wildlife habitat, coastal headlands, and exceptional aesthetic resources in the Coastal Shorelands Boundary shall be protected.

## P20.9. LAND TRANSPORTATION SYSTEMS

Policies in this subsection are applicable to the maintenance and construction of railroads, roads and bridges in Columbia River Estuary shoreland and aquatic areas. Public, as well as private facilities are covered under this subsection. Forest roads, however, are excluded.

1. New non-water-dependent uses in aquatic or shoreland areas especially suited for water-dependent development shall not preclude or pose any significant conflicts with existing, proposed or probable future water-dependent uses on the site or in the vicinity.
2. Land transportation systems shall be maintained and improved to support existing urban areas, allow industrial site development and support rural and recreational uses.
3. New land transportation routes shall not be located in aquatic areas or in significant nontidal wetlands in shoreland areas except where bridges are needed, and where no feasible alternative route exists.
4. New land transportation routes shall be located so as not to reduce or downgrade the potential for development of Development Shorelands or Development Aquatic areas.
5. When feasible, new public roads in scenic areas shall provide rest areas, view-points and facilities for safe bicycle and pedestrian travel.
6. Construction of new land transportation systems and maintenance of existing land transportation systems shall be undertaken in a manner that minimizes expected impacts on aquatic and shoreland estuarine resources.

## P20.10. LOG STORAGE

This subsection establishes policies for the establishment of new, and the expansion of existing, log storage and sorting areas in Columbia River Estuary aquatic and shoreland areas.

1. New aquatic area log storage facilities shall be designed and located so as to minimize potential adverse impacts on aquatic habitat, water quality and in areas that will not conflict with other estuarine uses.

## P20.11. MINING AND MINERAL EXTRACTION

Policies in this subsection are applicable to the extraction of sand, gravel, petroleum products and other minerals from both submerged lands under aquatic areas and from shoreland areas in the Columbia River Estuary.

1. Proposals for aquatic and shoreland area mining may be approved subject to protection of adjacent property and fishery resources from potential adverse impacts, including sedimentation and siltation.
2. Mining operations in aquatic and shoreland areas shall use technology and practices which minimize potential damage to estuarine resources, in conformance with the Oregon State Reclamation of Mined Lands Act.
3. Mineral extraction or gravel or sand dredging from the estuary may be permitted only when these resources are not otherwise available at upland locations and in conformance with the County's Dredging and Dredged Material Disposal policies and standards concerning mining and mineral extraction.
4. Aquatic area mining or mineral extraction projects may be approved only for the least biologically sensitive areas, and may occur only in aquatic areas deeper than ten feet below MLLW.
5. Mining and mineral extraction activities shall not be approved in areas of major marshes, significant fish and wildlife habitat, or exceptional aesthetic resources. Mining and mineral extraction activities occurring in areas of known or reported historical or archaeological sites should have an archaeological survey conducted of the proposed site.
6. Wastewater associated with mining shall be handled in a manner that preserves water quality and in conformance with state and federal water quality requirements.

(PREVIOUS POLICY P20.12 FORESTRY AND FOREST PRODUCTS INDUSTRY WAS DELETED)

## P20.12. MITIGATION AND RESTORATION

Policies in this section are applicable to estuarine restoration and mitigation projects on Columbia River Estuary aquatic areas and shorelands. Non-tidal wetlands are briefly addressed.

### Mitigation

1. Any fill activities that are permitted in the Columbia River Estuary aquatic areas or dredging activities in intertidal and shallow to medium depth subtidal areas shall be mitigated through project design and/or compensatory mitigation (creation, restoration or enhancement) to ensure that the integrity of the estuary ecosystem is maintained. Local Comprehensive Plans shall designate and protect specific sites for mitigation which generally correspond to the types and quantity of aquatic area proposed for dredging or filling.
2. Mitigation for fill in estuarine aquatic areas or dredging in intertidal and shallow to medium depth subtidal areas of the Columbia River Estuary planning area shall be implemented through the following mitigation actions:

#### Project Design Mitigation Actions

- a) Avoiding the impact altogether by not taking a certain action or parts of an action;
- b) Minimizing impacts by limiting the degree or magnitude of action and its implementation;
- c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment (e.g., removing wetland fills, rehabilitation of a resource use and/or extraction site when its economic life is terminated);
- d) Reducing or eliminating the impact over time by preservation and maintenance operations;

#### Compensatory Mitigation Actions

- e) 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.

Any combination of the above actions may be required to implement mitigation requirements. The compensatory mitigation actions listed in section (e) shall only be implemented after impact avoidance, reduction and rectification techniques have been considered, and there are still unavoidable adverse impacts.

3. Pre-permit application meetings and visits to the proposed development and mitigation sites shall be encouraged. The initial site visit coordinated between the local government and federal and state agencies shall be structured such that key issues will be addressed and consensus, to the degree possible, is established on each issue. This will require a structured site review format listing goals, objectives, and specific activities associated with the proposed development and mitigation actions.



4. The full array of wetland and aquatic area values shall be addressed when making mitigation site decisions and when designing mitigation action requirements. The list includes but is not limited to: fish and wildlife habitat, flood storage and desynchronization, food chain support, passive recreation, shoreline anchoring and water purification functions.
5. All mitigation actions shall be required to begin prior to or concurrent with the associated development action.
6. Developments in low-value diked freshwater nontidal wetlands can be mitigated by treating estuarine restorations or creations as in-kind mitigation actions. The final decision on the relative value of diked freshwater nontidal wetland shall be made through a cooperative effort between local governments and state and federal regulatory agencies. Values considered shall include but are not restricted to fish and wildlife habitat, flood storage and desynchronization, food chain support, passive recreation, shoreline anchoring and water purification functions.
7. If any of the compensatory mitigation actions are required, the local government shall require that the U.S. Fish and Wildlife Service make a Resource Category determination for the site proposed for development. The classification shall be listed on the permit application and review notice. If the area subject to impact is in a Resource Category 2 or lower (4 = lowest), the following sequence of mitigation options shall be considered:
  - In-Kind/On-Site
  - In-Kind/Off-Site
  - Out-of-Kind/On-Site
  - Out-of-Kind/Off-Site
8. If out-of-kind mitigation is found to be the only option, the applicant shall first seek restoration of historically and/or present day scarce habitat types.
9. All completed mitigation sites shall be adequately buffered from development and other activities to minimize the potential adverse impacts on the mitigation site. Buffer requirements shall be determined through a cooperative effort between local governments and state and federal regulatory agencies.
10. No mitigation action shall endanger or obstruct adjacent properties. The potential for present or future endangerment or obstruction shall be determined in advance of the mitigation action. Responsibility for rectifying potential damage to adjacent property shall be determined prior to permit approval.
11. Clatsop County will cooperate with CREST and state and federal resource agencies in the periodic review of the region's mitigation plan. Reviews should occur every 4-7 years. The review shall include reexamination of site availability, degree of plan implementation, changed policies and legal requirements and possible new projects that may require mitigation.

12. Additional mitigation sites shall be designated by Clatsop County as the need arises. New designations shall be coordinated with CREST, local governments, state and federal resource agencies. New sites shall be subject to the same policies and standards as sites presently designated.
13. All designated mitigation sites shall be protected and shall facilitate mitigation actions through appropriate zoning ordinance measures. For any new site not designated in the plan, mitigation shall be implemented through the policies and standards of this plan.
14. Estuarine alterations in Washington can be mitigated by actions in Oregon and vice versa if local and state authorities from both states and federal authorities with statutory responsibility for administering mitigation requirements approve the mitigation site selected and the mitigation action proposed.
15. Shorelands that are in a Water-Dependent Development Shorelands designation can only be used for mitigation subject to a finding that the use of the site for mitigation will not preclude or conflict with water-dependent uses.
16. Full consideration shall be given to existing significant Goal 17 resources when designing a mitigation project that may potentially alter, impair or destroy all or any portion of these resources. The minimum consideration will be to discount value from the credit potential of the mitigation action proportional to the existing value of the Goal 17 resource. Significant Goal 17 resource areas (major marshes, significant wildlife habitat and exceptional aesthetic resources) can only be used for mitigation subject to a finding that the use of the site for mitigation will be consistent with the protection of natural values.
17. Any acquisition strategy for bringing designated mitigation sites (pre- or post-mitigation action) into public ownership or into ownership of a private nonprofit land trust organization is encouraged.
18. All mitigation sites designated on public lands shall remain in public ownership.
19. An area in forest production, and considered for mitigation purposes, shall be evaluated for its present use value and compared with its potential value as a wetland before conversion of the site is acceptable.
20. A developer may create, restore or enhance more wetland area than required for immediate development impacts. Subject to federal, state and local agency approval, this "surplus mitigation" may be credited against future development. The reserve wetland area shall not be considered a mitigation bank unless it is acquired and managed by a federal or state land and resource management agency. In Oregon, this shall be the Division of State Lands.

#### Mitigation Bank Policies

21. Any area where a mitigation action has taken place and mitigation credits are available for future development and the site is owned and managed by a federal or state land management agency, shall be designated as a mitigation bank. The federal or state agency (Division of State Lands) shall be responsible for administration of a mitigation bank area throughout the period it serves as a bank.

22. An agreement among local, state and federal authorities shall serve as the implementing instrument establishing a mitigation bank and for continuing management of a bank. Such an agreement is necessary to document the initial conditions of a bank's formation, including the means by which a mitigation bank shall be administered. The agreement shall also detail ownership of the site and include an itemized presentation of project costs, a technical plan outlining the habitat mitigation action, and include the number of mitigation credits available in the bank. A plan for monitoring the mitigation site shall be provided, including the goals, costs, and responsibility of the monitoring program. The agreement shall specify the mechanisms by which mitigation "credits" will be transferred from the bank and applied to the activity qualifying for use of the bank. The agreement shall also specify the means by which proportional mitigation bank creation costs will be assessed.

23. Mitigation credits in mitigation banks shall be reserved for use by small scale development projects (5 acres or less of impacted wetland and/or aquatic area). This does not apply to the Airport Mitigation Bank.

24. A variety of habitats shall be created in a mitigation bank whenever possible, such that the opportunity of replacement for wetland resources lost to a variety of development activities is possible. The mitigation bank shall be of sufficient capacity to meet the requirements of a number of expected development projects.

25. Mitigation banks shall be created by written agreement with the Director of Oregon Division of State Lands (DSL) and shall be administered by DSL. Such agreements shall provide the basis for creation and operation of the bank and shall specifically provide for the following:

- a) The exact location of the real property.
- b) Proof of ownership or control, i.e., deed or title report.
- c) The nature and extent of the mitigation action. This analysis shall require information about the site salinity, elevation, wave and current actions, substrate, and other physical and biological characteristics.
- d) How and when the mitigation action shall be performed.
- e) A statement of informed opinion as to what habitat shall result from the action and a statement as to the relative value of each anticipated habitat type.
- f) How the resulting changes shall be monitored and evaluated [OAR 141-85-254 (12, 14)] and what contingencies are planned if goals are not satisfied within a reasonable time period.
- g) How the mitigation bank shall be protected (e.g., dedication, conservation easement, deed transfer).
- h) How funding for necessary construction or alteration work and potential remedial action shall be guaranteed (e.g., bonding).
- i) The price that may be charged for credits from the bank.

26. Applicants for removal and fill permits requiring mitigation are not obligated, or automatically entitled, to use an existing mitigation bank to meet the mitigation needs of any project. Permit applicants shall negotiate directly with the administrator of the bank, resource agencies, and regulatory agencies to secure the right to use the bank. Agreements between the administrator of the bank and the permit applicant are subject to the Planning Director's approval of the number of mitigation credits charged against the bank.

#### Restoration

27. Restoration of tidal and nontidal wetlands in the Columbia River Estuary area may be done either as a mitigation action or as an action outside of the context of mitigation.

28. Restoration outside of the context of mitigation shall be allowed at designated mitigation sites if the site is a middle or low priority site and findings are made that it is no longer needed for mitigation.

29. All restoration projects shall serve to revitalize, return, replace or otherwise improve the wetland and aquatic ecosystems in the Columbia River Estuary area. Examples include restoration of natural biological productivity, fish and wildlife habitat, aesthetic or historic resources that have been diminished or lost due to past alterations, activities, or catastrophic events. In selecting projects, priority shall be given to those projects which provide substantial public benefits and which restore those wetland and aquatic habitat types, resources, or amenities which are in shortest supply compared to past abundance.

30. After a restoration takes place the local jurisdiction shall amend its plan and implement a zone change, for the restored area, to reflect the aquatic character of the site.

31. Restoration of economically marginal and unused low-lying diked areas to estuarine wetland shall be encouraged; active restorations to provide potential for diverse habitat (e.g., mudflat and marsh) as well as passive restorations are encouraged. Except through public condemnation procedures, removal of dikes or excavation on private lands shall not occur without consent of the landowner.

33. Shorelands that are in a Water-Dependent Development Shorelands designation can only be used for restoration subject to a finding that the use of the site for restoration will not preclude or conflict with water-dependent uses.

34. Significant Goal 17 resource areas (major marshes, significant wildlife habitat, and exceptional aesthetic resources) can only be used for restoration subject to a finding that the use of the site for restoration will be consistent with protection of its natural values.

35. Old piling, navigational structures, and buildings that are a hazard to navigation and contribute to excessive shoaling, or pose a threat to life or property shall be removed. Prior to removal, the costs and benefits associated with removal shall be evaluated. Factors requiring consideration include:

- Potential erosion or sedimentation problems that may result from removal;
- The structure's habitat value and probable longevity; and
- The structure's historic and scenic values.

36. Restoration of riparian vegetation around wetlands and waterways in the Columbia River Estuary planning area is a high priority. Protection of these areas shall be implemented using various strategies (e.g., zoning, acquisitions, easements, and transfer of development rights).

#### Long Term Aquatic Area and Nontidal Wetlands Mitigation and Restoration Policies

37. Federal and state resource agencies should be requested to intensify existing programs to identify Resource Categories of wetlands and Section 404 wetlands in the Columbia River Estuary area to give developers greater certainty regarding available development sites and potential mitigation requirements. The net result shall be greater certainty for developers and a more streamlined permit process.

38. CREST shall make an effort to develop a program to identify and assess the relative values of nontidal wetlands. This inventory effort shall provide baseline data that can be used to give greater certainty regarding site potential for development and mitigation requirements.

39. A method of quantifying enhancement credits for estuarine and nonestuarine wetland mitigation should be developed. Also, a method for quantifying nonestuarine wetland values should be developed and incorporated into local statutes. Ideally, this system should be compatible with the system used in Oregon's Estuarine Mitigation Law. The system would have to be reviewed and accepted by state and federal resource and regulatory agencies.

40. A system should be devised whereby wetland impacts that are allowed under a regional or nationwide permit, and that do not require any permit procedure, may be reported to the local government so that an accurate record of cumulative wetland impacts can be maintained.

41. The following framework for restoration implementation is recommended for the Columbia River Estuary:

- a) Develop and provide educational materials for landowners explaining the benefits of natural area protection and various options for restoring land to natural conditions and protecting the restored land.

- b) Establish an incentive system in the Columbia River Estuary area whereby landowners can effectively utilize a variety of options for restoration and protection of their land.

- c) Identify landowners with economically marginal production land (e.g., forest or agricultural production), that was historically wetland, and inform them of any incentive-oriented restoration systems for restoration and encourage their participation.

42. The following techniques are suggested as potential methods to establish a wetland restoration and protection incentive system:

- a) Development of effective acquisition power through private nonprofit organizations and federal and state grants (acquisition may be through sale, trade or land donations). Public ownership is encouraged.

- b) Protection through restrictions while landowners retain title to the land, (e.g., conservation easements, mutual covenants, deed restrictions and leases).
- c) Provide tax incentives for landowners that allow restoration to take place on their land.
- d) Deed restrictions, wildlife easements or fee acquisition on Farmers Home Administration farm foreclosure inventory lands.

#### P20.13. PUBLIC ACCESS TO THE ESTUARY AND ITS SHORELINE

Policies in this subsection apply to all uses and activities in Columbia River Estuary shoreland and aquatic areas which directly or indirectly affect public access. "Public access" is used broadly here to include direct physical access to estuary aquatic areas (i.e. boat ramps), aesthetic access (i.e. viewing opportunities), and other facilities, designations, or opportunities that provide some degree of public access to Columbia River Estuary shorelands and aquatic areas.

1. Federal, state and local activities in the estuary shall, when feasible, provide for maintenance and improvement of estuarine public access.
2. Public access in urban areas shall be preserved and enhanced through waterfront restoration and construction of public facilities, and other actions consistent with local public access plans.
3. Public access in rural areas shall be preserved and enhanced through development of trails, scenic viewing areas, boat ramps and other actions consistent with local public access plans.
4. Proposed major shoreline developments shall not, individually or cumulatively, exclude the public from shoreline access to areas traditionally used for fishing, hunting or other shoreline activities.
5. Publicly owned shorelands with water access should remain in public hands.
6. Special consideration shall be given toward making the estuary accessible for the physically handicapped or disabled.
7. Public access to publicly owned shorelands and aquatic areas shall be maintained and improved where feasible.
8. Clatsop County will develop and implement programs for increasing public access.

#### P20.14. RECREATION AND TOURISM

Policies in this subsection are applicable to recreational and tourist-oriented facilities in Columbia River Estuary shoreland and aquatic areas.

1. New non-water-dependent uses in aquatic areas or in shoreland areas especially suited for water-dependent development, if permitted, shall not preclude or pose any significant conflicts with existing, proposed or probable future water-dependent uses on the site or in the vicinity.
2. Recreation uses in waterfront areas shall take maximum advantage of their proximity to the water by providing water access points, water-front viewing areas, and structures visually compatible with the waterfront.

#### P20.15. RESIDENTIAL, COMMERCIAL AND INDUSTRIAL DEVELOPMENT

The policies in this subsection are applicable to construction or expansion of residential, commercial or industrial facilities in Columbia River Estuary shoreland and aquatic areas. Within the context of this subsection, residential uses include single and multi-family structures, mobile homes, and floating residences (subject to an exception). Duck shacks, recreational vehicles, hotels, motels and bed-and-breakfast facilities are not considered residential structures for purposes of this subsection. Commercial structures and uses include all retail or wholesale storage, service or sales facilities and uses, whether water-dependent, water-related, or non-dependent, non-related. Industrial uses and activities include facilities for fabrication, assembly, and processing, whether water-dependent, water-related or non-dependent non-related.

1. New non-water-dependent uses in aquatic areas or in shoreland areas especially suited for water-dependent development if permitted, shall not preclude or pose any significant conflicts with existing, proposed or probable future water-dependent uses on the site or in the vicinity.
2. Shoreland developments shall be designed and constructed to minimize adverse environmental and aesthetic impacts. Where appropriate and feasible, development shall be clustered to provide open space.
3. Where non-water-dependent, non-water-related residential, commercial or industrial development exists on shorelands designated for water-dependent development, transition of shorelands to water-dependent or water-related uses is encouraged.

#### P20.16. SHALLOW-DRAFT PORTS AND MARINAS

The policies in this subsection apply to development of new marinas and improvement of existing marinas in aquatic areas of the Columbia River Estuary. Also covered are adjacent shoreland support facilities that are in conjunction with or incidental to the marina. Included under this subsection's coverage are both public and private marinas for either recreational, charter or commercial shallow draft vessels.

1. Proliferation of individual single-purpose docks and moorages is discouraged. Public or commercial multi-vessel moorage is preferred.
2. Navigational access to the estuary and its tributaries shall be maintained. Peripheral channels, streams and sloughs shall not be closed to navigation. Necessary maintenance dredging for traditional moorage areas shall be allowed, subject to the requirements of the aquatic designation, state and federal permits, and local plan and ordinance provisions.
3. Provisions should be made for adequate flushing and water circulation and waste disposal receptacles to ensure the maintenance of water quality in marina and moorage facilities.

#### P20.17. SIGNIFICANT AREAS

The policies in this subsection are intended to protect certain Columbia River shoreland and aquatic resources with estuary-wide significance. Significant shoreland resources are identified as such in subarea plans. Significant aquatic resources are found in Natural Aquatic areas. This subsection applies only to activities and uses that potentially affect significant shoreland or aquatic resources. Other resources without estuary-wide significance are not covered by this subsection.

1. Significant estuarine aquatic and shoreland resources shall be protected from degradation or destruction by conflicting uses and activities.
2. Major marshes, significant wildlife habitat, and aesthetic resources shall be protected.
3. Known or newly discovered archaeological sites shall be protected in compliance with existing state and federal laws.

#### P20.18. SHORELAND HAZARD AREAS

The policies in this subsection apply to development in Columbia River Estuary shoreland areas with identified hazards to development. These hazards are identified in subarea plans, and include areas susceptible to erosion, soil movement, and flooding.

1. Development proposed in identified shoreland hazard areas is generally discouraged. All new and replacement development in shoreland hazard areas shall be protected from the hazard.



#### P20.19. WATER QUALITY MAINTENANCE

The policies in this subsection are intended to help protect and enhance the quality of water in the Columbia River Estuary. Impacts on water quality in aquatic areas and in tidegated sloughs in shoreland areas are covered.

1. Non-point source water pollutants from forest lands, roads, agricultural lands, streambank erosion and urban runoff shall be controlled by state water quality programs, Oregon Forest Practices Act and administrative rules, and Soil Conservation Service programs.
2. New untreated waste discharges into tributary streams, enclosed bays and sloughs shall not be permitted.
3. Petroleum spill containment and clean-up equipment should be located in the estuary area. This equipment should be capable of controlling a large spill in all areas of the estuary.
4. Ports, marinas and commercial moorage facilities shall provide waste disposal receptacles in compliance with Marpol Annex V.

#### P20.20. WATER-DEPENDENT DEVELOPMENT AREAS

Policies in this subsection are applicable only to those Columbia River Estuary Shorelands designated as Especially Suited for Water-Dependent Development. The purpose of these policies is to assure that adequate sites are available for water-dependent uses.

1. Shorelands especially suited for water-dependent uses shall be protected for water-dependent uses.
2. Temporary uses involving minimal capital investment or uses incidental to a water-dependent use may be allowed in shorelands especially suited to water-dependent development if the temporary or incidental use does not foreclose future opportunities for a water-dependent use.

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## P21 INTERGOVERNMENTAL COORDINATION POLICIES

### P21.1 LOCAL INTERGOVERNMENTAL COORDINATION

The Columbia River Estuary Study Taskforce (CREST) provides local governments with a forum for communication and cooperation in planning and development activities of regional scope and importance. Local governments recognize the mutual benefits of such coordination during the decision-making and implementation process.

On behalf of member governments, CREST will:

1. Provide continued planning assistance to member jurisdictions upon request to and approval by the CREST Council, review local comprehensive plans and make recommendations which will result in coordination and conformance with the Columbia River Estuary Regional Management Plan;
2. Provide technical information and assistance to member jurisdictions, other agencies and private interests concerning implementation of the Columbia River Estuary Regional Management Plan;
3. Evaluate state and federal estuary activities, programs, developments and project impact assessments that may affect local governments and report results to concerned jurisdictions;
4. Coordinate with local, state and federal agencies on estuary development, research, regulation, project impact assessment and plan review and update;
5. Establish and maintain a library of information and data pertaining to and affecting the Columbia River Estuary for use by the public, local government and state and federal managers and researchers.

### P21.2 SCIENTIFIC RESEARCH AND PLANNING IN ESTUARINE AREAS

Research is conducted by state and federal agencies, universities, private consultants, and individuals in the estuary area. State and federal agencies periodically develop special-purpose plans for particular resource areas, within the estuary, which affect local planning and decision-making.

To ensure local coordination and to provide useful information for local estuary management decisions, it is recommended that all agencies, consultants, university personnel and individual researchers conducting research or developing special management plans should:

1. Contact CREST and affected local jurisdictions during the project-planning stage to outline the research or planning objectives and schedule, and the means of reporting project results; and
2. Make provision for timely reporting of research results and management plan findings to local jurisdictions.

### P21.3 PUBLIC INFORMATION

Public knowledge of the value of estuarine resources and the importance of estuarine resources to the local economy could be dramatically improved through a program of education and public information. CREST and local governments, in cooperation with state and federal agencies, educational institutions and private groups should:

1. Encourage development of practical educational courses, extension education programs, science fairs, library and museum displays relating to the Columbia River Estuary and the marine sciences in general;
2. Encourage the establishment of major oceanographic research and educational facilities in the area;
3. Maintain and expand the CREST library and information services.

### P21.4 DEVELOPMENT EVALUATION, PERMIT INFORMATION AND PERMIT REVIEW

Development occurring in estuarine aquatic or shorelands areas produces impacts of varying type and degree. State and federal permits are required for in-water construction, dredging, filling, waste discharge and numerous other activities. These permits are mandated by law and allow each local jurisdiction to carry out its responsibility to control or limit negative economic and environmental effects. The number of permits and necessary requirements, and the lack of knowledge about such requirements, may add substantial cost and time delays to development projects.

CREST will provide permit information and assistance for potential developers concerning requirements at the local, state and federal level. Information to be provided may include: environmental and legal constraints, methods to minimize or mitigate the impacts of proposed projects, and general policies of agencies that will review the project. The intent of this policy is to facilitate understanding and use of existing permit processes. Review by CREST is not mandatory.

### P21.5 STATE AND FEDERAL CONSISTENCY

The Columbia River Estuary plan is consistent with Oregon's Coastal Zone Management Program. The State's program is implemented through local comprehensive plans. Federal activities and federally funded or permitted activities in the estuary area shall be consistent to the maximum extent practicable with the regional policies, development standards, and land and water use designations in local comprehensive plans.

## P 30. COLUMBIA RIVER ESTUARY SUBAREA PLANS

The Columbia River Estuary Study Taskforce (CREST) has prepared a regional management plan for the Columbia River Estuary covering three counties, including Clatsop County, and four cities. The relevant parts of the *Columbia River Estuary Regional Management Plan* are adopted and summarized in the County's Comprehensive Plan and Land and Water Development and Use Ordinance. This section describes the aquatic areas and adjacent shorelands in Clatsop County.

The estuary is divided into 46 planning subareas. These subareas were drawn to represent distinct planning units with common features and needs: land use patterns, physical and biological characteristics, and jurisdictional boundaries were used to determine subarea boundaries. The subarea plans which are under, or in-part under Clatsop County jurisdiction are described in P30.1 through P30.22. There are 16 subareas wholly within Clatsop County and 6 subareas partially within Clatsop County and one or more other jurisdiction.

The subarea plans are divided into several elements, each of which addresses a different set of factors affecting land use. The elements are designed to provide local government officials, planners, and other plan users with the background information needed to evaluate development proposals. Those elements and their contents are described below.

### General Description

This section contains a description of subarea boundaries and general characteristics. The boundaries are described using, where possible, commonly known features.

### Aquatic Features

This section describes predominant aquatic area characteristics. The aquatic area is defined as all areas lying waterward of the landward limit of aquatic vegetation or, where there is no vegetation, Mean Higher High Water. The following physical and biological characteristics are discussed:

- a. Changes to the aquatic habitats over the past century.
- b. Currents, bathymetry, salinity, tidal influences, flushing, sedimentation, and flow;
- c. Estuarine wetlands;
- d. Benthic and water-column invertebrates;
- e. Fish; and
- f. Wildlife.

## Shoreland Features

This section contains information on shoreland physical and biological features. Features discussed include:

- a. Soils;
- b. Topography;
- c. Vegetation;
- d. Nontidal wetland habitat; and
- e. Wildlife.

For informational and planning purposes, the Shoreland Features section describes all of the land area within the floodplain. Much of this area does not fall under the regulatory boundaries of shorelands, as defined by Oregon.

The regulatory estuary shorelands area in Oregon includes all lands within fifty feet landward of the estuarine shoreline. Land with the following characteristics is also included:

- a. Areas subject to ocean flooding and lands within 100 feet of the ocean shore or within 50 feet of an estuary or a coastal lake.
- b. Areas of geological instability in or adjacent to the shoreland boundary when the geologic instability is related to or will impact a coastal water body.
- c. Natural or man-made riparian resources, especially vegetation which function to stabilize the shoreline or maintain water quality and temperature necessary for the maintenance of fish habitat and spawning areas.
- d. Areas of significant shoreland and wetland biological habitats whose habitat quality is primarily derived from or related to the association with coastal and estuarine areas.
- e. Areas necessary and appropriate for water-dependent and water-related uses, including areas appropriate for port facilities and navigational structures, dredged material disposal and mitigation sites, and areas suitable for aquaculture, and existing land uses and public facilities.
- f. Areas of exceptional aesthetic or scenic quality, where the quality is primarily derived from or associated with the coastal or estuarine areas.
- g. Areas of recreational importance or public access which utilize coastal waters or riparian resources.
- h. Locations of archaeological or historical importance associated with the estuary.
- i. Coastal headlands.
- j. Dikes and their associated inland toe drains.

## Human Use

This section describes human land and water uses in each subarea. The following factors, where applicable, are discussed:

- a. Predominant economic activities and developed land uses;
- b. Locational advantages to economic activities resulting from the presence of natural resources or from physical site characteristics;
- c. Recreational uses, both active and passive;
- d. Major point and non-point pollution sources;
- e. Navigational structures and channels;
- f. Transportation facilities; and
- g. Cumulative impacts on the subarea from particular activities.

## Issues

This section focuses on the relationship between resources and uses identified in the previous three subsection descriptions and existing and projected land use patterns. Areas are identified where conflicts exist between pressures for development and resource conservation. Limitations on development potential resulting from physical site characteristics are discussed with particular emphasis on changes that have taken place since adoption of the *1979 Columbia River Estuary Regional Management Plan*.

## Aquatic and Shoreland Designations

Based on an evaluation of the aquatic and shoreland features described in the previous sections, portions of the various subareas are designated according to their development potential, resource sensitivity, and conservation needs. Aquatic and shoreland designations are used with the policies and development standards to determine the types and intensities of uses which would be permitted within the subarea. Aquatic and shoreland designations are defined in Policy P10. Shoreland designations apply to the regulatory shoreland area only. This subsection defines the regulatory shoreland boundary of each subarea.

## Subarea Policies

This subsection includes policies that contain specific provisions concerning a unique physical, land use, or economic characteristic of the subarea. Policies applicable to the entire estuary are included in Policy P20.

## P 30.1 MOUTH OF THE COLUMBIA RIVER

### General Description

This subarea includes the South Jetty, the offshore waters west of the Columbia River Entrance Buoy and the estuary between the South Jetty and a line connecting Jetty A and the North Jetty. It extends upstream to about RM 3. It does not, however, include Clatsop Spit, Jetty A, the ocean beaches or any land areas except the South Jetty. The subarea extends seaward of the Columbia Entrance Buoy to the three mile limit (state and county line), encompassing productive areas outside the mouth of the estuary and ocean dredged material disposal sites. The subarea includes parts of both Clatsop County, Oregon and Pacific County, Washington.

### Aquatic Features

The Mouth of the Columbia River Subarea includes waters both inside the estuary and in the ocean. The river mouth has undergone large physical changes resulting from construction of the entrance jetties. Prior to jetty construction, the mouth of the river was at Cape Disappointment in Washington and Point Adams in Oregon. Large, shifting sand bars and shallow channels characterized the area. With the construction of the jetties, the mouth was moved about 3-1/2 miles seaward and constricted from 6 to 2 miles wide. The constriction of the mouth has resulted in a deeper entrance channel.

The mouth of the Columbia River is the most physically dynamic area of the estuary. Tidal currents, freshwater flow, wind-driven currents, waves, and coastal currents all affect the waters of the subarea. Currents and wave action combine to make navigation difficult.

Sediments in the subarea consist almost entirely of fine sand inside the mouth and in the adjacent offshore area. Some silt is found farther offshore and south of the entrance. Outside the mouth, sediment is transported by wind-driven currents and waves. The dominant direction of sediment transport is north. From the bar inward, tidal, estuarine and river flow effects become much more important. Upstream bottom currents bring sand into the estuary from the ocean during low flow periods. The overall yearly balance and the effect of storms are not known.

Salinity levels in the estuary portion of the subarea vary from zero to near ocean salinities depending on tidal cycle and river discharge. During high river discharge the water column becomes stratified with bottom salinity levels greatly exceeding those on the surface. The area becomes entirely freshwater during very high river discharges and strong ebb tides. During low river discharge, the water column becomes highly stratified during neap tides and nearly unstratified during spring tides.

Plant types in the subarea include phytoplankton and marine algae. Phytoplankton productivity is high in offshore areas but is generally low within the estuary portion of the subarea. Marine algae grow on the jetties.

Zooplankton productivity is very high in this area and seaward for several miles. Benthic invertebrate production is high in offshore marine waters but decreases toward the mouth. There is an extensive commercial crab and shrimp fishery outside the mouth, while recreational crab fishing is important inside the jetties. The main channel area is an important nursery area for juvenile Dungeness crab.

Fish in the subarea include a mix of coastal marine, estuarine and anadromous species. Common marine species include English sole, sand sole, butter sole, starry flounder, northern anchovy, surf smelt, whitebait smelt, and Pacific tomcod. Anadromous fish including longfin smelt, American shad, Pacific herring, eulachon, and the salmonids migrate through the subarea.

Birds commonly occurring within the subarea include cormorants, gulls, surf scoters, western grebes, and sanderlings. Western and glaucous-winged gulls feed in the subarea year round and nest on the South Jetty in spring and summer.

The subarea is an important feeding area for California and northern sea lions. Although the sea lion species can be found in the subarea year round, they are most common in winter and spring. Harbor seals also feed in the subarea.

#### Shoreland Features

The only shorelands in the subarea are on the South Jetty, which is constructed of rock and rubble. The tip of the South Jetty is the largest California and northern sea lion haulout site in the estuary.

#### Human Use

This subarea contains the downstream end of the authorized navigation channel (55 feet deep by 1/2 mile wide to RM 3). The channel is stabilized by the entrance jetties and maintained primarily by hopper dredge. The average amount dredged from this subarea is about 8 million cubic yards per year. The offshore disposal sites (Areas A, B, E, and F) are in the outer portions of this area. An in-water estuary site (Area D in the Estuary Channels Subarea) was used for disposal of material from the inner bar when, during rough bar conditions, disposal at sites outside the mouth (disposal sites A, B, E, and F) was too hazardous. The Corps of Engineers has adopted a change in practices to discontinue disposal of entrance material in Area D. Recreational use of the waters by small boats is high. The Buoy 10 sports fishery draws large numbers of recreational anglers to this area each summer. Commercial fishing is intensive throughout the year.

The cumulative impact of jetty construction and dredging on circulation and scouring in this subarea has been substantial, particularly with respect to deep-draft navigation. The cumulative impact of the jetties on sand transport along the ocean beaches is not well-documented, but probably significant. The cumulative impact of bar dredging on fish habitat, particularly Dungeness crabs, may be significant, but recent studies on this are inconclusive.



## Issues

The Corps of Engineers has studied the effects of dredging the bar on the juvenile Dungeness crab population. Study results demonstrate that the hopper dredge removes large numbers of juvenile crab from the bar. The long-term effect of this removal on the regional crab population has not been determined.

Peacock Spit has accreted north of the North Jetty (in the Cape Disappointment, Washington Subarea) and is part of Fort Canby State Park. In recent years the spit has experienced erosion and the Washington State Parks Department desires maximum disposal of dredged material at Area E, since this may feed the beach at Peacock Spit and retard erosion. The desirability of extensive disposal at Area E needs to be evaluated, particularly as it may affect the productive crab fishery in the area.

## Aquatic and Shoreland Designations

All aquatic areas are Conservation, except:

1. Dredged material disposal sites A, B, E, and F, which are designated Development.
2. The navigation channel, plus a flowlane disposal area on each side (either 600 feet wide or to the 20-foot bathymetric contour, whichever is narrowest), is designated Development.
3. Shorelands on the South Jetty are designated Development. The South Jetty is entirely within the regulatory shorelands boundary.

## Subarea Policies

1. Adverse impacts on Dungeness crab habitat and on commercial or recreational crabbing in the Mouth of the Columbia River subarea caused by dredging or by in-water dredged material disposal shall be minimized.

### General Description

This subarea includes the aquatic areas of Baker Bay and the Sand Islands. It is bounded on the west side by the Ilwaco navigation channel and by the shoreline to the north. On the east it is bounded by Chinook Point, and by the 30 foot depth contour to the south. The Sand Islands are the only shorelands in this subarea. The Town of Ilwaco and the Port of Ilwaco are not included in this subarea. The subarea is under the jurisdiction of Clatsop County, Oregon and Pacific County, Washington.

### Aquatic Features

The aquatic portion of this subarea includes the waters and wetlands of Baker Bay out to the North Channel. Prior to construction of the South Jetty in the 1890's, Baker Bay was an open water environment, very exposed to winds and waves. Sheltered anchorage and deep water were provided at and behind Cape Disappointment; most of the bay was navigable. The mouth of the Columbia River, including Baker Bay, was an extremely dynamic environment. Channels and sand bars continually changed in size, shape, and position. Between 1839 and 1848, Sand Island was located mid-river approximately 4.3 miles south of Cape Disappointment. By 1870, the island had naturally shifted 1.55 miles to the north to a position 2.75 miles south of Cape Disappointment.

The natural northerly movement of Sand Island continued until 1885 when South Jetty construction began. While the jetty was being built, Sand Island moved into Baker Bay and enlarged. By 1910, the island stabilized in approximately its present location due to changes in current flow patterns resulting from the new jetty. The movement and stabilization of Sand Island in Baker Bay has been the largest recorded shoaling event in the bay.

Shoaling continued to occur rapidly in the bay through the 1930's. Factors contributing to this shoaling included shelter from strong currents and waves brought on by Sand Island's presence in the bay, the effects of numerous pilings in the bay, and, possibly, the effects of diking the Chinook and Wallacut River tidelands and the increased sediment load in the Columbia River due to upriver logging and agricultural activities.

Sand Island breached and formed two islands in 1940. A great deal of sediment eroded from the gap between the islands during the occurrence of the breach. In addition, the newly opened gap resulted in scouring and deepening of the shallow flats immediately north of the islands.

The complex water exchange patterns of Baker Bay's three entrances determine the bay's circulation. A mathematical model of the bay provides the only information available on circulation. Much of the water exchange between the bay and the main channel of the estuary occurs through the entrance between East and West Sand Islands. The Ilwaco and Chinook Channel entrances exhibit maximum ebb flows about two hours before high water and maximum flood flows about two hours after high water. The situation is reversed in the entrance between East and West Sand Islands, with maximum ebb flows about two hours after high water and maximum flood flows two hours before high water. The currents in the interior of the bay are much weaker than the currents in the bay's entrances.

Winds have a significant impact on the bay's water levels, currents, and waves. During the prevailing north and northwest winds of summer, water levels drop and the circulation patterns in the bay change. For example, an average north-flowing current in the east portion of the bay reverses and flows south. During the prevailing south winds of winter, water levels rise in the bay and the average north-flowing current of the east portion of the bay continues to flow to the north and increases in strength. The windward shores in the bay receive strong wave action.

Two tributaries flow into the bay but have little affect on the bay's circulation. The discharge of the Chinook River averages 55 cubic feet per second while the discharge of the Wallacut River averages 25 cubic feet per second.

The salinity of Baker Bay ranges from less than 0.5 to greater than 30 parts per thousand (ppt) depending on the tidal stage and the discharge of the Columbia River. During low river discharge the salinity levels in the east half of the bay range over the tidal cycle from 0.5 to 30 ppt while the salinity levels in the western half of the bay range from 5 to 30 ppt. Salinity levels during high river discharge range over the tidal cycle from less than 0.5 to 30 ppt.

The sediments of the Baker Bay Subarea are primarily poorly-sorted with mean grain sizes ranging from fine sand to coarse silt. Very fine sand, silt, and clay comprise the tidal flats of the inner bay. These tidal flats tend to have coarser sediments near the shoreline than offshore. Many of the outer bay's protected tidal flats contain sediments with mean grain sizes in the very fine sand, silt, and clay classes during high river discharge periods and in the medium to fine sand classes during low river discharge periods. Exposed tidal flats of the outer bay, such as the flat near Chinook Point, consist of sediments with mean grain sizes ranging from medium to fine sand year round. Sediments with mean grain sizes in the coarse sand class exist in the subarea on the northeast shore of West Sand Island, the southern shores of East and West Sand Islands, and in the channel between the islands.

The plant types of the Baker Bay aquatic area include phytoplankton, benthic algae, eelgrass, and brackish tidal marsh and swamp vegetation. Phytoplankton productivity has not been measured in the bay. Benthic algal productivity levels on the tidal flats and low marshes of the subarea rank among the highest in the estuary. Productivity rates are highest on the more protected tidal flats on the west side of the bay and lowest on the exposed tidal flats adjacent to the islands. The tidal flats of the inner bay and north shoreline exhibit intermediate production levels. Sparse patches of eelgrass grow on many of the tidal flats of the bay, with highest densities on the flats adjacent to Ilwaco Channel. The tidal marshes and swamps of the subarea form a narrow band around much of the shoreline. Bulrush dominates the colonizing (lowest elevation) low marshes while Lyngby's sedge dominates higher elevation low marshes. The high marshes contain primarily creeping bent grass, aster, and marsh potentilla. The swamps contain mainly willow, Sitka spruce, and alder.

Invertebrate types studied in the Baker Bay subarea include benthic infauna and epibenthic organisms. The benthic infauna consist of a very productive community dominated by clams, polychaetes, and oligochaetes. The epibenthic zooplankton community exhibits high densities on the tidal flats and slopes during spring, summer, and fall. The channels are important nursery areas for Dungeness crab.

Fish community sampling in Baker Bay has been concentrated on the tidal flats north of East and West Sand Islands and in Ilwaco Channel. Little is known about the fish utilization of the inner bay. The dominant fish species found in the bay include English sole, starry flounder, Pacific

staghorn sculpin, Pacific herring, shiner perch, longfin smelt, and juvenile salmonids. Other abundant species include prickly sculpin, Pacific tomcod, snake prickleback, peamouth, and threespine stickleback.

Pacific herring, shiner perch, and longfin smelt spawn in the estuary and possibly within the Baker Bay subarea. Pacific herring spawn in the estuary from April through July. Although yearling and older herring have not been found to be abundant in the bay, herring spawning habitat (eelgrass beds) does exist in the inner bay. Larval Pacific herring appear in the estuary in spring and summer and subyearlings utilize Baker Bay as a nursery area during the same seasons. Shiner perch bear their young in the estuary in June and July and perch ranging in age from yearlings through adults are very abundant in the bay in spring, summer, and fall. Subyearling shiner perch utilize the bay as a nursery area in summer and fall. Longfin smelt spawn in the estuary from November through March and smelt ranging in age from yearlings through adults occur in the subarea year round. They are particularly abundant in summer. Larval longfin smelt appear in the estuary in winter and spring and subyearlings utilize the bay as a nursery area in summer and fall.

Several salmonid species migrate through the bay and use it as a nursery area. Subyearling chinook salmon, originating from upriver populations and from a hatchery on the Chinook River migrate through the bay from March through August. They utilize the bay as a nursery area primarily in spring and summer but are also present in fall and winter. Yearling chinook salmon migrate along the mouth of the bay primarily in spring. Yearling coho salmon, originating from upriver populations and from a hatchery on the Chinook River, migrate through the bay primarily in spring. The hatchery on the Chinook River also produces chum salmon.

Several bird species utilize the Baker Bay Subarea. Surf scoter, a migratory waterfowl species, winters in the bay. Other migratory waterfowl, particularly pintail, widgeon, rudy duck, and merganser, also winter in the bay. Mallard, a resident waterfowl species, feed in the bay and nest in marshes on West Sand Island. Shorebirds and great blue heron feed in the tidal flat and low marsh habitats. Shorebirds utilize the tidal flats and marshes of the entire bay while great blue heron concentrate in the western portion of the bay. Western and glaucous-winged gulls nest in a large colony on East Sand Island in spring, summer, and fall. There is also a large Caspian tern nesting colony on East Sand Island. The bay is an important bald eagle feeding area. Two nesting pairs of eagles use the bay. Their nests are located above Cape Disappointment and Scarboro Hill. The bay is also used by numerous wintering and transient eagles.

The harbor seal is the most abundant marine mammal species in Baker Bay. Seals occupy a haulout site on a sand flat west of Chinook Point and feed throughout the bay. The numbers of seals utilizing the bay is relatively low, with fewer than 25 animals found on the haulout at any one time.

Aquatic and terrestrial mammal use of the Baker Bay Subarea is relatively low. The narrow, fringing low marshes do not provide suitable habitat for supporting large populations of mammals. A few muskrat utilize the low marshes for feeding and some denning activity occurs near the Chinook River. Most mammal activity is concentrated in the high marsh and swamp near the Chinook River. These habitats receive use by raccoon, river otter, and deer.

## Shoreland Features

East and West Sand Islands comprise the subarea's shorelands. The islands have sandy sediments and are vegetated primarily by dune grasses and Scotch broom. There are several open sand areas, primarily at actively used dredged material disposal sites. The southern part of West Sand Island has some of the last remaining examples of a native dune grass communities on the Oregon and Washington coast.

Wildlife values on the islands are high. East Sand Island contains gull and Caspian tern nesting colonies.

## Human Use

The Corps of Engineers uses both East and West Sand Islands for dredged material disposal. The U.S. Fish and Wildlife Service and the Corps have an agreement that specifies procedures for revegetation of the islands. The Corps of Engineers revegetates the dredged material with a mixture of clover and perennial grasses and disposes dredged material on a rotating basis to allow maximum habitat establishment.

Alterations are extensive in Baker Bay. Several thousand pilings from old fish traps remain. The Chinook Jetty and pile dikes along the southern shore of the islands were built to direct river flow toward the main navigation channel and prevent erosion of the islands. The southern shore of East Sand Island is riprapped. The remains of the pier and the railroad bed used to unload the material remain on East Sand Island.

Tidelands are owned by the States of Oregon and Washington. East and West Sand Islands are owned by the federal government. Many of the Washington tidelands have had mineral, oil, and gas rights leased. There are also leases pending for black sands mining.

There are three authorized navigation channels in Baker Bay. The Chinook Channel extends 1.3 miles between the Columbia River and the Chinook Basin. It is authorized at 10 feet deep and 150 feet wide. Shoaling problems in the Chinook Channel are severe; the worst shoal encroaches from Chinook Point to the east, opposite East Sand Island. The Ilwaco navigation channel follows a circuitous course between Jetty A and the Port of Ilwaco. The southernmost half mile of the authorized channel is 16 feet deep and 200 feet wide; the remaining 2.7 miles are 16 feet deep and 150 feet wide. The channel has a moderate shoaling problem, with the worst shoals at the outer end and at the final turn into Ilwaco. The Baker Bay East Channel, from East Sand Island to Ilwaco, is not presently maintained.

## Issues

Use conflicts in this subarea include the impacts on aquatic and terrestrial habitat from dredging, dredged material disposal, and possible future black sands mining. The eastern portion of East Sand Island is a nesting area for Caspian terns. This area has also been used as a disposal site

for maintenance dredging of the Chinook Channel. The northwest corner of West Sand Island has been used for disposal and other parts of the island are designated for disposal. The southern portion of West Sand Island has the last remnant of native fescue-bluegrass unstabilized sand dune community in Oregon or Washington.

Dredged material disposal by the U. S. Army Corps of Engineers at Area D has been a subject of continuing controversy. A report by the Columbia River Estuary Study Taskforce (Fox and Benoit: Dredged Material Disposal at Area D, 1986) found that although a portion of the material disposed at Area D may enter Baker Bay, that sediment is probably responsible for only a minor amount of total shoaling in the bay. A more recent study of sediment erosion and accretion in Baker Bay by the U. S. Army Corps of Engineers (U. S. Army Corps of Engineers, Portland District: Bathymetric Differencing in Baker Bay) found that sediments in Baker Bay had generally accreted until about 1957, when erosion began to exceed accretion. It should be noted, however, that maintenance dredging is included in the total erosion calculations. Use of Area D, which is located approximately three-quarters of a mile south of the Chinook pile dike, has been decreasing. A maximum limit of 3,250,000 cyds of material over a 5 year time period was recommended in a study by CREST in 1986. Average annual disposal has decreased from 1,320,000 cubic yards in the 1971 through 1977 period to 742,000 cubic yards in the 1978 through 1984 period. In 1986, approximately 491,994 cubic yards were disposed. Disposal amounts in the last three years have averaged less than 650,00 cubic yards per year.

In 1991, an interim Area D site was located immediately downstream of the existing disposal site, in order to resolve operational and safety problems encountered by the hopper dredges and to determine its feasibility as a long-term dredged material disposal site. The new site is for an interim period of three years, during which time predisposal benthic surveys will be conducted and sediment movement and hydrology will be monitored to determine its potential as a long-term in-water disposal site. The majority of sediments disposed at Area D are coarse and settle quickly. They are transported primarily as bedload. There is evidence that this sediment moves primarily upstream along the north channel. Principal sources for the material currently disposed at Area D are the Ilwaco and Chinook navigation channel, Flavel Shoals, Desdemona Shoals, and the Skipanon Waterway. (See Estuary Channels Subarea Plan).

The mineral rights to most of Baker Bay have been leased for black sands mining. This mining would have unknown impacts on the bay's hydrology and biological productivity.

#### Aquatic and Shoreland Designations

The intertidal areas of Baker Bay are designated Natural. The subtidal aquatic areas are designated Conservation, except for the two maintained navigation channels which are designated Development.

The shorelands of the Sand Islands are designated Conservation.

Three dredged material disposal sites are listed in the *1986 Columbia River Estuary Dredged Material Management Plan*: CC-S-3.1 (on West Sand Island), CC-B-5.8, CC-S-6.8 (on East Sand Island).

A mitigation site on West Sand Island (Site 12, Priority 2) is described in the *1987 Mitigation and Restoration Plan for the Columbia River Estuary*.

Both East and West Sand Islands are within the regulatory shoreland boundary of Clatsop County.

#### Subarea Policies

1. The local governmental bodies, relevant agencies and interested parties shall continue to pursue the resolution of the navigational access problems in Baker Bay.
2. Channel realignments or other improvements must be justified in terms of hydraulics, sand transport and impacts on maintenance dredging.
3. Areas of future channel realignment shall be designated Development for the purpose of establishing a new navigation channel.
4. The marshes north of the Sand Islands should be protected as should the native dune grass communities on the southern part of West Sand Island.
5. The use of heavy equipment for activities associated with dredged material disposal on the Sand Islands is appropriate.

## P 30.3 ESTUARY CHANNELS

### General Description

This subarea includes the deep water portions of the estuary from Jetty A (RM 3) to the upper end of Rice Island (RM 22.5). The subarea contains the authorized navigation channel. The boundary of the subarea generally follows the 20-foot bathymetric contour; however, it varies from this contour in the vicinity of cities and other subareas containing deep channels. There are no intertidal wetland or shoreland areas. Portions of Clatsop County, Astoria, Hammond and Warrenton, Oregon and Pacific and Wahkiakum Counties, Washington are within this subarea.

### Aquatic Features

Human activities have caused some changes in the channels. Historically, the north channel carried a larger portion of the river flow than the south. Navigation structures, including pile dikes and created islands, now direct a larger portion of the flow to the south channel.

Tidal and river flow are the primary factors influencing currents in the subarea. Most of the tidal exchange between the estuary and ocean occurs through the north channel. In comparison, the south channel receives less tidal flow but greater river flow. As a result, flood currents are relatively stronger in the north channel while ebb currents are relatively stronger in the south channel.

Salinity levels vary widely both over time and among different parts of the subarea. The eastern extent of the subarea represents the normal upstream limit of salinity intrusion. Salinity levels increase in the downstream direction. In most of the subarea, salinity levels vary from freshwater conditions to 33 ppt. Generally, salinity levels in bottom waters are greater than those on the surface. Saline water intrudes farther upstream in the north channel than in the south.

Sediments in the subarea range primarily from coarse to medium sand. Patches of very fine sand, silt, and clay appear periodically in the portion of the channel between RM 8 and 18. In addition, the south channel contains fine sand during low river discharge months in the area between RM 8 and 12. The area of finer sediments results from the turbidity maximum zone. This zone is the area where upstream suspended sediment transport converges with downstream sediment transport. Waters in the zone are very turbid because they are laden with sediments. Fine sediments are periodically deposited on the bottom in this area.

Bedload sediment transport on the channel bottoms also converges at the turbidity maximum zone. Coarse sediments originating seaward of the zone are transported upriver while those originating landward of the zone are transported downriver.

The only plant type present is phytoplankton because the subarea consists entirely of deep water habitat. Phytoplankton productivity is relatively high at the upstream end of the subarea and decreases to relatively low levels toward the downstream end.



The estuary's major invertebrate groups, zooplankton, benthic infauna, and epibenthic organisms, have been studied in the subarea. The accumulation of particulate organic matter in the turbidity maximum zone allows for very high zooplankton and epibenthic organism population densities in the area between RM 8 and 18. The most abundant zooplanktonic organism in this region, Eurytemora affinis, has been considered by researchers to be the most important food species for fish in the estuary. Benthic infauna populations are relatively sparse in the channels. This is most likely a result of frequent sediment movement on the channel bottom. Dungeness crab use the western part of the subarea as a nursery area.

Fish populations in the estuary tend to concentrate in the area between RM 6 and 19, due to the abundant supply of invertebrate food species. The subarea is an important nursery area for marine bottom species such as English sole, starry flounder, and Pacific staghorn sculpin. Pacific tomcod, snake pricklyback, and northern anchovy are seasonally abundant in the channels. White and green sturgeon populations concentrate in the deeper portions of the subarea, primarily in the north channel near the Astoria-Megler Bridge and in the south channel off Tongue Point. Pacific herring, shiner perch, and longfin smelt possibly spawn in the subarea.

In addition to longfin smelt, other anadromous species including American shad, eulachon, and the salmonids utilize the subarea as a migration route and nursery area. Adult American shad migrate upriver primarily in June and July while juveniles migrate downriver mainly in November and December. Juvenile shad use the channels year round as a nursery area. Eulachon migrate upriver from December through April with a peak run in February. All of the salmonid species abundant in the estuary use the channels as a migration route. Subyearling chinook migrate downriver primarily from March through August. Yearling chinook and coho salmon and juvenile steelhead and cutthroat trout migrate through the subarea primarily in spring.

Several bird species, particularly the fish eaters, utilize the subarea. Bird concentrations tend to be greater in the north channel than the south channel. Cormorants use primarily the western portion of the subarea while common mergansers and western grebes use the eastern portion. Surf scoters are also abundant in the subarea. Bald eagles associated with nesting sites near Tongue Point and along the northern shore of the estuary feed in the subarea.

The channels are important feeding areas for harbor seals and California sea lions. Harbor seals use the subarea year round while California sea lions use the channels primarily in winter.

### Human Use

Navigation, maintenance dredging, and dredged material disposal are the predominant human activities in the ship channel. Waste disposal, principally from fish processing, is a lesser use. There are also gillnet drifts in and around the north and south channels. Recreational fishing for salmon and sturgeon is important. Recreational and commercial crabbing occurs off Hammond and the Sand Islands. The cumulative impacts of navigation channel maintenance on the southern arm of this subarea have been significant with respect to both navigation and circulation. The northern arm of the subarea has been affected by decreased river flow and some shoaling as a result of river flow training structures.

## Issues

In-water disposal of dredged material is an issue of concern. Approximately 630,000 cubic yards of dredged material are placed in the Harrington Point Sump by hopper dredge each year, and eventually moved by pipeline dredge to Rice Island (See the Estuary Sands Subarea Plan). Approximately 650,000 cubic yards are deposited in Area D annually.

Area D is located in the north channel of the Columbia River Estuary approximately 4,200 feet south of the Chinook pile dike. Disposal of dredged material at Area D is a major concern. The Corps of Engineers places dredged material at Area D for several channel maintenance projects in the lower estuary. A study by CREST in 1986 made several recommendations for regulating disposal at Area D, including a maximum limit for Corps projects of 3,250,000 cubic yards of dredged material over a 5-year time period (see Baker Bay subarea). Non-federal projects in the lower estuary are limited to a total of no more than 100,000 cubic yards of material during any one year period.

In 1991, an interim Area D site was located immediately downstream of the existing disposal site, in order to resolve operational and safety problems encountered by the hopper dredges and to determine its feasibility as a long-term dredged material disposal site. The shifting of the north channel along with the settling of the disposed material has rendered portions of the site too shallow or created a navigational hazard for the larger hopper dredges to maneuver safely. The new site is for an interim period of three years, during which time predisposal benthic surveys will be conducted and sediment movement and hydrology will be monitored to determine its potential as a long-term in-water disposal site.

## Aquatic Designations

All aquatic areas are designated Conservation except:

1. The main navigational channel and a flowlane disposal area on each side of the channel (either 600 feet wide or extending to the 20 foot bathymetric contour, whichever is narrower) is designated Development.
2. Dredged material disposal sites CC-E-8.5 (Area D) and CC-E-21.0 (Harrington Sump) listed in the *Columbia River Estuary Dredged Material Management Plan* are designated Development.

## Subarea Policies

1. The use of the Area D in-water dredged material disposal site shall be kept to an absolute minimum. In all cases, ocean disposal shall be substituted for the use of this site whenever feasible. The use of Area D shall be regulated by implementing cubic yardage limitations for dredged material disposal. The Corps of Engineers should continue to examine alternative disposal sites and methods that would result in fewer adverse shoaling impacts. The use of Area D should be discontinued when feasible alternatives are found.

2. The U.S. Army Corps of Engineers shall continue to review navigation improvements and the impacts of disposal of dredged material at Area D with the objective of minimizing undesirable sedimentation.
3. Dredged disposal at Area D shall be allowed for the following Corps dredging projects and sites: Flavel Shoal, Desdemona Shoal, Upper Sands Shoal, Tongue Point Crossing Shoal, Chinook Channel, Baker Bay West Channel, Skipanon Channel, and the Columbia River Bar.
4. Non-federal projects proposed in estuarine locations between the mouth of the Columbia River and Tongue Point (i.e. local ports and marinas) may also be eligible for disposal at the existing Area D, provided they meet the policies and standards for estuarine in-water disposal.
5. Total disposal for Corps of Engineers projects at Area D shall not exceed 3,250,000 cubic yards over a 5 year period.
6. The Corps of Engineers has provided the following estimates of their Area D disposal needs for the projects and shoals listed in Condition #3.

Flavel Shoal 500,000 cubic yards per year

Desdemona, Upper Sands, and Tongue Point Crossing Shoals 30,000 cubic yards per year

Columbia River Bar 50,000 cubic yards per year

Skipanon, Chinook and Baker Bay West Channels 65,000 cubic yards per year

Total Disposal Approximately 650,000 cubic yards per year
7. All dredged material disposal at Area D shall be reported to CREST and local jurisdictions. If annual disposal amounts significantly exceed those given in No. 6 above, the Corps of Engineers shall limit subsequent disposal operations at Area D to ensure that the 5-year disposal limit (3,250,000 cubic yards) is not exceeded.
8. Total annual disposal for non-federal projects at Area D shall not exceed 100,000 cubic yards.
9. Disposal at Area D shall be controlled so as to minimize impacts to commercial gillnet and crab fishermen.
10. Uncontaminated dredged material from navigation channel projects in this subarea should be used for dike maintenance.

### General Description

This subarea includes the extensive mid-estuary sand flats between approximately RM 6 and RM 24 and the adjacent slopes to as deep as 20 feet below MLLW. These include Desdemona and Taylor Sands, the Tongue Point bar and other unnamed sands, the largest of which extends west and north from Rice Island into Grays Bay. Rice Island, a dredged material disposal island, is also included. Rice Island and adjacent water areas are part of the Lewis and Clark National Wildlife Refuge. This subarea includes portions of Clatsop County, Oregon and Pacific and Wahkiakum Counties, Washington.

### Aquatic Features

The western part of this subarea has accreted significantly since the construction of the jetties at the mouth. The increase in tidal currents resulting from constriction of the mouth by the jetties has caused sediments forming the natural tidal delta to be transported both into the estuary and out to sea. A portion of the sediment transported into the estuary has accumulated in the estuary sands subarea.

Strong river and tidal currents and wind waves create the high energy environments of the Estuary Sands Subarea. The broad, shallow channels between Desdemona and Taylor Sands form the main corridor of water transport between the north and south channels. Water flows southeasterly from the north to the south channel during flood tides and northwesterly from the south to the north channels during ebb tides.

Salinity levels are similar to surface salinities found in the adjacent north and south channels (see Estuary Channels Subarea Plan).

The subarea has a wide range of sediment types. The tidal flat sediments range from medium to fine sand while the surrounding slopes contain coarse to medium sand. Scattered deposits of silt and clay appear intermittently throughout the subarea.

Plant types in the subarea include phytoplankton and benthic algae. Phytoplankton productivity is similar to that found in the adjacent north and south channel (see Estuary Channels Subarea Plan). Benthic algae productivity on the sands is low due to the instability of the sediments.

Invertebrate, fish and bird species present in the subarea are similar to those found in the surrounding north and south channels (see Estuary Channels Subarea Plan). Rice Island is used as a nesting site for Caspian Terns and small colonies of western and glaucous-winged gulls. Canada Geese are also establishing nesting sites on the island. The subarea is an important fish and bird feeding area.

Taylor Sands and the surrounding waters are important feeding areas for the Mill Creek bald eagle pair (see Tongue Point Subarea Plan). Feeding in this area is particularly intense during the nesting season. A pile dolphin on Taylor Sands provides an important hunting perch site for the eagles.

The subarea contains the largest harbor seal haulout sites in the estuary. Desdemona and Taylor Sands each contain two haulout sites. The largest site, on Desdemona Sands, is used by about 50% of the estuary's harbor seal population in winter and early spring, nearly 100% of the population in late spring and summer, and 80 to 90% of the population in fall.

### Shoreland Features

The only shorelands in the subarea are on Rice Island. Rice Island is a large dredged material disposal island created to receive material from the main navigation channel, and to direct river flow. It is now nearly filled to capacity. The island has some planted vegetation, primarily grasses, to stabilize the sand. Canada geese nest on the island.

### Human Use

Major uses and activities in this subarea include gillnet drifts along the margins of the sands and in the minor channels between the sand bars, recreational boating, and small boat and tug navigation across the river. Dredging and dredged material disposal have occurred on and around various sands. The sands were used for horse seining and fish traps when such activities were practiced. The only area currently being used for dredged material disposal is Rice Island, an entirely man-made island created for the dual purposes of flow control and dredged material disposal. The cumulative impact of channel maintenance (dredging and river training) on circulation and sediment transport has been significant in this subarea. Shoaling has increased substantially in this subarea as a result of jetty construction and other channel maintenance activities.

The Corps of Engineers and the U.S. Fish and Wildlife Service cooperate with regard to management of dredged material disposal islands. The cooperative agreement provides for continued dredged material disposal on Rice Island, and establishes timing of disposal as well as revegetation and habitat maintenance techniques.

### Issues

Potential uses of the sand flats include dredged material disposal, recreation, aquaculture, and restoration. The Corps of Engineers has discussed the possibility of creating additional islands for dredged material disposal. State and federal resource agencies have raised concerns regarding the proposal and it may not be actively pursued. Island creation or expansion for dredged material disposal would require amendment of local shoreline master programs and comprehensive plans.

### Aquatic and Shoreland Designations

Subtidal aquatic areas and the narrow tidal flat along the south shore of Rice Island are Conservation. All other tidal flats are Natural.

All shoreland areas are Conservation.

Rice Island is entirely within the regulatory shorelands area. The western portion of the island is within the regulatory shoreland boundary of Clatsop County and the eastern tip is in the regulatory shoreland boundary of Wahkiakum County.

Rice Island is a dredged material disposal site listed in the *1986 Columbia River Estuary Dredged Material Management Plan*: CC-S-22.2/WK-S-21.2.

### Subarea Policies

1. Proposals to enlarge existing dredged material disposal islands or to create new ones will require an exception to Oregon Statewide Planning Goal 16.
2. The use of heavy equipment on Rice Island in association with dredged material disposal activities is appropriate.

## P 30.5 RIVER CHANNELS

### General Description

This subarea includes the deep water portions (deeper than 20 feet below MLLW) of the authorized navigation channel and adjacent slopes between Harrington Point (RM 22.5) and the western end of Puget Island. The authorized navigation channel is in this subarea, but side channels are not included. There are no intertidal wetlands or shorelands. Some water areas are part of the Lewis and Clark National Wildlife Refuge. Parts of Wahkiakum County, Washington and Clatsop County, Oregon are included.

### Aquatic Features

While tides and tidal currents are important in this reach, fresh water flow increasingly dominates circulation patterns toward the upriver end. Salinity intrusion varies, depending on freshwater flow and the tides, but will normally not extend past Pillar Rock. Flood tide currents may not be observable under high flow conditions, and the 100-year flood level rises sharply toward the upstream limit of the subarea.

Sediments in the channel and slopes are largely medium to coarse sand, with some gravel. Compacted sediments are found in some scour holes. The transport of sand and gravel as bedload is almost entirely downstream. Some sand moves in suspension under fresher conditions.

Phytoplankton comprise the only plant type found in the subarea. The phytoplankton consist primarily of freshwater species carried into the estuary from upriver. They exhibit relatively high productivity levels in the subarea. As these freshwater species encounter saline water downriver from the subarea many are killed. This accounts for the lower phytoplankton productivity in downriver subareas (see Estuary Channels Subarea Plan).

Zooplankton, benthic infauna, and epibenthic organisms occurring in the subarea consist primarily of freshwater species. Population densities are relatively low.

Fish species present in the subarea include freshwater fishes, marine fishes tolerant of low salinities, and anadromous fishes. The most abundant freshwater species include threespine stickleback, peamouth, and prickly sculpin. Principal marine species in the subarea include starry flounder, Pacific staghorn sculpin, Pacific tomcod, and snake prickleback. White sturgeon concentrate in deep channel areas. The primary anadromous species include American shad, eulachon, and the salmonids (see Estuary Channels Subarea Plan).

Several species of water birds utilize the subarea. Double-crested cormorants associated with nesting sites on range markers off of Miller Sands are abundant. Waterfowl species, including mallard, surf scoter, and common merganser, feed in the subarea.

Two marine mammal species, harbor seals and California sea lions use the subarea. They are most common in winter when the seals and sea lions feed on the eulachon run as it moves upriver.

## Human Use

The main navigation channel passes through this area. Dredging is required at five separate bars, with an average 900,000 cubic yards removed annually by pipeline and 625,000 cubic yards by hopper dredge. In-water disposal occurs at the Harrington Point Sump (for rehandling) and at several flowlane disposal sites along the main navigation channel. Numerous pile dikes exist. Gillnet drifts exist along the edge of and in the main navigation channel. Commercial sturgeon, gillnetting, sports fishing and pleasure boating also occur. The cumulative impact of channel maintenance activities on water quality and circulation may be substantial.

## Issues

Major issues in this subarea are related to dredging, disposal and navigational structures and their impact on fish habitat and commercial fisheries. Replacement of pile dikes in this area is being studied by the Corps of Engineers. Depending on the results of monitoring the prototype rock groin at Cottonwood Island, the Corps may consider replacing aging pile dikes in this subarea with rock groins.

Gillnet fishermen have expressed concern over in-water activities which interfere with commercial fishing. Major areas of conflict include:

- Sinker logs from log rafts;
- Debris uncovered by dredging; and
- Dredged material disposal activities

Potential conflicts may be alleviated through continued coordination between gillnetters, log transport companies and the Corps of Engineers. Some gillnetters have suggested that they be reimbursed for costs they incur while clearing drift areas. Such a requirement is outside of this Plan's scope. Planning measures that can be implemented to reduce the snag problem include:

- Requirements that conflicting activities avoid gillnet drifts whenever possible; and
- Requirements that gillnet drift captains be consulted concerning timing and location of in-water activity.

## Aquatic Designations

The main navigation channel and a flowlane disposal area on each side of the channel (extending either 600 feet or to the 20-foot bathymetric contour, whichever is narrowest) are designated Development. All other areas are Conservation.

Harrington Point Sump is an in-water dredged material disposal site listed in the *1986 Columbia River Estuary Dredged Material Management Plan*: CC-E-21.0.



### Subarea Policies

1. Prior to approval of in-water activities with the potential for affecting fisheries, the project sponsor shall notify local drift captains, the Columbia River Fisherman's Protective Union and the Northwest Gillnetters Association. The Washington Department of Fisheries shall also be consulted to determine project timing and methods that will minimize impacts on the fishery.
2. In-water activities that may leave snags in gillnet drifts shall be avoided whenever possible. The project sponsor shall notify the drift captain if a drift cannot be avoided.
3. Uncontaminated dredged material from navigation channel projects in this subarea should be used for dike maintenance.

## P 30.6 SNAG ISLANDS

### General Description

This subarea includes dredged material disposal islands (Miller Sands and Jim Crow Sands), tidal marsh (around the Snag Island Jetty and Miller Sands), the Woody Island Channel, exposed sand bars south and west of Woody Island Channel, and various subsidiary channels. The entire subarea is within the Lewis and Clark National Wildlife Refuge, and within Clatsop County, Oregon.

### Aquatic Features

The aquatic portion of this subarea consists of several small marsh islands and sandflats separated by a network of shallow channels. Historically the subarea has tended to shoal due to navigation structures and created islands which have channeled most of the river flow through the main navigation channel. There are more tidal marshes and flats in the subarea than occurred a century ago. Woody Island channel which runs along the southern boundary of the subarea was once an important navigation channel. Parts of the channel are now too shallow for safe navigation by all but the smallest boats.

Little is known about currents in the subarea. Woody Island channel is the main corridor for water transport through the subarea. The subarea is primarily freshwater. During very low river discharge conditions, saline water extends into Woody Island Channel.

Sediments in most of the subarea are sandy. Coarse sand occurs in the deeper areas while fine sand occurs on the flats. Sediments in the tidal marshes probably consist mainly of silt and clay.

Plant types in the subarea include phytoplankton, benthic algae, and tidal marsh vegetation. Phytoplankton productivity is relatively high. Benthic algal productivity on the predominantly sandy tidal flats is very low. The marshes of the subarea include colonizing low marshes dominated by bulrush (Scirpus validus) and higher elevation low marshes dominated by Lyngby's sedge (Carex lyngbyei), reed canary grass (Phalaris arundinacea), and cattail (Typha angustifolia). The colonizing marshes develop on the downstream side of the islands while the higher marshes develop on the upstream sides.

Of the estuary's invertebrate types, only benthic infauna and epibenthic organisms have been studied in the subarea. Benthic infauna densities are high. Important fish prey species such as the amphipod Corophium salmonis and the clam Corbicula manilensis are abundant. Epibenthic organism densities are also high in the subarea.

Fish species present in the subarea are the same as those found in the River Channels Subarea and the upstream end of the Estuary Channels Subarea. The shallow tidal flats and marsh channel are important feeding and nursery areas for juvenile salmonids.

Several species of water birds utilize the subarea. Double-crested cormorants nest on channel range markers west of Miller Sands. Western and glaucous-winged gulls occupy a small nesting colony on the western tip of the Miller Sands sandspit. Canada geese are exhibiting significant growth in the estuary. A large nesting colony is established on Miller Sands. Abundant waterfowl in the subarea include western grebe, mallard, and common merganser.

Marine mammal use of the subarea concentrates around a haulout site south of Miller Sands. Harbor seals occupy this haulout year round with peak use in spring and winter. The aquatic mammal species muskrat and nutria utilize the marshes of the subarea.

### Shoreland Features

Shorelands in the subarea include Miller Sands and Jim Crow Sands, both dredged material disposal islands. Soils on the islands consist of Columbia River sand. Both islands are relatively low and flat.

Vegetation has been planted on the islands to help stabilize the sand. Miller Sands has some well-developed grasslands, shrub and willow/cottonwood habitat on the main island. Only scattered grasslands have become established on Jim Crow Sands.

Wildlife on the islands includes small mammals such as muskrat and nutria and several bird species. Bald eagles hunt from the islands. Canada geese nest on Miller and Jim Crow Sands. There is a small nesting colony of Caspian terns on Miller Sands.

### Human Use

Activities in this area include navigational improvements, dredged material disposal, commercial and sports fishing, wildlife observation, waterfowl hunting, and trapping. Active dredge material disposal sites are located on Jim Crow Sands and Miller Sands. Gillnet drifts are found in Woody Island Channel and along the margins of the navigational channel.

### Issues

The establishment of duck shacks in the sloughs and along the shores of the islands is a longstanding issue. These structures are approved for temporary periods (i.e., the hunting season) and not for use as permanent residences. However, in some cases, they have been improved beyond their intended function.

A proposal involving a possible exchange of the State of Oregon's ownership interests in some estuary islands, including Miller Sands and Jim Crow Sands Islands, for federal property on the South Tongue Point peninsula was first investigated in 1987 and is again being considered in 1990. As part of the proposal, the federal government would consolidate ownership of islands in the Lewis and Clark

National Wildlife Refuge (except Mott Island). The State of Oregon would expand its ownership of the old naval station site on the North Tongue Point peninsula and acquire the South Tongue Point peninsula, facilitating its plans for development of the Tongue Point area. Clatsop County may also quitclaim its relatively minor ownership interests in the estuary islands to the federal government in exchange for in-lieu-of-tax payments.

This subarea is relatively distant from all boat ramps. The hunting and sport fishing use of this area is probably less than in some other subareas. All areas except Miller Sands are open to hunting and trapping. Future use of Miller Sands and Jim Crow Sands is an issue of concern. Public access to the wildlife refuge is discussed in the Upper Marsh Islands Subarea Plan.

#### Aquatic and Shoreland Designations

All aquatic areas are designated Conservation except:

The wetlands above the 3 feet bathymetric contour surrounding the Snag Island Jetty; the wetlands north of Green Island; and the unnamed sands southeast of the Woody Island Channel area are all designated Natural.

Shorelands, including Miller Sands and Jim Crow Sands, are designated Conservation.

Jim Crow Sands and Miller Sands Islands are within the regulatory shoreland boundary of Clatsop County.

Four dredged material disposal sites are listed in the *1986 Columbia River Estuary Dredged Material Management Plan*: CC-B-23.1, CC-S-23.5 (Miller Sands), and CC-B-27.2, CC-S-27.2 (Jim Crow Sands).

#### Subarea Policies

1. Measures that increase or enhance public access opportunities to the Wildlife Refuge are encouraged.
2. The use of heavy equipment in association with dredged material disposal on Miller Sands and Jim Crow Sands is appropriate.
3. In-water activities that may leave snags in gillnet drifts shall be avoided whenever possible. The project sponsor shall notify the drift captain if a drift cannot be avoided.

## P 30.7 CATHLAMET BAY

### General Description

This subarea includes Lois, Mott, Green, Russian, Seal, McGregor and unnamed marsh islands; sand and mud flats; and parts of South, Prairie and other subsidiary channels. It extends from near Tongue Point (RM 19) to RM 25. The entire subarea is in the Lewis and Clark Wildlife Refuge, and within Clatsop County.

### Aquatic Features

The aquatic features in this subarea include several tidal marsh islands separated by relatively deep, narrow channels. Historically, this subarea has tended to shoal and develop more marsh habitat. The marshes of Green Island have developed in the past century. Also, the unnamed marsh islands in the western part of the subarea increased in size since the creation of Lois Island.

There is little information on currents in the subarea. The subarea is primarily freshwater with some salinity intrusion in the deeper water areas north of Lois and Mott Islands. Sediments in the subarea are similar to sediments in the Snag Islands Subarea.

The plant types present in the subarea include phytoplankton, benthic algae, and tidal marsh and swamp vegetation. Phytoplankton and benthic algal productivity are similar to that in the Snag Islands Subarea. The low marshes of Green Island and the unnamed islands east of Lois Island have developed a pattern of growth common in the Cathlamet Bay islands. The lowest elevation marshes develop on the downstream sides of the islands and the highest on the upstream sides. The downstream sites consist of bulrush (*Scirpus validus*) dominated colonizing low marshes which grade into tidal flats, while the upstream sides consist of higher elevation marshes dominated by Lyngby's sedge (*Carex lyngbyei*). The marshes of Russian Island are slightly higher than those on the other islands. They are dominated by Lyngby's sedge, horsetail (*Equisetum fluviatile*), rush (*Juncus oxymeres*), wappato (*Sagittaria latifolia*), water parsnip (*Sium suave*), and creeping spikerush (*Eleocharis palustris*). The marsh islands have an extensive network of tidal channels. These channels are important as feeding and shelter areas for juvenile salmonids. Although they have not been studied extensively in the Columbia, marshes and associated tidal channels have been demonstrated to be the most important salmon rearing habitats in other estuaries. Lois and Mott Islands are surrounded by tidal marshes and swamps. The marshes are similar to others found in the subarea. The swamps contain primarily shrub species.

Invertebrate and fish species in the subarea are similar to those found in the Snag Island Subarea.

Bird species common in the subarea are similar to those in the Snag Island Subarea. In addition, great blue heron and shorebirds utilize the subarea. Bald eagles use the subarea intensively as a feeding area. South channel and the unnamed islands and associated flats east of Lois Island are used most frequently. Eagles also feed on Green and Russian Islands and the marshes and flats around Lois Island. Piling on the northern side of South channel are important bald eagle perching sites. A

breeding pair of eagles known as the Twilight Creek pair as well as many non-breeding eagles that occupy the area primarily in winter and spring use the subarea.

Marine mammal use of the subarea primarily occurs on and adjacent to a harbor seal haulout site on Green Island. Although a relatively small number of harbor seals utilize the site, it is one of the few haulouts in the estuary where harbor seals give birth to young. They generally give birth in late spring and raise the pups through summer. The group of harbor seals remaining in the Columbia River during this period generally produce fewer than 10 pups per year.

Aquatic and terrestrial mammals utilize the marshes and swamps of the subarea. Muskrat and nutria occupy the marsh islands. These species, along with beaver and raccoon are found in the swamps surrounding Lois and Mott Islands.

### Shoreland Features

Shorelands in the subarea are on Lois and Mott Islands. Both islands were created from material dredged from the MARAD Basin and Tongue Point pier area. Both islands are wooded with willow and alder along the fringes and grass-covered on the interiors. Wildlife values are considered high. There is a bald eagle perch site on the eastern-most point of Lois Island.

### Human Use

Human use of this area includes sport and commercial fishing, log storage and transport, hunting, trapping, and wildlife observation. None of these could be classified as intensive.

### Issues

The tidal flats and marshes of Cathlamet Bay are a highly productive, integral part of the estuarine ecosystem. Their inclusion in the Lewis and Clark National Wildlife Refuge provides needed protection for fish and wildlife resources in the area.

The establishment of duck shacks in the sloughs and along the shores of the islands is a long-standing issue. These structures are approved for temporary periods (i.e., the hunting season) and not for use as permanent residences. However, in some cases, they have been improved beyond their intended function.

Both Mott and Lois Islands are within the wildlife refuge and the habitat value of the upland areas for birds and wildlife is high. The U.S. Fish and Wildlife Service (USFWS) has indicated that they generally oppose use of the area for dredged material disposal. Recreational fishing and boating may conflict with port development in the Tongue Point area. Public access to the islands in the Wildlife Refuge is limited. USFWS does not provide any access facilities, and does not manage the refuge for public access.

### Aquatic and Shoreland Designations

Aquatic areas are Conservation, except for tidal marsh and other wetland areas on and adjacent to the islands which are designated Natural.

Shoreland areas in this subarea are designated Natural. The entire upland portions of Lois and Mott Islands are included in the regulatory shoreland boundary of Clatsop County.

### Subarea Policies

1. Measures that increase or enhance public access opportunities to the Wildlife Refuge are encouraged.

## P 30.8 UPPER MARSH ISLANDS

### General Description

This diverse group of marsh islands and interconnecting channels extends between Minaker Island (RM 26) and Welch Island (RM 35). The subarea includes Minaker, Karlson, Marsh, Brush, Horseshoe, Woody, Tronson, Quinns, Goose, Grassy, Fitzpatrick and Welch Islands. Parts of Prairie and other subsidiary Channels are also included. Large sections of the islands consist of forested and shrub swamps, with tidal marsh in the lower areas. Sand and mudflats also occur. The shorelands on Woody, Welch, and Fitzpatrick Islands are current or former dredged material disposal sites. The entire area is in the Lewis and Clark National Wildlife Refuge, and within Clatsop County.

### Aquatic Features

The aquatic portions of this subarea include several large intertidal marsh and swamp islands separated by relatively deep, narrow channels. Historically the area has changed little compared with other areas of the estuary. Horseshoe and Grassy Island marshes have enlarged slightly in the last century.

There is little information on currents in the subarea. Saline water does not intrude into the subarea. Sediments consist primarily of very fine sand, silt, and clay. Prairie Channel contains some coarser sandy sediments.

The plant types in the subarea include phytoplankton, benthic algae, and tidal marsh and swamp vegetation. Phytoplankton and benthic algal productivity levels are similar to those in the Snag Islands Subarea. The islands of the subarea contain the largest tracts of tidal marsh and swamp in the estuary.

Most of Minaker Island is low marsh, with high marsh and mixed shrub vegetation in a few areas. Karlson Island is more complex. About one-fourth of the island was diked, but the dikes have breached and the area has returned to tidal marsh. The western end of the island is undisturbed tidal marsh. The rest of the island is tidal swamp consisting of willow and a species mixture of alder, Sitka spruce, western red cedar and cottonwood. Brush and Horseshoe Islands are a mixture of low marsh, high marsh, and swamp. Marsh and Woody Islands consist mostly of tidal swamp with some marsh. There is some willow swamp on Quinns and Tronson Islands and some marsh on Goose, Grassy and Quinns Islands. Fitzpatrick Island is dominated by low marsh. Welch Island is covered with high sedge marsh, and cottonwood and willow swamp. The marsh and swamp islands have an extensive network of tidal channels. These channels are important as feeding and shelter areas for juvenile salmonids. Although they have not been studied extensively in the Columbia, marshes and associated tidal channels have been demonstrated to be the most important juvenile salmon rearing habitats in other estuaries.

Invertebrate and fish species in the subarea are similar to those in the Snag Island Subarea.



Several species of resident and migratory birds feed and nest in the subarea. Because of presence of several types of habitats, the subarea has the greatest bird numbers and species diversity in the estuary. Double-crested cormorant feed in the water areas in summer, fall, and winter. Western grebe and several other species of migratory waterfowl winter in the subarea. Resident waterfowl which nest in the marshes of the subarea include common merganser, mallard, green-winged teal, wood duck, and blue-winged/cinnamon teal. Green-winged teal and wood duck are most concentrated on Karlson Island. Shorebirds feed in the tidal flats, low marsh, and high marsh habitats. Great blue heron feed in the subarea year round and occupy a larger nesting colony in a tidal spruce swamp on Karlson Island. The marshes and swamps of the subarea also contain a diverse array of land birds. The subarea provides important bald eagle habitat. Karlson, Marsh, and Quinns Islands have bald eagle nesting sites within the wooded tidal swamp habitats. In addition to supporting two nesting pairs of eagles, the subarea also provides feeding habitat for wintering and transitory eagles.

The marshes and swamps of the subarea receive the greatest aquatic and terrestrial mammal use in the estuary. Muskrat and nutria feed and den primarily in the tidal marshes. Muskrat are particularly abundant in the sedge-dominated low marshes. Beaver feed and den in the Sitka spruce and willow swamps while raccoon utilize the shrub swamps of the subarea. River otter feed in the tidal sloughs of the subarea's swamps. Two species of deer, the black-tailed deer and the Columbian white-tailed deer, utilize the subarea. Black-tailed deer feed in the swamps of the larger islands as well as on the mainland. Columbian white-tailed deer, an endangered species, occur on Karlson and Welch Islands.

#### Shoreland Features

The shorelands in the subarea consist of dredged material disposal sites on Welch and Fitzpatrick Islands and an inactive dredged material disposal site on Woody Island. These areas are primarily sandy with little wildlife value. The Soil Conservation Service is revegetating the eastern part of the Fitzpatrick Island disposal site. Welch Island is being revegetated by the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service in accordance with an agreement on its use for dredged material disposal. Woody Island has been revegetating naturally. Only Fitzpatrick Island is designated as a dredged material disposal site in the *1986 Columbia River Estuary Dredged Material Management Plan*.

#### Human Use

Human uses in the area include dredged material disposal, log storage and transport, small boat navigation, sports and commercial fishing, hunting, trapping, and wildlife observation.

#### Issues

The main access point is at Aldrich Point, and the nearby islands probably receive more use than islands more distant from the boat ramp. Karlson Island is closed to all public use. Welch Island is subject to seasonal access regulations. Otherwise, the islands are open to the public, but access is difficult.

The use of duck shacks in the subarea's sloughs is an issue. They are sometimes used as permanent dwellings. The U.S. Fish and Wildlife Service believes that this level of use is incompatible with the refuge's goal of wildlife protection and management. The U.S. Fish and Wildlife Service does not provide any public access facilities for the refuges, and does not manage the refuges for public access. Increased public access, consistent with wildlife management needs, is desired locally.

#### Aquatic and Shoreland Designations

The marsh and tideflat areas and the formerly diked area on Karlson Island are Natural. All other water areas are Conservation.

The shoreland areas on Woody, Welch, and Fitzpatrick Islands are designated Conservation.

The dredged material disposal upland sites on Woody, Welch, and Fitzpatrick Islands are entirely within the regulatory shorelands boundary of Clatsop County. The dredged material disposal site on Fitzpatrick Island (CC-S-31.2) is listed in the *1986 Columbia River Estuary Dredged Material Management Plan*.

#### Subarea Policies

1. Measures that increase or enhance public access opportunities to the Wildlife Refuge are encouraged.
2. The use of heavy equipment in association with dredged material disposal on Welch and Fitzpatrick Islands is appropriate.

## P 30.9 TENASILLAHE ISLAND

### General Description

This subarea extends from Multnomah Slough (RM 35), which separates Welch and Tenasillahe Islands, to the pile dike (RM 38) at the upstream end of Tenasillahe Island, and includes the south side of the Main Channel and to the center of the Clifton Channel. Most of the perimeter of Tenasillahe Island is forested wetland. The remainder inside the dike is pasture land and wetland. The island is part of the Columbia White-tailed Deer National Wildlife Refuge. The entire subarea is in Clatsop County.

### Aquatic Features

The aquatic portions of this subarea include waters adjacent to the main navigation channel and in Clifton Channel and tidal marshes and swamps which fringe Tenasillahe Island. Historically the subarea has undergone large changes. Tenasillahe Island once consisted of a large tidal marsh and swamp. It is now primarily diked pasture land and nontidal wetland. A small island south of Tenasillahe Island has been created from dredged material.

Physical characteristics in the waters surrounding the island areas are similar to those in the River Channels Subarea.

Phytoplankton, invertebrate, and fish productivity and species are similar to those in the River Channels Subarea.

Tidal marsh and swamp fringe the island. The tidal swamp on the south and east side of the island has been proposed for designation as a Federal Research Natural Area because it represents some of the last remaining habitat of tidally-influenced deciduous forest in the lower Columbia River that has not been altered by diking and ditching activities.

Many of the water bird species found in the Snag Islands and Cathlamet Bay Subareas utilize the waters and wetlands surrounding Tenasillahe Island. A pair of bald eagles nest in the tidal swamp on the southeast side of the island.

Aquatic and terrestrial mammal use of the marshes and swamps surrounding the island is similar to mammal use in the Upper Marsh Islands Subarea.

### Shoreland Features

Shorelands include Tenasillahe Island and a small dredged material disposal island to the south. Tenasillahe Island is a diked, former tidal wetland. The small island to the south consists of sandy sediments dredged from the main navigation channel.

Vegetation on Tenasillahe Island includes pastures with a mix of grasses and rush, and wooded areas consisting largely of alder, willow, and cottonwood. There are several sloughs on the island which are surrounded by large nontidal wetlands. Several of the wetlands are classified as significant under Oregon Statewide Planning Goal 17.

Wildlife values on the island are high. The island serves as a wintering area for mallards, Canada geese, whistling swans, and other waterfowl species. Muskrat, nutria, and beaver are common. Tenasillahe Island is managed for Columbia white-tailed deer, an endangered species, by the U.S. Fish and Wildlife Service. The island's population of this species is between 50 and 60 animals.

### Human Use

Human use of the area includes log storage and transport, small boat navigation, sports and commercial fishing, wildlife management and observation and grazing on the island. There is a log storage area along Clifton Channel and commercial fishing areas along both the Clifton and Main Channel sides of Tenasillahe Island. There is restricted public access to the island; however, a private duck hunting club has access during certain periods of the year to an area near Multnomah Slough.

The cumulative impact of diking has been significant in this area. Diking at the turn of the century resulted in the conversion of Tenasillahe Island from tidal marsh and swamp to pasture.

### Issues

Log storage and public access are issues, as they are in the Upper Marsh Islands Subarea. The establishment and expansion of beach nourishment sites are also of concern.

### Aquatic and Shoreland Designations

The waters of Multnomah Slough and other wetlands are Natural, except along Clifton Channel, where log storage sites are Conservation, and at the U.S. Fish and Wildlife Service boat dock, which is Conservation. The waters south of the Main Channel and Clifton Channels are classified Conservation.

The dikes and diked area of Tenasillahe Island are Conservation Shoreland. Much of the island is classified as a significant non-tidal wetland.

The entire diked portion of Tenasillahe Island and the small dredged material disposal island are included in the regulatory shorelands boundary of Clatsop County. The three dredged material disposal sites in this subarea designated in the *1986 Columbia River Estuary Dredged Material Management Plan* are on or adjacent to Tenasillahe Island: CC-B-36.8, CC-B-38.3, CC-S-38.3.

### Subarea Policies

1. Measures that increase or enhance public access opportunities to the Wildlife Refuge are encouraged.

## P 30.10 FORT STEVENS STATE PARK

### General Description

This subarea encompasses the northern part of Fort Stevens State Park. The subarea extends east along the top of the South Jetty, over the existing dune ridge at the Jetty landfall, to meet and follow the western margin of the Russell-Clatsop Spit Road to the south. The subarea's boundary on the east is the Town of Hammond's Urban Growth Boundary. Included is the Swash Lake wetland area between the Town of Hammond Urban Growth Boundary and Trestle Bay. The aquatic area boundary is the -40 MLLW contour line to River Mile 3, and the -3 MLLW contour line thereafter, to its intersection with the south jetty. The entire subarea is in Clatsop County.

### Aquatic Features

The northwest face of Clatsop Spit is a sandy beach area with significant wave energy impinging upon it. The northeast face of the spit, also a beach area, is an area of high erosion and strong currents.

Trestle Bay is a shallow embayment on Clatsop Spit consisting primarily of tidal flats, low marsh, and high marsh habitat types. A portion of the South Jetty and a trestle form a barrier across the bay, the jetty being overtopped regularly by tidal waters. Water passes freely through the jetty allowing for tidal exchange between the inner and outer portions of the bay. The marshes are cut by deep tidal channels, one of which, on the southeast margin, leads inland to Swash Lake, another area which is dominated by tidal marsh.

There is also a small tidal salt marsh on Clatsop Spit adjacent to the observation tower. It is covered by high salinity tidal waters coming directly in under the jetty from the ocean.

Little information exists on Trestle Bay sediments. Based on knowledge of similar environments, researchers speculate that most of the bay's sediments consist of very fine sand, silt, and clay year round. The sediments off of Point Adams range in mean grain size from medium to fine sand.

No information exists on circulation within Trestle Bay. Current speed is most likely very low within the portion of the bay enclosed by the jetty. The tides at Point Adams have an average range of 6.41 feet and an extreme range of 13.7 feet.

Salinity levels have not been measured within the bay. Surface salinities adjacent to the mouth of the bay range from less than 0.5 ppt to 20 or 30 ppt during high river discharge and from 5 to 30 ppt during low river discharge.

The plant types of Trestle Bay include phytoplankton, benthic algae, eelgrass, and brackish tidal marsh and swamp vegetation. Phytoplankton productivity has not been measured in the bay. Benthic microalgal productivity on the tidal flats ranges from high levels in the more protected inner portion of the bay to moderate levels in the outer bay. Sparse patches of eelgrass (Zostera marina) probably grow on the outer bay's tidal flats. It is the only location on the Oregon side of the estuary where this species is found. Tidal marshes and swamps form a wide band along much of the bay's shoreline. American Threesquare (Scirpus americanus) dominates the Trestle Bay lowest marshes while Lyngby's Sedge (Carex lyngbyei), and Pacific Silverweed (Potentilla pacifica) dominate higher elevation low marshes. Swash Lake low marshes consist primarily of (Scirpus validus), Common Cattail (Typha angustifolia), and Pacific Silverweed (Potentilla pacifica) dominate the subarea's high marshes. The high marsh assemblage is more species-rich than that of the low marsh. The swamps consist of an assemblage of shrubs and trees that grade into a similar upland community.

Little information exists on the invertebrates of Trestle Bay. Zooplankton and epibenthic organisms have not been studied and benthic infauna have only been sampled at one site in the outer bay. The principal taxa in the single infauna sample were Neanthes limnicola, oligochaetes, Macoma balthica, and Eohaustorius estuarius.

Fish community sampling has been conducted on tidal flats adjacent to the mouth of the bay only. No information exists on fish utilization of the portion of the bay enclosed by the jetty. The marine demersal species English sole (subyearlings), starry flounder, and Pacific staghorn sculpin utilize river areas near the bay much of the year. Juveniles of these species may use the bay as a nursery area. Threespine stickleback, a freshwater species, is also abundant near the bay. Adult Pacific herring and shiner perch migrate into the estuary in spring and summer and possibly spawn in the Trestle Bay subarea in summer. Longfin smelt ranging in age from yearlings to adults are abundant in the area year round. They may spawn in the bay during winter and spring. Juvenile herring, perch, and smelt may utilize the bay as a nursery area. Juvenile salmonids migrate primarily along the main channels and adjacent tidal flats in the lower estuary. Although several species of salmon migrate in the channel adjacent to the bay's mouth, the outer bay probably receives its greatest use by subyearling chinook and yearling coho salmon, which migrate in the estuary's channels and tidal flats in spring and summer.

Trestle Bay is a feeding, nesting, and wintering site for many species of birds. Migratory waterfowl, particularly swans, canvasback, scaups, surf scoter, ruddy duck, wigeon and bufflehead utilize the bay during their spring and fall migrations and winter in the bay. The mallard, a resident waterfowl species, feed in the slope, tidal flat, low marsh, and high marsh habitat types and nest in the marshes. The largest nesting colony of double-crested cormorants in the estuary exists on rows of pilings adjacent to the bay's rock jetty. Double-crested cormorants nest in spring, summer, and fall and feed in the bay year round. Snowy Plover and Sanderlings also nest in the subarea. Shorebirds and great blue heron feed on the tidal flats and in the low marshes of the bay.

Aquatic and terrestrial mammals utilize the marshes and swamps of the bay year round; however, mammal use is low compared to upriver wetlands. Several muskrat dens have been found along the tidal channels of the low and high marshes. In addition, beaver colonies have been found in non-tidal areas adjacent to the bay. Nutria, raccoon, and deer also utilize the subarea's marshes and swamps.

## Shoreland Features

The shorelands of Clatsop spit are rolling foredunes stabilized by European beachgrass. Coastal strawberry, hairgrass, scotch broom and coastal pine are also present. The Columbia River Estuary shoreline up to Hammond consists of protected sandy beaches, river beaches, rock riprap and some shrub vegetation. The upland adjacent to Trestle Bay consists primarily of beachgrass. Stands of willow and alder as well as beachgrass form the upland adjacent to Swash Lake and to a lesser extent, at Trestle Bay. Trestle Bay is important for waterfowl, wading birds, shorebirds and raptors, as well as deer, elk, nutria, mink, beaver, raccoon and opossum.

## Human Use

Intensity of human use in the Fort Stevens subarea varies from high to low. Most use centers around the community of Fort Stevens and the three parking lot areas on Clatsop Spit and includes sightseeing, bicycling, hiking, beachcombing, clamming, nature observation, and jetty and beach angling. Drift logs are used for firewood. There is also some illegal off-road use of the area by four-wheel drive vehicles, even in the salt marsh adjacent to the observation tower. The old gun batteries at Point Adams have been restored and a parking area developed.

## Issues

Development potential of the area is restricted to recreation and historic preservation. The Clatsop Spit area is already developed as far as it is intended to be.

Erosion problems along Jetty Sands and on Clatsop Spit, just south of the South Jetty, use of the area by four-wheel drive vehicles, removal of beach logs, and the possibility of ocean waves breaching the spit south of the jetty are issues of concern. While some structural control over erosion south of the jetty may eventually be required, non-structural means of erosion control are more suitable in a state park.

Swash Lake in recent years has been the focus of attention as a possible mitigation site for several projects. There is potential for conflict between State Park management interests and potential developers considering Swash Lake as a possible mitigation site. It is designated as a potential mitigation match-up for development at the Hammond Boat Basin, but projects far off-site, for example the John Day River Bridge, have used or may be interested in using Swash Lake for mitigation.

## Aquatic and Shoreland Designations

All aquatic areas are designated Natural.

Parts of Clatsop Spit are designated Natural, with the remainder as Conservation. The three developed parking areas are considered to be consistent with the conservation designation. The South

Jetty is classified as Development from Point Adams to its outer end. The shoreland area from Hammond northwest to Swash Lake is designated Conservation.

Mitigation sites are designated in the *Mitigation and Restoration Plan of the Columbia River Estuary*.

#### Subarea Policies

1. Off-road vehicles should not be permitted on dune or wetland areas in the park and should not traverse the wetland saltmarsh on Clatsop Spit.



### General Description

Youngs Bay is one of the more biologically productive parts of the estuary. This subarea extends from the old Highway 101 bridges over the Youngs River and the Lewis and Clark River to the 20-foot bathymetric contour adjacent to the navigation channel of the Columbia River. It includes large fringing marshes, tideflats, open water, and restored wetlands at the Airport Mitigation Bank. The subarea boundary follows the shoreline, except adjacent to the Port of Astoria and the East Peninsula of the Skipanon River. No shorelands are included. Youngs Bay is in Warrenton, Astoria and Clatsop County.

### Aquatic Features

Because of numerous development proposals, Youngs Bay is the most intensively studied bay of the estuary. The area has been considerably altered by human activity. The most important physical alterations have been diking of tidal marshes and spruce swamps, the filling of shallow areas, and the hydraulic alteration of the bay by channels, fills and causeways. Youngs Bay originally extended from Tansy Point to Smith Point, but the peninsulas at the mouth of the Skipanon River have completely separated Alder Cove from Youngs Bay, though the systems remain similar in their biology. The strongest effects on the bay's hydraulics have been exerted by the Skipanon peninsulas, the fills at Smith Point (Port of Astoria piers) and bridge causeways. The new Highway 101 causeway in particular has caused a marked reduction in currents and wave action in the interior of Youngs Bay. There has been extensive shoaling. Many of the adjacent diked areas were previously tidal marshes and swamps connected with Youngs Bay.

Tides in Youngs Bay and tributary streams are of the standing wave type. Thus, the tidal range increases somewhat from the port docks (8.0 feet) to the tidal reaches of the tributary streams (8.6 or 8.7 feet). High water is nearly simultaneous throughout the system and occurs at slack water. This type of tide is typical of shallow bays but atypical of the Columbia River Estuary.

Three water masses contribute to circulation in Youngs Bay: Columbia River fresh water, tributary fresh water and marine water. Fresh water flow in the Columbia River is greatest during the spring freshet in June; winter freshets also occur. Youngs Bay tributary flow is strongest in December and January, when local rainfall is at a maximum. Intrusion of saline marine water is governed primarily by Columbia River flow and secondarily by tributary flow. Salinities in Youngs Bay rarely exceed 10 to 15 parts per thousand even in the fall. Under these conditions, the vertical salinity differences are pronounced and salinity may intrude upriver along the bottom as far as RM 10 in the Youngs River and RM 6 in the Lewis and Clark River. During high flow periods for either the Columbia River or Youngs Bay tributaries, salinity is entirely or nearly absent from Youngs Bay.

Current patterns in Youngs Bay are complex. Eddies and stagnant areas prevail in the shallows. Stronger currents are found in the deep areas. Currents are highly variable, depending on winds, tides, freshwater flow and salinity intrusion.

Water quality is generally good in Youngs Bay; no serious pollutant sources are present and the flushing is excellent. Flushing times for the bay itself have been estimated to vary from 1 to 2 days, depending on tide and freshwater flow conditions. The flushing time of the tributaries below the head of tide is slower; 3.3 to 16 days for the Lewis and Clark River and 2.3 to 7.8 days for the Youngs River. Water quality in some smaller tributaries and sloughs such as the Little Walluski River is less favorable because of the poor flushing.

Sediments in the subarea range from medium to fine sand in the central bay to very fine sand, silt, and clay on the tidal flats. Youngs Bay appears to experience alternating periods of sedimentation and erosion, with variations occurring on time scales from storm events and seasons to years and decades. Sedimentation predominates (average rate throughout bay 1 cm/yr) and most strongly so in the shallow areas (up to 6 cm/yr). These observations are confirmed by bathymetric changes over the last century.

Aquatic plant types in Youngs Bay include phytoplankton, benthic algae, and tidal marsh and swamp vegetation. Phytoplankton productivity is low compared with the remainder of the estuary. Benthic algal productivity on the tidal flats and in the low marshes ranks among the highest in the estuary. Tidal flats along the west shore of Youngs Bay are particularly productive. Tidal marshes and swamps form a narrow fringe along most of the Bay's shoreline. Colonizing low marshes dominated by bulrush account for about half of the low marsh area. The remaining low marshes are dominated by Lyngby's sedge and are highly productive. The high marshes consist of a mixture of several species of herbaceous plants and shrubs. Shrub species dominate the tidal swamps. A 35-acre diked area on the west side of the Lewis and Clark River mouth was restored to tidal influence in 1987. This area is expected to develop low and high tidal marsh.

Invertebrate types that have been studied in the subarea include benthic infauna and epibenthic organisms. Benthic infauna densities rank among the highest in the estuary. Fish prey species such as amphipods and clams are abundant in the infauna community. The epibenthic organism community in the subarea also ranks among the most abundant in the estuary. Key species include small copepods such as Eurytemora affinis and larger animals such as sand shrimp.

Youngs Bay is a feeding area for many species of fresh and salt water fish. The Bay is also a particularly important nursery area for the juveniles of many species. The marine demersal species English sole, starry flounder, and Pacific staghorn sculpin utilize the bay as a feeding and nursery area. The English sole found in the bay are primarily subyearlings and are most abundant in the deeper habitats during the fall months. Abundant freshwater species in the subarea include threespine stickleback, peamouth, and prickly sculpin.

Pacific herring, shiner perch, and longfin smelt possibly spawn in Youngs Bay. Pacific herring spawn in the estuary from April through July. Yearling and older herring, however, are not abundant in the bay. Subyearlings become abundant in the bay in summer. Youngs Bay is more important as a nursery area than a spawning area for Pacific herring. Shiner perch bear their young in the estuary in June and July. Yearling and older perch become particularly concentrated in the bay during this period. Subyearling perch utilize the bay as a nursery area in summer and fall. Longfin smelt spawn in the estuary from November through March. Smelt ranging in age from yearlings through adults utilize Youngs Bay throughout the year and are abundant in fall. Larval longfin smelt appear in the estuary in winter and spring and subyearlings utilize the bay as a nursery area primarily in fall.

In addition to longfin smelt, several other anadromous species, including American shad and the salmonids, utilize the bay as a migration route and nursery area. American shad spawn in tributaries to the bay from June to August. Adult American shad migrate through the bay in June and July and juveniles in November and December. Because these spawning runs are relatively small, American shad are less abundant in Youngs Bay than in the main stem of the estuary. All of the salmonid species abundant in the estuary utilize Youngs Bay as a migration route or nursery area. Subyearling Chinook salmon utilize the bay as a nursery area year round and are abundant during their spring migration. These juvenile Chinook include populations which have migrated from upriver as well as from natural spawning areas and hatcheries in the tributaries of the bay. Yearling Chinook and coho and juvenile steelhead and cutthroat trout migrate through the bay primarily in spring. The yearling Chinook populations represent upriver stocks, while the coho and steelhead populations originate both upriver and in natural spawning areas and hatcheries in the bay's tributaries.

The Youngs Bay subarea provides habitat for several species of resident and migratory birds. Double-crested cormorant feed in the subarea year round while pelagic cormorant utilize the subarea primarily in winter. The subarea's marshes and tidal flats provide habitat for migratory waterfowl, especially swans, canvasback, scaups, and scoters. These birds are abundant in winter and during their spring and fall migrations. The western grebe, another migratory species, is abundant in the subarea and uses Youngs Bay as a staging area before its spring migration. Mallard, a resident waterfowl species, utilize the subarea year round. Western and glaucous-winged gulls feed in the subarea year round. Shorebirds utilize the tidal flat and low marsh habitats during all seasons but are most abundant during their spring and fall migrations. Great blue heron feed in the tidal flats and marshes of the subarea year round. They are particularly abundant in spring and summer in association with their use during the nesting season of a rookery near the mouth of the Youngs River.

Aquatic and terrestrial mammals utilize the marshes of the subarea; however, mammal use is low compared with upriver wetlands. Muskrat and nutria use the low and high marshes for feeding and denning. Raccoon feed in the high marsh habitats of the subarea.

### Human Use

The primary uses are recreational boating and fishing, commercial fishing, and log transport.

The cumulative impacts of diking, shore protection, bridge construction and other human activity in Youngs Bay has been significant. Circulation, aquatic habitat and public access have all been affected.

### Issues

Youngs Bay is surrounded by Warrenton and Astoria. Several land use disputes have centered around proposed fills in Youngs Bay or uses of nearby shorelands that might have polluted the bay. Prime industrial sites on the shorelands adjacent to Youngs Bay include the East Peninsula of the Skipanon River and the Astoria Airport. These sites could be made larger by filling productive shallow areas.

The use of the bay and tributaries for fisheries-related uses will probably increase. The Clatsop Economic Development Committee's fisheries project on the north shore of the bay has been successful and is expanding. The physical characteristics of Youngs Bay, including good water quality, adequate depth at certain sites, and access to shoreland sites make it particularly suitable for aquaculture. The salmon gillnet fishery in Youngs Bay has increased in size in recent years, with rising production at the Oregon Department of Fish and Wildlife's Klaskanine Hatchery and the two Clatsop Economic Development Committee hatcheries on the south fork of the Klaskanine and on Tucker Creek. Youngs Bay gillnetters participate in a system of voluntary assessments to pay for the Clatsop Economic Development Committee hatchery projects. A net pen salmon smolt rearing project on the north shore of the bay is expected to increase salmon runs.

The Oregon Department of Transportation has proposed to reroute and expand Highway 30 so that the main-stem transportation system will by-pass downtown Astoria. The proposed rerouted Highway 30 will join Highway 202 near the mouth of Youngs River and proceed to Smith Point, to the Highway 101 causeway bridge. This reroute and expansion necessitates widening the existing Highway 202 and West Marine Drive. This will require filling portions of the northern shoreline of Youngs Bay. Proposals being investigated during the environmental impact analysis phase include widening the existing road approximately 50 feet and filling from 1 to 6 acres of aquatic areas in Youngs Bay and at the mouth of Youngs River. Resource agencies have raised concerns about the fill, indicating that impacts on the aquatic resources need investigating as the actual productivity of the aquatic areas in the northeastern portion of Youngs Bay is virtually unknown. The construction phase of the project is not scheduled to begin until 1995-1996.

A major limitation on development of shorelands adjacent to Youngs Bay to the west is the limited land transportation system. Navigational access to the Youngs Bay shoreline is limited by fringing tidal marshes, shallow water and the high shoaling rate. Commercial use of the bay in the near future will probably be limited to log transport and fishing. Recreational boating and fishing will probably increase. There is a need for support facilities along the shore of Youngs Bay for recreational and commercial fishing vessels.

Severe contamination of both upland and tidal flat sediments at the old Pacific Power and Light coal gasification plant on Youngs Bay was discovered in 1984. There was evidence of contamination of aquatic organisms (not including fish) as well as groundwater contamination. The sampling identified carcinogenic polynuclear aromatic hydrocarbons (PAHs) and benzene as the contaminants of primary concern in the coal tars. A remedial action program was developed in coordination with the Environmental Protection Agency and the Oregon Department of Environmental Quality. The old PP&L Service Center building was demolished in 1985 and the rubble was disposed on-site, then covered with sand and several feet of topsoil. Warning signs were placed around the contaminated area. A groundwater monitoring program indicated mainly localized groundwater contamination.

The dike adjacent to the airport runway designated for an instrument landing system, which once intruded into the clear zone of that runway, was moved waterward in 1984-85. Spruce and other vegetation from approximately one acre outside the present dike was also removed. This activity was mitigated by building a new dike landward of the previous dike east of the airport, creating a new marsh area. The old dike was then breached to restore the area to tidal influence. A 35-acre mitigation bank was created. The mitigation bank is administered by the Oregon Division of State Lands. An exception to Oregon Statewide Planning Goal 16 was approved for this action.

### Aquatic Designations

The authorized navigation channels are designated Development. The mud flats, tidal flats, and fringing marshes are designated Natural, except for areas adjacent to the old PP&L facility, the site of a former net storage building south of the new Youngs Bay Bridge, and the existing structure at the Columbia Boatworks, which are designated Conservation. All other water areas are designated Conservation.

### Subarea Policies

1. Proposed developments shall be evaluated for their impact on existing aquaculture operations. Aquatic sites that are especially suited for aquaculture development shall be reserved for that use whenever possible.
2. Development of the aquatic area adjacent to the old Pacific Power and Light facility shall be evaluated for its impacts related to contaminated sediments buried on-site. Potential exposure of coal tar pollutants from disturbance of contaminated sediments shall be avoided.

## P 30.12 LEWIS AND CLARK RIVER

### General Description

This subarea includes the Lewis and Clark River and diked and flood-plain areas on the Lewis and Clark River and tributary sloughs between the Alternate Highway 101 bridge and the head of tide. The subarea is within Clatsop County.

### Aquatic Features

The aquatic portion of the subarea consists of the Lewis and Clark River and the marshes fringing the river shore. Diking has brought about large changes in this subarea in the past century. Prior to diking activities, the river was flanked by broad tidal swamps. Most of the present fringing marshes along the river shore formed after the dikes were constructed.

The Lewis and Clark River has an annual average discharge of 255 cubic feet per second (cfs). Monthly average discharges can exceed 600 cfs in December and January, and are typically less than 100 cfs in summer and fall. Two-thirds of the total annual river discharge occurs during the period of December through March. Tidal flow reversals are evident as far upstream as Lewis and Clark River Mile 6 during low discharge periods and River Mile 2 during high discharge periods.

Salinity levels in the subarea depend on the salinity of Youngs Bay water and the volume of Lewis and Clark River discharge. Youngs Bay is freshwater during the spring and summer Columbia River freshet, hence the Lewis and Clark River is freshwater. By late summer, the mouth of the Lewis and Clark River exhibits salinities of 1 to 2 ppt. In fall, salinities at the river mouth average 2 to 8 ppt and saline water intrudes to Lewis and Clark River Mile 6. In winter, the high runoff of the Lewis and Clark River prevents saline water from entering the river.

Sediments have been quantitatively sampled at two sites in the river. At Lewis and Clark River Mile 7.5, the sediments consist of medium and coarse gravel. The lower river sediments consist mainly of fine sand and silt.

Of the river's plant types, only phytoplankton and tidal marsh and swamp vegetation have been studied. Information on these plant types exists for the lower river only (to about RM 2.5). Phytoplankton productivity in the lower river ranks among the highest measured in the estuary. The lower river marshes are similar to those in Youngs Bay (see Youngs Bay Subarea Plan).

Invertebrate and fish species using the river are similar to those in Youngs Bay (see Youngs Bay Subarea Plan).

Several anadromous species are known to spawn in the river. American shad spawn in the upper portion of the river from June through August. Fall Chinook spawn in August and September, coho from August through October, and steelhead from November through March.

Wildlife use of the subarea is similar to that in Youngs Bay (see Youngs Bay Subarea Plan).

### Shoreland Features

Most shorelands in this reach are low, diked lands in the 100 year floodplain. Soils are of the Coquille-Tidal Marsh (fresh) - Clatsop and Walluski-Knappa Associations. The soils are fair to good for agricultural use. Most of the land is or has been in agricultural production. There are few houses in the subarea.

Several tidegated sloughs drain the shorelands. These are significant wetlands under Oregon Statewide Planning Goal 17. In addition, emergent wetlands east of the Fort Clatsop Memorial are classified as significant.

Wildlife use of the shorelands is high.

### Human Use

Land uses include agriculture (largely grazing), rural housing, and the log dump owned by Cavenham Forest Products. Highway access is provided by Alternate Highway 101 and county roads. Water is private or provided by the Youngs River and Lewis and Clark Water District. There is no sewer system. The scenic value of the river is high. The Fort Clatsop National Memorial commemorates the winter headquarters of the Lewis and Clark Expedition. The major human uses of the waters are fishing, log sorting, storage and transport, and recreational boating. There are two active diking districts in the subarea.

The cumulative impact of dike construction on circulation and aquatic habitat has been substantial. Large areas in this subarea have been converted from marsh/swamp habitat into agricultural use.

### Issues

There is limited development potential because of the flood hazard, poor transportation network and distance from developed areas. Some housing development may occur on adjacent upland areas.

Dredging of the Lewis and Clark River channel (10 feet deep and 150 feet wide) was at one time authorized, but has since been deauthorized. However, private dredging occurs in the river.

Maintenance of fresh water flow and water quality during summer minimum flow periods is important for continuation and enhancement of fish runs. There is potentially a conflict between public water supply and the need to maintain minimum stream flows.

This subarea includes hundreds of acres of farmland and many residences which are dependent upon an extensive diking and drainage system for protection from flooding. The maintenance of this system is the responsibility of local diking districts which have limited funds. In some instances the only economically feasible material for dike maintenance are river bottom sediments outside the dike.

An exception to Oregon Statewide Planning Goal 16 has been approved to allow subtidal dredging for dike maintenance.

Public access to the Lewis and Clark River is limited. Construction of a small boat ramp would significantly improve this situation. Concerns have been raised by local landowners about the potential negative impacts of increased public access. Problems cited by riparian owners include trespassing, damage to dikes, and erosion caused by boat wakes.

#### Aquatic and Shoreland Designations

The river channel from the Alternate Highway 101 bridge to the upstream end of the Cavenham log booming area is designated Development. Adjacent to the Development Shoreland (Miles Crossing Subarea) south of the bridge and including the mouth of Jeffers Slough, the aquatic area from the shoreline out to the channel is designated Development.

Shorelands at the Cavenham log dump are designated Water-Dependent Development. The Fort Clatsop National Memorial and a small forested shoreland area are designated Conservation. Remaining shoreland is designated Rural.

The regulatory shoreland boundary in this subarea is 50 feet from the shoreline, or from the inland toe of dikes and associated toe drains, whichever is greatest, except where it extends farther inland to include the following features:

1. Significant riparian vegetation along the following tidewater sloughs: Jeffers Slough, Barrett Slough, Green Slough, and other unnamed diked sloughs, as shown on Columbia River Estuary Resource maps; and significant riparian vegetation along the banks of the Lewis and Clark River to the head of tide as shown on Columbia River Estuary Resource Maps.
2. Jeffers Slough, Barrett Slough, Green Slough and other unnamed diked sloughs providing significant wetland habitat as shown on Columbia River Estuary Resource Maps.
3. A log-dump site designated Water-Dependent Development.
4. The following dredged material disposal sites listed in the *1986 Columbia River Estuary Dredged Material Management Plan*: CC-S-12.9, CC-S-12.7.
5. Mitigation and restoration sites designated in the *Mitigation and Restoration Plan for the Columbia River Estuary*.



### Subarea Policies

1. Existing log storage areas should be inventoried to determine where logs rest on the bottom at low water. Use of these areas should be minimized and phased out as new sites adequate to meet industry needs are provided.
2. Boat ramps on the Lewis and Clark River shall be sited and designed to minimize negative impacts on adjacent properties. Only relatively small ramps offering access to smaller boats may be permitted.

## P 30.13 MILES CROSSING

### General Description

This subarea extends between the intersection of Clover Lane with Jeffers Slough at the southwest, around the peninsula separating the Lewis and Clark River and the Youngs River, and Miller Slough toward the southeast. There are no estuarine aquatic areas in this subarea. The subarea is within Clatsop County.

### Shoreland Features

The subarea's shorelands, except for the causeway fill for the Old Highway 101 bridge over the Youngs River, are diked. The area is entirely within the 100 year floodplain, with the exception of the highway and some lands north and west of the highway. The subarea consisted of tidal marsh and swamp before it was diked.

Soils are of the Coquille-Tidal Marsh (fresh) - Clatsop Association and topography is flat. Because the land is low, the agricultural suitability is fair to moderate, and there is no timber of commercial value. Much of the subarea is developed with residential, commercial and light industrial uses.

There are several tidegated sloughs in the subarea. The larger sloughs are classified as significant wetlands under Oregon Statewide Planning Goal 17. Wildlife values are high in the undeveloped areas and low in the developed areas.

### Human Use

The major agricultural use is grazing. Other land uses include rural and low density residential housing, commercial uses and light industry. The only water-dependent uses are the AMCCO Shipyard on the Lewis and Clark River, a small shipyard north of AMCCO, and boat construction at the mouth of Cook Slough. Commercial and industrial uses are concentrated along Alternate Highway 101. County roads provide access to nearby rural areas.

There is no sewer system, and septic tank suitability is poor. Sewering the area would probably require connection to the Warrenton or Astoria sewer systems.

Water and marsh areas adjacent to this subarea are used for hunting, fishing, boating and trapping. Some shoreline views are scenic.

## Issues

Major portions of this subarea were considered for inclusion in Astoria's Urban Growth Boundary in the late 1970s. The City and some commercial interests favored inclusion. A large majority of area residents who voiced their opinion were opposed. A decision was made not to include the area. Future inclusion may be possible (see subarea policy below).

The area has development potential due to its proximity to Astoria and the availability of flat land. This potential is constrained, however, by the lack of sewers, flood hazard, and poor soil suitability. Water-oriented development is feasible only along the Lewis and Clark River.

This subarea includes hundreds of acres of agricultural land and many residences which are dependent upon an extensive diking and drainage system for protection from flooding. The maintenance of this system is normally the responsibility of local diking districts which have limited funds. An exception to Oregon Statewide Planning Goal 16 has been approved to allow subtidal dredging for dike maintenance. The Corps of Engineers has completed a plan to rehabilitate the dikes in this subarea. As of the date of this Plan, no dike work has begun.

A boat construction facility adjacent to the tide box at the mouth of Cook Slough is presently being used for construction of steel-hulled fishing vessels. Extensive shoaling has substantially reduced water depths and launching is extremely difficult. The dredging of a "pothole" in the area would allow vessels to be launched in a safe manner and would permit the vessels to be moored at this location while final outfitting takes place. Movement out to the main river channel could occur at high tide. Continued shoaling of this area, however, could result in shallow water depths which would not allow the movement of these vessels (drafts of approximately 9 feet) out to the river channel even on the highest tides. Under those circumstances limited dredging for ingress and egress to the area would be appropriate. An exception to Oregon Statewide Planning Goal 16 will be required to permit this dredging.

## Shoreland Designations

All shorelands in this subarea are designated Rural, except for the existing industrial zone on the east bank of the Lewis and Clark River which is designated Water-Dependent Development, and the existing industrial zone between Alternate Highway 101 and Knowland Slough; which is designated Development.

The regulatory shoreland boundary in this subarea is 50 feet from the Youngs Bay shoreline, or from the landward toe of dikes and associated toe drains, whichever is greatest, except where it extends further inland to include the following shoreland features:

1. Significant riparian vegetation along Knowland Slough, Jeffers Slough, Cook Slough and other unnamed sloughs, as mapped on Columbia River Estuary Resource Maps; and significant riparian vegetation along the Youngs Bay shoreline, as shown on Columbia River Estuary Resource Maps.
2. Jeffers Slough, Cook Slough, Knowland Slough, and other unnamed tidegated sloughs providing significant Goal 17 wetland habitat as shown on Columbia River Estuary Resource Maps.

3. The Astoria Marine Construction (AMCCO) boatworks, in a Water-Dependent Development Shorelands designation; a small boat shop about 1,500 feet downstream from the AMCCO facility, also in a Water-Dependent Development Shorelands designation; a partially developed site at the mouth of Cook Slough, also in a Water-Dependent Development Shorelands designation; and mitigation and restoration sites designated in the *Mitigation and Restoration Plan for the Columbia River Estuary*.

#### Subarea Policies

1. The Rural designation in the Miles Crossing area recognizes that there are no plans to include this area in the Astoria Urban Growth Boundary (UGB) at this time. However, there are commitments between the County and City to reconsider the UGB issue during future review and update of plans. In the meantime, the nature and intensity of new uses should be consistent with the Rural designation and availability of public services.

## P 30.14 YOUNGS RIVER

### General Description

This subarea includes the aquatic and shoreland areas of Youngs River above the Old Highway 101 bridge upstream to the head of tide. On the west side of the river, the shoreland north of Millers Slough is not included. The boundary of this subarea in Astoria is the pierhead line between the bridge and the point where the Astoria city limits intersect the Youngs River shoreline. The subarea is under Clatsop County's jurisdiction.

### Aquatic Features

The aquatic areas in this subarea include the Youngs, Walluski, and Klaskanine Rivers to the head of tide and adjacent tidal marshes and swamps. Diking has brought about large changes in this subarea in the past century. Broad tidal marshes and swamps flanked the shores of the rivers prior to being converted to agricultural land by diking and clearing. Most of the narrow fringing marshes along the rivers' shores formed after the dikes were built.

Youngs River has an average annual discharge of 560 cubic feet per second (cfs). Monthly average discharges can exceed 1,200 cfs in December and January, and typically range around 100 cfs in summer and fall. Two-thirds of the total annual river discharge occurs during the period of December through March. Flow reversals are evident as far upstream as Youngs RM 9.5 during average river discharge and RM 6 during high discharge.

The salinity levels in Youngs Bay and the discharge levels of Youngs River determine the salinity of the river. During the Columbia River freshet, both Youngs Bay and River are entirely freshwater. In fall, salt water intrudes into Youngs Bay and the mouth of Youngs River exhibits salinities of 4 to 10 ppt with significant salinity stratification. Brackish water moves up the river to RM 10. In winter, Youngs River becomes entirely freshwater.

The sediments of Youngs River grade from coarse-grained in upriver areas to fine-grained in downriver areas. The sediments consist of cobbles and boulders upriver from the Klaskanine River confluence. The river bed grades from sand to silt between the Klaskanine River confluence and Daggett Point. Fine suspended sediments tend to settle out in the portion of this stretch of river between the Walluski River confluence and Daggett Point. The sediments become coarser silt downriver from Daggett Point.

The plant types of the Youngs River Subarea include phytoplankton, benthic algae, and tidal marsh and swamp vegetation. Phytoplankton productivity levels in the lower river rank among the highest measured in the estuary. Benthic algal productivity on the lower river tidal flats is moderate to high. There is no information on phytoplankton or benthic algal productivity upriver from RM 5. Data on marsh production and community composition exist for the lower river only (to RM 8). The tidal low marshes near the river mouth resemble the brackish marshes of Youngs Bay, while those farther upriver resemble the freshwater marshes of Cathlamet Bay (see Youngs Bay and Cathlamet

Bay Subarea Plan). The dikes surrounding Haven Island were breached in the early 1980's and the island is reverting to tidal marsh.

Invertebrate and fish utilization in the subarea is similar to Youngs Bay (see Youngs Bay Subarea Plan).

Several anadromous species are known to spawn in the river. American shad spawn in the upper portion of the Youngs and Walluski Rivers from June through August. Fall chinook spawn in the Klaskanine River in August and September, coho in the Youngs and Klaskanine Rivers from August through October, and winter run steelhead in the Youngs and Klaskanine Rivers from November through March. In addition hatcheries on the Klaskanine River releases fall chinook, coho, and steelhead.

Bird and wildlife use of the subarea is similar to Youngs Bay (see Youngs Bay Subarea Plan). A great blue heron nesting colony exists east of the subarea on Brown's Creek. Heron from this colony feed in Youngs River and Bay. Much of the subarea is within the home range of a nesting pair of bald eagles. The pair nests east of Youngs River near Cooperage Slough.

#### Shoreland Features

Most shorelands in this reach are low diked lands in the 100 year floodplain. Soils are of the Coquille-Tidal Marsh (fresh) - Clatsop, Walluski-Knappa, and Nehalem Associations. These soils are fair to good for agricultural use. Most of the land is or has been in agricultural production. There is some commercially valuable timber in the subarea. Adjacent uplands are highly productive timberland. There is rural housing development along the main roads passing through the subarea.

Several tidegated sloughs drain the shoreland of the subarea. Most of the large sloughs are significant wetlands under Oregon Statewide Planning Goal 17.

Bird use of the shorelands is high and mammal use is high in the undeveloped areas and adjacent to the rivers and wetlands.

#### Human Use

Major land uses are agriculture and rural housing. Highway access is provided by Oregon Highway 202 and county roads. Water is provided by three water districts; there is no sewer system, except at the old naval hospital. The scenic value of the river is high. There is a County park at Youngs River Falls and there are several undeveloped access points for angling.

The major human uses of the aquatic areas are fishing, log storage and transport, and recreational boating. There is one active diking district and one defunct diking district on the Youngs and Klaskanine Rivers. Most dikes throughout the area have been maintained by barge-mounted dragline. An exception to Oregon Statewide Planning Goal 16 has been approved to allow subtidal dredging for

dike maintenance. The Corps of Engineers has completed a plan to rehabilitate the dike from the Miles Crossing subarea to Binder Slough. As of the date of this plan, work has not begun.

The cumulative impact of diking in this subarea has been substantial. Nearly all of the former marshes and swampland along the rivers have been converted to agricultural use. Remaining intertidal areas are greatly diminished relative to their pre-diking size.

### Issues

There is limited development potential in this subarea because of the flood hazard, poor transportation network and distance from developed areas. Residential development may occur on adjacent upland areas. The old naval hospital site is on high ground near the intersection of Youngs and Walluski Rivers, has water and sewer systems, and could be developed. Increased residential use in the Youngs River area is likely. Water-related issues include the preservation of diked, freshwater wetlands, log storage in wetland areas where logs may go aground at low water, and the dredging of shallow productive areas for fill material to maintain dikes.

The Oregon Department of Transportation has proposed to reroute and expand Highway 30 so that the mainstem transportation system will by-pass downtown Astoria. The proposed reroute will join Highway 202 near the mouth of Youngs river. The proposed reroute and expansion will necessitate widening the existing Highway 202 and West Marine Drive, which will require filling portions of the northern shoreline of Youngs River and Bay. The proposals being investigated during the environmental impact analysis phase consider filling from 1 to 6 acres in Youngs River and Bay. Portions of the road may extend approximately 50 feet into the aquatic areas. Resource agencies are concerned that the actual impact on aquatic resources may be underestimated because the productivity of the northern shoreline of Youngs Bay and River is virtually unknown. The construction phase of the project is not scheduled to begin until 1995-1996.

This subarea includes hundreds of acres of farmland and many residences which are dependent upon an extensive diking and drainage system for protection from flooding. The maintenance of this system is the responsibility of local diking districts which have limited funds. In some instances the only economically feasible material for dike maintenance are river bottom sediments outside the dike.

The Youngs River subarea contains significant natural values which should be protected. Except for extensive diking, people have changed this environment to a lesser extent than many other portions of the estuary. There is a substantial local and state investment in fisheries enhancement. The state and Clatsop Economic Development Committee operate fish hatcheries on the Klaskanine River. Expansion of these fish-rearing efforts is planned. The construction of a fish ladder at Youngs River Falls and the use of the area for mitigation sites could result in development of the river as an extremely valuable fisheries resource. Youngs River Falls has also been considered as a potential hydroelectric development site.

### Aquatic and Shoreland Designations

The authorized navigation channel in Youngs River is designated Development to Haven Island. The following aquatic areas are designated Natural: Cooperage Slough, Grant Island, Haven Island, Fry Island, and the tidal flats downstream of the Walluski River on both sides of the river including Daggett Point. Remaining aquatic areas are designated Conservation.

Shorelands in this subarea used for agriculture and associated uses are designated Rural. Areas along the upper tidal reaches of the Walluski, Klaskanine, and Youngs River, and shorelands used primarily for timber production are designated Conservation.

The regulatory shoreland boundary in this subarea is 50 feet from the Youngs River shoreline, or from the landward toe of dikes and associated toe drains, whichever is greater, except where it extends farther inland to include the following shoreland features:

1. Significant riparian vegetation along both banks of the Youngs River, the Walluski River, the Little Walluski River, Crosel Creek and the Klaskanine River to the head of tide, as mapped on Columbia River Estuary Resource Maps; and significant riparian vegetation along diked sloughs as shown on Columbia River Estuary Resource Maps, including Sales Slough, Binder Slough, Casey Slough, Tucker Creek Slough, Battle Creek Slough and other unnamed sloughs.
2. An eagle's nest near Cooperage Slough and a 50-foot buffer around the next tree.
3. Sales Slough, Binder Slough, Tucker Creek Slough, Battle Creek Slough, Casey Slough and other unnamed sloughs providing significant Goal 17 wetland habitat as shown on Columbia River Estuary Resource Maps.
4. Mitigation and restoration sites as designated in the *Mitigation and Restoration Plan for the Columbia River Estuary*.

### Subarea Policies

1. Existing log storage areas should be inventoried to determine where logs rest on the bottom at low water. Use of these areas should be minimized and phased-out as new sites adequate to meet industry needs are provided.
2. To protect present investments and the future potential of the fisheries resource of the Youngs River, new development in the area shall be carried out so as to preserve water quality, biological productivity, and other factors which contribute to fisheries production.



## P 30.15 TONGUE POINT

### General Description

This subarea covers both shorelands and aquatic areas between the navigation channel on the north, the MARAD Basin on the east, the Astoria Urban Growth Boundary on the south, Highway 30 on the west (from the Astoria Urban Growth boundary on the south to Mill Creek), and the Burlington Northern Railroad right-of-way (from Mill Creek to the Astoria sewage ponds). This subarea contains the former Tongue Point Naval Station and finger piers, portions of the federal Job Corps Center, and the U. S. Army Corps of Engineers Field Station. The area is in the Astoria Urban Growth Boundary, under the jurisdiction of Clatsop County.

### Aquatic Features

The aquatic areas include the access channel to Tongue Point from the Columbia River, the area surrounding 8 large finger piers, the MARAD Basin between Mott Island, Lois Island and South Tongue Point, the tidal flats and marshes adjacent to the Corps of Engineers Field Office, and water areas west and north of Tongue Point and the Coast Guard piers.

The aquatic area adjacent to Tongue Point has been highly altered by human activities. Prior to 1939, the area between the mouth of the John Day River and Tongue Point was an area of shallow waters, tidal flats, and marshes. The railroad track marked the approximate shoreline east of the neck of Tongue Point, except on the west side of the John Day River mouth, where the railroad track cut off a shallow embayment. The present Mott and Lois Islands were tidelands or waters up to 15 feet deep. The material dredged from the entrance channel into Tongue Point and the MARAD Basin was used to form virtually all of the low-lying, flat lands of the present Tongue Point and Corps of Engineers facilities. Mott and Lois Islands in the adjacent subarea were also formed with this material.

The aquatic area north and west of Tongue Point differs markedly from the basin formed by the Point and Lois and Mott Islands. The aquatic characteristics north and west of Tongue Point are discussed in the Estuary Channels Subarea Plan.

The partially enclosed aquatic area east of Tongue Point is characterized by slower currents, finer sediments, and lower salinity than the main channel. The entrance channel into Tongue Point ranges from about 40 feet deep at the mouth to about 25 feet deep east of the finger piers. The adjacent turning basin is approximately -34 feet MLLW. The MARAD Basin is generally between 20 and 26 feet deep. Depths between the finger piers are generally less than 15 feet. A band of intertidal areas, including tidal flats, marshes, and swamps, surrounds the south Tongue Point peninsula. This intertidal area varies from 300 to 1,500 feet in width and averages about 500 feet in width. Currents and flushing in these waters east of Tongue Point result primarily from tidal flow. Columbia River flow through the south channel is relatively small and the discharge of the John Day River is inconsequential.

Sediments in the area east of Tongue Point consist primarily of very fine sand, silt, and clay. Organic content is fairly high in some areas, and a potential layer of navy grey paint in the MARAD Basin may cause the sediments to be polluted according to EPA standards. Based on bathymetric surveys and core studies, the average sedimentation rate in the MARAD Basin is 4-6 cm/yr (about 2 in/yr) at the present depth of 20-26 feet below MLLW.

Tidal marshes and swamps in the subarea exist primarily around the south Tongue Point peninsula. The tidal swamps form an approximately 250-foot wide band around the peninsula. They contain primarily shrub species. The tidal marshes form a fringe waterward of the swamps. This fringe extends 1,200 feet on the north side of the peninsula. Softstem bulrush (Scirpus validus) dominates the lowest elevation marshes while Lyngby's sedge (Carex lyngbyei), reed canary grass (Phalaris arundinacea) and cattail (Typha angustifolia) dominate the higher elevation marshes.

Of the estuary's invertebrate types, only benthic infauna have been sampled in the area east of Tongue Point. Important fish prey items such as amphipods (Corophium salmonis), insect larvae (chironomids), and freshwater clams (Corbicula manilensis) dominate the infauna community. Infauna biomass is high compared with sandy areas of the estuary.

Fishes found to be abundant in the subarea include species tolerant of freshwater conditions and anadromous species. Two marine demersal species tolerant of freshwater, starry flounder and Pacific staghorn sculpin, utilize the subarea. Subyearling starry flounder are particularly abundant in summer. Another marine species, whitebait smelt, has been found in the subarea in winter. The most abundant freshwater species in the subarea are threespine stickleback and peamouth. White sturgeon are also abundant.

Two species that spawn in the estuary, longfin smelt and shiner perch, utilize the subarea. Longfin smelt, an anadromous species, spawns from November through March. Smelt ranging in age from yearlings through adults are found in the subarea in winter. Larval longfin smelt appear in the estuary in winter and spring and subyearlings utilize the subarea as a nursery area in fall. The subarea is probably important to shiner perch only as a nursery area because only subyearling perch are abundant. They use the subarea primarily in summer.

In addition to longfin smelt, several other anadromous species, including American shad and the salmonids, use the subarea as a migration route and nursery area. Adult American shad migrate upriver in June and July. Most of the upstream migrants are destined for spawning areas upriver from the estuary and do not pass through the subarea. Some, however, migrate through the subarea and spawn in the John Day River. Juvenile American shad migrate downriver primarily in November and December. Juvenile shad, originating from upstream spawning areas as well as from the John Day River, use the subarea as a nursery area. The subarea is also a nursery area for juvenile salmon. Subyearling Chinook salmon are abundant during their spring and summer migrations and remain fairly abundant through fall and winter. Yearling coho are found in greater abundance in the subarea than in other estuarine areas during their spring migration. Yearling Chinook and juvenile steelhead and cutthroat trout migrate through the subarea primarily in spring.

The subarea provides habitat for several species of resident and migratory birds. Double-crested cormorant are found in the subarea in winter while pelagic cormorant are found in spring, fall, and winter. Common merganser, a resident waterfowl species, utilize the subarea in fall and winter.

Western grebe, a migratory species, winters in the subarea. The tidal flats and low marshes provide feeding areas for great blue heron year round and for shorebirds primarily in spring.

Bald eagle use of the Tongue Point area was studied intensively in 1984 and 1985. The subarea is used by a resident pair of eagles, referred to as the Mill Creek pair, and by transitory and wintering eagles. The Mill Creek pair's nesting site is located about 2,500 feet east of the subarea along Mill Creek. The nesting area is protected under Astoria's Comprehensive Plan and by state and federal regulations. Another eagle pair nesting several miles to the east, the Twilight Creek pair, use the extreme eastern part of the Tongue Point Subarea. This pair is discussed in the John Day-Eddy Point Subarea Plan.

The home range or territory of the Mill Creek pair encompasses the entire Tongue Point subarea and portions of the adjacent subareas. The eagles' use of the subarea includes use of old growth conifer perch trees at the tip of Tongue Point, just south of the mouth of Mill Creek, and on the north and south tips of the south Tongue Point peninsula. The primary foraging areas for the pair include the mudflat off the mouth of Mill Creek and Taylor Sands (see Estuary Sands Subarea Plan). The Mill Creek site is used more often in winter while the Taylor Sands site is used more often during the nesting season. The pair also forage in the aquatic area around the periphery of Tongue Point and off the southern tip of the south Tongue Point peninsula.

Wintering and transient eagles use the subarea from November through August. Peak numbers occur in March. The perch trees and foraging area off the mouth of Mill Creek are also used by these eagles. This area is used much less frequently by these eagles than perching and foraging areas east of Lois Island (see Cathlamet Bay Subarea Plan).

In and adjacent to the foraging area off the mouth of Mill Creek, the Mill Creek pair exhibit a high tolerance of motor vehicles and trains, moderate tolerance of walking humans, and a very low tolerance of boats. The pair avoids the industrial area except when flying over at high altitudes. High priority measures for protecting this pair within the subarea include complete protection of all of their perching trees along the tip of Tongue Point, south of the mouth of Mill Creek and on the north and south tips of the Tongue Point peninsula and protection of mudflats and marshes off of the mouth of Mill Creek. In addition, human activities in the vicinity of the foraging areas should be minimized during morning hours.

Aquatic and terrestrial mammals utilize the marshes and swamps of the subarea. Muskrat and nutria feed and den in the marshes and occasionally utilize the swamps. Beaver and raccoon feed and den in the swamps and deer feed in the swamps and adjacent upland.

### Shoreland Features

From north to south, the shorelands of this subarea include the steep, forested slopes of Tongue Point itself, the relatively flat developed area occupied by the Coast Guard station and the former naval base, the sloped area waterward of Highway 30 between Mill Creek and the south Tongue Point peninsula, and the south Tongue Point peninsula. Almost all of the flat lands of this subarea are the result of filling former aquatic areas with dredged material.

The flat land on the north Tongue Point peninsula is mostly developed. The developed flat land forming the south Tongue Point peninsula consists of a Corps of Engineers field station and access roads. The remainder of this area consists of vegetated shorelands with some nontidal wetland. The boundaries of the nontidal wetland were surveyed by the Corps of Engineers in 1987. Tongue Point proper consists of a steeply sloping hill. The point contains basalt rock. Vegetation on Tongue Point consists of old growth coniferous forest.

Wildlife in the subarea include deer and small mammals. As discussed under Aquatic Features, bald eagles utilize the subarea. Although there are currently no active eagle nests in the subarea, a nest tree on Tongue Point was occupied in the early 1970's. The trees at the tip of Tongue Point are used for roosting.

### Human Uses

#### North Tongue Point Peninsula:

The peninsula is mostly undeveloped with the exception of a Coast Guard installation on the southwest corner. Tongue Point has been designated a habitat area for the bald eagle by the U.S. Fish and Wildlife Service. There is an access road circling the point between the Job Corps Center on the southeast corner and the U.S. Coast Guard installation on the southwest corner.

#### The Naval Station, Job Corps Center and Finger Pier Area:

The Federal Job Corps Center occupies the area immediately adjacent to Tongue Point Road on the west and between Tongue Point Road and the railroad tracks. East of the railroad tracks there is a large level area which was used as a naval station at one time. The north portion of this area is under Federal ownership, the south portion is owned by the State of Oregon and administered by the Division of State Lands. The Division of State Lands has leased this area to a private developer wishing to establish a deep draft car import facility at the site. The finger pier area has been used for long-term storage of vessels. The aquatic area between the finger piers is used for log storage as well.

#### South Tongue Point Mediation Agreement Area:

Constructed out of dredged material, this area is enclosed by water on three sides and by railroad tracks on the south. It is almost undeveloped with the exception of a U.S. Army Corps of Engineers installation. The lower areas have a high water table and contain wetland vegetation. South Tongue Point has been proposed for development of a U.S. Naval base.

## Issues

The Tongue Point subarea contains one of the most difficult conflicts between natural resource values and development potential in the Columbia River Estuary. The subarea receives extensive use by bald eagles. The aquatic area is productive for several fish species, including shad, Chinook salmon, and starry flounder. The area around south Tongue Point contains tidal marsh and wetland habitat.

There have been a number of proposals for water-dependent uses at Tongue Point. A mediation agreement was reached by representatives from state and federal resource agencies and local jurisdictions in 1981. The Agreement designated use zones and development requirements for Tongue Point. It provides for the potential development of water-dependent uses in the finger pier area by designating the aquatic area between the finger piers, the access channel, and turning basin as development aquatic. A determination of dredged material disposal sites for excavation of the access channel and turning basin and mitigation sites for filling of the aquatic area was not made. Major issues involved in proposals for water-dependent uses at Tongue Point include the dredging of access channels, disposal of the dredged material, the filling of wetlands in and around Tongue Point, protection of intertidal habitat, the impact of access road construction on residences, and protection of bald eagle habitat. An access channel and turning basin were dredged in 1989, related to development of the proposed automobile import facility.

The development potential of the area around the finger piers is high. The shoreland immediately adjacent to the finger piers would provide a backup area for water-dependent development. The area has good access to Oregon Highway 30 and the Burlington Northern railroad tracks. The 1981 Mediation Panel Agreement permits filling of the area between the piers and construction of access channels from the navigation channel to the finger piers. The Agreement also provides for an access channel on the east side of South Tongue Point, and construction of a turning basin. A private developer has leased the area around the finger piers from the Division of State Lands for the purposes of developing a car import facility. The access channel and turning basin were dredged during 1989 to approximately -34 feet MLLW.

The 1986 Lower Columbia River Assessment of Oregon Deep Draft Sites identified Tongue Point as a potential deep draft development site. The document included two scenarios for development of Tongue Point. The first scenario, identified as the East Astoria Development Plan, appears consistent with the Mediation Panel Agreement. The second scenario, identified as the Tongue Point Development Plan, involves larger aquatic area fills than specified in the Mediation Panel Agreement. The total Tongue Point Mediation Panel Agreement fills amount to 97 acres while fills under the second scenario amount to 209 acres. The additional fill would occur in areas designated Aquatic Natural. This Plan retains the designations and development scenario specified in the 1981 Mediation Panel Agreement. Redesignation of Tongue Point to allow for the development scenario in the Deep Draft Sites assessment would require full coordination with all of the Mediation Panel participants and other affected agencies.

There are some physical and natural resource constraints to development at Tongue Point. There are steep slopes in much of the area and evidence of landsliding at one site, a factor which may affect access road construction. Extensive wetland areas exist south of the finger piers. In addition, an earthquake fault, possibly no longer active, crosses the area in a northeast/southwest alignment just south of the finger piers.

The federal General Services Administration has considered the possibility of trading ownership of the Tongue Point south peninsula to the State of Oregon in exchange for several state owned estuary islands. The General Services Administration would then transfer its interest in the estuary islands to the U. S. Fish and Wildlife Service. The Oregon Division of State Lands would assume ownership of the Tongue Point south peninsula in addition to existing State ownership in the finger pier area. In addition, Clatsop County could quitclaim its interest in the estuary islands to the U. S. Fish and Wildlife Services. This transaction had not taken place as of 1989, although it is again under serious consideration in 1990. The federal government is considering designating Astoria as a homeport base, proposing to station two mine sweepers at the new base. South Tongue Point is the most likely choice for the new base.

#### Aquatic and Shoreland Designations

The following aquatic areas are designated Development:

1. The aquatic area between the shoreline of the old naval station and the waterward end of the finger piers.
2. A channel 500 feet in width from the main navigation channel to the finger piers and out 700 feet from the end of the finger piers.
3. A turning basin approximately 1,500 feet wide lying immediately waterward of the end of the southerly four finger piers.
4. The aquatic area within the Coast Guard base.
5. The wetland lying south of the Corps of Engineers causeway, if South Tongue Point is used for a water-dependent development. Otherwise the designation is Natural.
6. Tidal wetlands above the fringing emergent marsh lying between the Corps of Engineers dock and the southerly line of T8N, R9W, Section 12, if South Tongue Point is used for a water-dependent development. Otherwise, the designation is Natural.

The following aquatic areas are designated Natural:

1. The subtidal and intertidal areas between the southern most finger pier and the South Tongue Point Peninsula.
2. The wetlands lying south of the Corps of Engineers causeway if South Tongue Point is used for non-water-dependent development.

The following aquatic areas are designated Conservation:

1. The aquatic area between the shoreline of the North Tongue Point peninsula, the navigation channel to the north, and the access channel to the east.

The following shoreland areas are designated Water-Dependent Development:

1. The Coast Guard base.
2. The shorelands between Mill Creek and the Job Corps Center.
3. The South Tongue Point Peninsula can be committed to water-dependent or non-water-dependent developments.

The following shoreland area is designated Development:

1. The Federal Job Corps Center.

The following shoreland area is designated Rural:

1. The potentially unstable slope area waterward of Oregon Highway 30 between Mill Creek and the entrance to South Tongue Point, outside of the Astoria city limits.

The following shorelands are designated Natural:

1. The Tongue Point peninsula north of the Job Corps Center, with the exception of the Coast Guard Base.

The regulatory shoreland boundary is 50 feet from the Columbia River Estuary shoreline except where it extends farther inland to include the following features:

1. The Tongue Point peninsula, because of its significant shoreland habitat.
2. Bald eagle roosting trees in the Mill Creek area and south of Mill Creek to the South Tongue Point Peninsula (waterward of Highway 30).
3. The steeply sloping potentially unstable area waterward of Oregon Highway 30 between Mill Creek and the entrance to the South Tongue Point peninsula.

4. Water-Dependent Development sites at the South Tongue Point peninsula; a designated dredged material disposal site (As-S-18.7) (from the *Columbia River Estuary Dredged Material Management Plan*); the upland area between the railroad right-of-way and the finger piers north of Mill Creek (also containing a designated dredged material disposal site (As-S-18.2); and the Coast Guard base.

#### Subarea Policies

1. Tidal wetlands south of the Corps of Engineers causeway on the South Tongue Point peninsula can only be developed for improved vehicular or rail access. Otherwise, uses permitted shall conform to the Natural Aquatic designation.
2. Development proposals for the area between the railroad right-of-way and Oregon Highway 30 south of Mill Creek shall demonstrate through such measures as a soils engineering analysis that surface alteration will not result in slope failure.
3. The USFWS and the ODFW shall be contacted prior to any development to assess the potential for impacts on bald eagle habitat.
4. The design and construction of new access roads to the finger pier area shall take into account potential impacts on residences and slope stability.
5. The areas designated Development by the Mediation Panel Agreement can be developed for all uses permitted under that designation, but compliance with the policies in the agreement shall be required.
6. Uncontaminated dredged material from navigation channel projects in this subarea should be used for dike maintenance.

#### Mediation Panel Agreement Subarea Policies - North Tongue Point

7. The maximum extent of fill in aquatic areas at North Tongue Point shall be: from the present shoreline eastward to the end of the existing piers; from the south side of the southernmost finger pier to the northern line of state ownership (halfway between the 5th and 6th finger piers from the south). Fill shall be allowed only for water-dependent uses.
8. A navigation channel 500 feet wide and 40 feet deep (with overdredge for compatibility with main channel) is allowed to provide access from the Columbia River to North Tongue Point. The width of the access channel may be extended 200 feet (creating a 700-foot wide channel) if necessary to allow movement around vessels docked at North Tongue Point.
9. If the main Columbia River navigation channel is deepened, the access channel into North Tongue Point may be deepened to the same depth.



10. Construction and maintenance of a 1,500-foot wide, 25-foot deep (MLLW) turning basin is allowed. The basin shall be designed to protect productive intertidal and nearshore subtidal areas in the Tongue Point area. The turning basin may extend southward into the MARAD Basin but not south of the existing Corps of Engineers dock at South Tongue Point.

11. The location and dimensions of the access channel and the turning basin shall be determined through engineering studies as a part of the permit application process.

12. Spur railroad trestle access to North Tongue Point from the main line across adjacent wetland areas is allowed. This rail access corridor may also contain piling-supported conveyor or vehicle access facilities for movement of commodities or cargo between South Tongue Point and North Tongue Point (pursuant to the exception to Oregon Statewide Planning Goal 16 adopted by Clatsop County and Astoria).

13. Dredged material disposal sites needed for fill development of North Tongue Point must be identified and agreed upon in preapplication consultation with resource agencies or in the permit process.

#### Mediation Panel Agreement Subarea Policies - South Tongue Point

14. If South Tongue Point is developed for water-dependent uses, the following accessory activities are allowed:

A) One access corridor from South Tongue Point to North Tongue Point is allowed in addition to the rail access provided in the North Tongue Point agreement. This corridor shall be located adjacent to and waterward of the Burlington Northern Railroad to allow movement of commodities or cargo between the sites. The corridor may contain rail, conveyor, road access, or a combination thereof. If a road is built some fringing wetlands along the shoreland may be filled. Otherwise the corridor must use pile supported structures (pursuant to the exception to Oregon Statewide Planning Goal 16 adopted by Clatsop County and Astoria).

B) A navigational access channel (not to exceed 500 feet in width or 25 feet depth at Mean Lower Low Water) suitable for ocean-going vessels is allowed to the eastern side of South Tongue Point. Dredging shall be allowed in this channel to maintain the approved depth not to exceed -25 feet. The objective shall be to locate the channel below -20 feet MLLW and to minimize the amount of dredging required.

C) T-docks or other piling-supported structures are allowed to facilitate movement of commodities from the shoreland to barges or boats in this channel (pursuant to the exception to Oregon Statewide Planning Goal 16 adopted by Clatsop County and Astoria). Such structures shall be designed and located with an objective of protecting productive intertidal and nearshore subtidal areas.

15. Spur railroad trestle access to South Tongue Point from the main line across adjacent wetland areas located southeasterly of the site is allowed (pursuant to the exception to Oregon Statewide Planning Goal 16 adopted by Clatsop County and Astoria).

16. Specific locations of spur lines, transportation corridors, roads, pile-supported structures, and the channel described above shall be determined during the permit process.

17. Filling in the Development Aquatic shrub wetland area lying adjacent to and southerly of the access causeway must meet the use-needs-alternatives criteria of the Section 404 permit process.

### General Description

This area includes the John Day River from its mouth to the head of tide, and the adjacent shorelands. The subarea is under the jurisdiction of Clatsop County.

### Aquatic Features

The aquatic portion of this subarea includes the John Day River and adjacent tidal marshes. Diking activities have reduced the amount of tidal wetlands in this subarea. Prior to diking most of the river's floodplain consisted of tidal swamp.

Water depths are a relatively shallow 4 to 12 feet. The river is considered navigable for a distance of three miles. River flow from the small drainage basin is low, particularly in the summer. There is minimal sediment transport, and flushing is slow. There is little salt water intrusion. The aquatic ecosystem of the John Day River is thus freshwater in nature.

Tidal swamps and marshes exist near the mouth of the river and near the upstream end of tidal influence. These tidal wetlands have plant species similar to those found in Cathlamet Bay wetlands (see Cathlamet Bay Subarea Plan).

There is no information on invertebrate populations in the subarea and little information on fish. During the fall, there are cutthroat trout, some coho salmon, and maybe a small number of Chum salmon. During May and June, there is a run of American Shad which spawn around the head of tide. Other species which occur throughout the year are carp, largemouth bass, crappie, yellow perch, catfish, and other rough fish.

Bird and mammal use of the river's waters and wetlands is probably similar to Cathlamet Bay (see Cathlamet Bay Subarea Plan). Bald eagles feed at the mouth of the river. The Aquatic Features sections in adjacent subarea plans discuss these eagles (see Tongue Point and Cathlamet Bay Subarea Plans).

### Shoreland Features

The shorelands are predominantly diked tidelands used for low intensity agriculture. There are also small forested shoreland areas. Shoreland soils are the Coquille-Tidal Marsh (fresh)-Tolovana Association. These lowlands have high flooding potential (most of the area is within the 100 year floodplain), relatively high ground water level, and moderate agricultural suitability. The shorelands have moderate wildlife value. Deer and elk, along with smaller wildlife, frequent the area and several bald eagle nests have been located in adjacent upland areas.

There are several nontidal wetlands in the subarea that are significant under Oregon Statewide Planning Goal 17. The wetlands include emergent marshes dominated by sedges (Carex sitchensis, Carex cusickii, and Carex obnupta), Sitka spruce swamps, and shrub swamps.

## Human Use

Existing land and water use includes agriculture, forestry, residential use, and recreation. Low-lying shoreland areas are protected by dikes and fourteen tidegates located along the river. Adjacent land uses are mostly related to agriculture and forestry.

Ownership is mostly private with some county, state and corporate owners. There is a public boat launching ramp on county land near the mouth of the river. There are also numerous private docks along the river. Access to the area is by water from Cathlamet Bay and by road from Highway 30.

Relocation of the John Day River bridge was approved by Clatsop County. The new bridge was constructed slightly downstream of the existing one. The project involved fill of approximately 1.3 acres of tidal marsh on the west side of the river. The embankment is stabilized with riprap. The project required wetlands mitigation.

## Issues

There is limited potential for new development on the John Day River and its low-lying shorelands. The river itself is relatively narrow and shallow. Increased river traffic would conflict with existing houseboat uses and worsen the streambank erosion problem. The shorelands, being either low and flood-prone or steep and unsuitable for intensive development, also offer little potential for expanded use. Factors which could improve development potential in the future would be the use of low areas for disposal of dredged material and possible relocation of Highway 30. An exception to Oregon Statewide Planning Goal 16 to permit continued houseboat use on the John Day River was approved by Clatsop County in 1983. This exception does not permit expansion of the outside boundaries of the aquatic area "committed to houseboat use" at the time the exception was approved. The Oregon Department of Land Conservation and Development's position on houseboats is that residential uses are not water-dependent and therefore cannot be permitted in aquatic areas. Water quality and navigational access concerns related to existing houseboats may become a more significant issue in the future.

The tidal marsh-mudflat areas just inside the river mouth are very shallow, are flooded on every tide, have significant fish and wildlife values, are publicly owned, and have little potential for development. It is in the public interest to protect these natural resource values. The low-intensity recreational uses of the river, the fishery resources and wildlife values should be protected while providing for limited development.

## Aquatic and Shoreland Designations

The large tidal marsh and mudflat just inside the mouth of the John Day River, to the west of the river channel, is designated Natural. The remaining aquatic areas to the head of tide are designated Conservation.

Shorelands in this subarea are designated Rural in agricultural areas and Conservation in forestry areas.

The regulatory shoreland boundary in this subarea is 50 feet from the shoreline or the inland toe of dikes and associated toe drains, whichever is greatest, except where it extends farther inland to include the following shoreland features:

1. Significant nontidal wetlands as shown on Columbia River Estuary Resource Maps.
2. Significant riparian vegetation along the John Day River to the head of tide, as shown on Columbia River Estuary Resource Maps.
3. The John Day River Boat Ramp, including parking lot; dredged material disposal sites CC-S-8.6 and CC-S-18.8 (from the *Columbia River Estuary Dredged Material Management Plan*); and mitigation and restoration sites as designated in the *Mitigation and Restoration Plan for the Columbia River Estuary*.

#### Subarea Policies

1. The tidal marsh and mudflats just inside the river mouth have significant fish and wildlife values and are publicly owned. They shall be protected.
2. New, replacement and relocated houseboats may be permitted in the John Day houseboat exception area, subject to local, state, and federal lease and permit requirements, and subject to the exception to Oregon Statewide Planning Goal 16. Approval of new or reoriented houseboats shall be subject to the following policies:
  - a. Any new or reoriented floating residence must have a DEQ approved sewage disposal system.
  - b. New or reoriented floating residences must show an upland parking area off any public road right-of-way.
  - c. New or reoriented floating residences must have an approved lease from the Division of State Lands to occupy the water surface.
  - d. Alignment of new or reoriented floating residences shall be such that navigability on the river is hindered as little as possible.
  - e. Maximum building height of new floating residences shall be equivalent to that in the adjacent upland zone.
  - f. A distance of 25 feet is required between any portion of the floats of a new or reoriented floating residence and any existing floating residence.
  - g. Any new or reoriented floating residence shall be sited so that the longer dimension runs parallel with the shoreline.

## P 30.17 JOHN DAY POINT TO EDDY POINT

### General Description

This subarea extends from John Day Point to Eddy Point. Included are the shorelands along this part of the Cathlamet Bay shoreline, adjacent tidal marshes, the lower portions of Twilight, Mary's, Bear, and Ferris Creeks, and Svensen and Calendar Islands. Most of the mainland shorelands are forested and rural. Svensen Island is diked and used primarily for pasture. Calendar Island consists of tidal marshes and swamps. The subarea is under the jurisdiction of Clatsop County.

### Aquatic Features

Aquatic portions of this subarea include the nearshore areas from John Day Point to Eddy Point, the waters surrounding Svensen Islands, and the marshes and swamps of Calendar Island. The principal historic changes that have occurred in the subarea have resulted from diking. All of the subarea's diked agricultural land previously consisted of tidal marshes and swamps.

Physical and biological characteristics of the aquatic areas are similar to those in adjacent subareas (see Cathlamet Bay and Upper Marsh Islands Subarea Plans). Tidal marshes and swamps fringe much of the subarea's shoreline. In addition, large marshes and swamps exist at the mouth of Twilight Creek, adjacent to Mary's, Bear, and Ferris Creeks, and on Calendar Island. The Mary's, Bear, and Ferris Creek wetlands were at one time diked but have returned to tidal influence when the dikes breached many years ago.

Mary's, Bear and Ferris Creeks have small wild runs of cutthroat trout, steelhead, and coho and chum salmon; coho from state hatcheries have been placed in Bear Creek. The creeks and adjacent waters and wetlands receive extensive use by feeding juvenile salmonids.

The subarea receives heavy use by bald eagles. The Mill Creek bald eagle pair (see Tongue Point Subarea Plan), Twilight Creek pair, and wintering and transient eagles feed off of John Day Point. The Twilight Creek marsh and adjacent south channel are feeding areas for the Twilight Creek bald eagle pair as well as wintering and transitory eagles. Calendar Island and adjacent waters are used by a pair of eagles that nest on Karlson Island.

### Shoreland Features

Soils from John Day Point to Settlers Point include the Tolovana and the Walluski-Knappa associations. Flood potential is low and there is a seasonally high water table. The soils have a very low suitability for agriculture. Soil movement hazards are present to the west of Twilight Creek. While the movement is not rapid, it is present almost every winter, intruding on Highway 30. The soils in the remainder of the subarea are primarily of the Coquille-Tidal Marsh (fresh)-Clatsop Association. Soil morphology is to a large extent a result of flooding, a relatively high seasonal water table, and a low slope. Agricultural suitability is moderate.

Shoreland vegetation is characterized by shrub willow, alder, Sitka spruce, and Douglas fir. Wildlife in the area includes blacktailed deer, elk, and small mammals. Freshwater marshes classified as significant under Oregon Statewide Planning Goal 17 are located on Svensen Island and Twilight Creek.

Bald eagle use of the shorelands is high. Several bald eagle nesting and roosting trees (outside of the estuary area) have been identified inland from the subarea. The Twilight Creek nest is located about one-half mile South of the subarea and a large communal roost known as the Mary's Creek roost is located about one and one-half miles south of the subarea. The eagles' main hunting perches in the subarea are located on John Day Point, adjacent to the Twilight Creek marsh, and near Settler's Point.

### Human Use

Existing uses in the area are agriculture, forestry, and scattered residential uses. The railroad runs along the shoreline. There are several in-water log storage areas. There is a mixture of state and private ownership. Physical access to the water is limited to private shoreline structures.

### Issues

There is limited development potential in the subarea. Some expansion of residential uses in the Burnside area near Settlers Point may occur in the future.

The tidal marshes at the mouth of Twilight Creek (also known as Eskeline Creek) have been intensively studied and are a valuable natural resource. The marshes are primarily in private ownership and are managed for waterfowl hunting by a local club. There are several small docks and walkways giving access to tidal channels cut in the marshes. Low intensity recreation is the dominant use of these marshes. Continued maintenance and possible improvement of docks and duck shacks is expected. Demand for recreation facilities requiring major alterations, however, is not expected.

A major issue in this subarea is whether or not the formerly diked wetlands can be rediked and placed into agricultural or other use. According to federal, state, and local policy, once areas have substantially reverted to wetland vegetation, repairing dikes and tide boxes is considered new diking. New diking of wetlands for agricultural use could not be permitted without an exception to Oregon Statewide Planning Goal 16. Proposals for restoring abandoned dikes on Mary's Creek and Ferris Creek have been made.

Dikes on the north side of Svensen Island have experienced problems with erosion. A series of pile dikes to retard erosion have been placed near the center of the island. These have not solved all of the erosion problems. Material to maintain the dikes has been difficult to obtain.

### Aquatic and Shoreland Designations

All tidal marshes and swamps are designated Natural except for the following which are designated Conservation: marshes around Svensen Island and fringing marshes along the mainland shore south of Svensen Island. All other aquatic areas are also designated Conservation.

Shoreland areas are designated Rural in agricultural and residential areas and Conservation in forested areas.

The regulatory shoreland boundary in this subarea is 50 feet from the estuary shoreline, or from the landward side of dikes or associated toe drains, whichever is greatest, except where it extends further inland to include the following resources:

Significant wetlands and riparian vegetation identified in *Significant Shoreland and Wetland Habitats in the Clatsop Plains and the Columbia Floodplain of Clatsop County, 1986*.

The western half of Svenson Island has been designated a dredged material disposal site (CC-S-24.0) in the *Columbia River Estuary Dredged Material Management Plan* and as a mitigation site in the *Mitigation and Restoration Plan for the Columbia River Estuary*.

### Subarea Policies:

1. Identified bald eagle roosting trees shall be preserved.
2. Dike maintenance and repair for existing dikes on Svenson Island shall be encouraged.



## P 30.18 BIG CREEK/LITTLE CREEK/FERTILE VALLEY

### General Description

This subarea lies between Eddy Point and Knappa Dock and includes adjacent waters of Knappa Slough, the spruce swamp and tideland soil shorelands at the mouths of Big and Little Creeks, and the diked lands in Fertile Valley. This subarea is under the jurisdiction of Clatsop County.

### Aquatic Features

Big and Little Creeks, a large tidal spruce swamp at the mouth of the creeks, and Knappa Slough are all prominent aquatic features of this subarea. There have been few changes to this subarea over the past century. Diking Fertile Valley has converted it from a tidal wetland to pastureland and nontidal wetland.

Physical and biological characteristics of the aquatic area are similar to those in the adjacent subarea (see Upper Marsh Islands Subarea Plan).

The approximately 125 acre tidal spruce swamp at the mouth of the Big and Little Creeks is undisturbed Sitka spruce forest, dominated by a large, open-growth form of Sitka spruce and some red alder, vine maple, salmonberry, skunk cabbage, sedges and waterparsley. A variety of other wetland plants are also present.

A state salmon hatchery on Big Creek releases chinook salmon, coho, and steelhead. The stream occasionally has a run of lamprey and has a wild population of cutthroat trout. Little Creek fish runs are primarily strays from Big Creek.

### Shoreland Features

The primary soil in this area is the Coquille-Tidal Marsh (fresh)-Clatsop Association. Portions of Little Creek flow through a group of soils known as the Nehalem Association. The upper part of Fertile Valley Creek flows through Walluski-Knappa Association. Many of the soils' characteristics are similar, but the primary difference is the agricultural suitability: the Nehalem and Walluski-Knappa Associations are mostly Class II soils, while the Coquille-Tidal Marsh (fresh) Clatsop Association is Class III and IV. The primary hazard in the area is the potential of flooding of the creeks, which also occurs upstream of tidal areas.

Shoreland vegetation includes primarily pasture grasses mixed with wetland plants such as common rush (Juncus effusus). There are also some forested areas.

Fertile Valley Creek is diked with a tidegate near its mouth where it joins Warren Slough. The area is a private wildlife reserve and receives significant wildlife use. Ducks and geese are common and nesting areas have been provided. No fishery information is available on Fertile Valley Creek, but warm water fish are probably common.

### Human Use

Agriculture on shorelands in the upper portion of the subarea is the most intensive human use. There is forestry on adjacent shorelands and recreational fishing in Big Creek is important farther upstream. Part of Fertile Valley is a privately owned wildlife refuge.

### Issues

The major issue in this subarea is the need for protection of the old growth spruce swamp at the mouth of Big and Little Creeks versus private property rights. The area has been inventoried by the Nature Conservancy and, based on its natural values, recommended for protection. Most of the spruce swamp is in a single corporate ownership (Boise Cascade), with a small portion in private farm ownership near the upper tidal reaches between the two streams. Both landowners object to a protective land use designation which would prevent their use of the area for forestry.

The waters of Knappa Slough adjacent to Big and Little Creeks are important holding areas for adult anadromous fish prior to ascending the streams to spawning grounds and the hatchery. This area should be protected from conflicting uses. The Knappa Slough area has significant historical and archaeological value. The shoreline of the slough was the site of an Indian village. The present Knappa Dock is also the first landing site of the Lewis and Clark expedition in Clatsop County.

The Knappa dock area, midway between public water access points on the John Day River and at Aldrich Point, has been proposed as a possible public boat launch site. Because of the inability of local roads to handle increased traffic and impacts on area residents and lifestyle, this has been opposed by some local residents.

### Aquatic and Shoreland Designations

The entire spruce swamp and portions of Big and Little Creeks running through the swamp are designated Natural. The wetland area north of the railroad at Eddy Point on the west is designated Conservation.

Shorelands from Eddy Point east to the spruce swamp and shorelands along the western and eastern edges of the swamp in forestry use are designated Conservation. Areas in agricultural use south and east of the spruce swamp are Rural. The privately-owned wildlife refuge in Fertile Valley is designated Natural.

The regulatory shoreland boundary in this subarea is 50 feet from the estuary shoreline, or the inland toe of dikes and associated toe drains, whichever is greater, except where it extends farther inland to include the following features:

1. Significant riparian vegetation along both sides of Big Creek to the head of tide; and significant riparian vegetation along the Columbia River shoreline near Eddy Point, as shown on Columbia River Estuary Resource Maps.
2. A privately-owned wildlife refuge consisting of lands below the 100-year flood level bounded by Knappa Road on the west, and by Ziak-Gnat Creek Road on the east and south.

#### Subarea Policies

1. The Natural designation of the Big Creek spruce swamp recognizes the unique natural fish and wildlife values of this area. However, such a designation should not limit logging of adjacent shoreland and upland areas in accordance with the Oregon Forest Practices Act, and should not impede construction of a log sorting yard or similar support facilities on the uplands adjacent to the swamp.
2. The Natural designation on the privately owned portion of wetland south of Blind Slough expressly provides for construction of a single residence at some future time on a piece of higher ground near the railroad. The residence would provide for a caretaker of the area, which is intended as a wildlife preserve.

## P 30.19 BROWNSMEAD/GNAT CREEK

### General Description

The Brownsmead/Gnat Creek subarea includes all of the lands behind the Brownsmead dikes, all sloughs and wetlands behind the dikes, Blind Slough and adjacent wetlands, Gnat Creek, and Prairie Channel waters and wetlands fronting the subarea. This subarea is in Clatsop County.

### Aquatic Features

The aquatic portions of this subarea include parts of Knappa Slough and Prairie Channel, Warren Slough, Blind Slough, and Gnat Creek. Diking activities have brought about large changes to this subarea in the past century. Prior to diking, the Brownsmead area consisted of tidal marsh and swamp.

Physical and biological characteristics of the aquatic area are similar to those in the adjacent subarea (see Upper Marsh Islands Subarea Plan). The freshwater wetland areas north and south of Blind Slough are some of the largest undisturbed tidal spruce and shrub swamps along the shoreline of the estuary. Natural resource values are high. The areas have not been extensively studied but the vegetation and wildlife use is probably similar to the Big Creek area. Sitka spruce, willow and alder make up the overstory with low wetland vegetation as an understory. Knappa Slough has been inventoried by the Nature Conservancy, and its tidelands, fringing marshes and riparian vegetation are described as valuable fish and wildlife habitat.

The fisheries value of the Gnat Creek area is very high. The Gnat Creek Fish Hatchery supports steelhead sport fishing in the creek. Most of the fish raised at the hatchery are transported and released at the other streams in Oregon. Gnat Creek also supports a good run of fall Chinook, and some coho, cutthroat, and chum.

The Brownsmead/Gnat Creek aquatic areas are within the home range of three nesting pairs of bald eagles: the Karlson Island, Marsh Island, and Aldrich Point pairs. There is an osprey nest in the Gnat Creek tidal wetlands.

### Shoreland Features

The shorelands consist of Class III and IV soil types of the Coquille-Tidal Marsh (fresh)-Clatsop Association. There are large areas of peat and organic soils. The lowlands are protected by dikes and five tidegates.

Shoreland vegetation consists mostly of upland grasses in large pasture-lands of the subarea. Some of these areas have developed wetland vegetation such as common rush (*Juncus effusus*). The diked sloughs within the shoreland are lined with riparian vegetation such as willow and alder.

There is a population of warm water game fish such as bass, crappie, and perch in Brownsmead Slough. Other sloughs also have populations of warm water fishes.

Wildlife values in and around the sloughs are high. Waterfowl use these sloughs as well as the surrounding pastures.

### Human Use

Existing uses include farming and rural residences. Portions of Blind Slough and Prairie Channel are used for log storage. Ownership is entirely private except for small parcels in state and county ownership. Recreational use of the aquatic area is high, including hunting and fishing.

There are several water access points. Private docks are located mainly on Blind Slough. There is a public boat launching facility at Aldrich Point, which receives extensive use, particularly in the summer.

### Issues

The Brownsmead area, according to the U. S. Soil Conservation Service, has the best agricultural land in Clatsop County. Most of the area is used as pasture land, but corn, peas, beans and other crops are also grown. The area is in the Exclusive Farm Use zone (EFU).

The public boat launching facility at Aldrich Point is a source of conflict in the area. Local residents do not want the facility expanded because traffic generated by the facility already causes problems during peak use periods. The County government operates the facility and has expressed plans for improving the boat ramp.

The bulk of the wetlands north and south of Blind Slough are owned or leased by Western Transportation Company, with the remainder in a small private ownership. These undisturbed wetlands have high natural values and need protection.

Blind Slough, Prairie Channel and Knappa Slough are among the more important log storage areas in the estuary. Water quality is good, the water is deep enough so that grounding at low water is not a problem, and there are no gillnet fish drifts in the area.

Gnat Creek, with its wetlands, riparian vegetation, and important fishery, needs protection from major alterations. Some of the wetlands are formerly diked areas, but no dike restoration has been suggested. Some pressure exists for installation of private docks. The recreation value of the stream for sport fishing is high.

### Aquatic and Shoreland Designations

The following aquatic areas are designated Natural:

1. The wetlands north and south of the mouth of Blind Slough.
2. The wetlands adjacent to the eastward bend in Prairie Channel.
3. The tidal marshes and swamps associated with Gnat Creek.

All other aquatic areas are designated Conservation.

All shorelands are designated Rural.

The regulatory shoreland boundary in this subarea is 50 feet from the estuary shoreline, or the inland toe of dikes and associated toe drains, whichever is greater, except where it extends farther inland to include the following features:

1. Significant riparian vegetation along the tidegated portions of Blind Slough, Saspall Slough, Grizzly Slough, and other tidegated sloughs in the Brownsmead area; significant riparian vegetation along both sides of Gnat Creek to the head of tide; and significant riparian vegetation along a tidegated slough in Sections 4 and 9, T8N R7W.
2. Significant wetlands of diked sloughs including Blind Slough, Grizzly Slough, Saspall Slough and other unnamed sloughs as shown on Columbia River Estuary Resource Maps.
3. A boat ramp on Blind Slough, a boat ramp on Gnat Creek, and the Aldrich Point boat ramp.
4. Mitigation and restoration sites designated in the *Mitigation and Restoration Plan of the Columbia River Estuary*.

### Subarea Policies

1. Maintenance and possible expansion of log storage activities in Blind Slough are provided for in this plan. This area is well protected from winds and river currents, has relatively deep water and is one of the most important log storage areas in the estuary. The Natural designation of the adjacent spruce swamps at the mouth of Blind Slough are intended to provide for protection of the natural vegetation and wildlife values, while not limiting adjacent log storage and transport activities. Logging in the swamp area shall not be permitted.

## P 30.20 CLIFTON CHANNEL

### General Description

This subarea consists of a shoreland strip from Aldrich Point to Bradwood. The area also includes the Columbia River to the center of the Clifton Channel. This subarea is in Clatsop County.

### Aquatic Features

The aquatic physical and biological characteristics of the deeper part of Clifton Channel, are, for the most part, similar to the River Channels Subarea. Because sediments are finer in the Clifton Channel than the Main Channel, benthic organisms tend to be more concentrated.

The nearshore parts of the channel contain some narrow, fringing tidal flats and swamps. Subyearling fall Chinook salmon migrate along the near-shore tidal flat and shallow subtidal areas. Two nesting pairs of bald eagles perch and feed in these nearshore areas. Their nests are located within the subarea's shoreland. The tidal swamps of the subarea provide habitat for small mammals and waterfowl.

### Shoreland Features

Most of the shorelands in this subarea are steep, heavily forested and subject to landslide hazards, particularly adjacent to Clifton Channel. Vegetation on these shorelands and adjacent uplands is mostly Douglas fir and hemlock. Small pockets of tideland soils occur along Clifton Channel, vegetated with conifers, alder and willow. Wildlife using shore and uplands include deer, elk, bear and smaller animals. Two bald eagle nests are located near Aldrich Point. The eagles using the nests are referred to as the Aldrich Point Pair and Clifton Channel Pair. Their home ranges extend over the adjacent islands.

### Human Use

Forestry and some residential uses occur in this area. The old fishing community of Clifton is still occupied by several families and is used as a staging area for fishing the Clifton Channel gillnet fish drifts. Extensive log storage sites are located across the channel adjacent to Tenasillahe Island.

## Issues

The fish drifts in this area are very productive, but are hampered by snag material. Most of these obstructions are sinker logs from log rafts stored across the channel. Occasional broken log bundles also cause serious problems, resulting in lost fishing time and expensive snag removal from drifts. Local fishermen are working with lumber companies to alleviate the problem.

## Aquatic and Shoreland Designations

All aquatic areas along Clifton Channel are designated Conservation.

Shoreland areas in forestry use or hazard areas are designated Conservation. The developed area at Clifton, southeast to Bradwood, is designated Rural.

The regulatory shoreland boundary in this subarea is 50 feet from the shoreline, except where it extends farther inland to include the following:

1. Bald eagle nest trees and a 500-foot buffer extending around the trees.



### General Description

This area includes the industrial area at Bradwood, a stretch of steep forested shoreline to the east, and portions of the Columbia River. This subarea is in Clatsop County. The eastern boundary is the section line between Sections 21 and 22 of T8N, R6W, which corresponds to the downstream end of Puget Island.

### Aquatic Features

The aquatic portions of this subarea include portions of Clifton Channel, the main navigation channel, an embayment and tidal marshes and swamps near Bradwood. The biological and physical characteristics of the aquatic area are similar to those in adjacent subareas (see River Channels and Clifton Channel Subarea Plans).

### Shoreland Features

The soils in this subarea include the Hembre-Klickitat Association (30% - 60% slope) in the Bradwood area, and the Astoria-Hembre-Klickitat Association (3% - 30% slope). The industrial area at Bradwood has been filled with sandy dredged material.

The vegetation on the Bradwood Cliffs is mostly Douglas fir and hemlock, portions of which were logged in 1988-1989. This serves as habitat for deer, elk, bear, small mammals and furbearers, and birds.

### Human Use

The Bradwood industrial site is currently proposed for use as a rock quarry. It is designated as a dredged material disposal site. Bradwood is privately owned. The shoreline area between Bradwood and Wauna is forested. Some logging has occurred on the Bradwood Cliffs.

There are private access points to the river in this reach. River use includes sport fishing, commercial gillnet drifts, and commercial ship and barge traffic.

## Issues

The Bradwood industrial site offers limited potential for small to medium sized water-dependent industrial development. There is deep water close to shore, some available vacant land, and railroad access. There are constraints to development, however, including poor highway access and the proximity of the wildlife refuge.

Future development which would require extensive filling (impacting aquatic areas in excess of 20 acres) along the Columbia River shoreline for the purpose of creating additional industrial land is not appropriate. In order to fully utilize the marine industrial shorelands, it would be appropriate to fill the old Bradwood mill pond. This pond covers an area of less than 10 acres. This fill activity would be subject to the state and federal permit process and the development of proper mitigation areas. An upland area along the entrance road into Bradwood has been identified as a potential mitigation site. This site is different from a nearby mitigation site designated in the *Mitigation and Restoration Plan for the Columbia River Estuary*.

## Aquatic and Shoreland Designations

The mill pond will be designated Development Aquatic until such time as it is filled; then it will be placed in the Marine Industrial zone. An aquatic band from the entrance of the mill pond upriver to the eastern boundary of the existing Marine Industrial zone and extending either 400 feet out from the shoreline or to the 40 foot depth contour where this contour is closer than 400 feet from shore shall be designated Development Aquatic. A 200 foot access channel from the shoreland to the main ship channel is also designated development.

The remaining aquatic areas are designated Conservation, except where the Development ship channel and its 600-foot wide flowlane disposal area (either 600 feet wide or to the 20-foot bathymetric contour, whichever is narrower) extend into the subarea.

The entire filled area at Bradwood is designated Water-Dependent Development. All other shorelands are designated Conservation.

The regulatory shoreland boundary in this subarea is 50 feet from the shoreline except where it extends farther inland to include the following shoreland features:

1. Significant riparian vegetation around the Hunt's Creek tidal marsh, as shown on Columbia River Estuary Resource Maps.
2. The Bradwood industrial site; dredged material disposal site CC-S-38.9, from the *Columbia River Estuary Dredged Material Management Plan*; and a mitigation site as designated in the *Mitigation and Restoration Plan for the Columbia River Estuary*.

### Subarea Policies

1. Large-scale fills along the Columbia River shoreline and impacting areas in excess of 20 acres is not appropriate.
2. The exact location of the 200-foot wide access channel to the Bradwood site is not designated in this Plan. The location of the channel shall be determined at the time of permit application.
3. The old Bradwood mill pond could be filled in order to provide a contiguous marine industrial site provided that proper state and federal permits were obtained.

### General Description

This subarea includes the Wauna Mill, Driscoll Slough, Westport Slough, the unincorporated community of Westport, and a private recreational home development east of Westport Slough. The subarea extends between the Clatsop/Columbia County line and the downstream end of Puget Island. It extends waterward to the state boundary, and landward to Oregon Highway 30.

### Aquatic Features

The aquatic portions of this subarea include a portion of the main channel of the Columbia River, wetlands and sloughs south of the Wauna Mill, and Westport Slough. This subarea has been altered appreciably during the past century. Much of the present shoreland areas were created by filling or diking tidal swamp.

Physical and biological characteristics of the aquatic area are similar to the River Channels and Clifton Channel Subareas. Nearshore areas tend to be very deep.

The tidal swamp south of the Wauna Mill is vegetated with spruce, willow, and blackberries. The swamp is one of the last remnants of the climax floodplain community that once covered large areas in the region. This area provides habitat for small mammals, deer, and waterfowl. A small population of the endangered Columbia white-tailed deer also use the swamp.

There is little information about the biological and physical characteristics of Westport Slough. The slough supports warm-water game fish. Plympton Creek, which drains into the slough, has a run of fall Chinook and some steelhead, coho, cutthroat, and chum.

### Shoreland Features

The soils in this area are of the Sauvie-Peat Association. These soils have a low slope, a high flood potential, and a high seasonal water table. They are moderately suitable for agricultural activities. Parts of the property just east of Driscoll Slough and the northern portion of the peninsula have been filled. Shorelands at the Wauna Mill site are developed while most of the other shorelands are undeveloped.

Shoreland vegetation includes shrubs, spruce, cottonwood, and grasses for pasture. Wildlife present include deer (black-tailed and Columbian white-tailed), elk, small mammals, and birds.

## Human Use

The Wauna Mill site is heavily developed. There are vacant lands east of Driscoll Slough, a ferry landing and access point on Westport Slough, grazing on the diked land and the southern part of the peninsula, and residential use on the northern portion of the peninsula. Ownership on the mainland portions of this subarea is largely corporate. The unincorporated community of Westport has urban-level services, including sewer, water and fire protection.

## Issues

This subarea contains both a high degree of development potential and substantial wetland habitat. With excellent accessibility to the main navigation channel of the Columbia River, the large vacant areas have potential for water-dependent industrial development.

Portions of this subarea are low-lying with considerable wetland habitat value. This is especially true of the area between the railroad and the highway. North of the railroad there are some areas of wetland and a strip of mature riparian vegetation along the west bank of Westport Slough. The area east and north of the community of Westport has been designated by the U.S. Fish and Wildlife Service as critical habitat for the endangered Columbia White-tailed deer.

The planning process involved extensive discussion of the conflict between the habitat values and economic development potential of the area. Resource agencies have agreed that the area has unique development potential but note that the good natural resource values can and should be protected, consistent with development of the area. Development interests have responded that within the very limited areas which are suitable for intensive development, undue restrictions should be avoided.

The portion of Driscoll Slough between the railroad and the river is a water and wetland area which has received considerable attention. During the original CREST planning process, resource agency representatives noted the habitat values, the need to preserve water quality, and the fact that riparian vegetation can be protected without unduly restricting development of adjacent land. A Conservation designation would provide such protection while allowing construction on pilings and minor dredging and filling, which may be necessary for development.

A site between Westport and Driscoll Sloughs has been identified as a potential deep-draft site by a 1986 study for the Oregon Department of Economic Development (Lower Columbia River Assessment of Oregon Deep-Draft Sites, Ogden Beeman and Associates, 1986). A portion of the site has been used for dredged material disposal and it is designated for this use in the *1986 Columbia River Estuary Dredged Material Management Plan*. Potential development of this site involves issues of riparian and wetland habitat protection. The development outlined in the Deep Draft Sites Assessment would involve filling 27 acres of wetlands at the site. These wetlands are significant under Oregon Statewide Planning Goal 5. A 1982 wetlands study (*Significant Shoreland and Wetland Habitats in the Clatsop Plains and the Columbia Floodplain of Clatsop County, Oregon* (Thomas, 1982) identified wetlands at the site as one of the last remnants of climax floodplain tidal swamp on the lower Columbia River Estuary. Resource agencies have requested protection of this valuable habitat. This Plan recognizes the suitability of this site as a small port facility. Development of the

site should be confined to the existing upland area. Any fill in the adjacent wetlands must be justified through the plan amendment process.

Residential property owners across Westport Slough have requested that protection be provided from noise and other impacts of development on the adjacent property.

This subarea includes the Westport Bar shoal in the main ship channel. Large quantities of sand are removed from this shoal each year to maintain required depths. The availability of this fill material coincides with the needs of developers to prepare their land for development. Substantial amounts of material have already been deposited. Disagreement, however, has arisen over continued filling that may impact wetland habitat and riparian vegetation along Westport Slough.

The northern shoreland portion of the peninsula was designated Development in the draft 1979 CREST Plan. However, Rural is a more appropriate designation, given the lack of sewers in the area and the moderate housing density. Portions of the shorelands and wetlands on the peninsula are considered critical habitat for the Columbian white-tailed deer and are to remain undeveloped as part of a zone-change agreement with the River Ranch subdivision developers.

Shorelands east of Westport are diked. There are no immediate development plans and the property will probably remain leased for grazing. Consideration should be given to the area's use by the Columbian white-tailed deer and also the proximity of the property to the community of Westport.

#### Aquatic and Shoreland Designations

The following aquatic areas are designated Development:

1. The area fronting the Wauna Mill site, the development site southeast of Wauna and Westport Slough, extended to the north subarea boundary;
2. Westport Slough;
3. The main navigation channel and the flowlane disposal area on each side of the channel (600 feet wide or to the 20-foot bathymetric contour, whichever is narrower).

The following aquatic areas are designated Natural:

1. Driscoll Slough;
2. The tidal wetland designated as significant under Oregon Statewide Planning Goal 5.

All other aquatic areas are designated Conservation.

The shorelands area north of Westport Slough is designated Rural. Shorelands south of the railroad track and east of Driscoll Slough are designated Conservation. All other shorelands are designated Natural.

Two dredged material disposal sites, CC-S-42.9 and CC-B-44.0, are listed in the *1986 Columbia River Estuary Dredged Material Management Plan*. A mitigation site is described in the *1987 Mitigation and Restoration Plan for the Columbia River Estuary*.

#### Subarea Policies

1. Development on lands adjacent to Driscoll Slough shall be carried out in a way that will minimize alteration of existing wetlands and riparian vegetation, degradation of water quality and stream sedimentation. Filling or other removal of vegetation for construction of a bridge or other transportation access across the slough shall be the minimum necessary to accomplish the project.
2. Except where direct access to water is required for wharves, docks or piers, riparian vegetation along Westport Slough shall be protected for bank stabilization, wildlife habitat, water quality, and a visual and noise buffer.

## P 40. COLUMBIA RIVER ESTUARY DREDGED MATERIAL MANAGEMENT PLAN

### P 40.1 PURPOSE AND PLAN CONTENT

In 1979 the Columbia River Estuary Study Taskforce (CREST) completed a *Dredged Material Management Plan* for the Columbia River Estuary. The primary purpose of the plan was to establish policies and standards for regulating dredging and disposal in the estuary and to identify an adequate number of sites with sufficient capacity to meet projected disposal needs over a 20 year period. Since 1979 dredging needs have changed, site capacities have been altered, and certain sites or portions of sites have been found to be unavailable for use due, for example, to the presence of important wetland habitat. Updating the policies and disposal site inventory to reflect the changes that have occurred over the past seven years will ensure that the *Dredged Material Management Plan* remains useful.

In 1986, the Columbia River Estuary Study Taskforce updated the existing Plan. CREST coordinated the revision of the *Dredged Material Management Plan* with government organizations, citizens, and development interests in the lower Columbia River. To accomplish this coordination, CREST established two groups to assist in plan revisions. The first was a general review group consisting of about 65 individuals representing local governments, state and federal agencies, ports, citizens, commercial fishing interests, diking districts, and development interests. This group reviewed an initial draft disposal site inventory and the draft *Dredged Material Management Plan*. The second group, the Dredged Material Disposal Advisory Committee, consisted of 22 representatives from the general review group. This committee participated in four workshops to revise disposal policies and refine the initial disposal site inventory. The Advisory Committee also reviewed the draft Plan.

The purpose of this revised *Dredged Material Management Plan* is to refine the original dredging and disposal policies and to inventory an adequate number of disposal sites with sufficient capacity to accommodate projected disposal needs for at least a five year period. A five year span was selected as the minimum planning period. Many of the inventoried sites provide for disposal over a much longer time span. The Plan is designed to be incorporated into local comprehensive plans in Oregon and shoreline master programs in Washington to update these documents with respect to changes in disposal needs and regulatory policies.

The Plan is also intended to serve as a guide to dredging project sponsors and regulatory agencies in planning and reviewing dredging projects. In order to be a useful guide, it focuses on disposal sites that are both in the proximity of the dredging areas and appear approvable under existing regulatory requirements. In this way, the plan can be used to expedite the dredging project sponsors' search for appropriate disposal sites and regulatory agencies' permit review process.

The Plan is not intended to be an exhaustive list of all possible disposal sites and it in no way restricts the disposal of dredged materials to designated sites only. Also, the Plan does not guarantee site availability. In many cases designated sites are privately owned and their use will require owner approval. The plan does not obviate the need to obtain dredging and disposal permits. In all cases, use of a site for dredged material disposal will have to conform with local, state, and federal regulatory requirements.



The revised Plan which exists as a separate background report entitled *Columbia River Estuary Dredged Material Management Plan* consists of six major sections. Section 2 provides updated policies and standards for regulating dredging and disposal projects. These policies and standards reflect refinements in local, state, and federal disposal policies that have occurred since 1979. Sections 3 and 4 include information on disposal site designation and plan implementation. Section 5 presents a summary of existing and potential dredging projects in the estuary and a projection of dredging volumes for a five years period. Section 6 inventories disposal sites needed to meet the projected dredging requirements. The final section compares the site and project inventories to determine if designated sites are adequate to meet dredging needs. appendices in the document summarize dredging and disposal options (Appendix B), and changes made to the original dredged material disposal site inventory (Appendix C).

## P 50. MITIGATION AND RESTORATION PLAN FOR THE COLUMBIA RIVER ESTUARY

### P 50.1 PURPOSE AND PLAN CONTENT

*The Mitigation and Restoration Plan for the Columbia River Estuary* (1987) revises and updates the *Mitigation Plan for the Columbia River Estuary* developed in 1983 by the Columbia River Estuary Study Taskforce (CREST). The 1983 plan designated mitigation sites in the Columbia River Estuary. The plan also provided a method to determine estuarine mitigation site area and type requirements [now adopted into Oregon state estuarine mitigation law (ORS 541.626)].

After four years of reviewing permits requiring mitigation under the 1983 plan, it became apparent certain revisions were required. With regard to policies, a more detailed review of government policy and legislation are completed and regional policies are revised to address current local, state, and federal policy concerns. Recent research on wetland mitigation feasibility and on cumulative aquatic area impacts is used to help guide mitigation policy revisions. New information on potential development scenarios and mitigation site designations is also included. The revised *Mitigation and Restoration Plan for the Columbia River Estuary* existing here as a separate background report, embodies these plan alterations and is incorporated by reference into the 1987 *Columbia River Estuary Regional Management Plan*.

CREST coordinated the revision and update of the *Mitigation and Restoration Plan* with government agencies, local jurisdictions, citizens, and development interests in the lower Columbia River. To accomplish this coordination, CREST established two groups to assist in plan revision (Appendix A). The first group consisted of 50 individuals representing local governments, state and federal agencies, ports, private industry and citizens. This general review group provided written comments on the draft *Mitigation and Restoration Plan*. The second group, the Mitigation and Restoration Plan advisory Committee, consisted of 33 members from the general review group. This committee participated in two meetings. The first meeting consisted of a review of standards and policies that were drafted using local, state and federal regulations and policies and guidelines. The Advisory Committee made suggestions for modifications. The second meeting focused on selecting appropriate mitigation sites. Sites were prioritized based on anticipated need. Landowners with mitigation sites designated on their properties made comments during the meeting. Final site selection and priority ratings were based on anticipated need and landowner concerns.

The Plan defines mitigation as any action that diminishes the degree of impact of development on aquatic areas. Mitigation is categorized as project design mitigation (planning developments to avoid impacts in order to conserve aquatic area and values) and compensatory mitigation (aquatic area creation, restoration, or enhancement at a site other than the impact site to compensate for lost aquatic area and values).

Portions of the Plan treat restoration as a management strategy separate from mitigation. That is, restoration of severely diminished habitat types is considered a worthwhile management directive for its own sake. Unless otherwise specified, this document considers restoration as a component of mitigation in the mitigation-related sections and as a separate management option in the restoration-related sections.

Section 2 of the Plan reviews current state and federal government definitions that are used in statutes and policies pertaining to mitigation and restoration. These definitions were used to help form definitions used in the policy and standard section (Section 5) of the Plan.

Section 3 discusses current federal and state regulations and policies that guide mitigation and restoration efforts in the Columbia River Estuary. These regulations and policies are used as a basis for determining standards and policies listed in the Plan (Section 5).

Section 4 reviews a study by Duncan Thomas (1983) that compares present day habitat types in the Columbia River Estuary with habitat types mapped in the estuary in the mid 1860's and 1870's. Historical changes in areal extent and spatial distribution of habitat types are discussed. Cumulative impacts on habitat types are documented. The most severely depleted habitat types are used as the basis for weighing the relative ranking of present day habitat types in the Columbia River Estuary (Smith 1983). This section summarizes the method used to determine the relative values of estuarine habitat types and the technique by which those values are used to determine mitigation requirements. A more detailed discussion of the method is discussed in the *Mitigation Plan for the Columbia River Estuary* (Smith 1983). Efforts toward developing restoration strategies outside of the context of mitigation are briefly discussed. Potential legal mechanisms and funding sources are described. A review of potential techniques for mitigation and restoration implementation is included.

Section 5 lists Mitigation and Restoration Plan policies and standards. These policies and standards are based on information in Sections 1 - 4 of the Plan and recommendations from the Columbia River Estuary Mitigation and Restoration Plan Advisory Committee.

Section 6 discusses specific mitigation and restoration sites available in the Columbia River Estuary. Sites are classified and protected at different priorities and levels based on the certainty of developments they are matched with. Private landowner rights and public need issues concerning mitigation are briefly discussed. Site selection strategies were reviewed by the Columbia River Estuary Mitigation and Restoration Plan Advisory Committee and concerned landowners. Modifications of protection language and site selection were made using input from the Advisory Committee and landowners.

The following materials are included in the County's comprehensive Plan by reference:

1. *Columbia River Estuary Inventory of Physical, Biological, and Culture Characteristics* (1977)
2. *The Columbia River Estuary Regional Management Plan* (1988)
3. *An Economic Evaluation of the Columbia River Estuary* (revised 1990)
4. The CREST Mediation Panel Agreement (1981)
5. *Energy Related Development in the Columbia River Estuary: Potential, Impacts and Mitigation* (1983)
6. *Columbia River Estuary Dredged Material Management Plan* (1986)
7. *A Mitigation and Restoration Plan for the Columbia River Estuary* (1987)
8. *Changes in the Columbia River Estuary Over the Past Century* (1983)
9. Columbia River Estuary Resource Base Maps. The Columbia River Estuary Planning area in the County is illustrated on nine Columbia River Estuary Resource Base Maps. The resource base maps include the following information:
  - a. Shoreline
  - b. Vegetation types: swamp, high and low marsh
  - c. Depth contours: -3 feet MLLW and deeper
  - d. Goal 17 significant wetlands
  - e. Goal 17 significant riparian vegetation
  - f. Roads/railroads
  - g. Designated dredged material disposal sites
  - h. Designated mitigation sites
  - i. Aquatic Zones: Development, Conservation Two, Conservation One, Natural
  - j. Shoreland Zones: Marine Industrial, Conservation and Natural
  - k. Shoreland Boundary
  - l. Overlay Zones: Shoreland, Mitigation & Dredged Material Disposal (DMD)

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### III. NECANICUM ESTUARY INTRODUCTION

The Necanicum River Estuary and Coastal Shorelands Element (Goals 16 and 17) of the Clatsop County Comprehensive Plan is comprised of several sources.

The Plan Element was developed by CTIC, the Cities of Seaside and Gearhart and Clatsop County.

The Necanicum Estuary Inventory. It was developed by Neal Maine of E-3 Awareness on contract to Clatsop County. This inventory has been updated for wetlands and riparian vegetation in the report Significant Shoreland and Wetland Habitats in the Clatsop Plains by Duncan Thomas (1982). These documents, together with the proposed Plan and zoning changes form the Necanicum Estuary and Coastal Shorelands Elements of the Clatsop County Comprehensive Plan.

# THE NECANICUM RIVER ESTUARY PLAN

PREPARED BY THE

NECANICUM ESTUARY COMMITTEE

AND THE STAFF

OF THE

CLATSOP-TILLAMOOK INTERGOVERNMENTAL COUNCIL  
(CTIC)

ADOPTED:

SEPT. 1983

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THE NECANICUM ESTUARY COMMITTEE

CLATSOP COUNTY

Bob Westerberg, County Commissioner  
Joe Camberg, Planning Commission

GEARHART

Bill Berg, City Council  
Leo Sayles, Planning Commission  
Brook Robin, Planning Commission

SEASIDE

Joyce Williams, Mayor  
Dale Sanders, Planning Commission  
Jim Hurd, Code Enforcement Officer

AGENCY PERSONNEL

Warren Knispel, Oregon Department of Fish and Wildlife  
Bill Park, Division of State Lands

STAFF

Neal Maine, Estuary Consultant  
Mike Morgan, Coordinator  
John Pace, Planner  
Curt Schneider, County Planning Director  
Rainmar Bartl, CTIC Coordinator

## THE NECANICUM ESTUARY PLAN

### ESTUARINE AND SHORELANDS GOALS AND POLICIES

#### INTRODUCTION

The Estuarine Resources Goal requires that the Land Conservation and Development Commission classify Oregon's estuaries to specify the most intensive levels of development or alteration to be allowed within each estuary. In October, 1977 an Administrative Rule classifying the estuaries was adopted.

The intent of the classification system adopted is to:

1. Specify the most intensive level of development or alteration allowable within each estuary;
2. Direct the kinds of management units appropriate and allowable in each estuary;
3. Affect the extent of detail required and items inventoried for each estuary;
4. Affect the issuance of and conditions attached to permits by state and federal agencies;
5. Provide guidance for the dispersal of state and federal public works funds; and
6. Indirectly affect decisions concerning private investment in and around estuaries.

The Necanicum Estuary is classed a Conservation Estuary, which is defined in the Estuary Classification Rule as shown in (b) on the following page. The definition for a natural management unit is provided on the following pages because a conservation estuary must include natural management units, as well as conservation management units.

- a. Natural estuaries (and management units) shall be managed to preserve the natural resources and the dynamic natural processes. Those uses which would change, alter or destroy the natural resource and natural processes are not permitted.

Natural estuaries shall only be used for undeveloped, low intensity, water-dependent recreation; and navigation aids such as beacons and buoys; protection of habitat, nutrient, fish, wildlife and aesthetic resources; passive restoration measures, and, where consistent with the resource capabilities of the area and the purpose of maintaining natural estuaries, aquaculture; communication facilities; placement of low water bridges and active restoration measures. Existing man-made features may be retained, maintained, and protected where they occur in a natural estuary. Activities and uses, such as waste discharge and structural changes, are prohibited. Rip-rap is not an allowable use, except that it may be allowed to a very limited extent where necessary for erosion control to protect:

- (1) uses existing as of October 7, 1977;
- (2) unique natural resource and historical and archeological values, or;
- (3) public facilities;

and where consistent with the natural management unit description in Goal #16 (and as deemed appropriate by the permitting agency).

- b. Conservation estuaries (and management units) shall be managed for long-term uses of renewable resources that do not require major alterations of the estuary.

Permissible uses in conservation areas shall be those allowed in (a) above; active restoration measures; aquaculture; and communication facilities. Where consistent with resource capabilities of the area and the purposes of maintaining conservation management units, high-intensity water-dependent recreation; maintenance dredging of existing facilities; minor navigational improvements; mining and mineral extraction; water-dependent uses requiring occupation of water surface area by means other than fill; and bridge crossings, shall also be appropriate. Conservation estuaries may have shorelines within urban or developed areas. Dredged marinas and boat basins without jetties or channels are appropriate in conservation estuaries. Waste discharge meeting state and federal water quality standards would be acceptable. Maintained jetties and channels shall not be allowed.

The Necanicum Estuary has been divided into the preceding two management units. A management unit is defined as a discrete geographic area, defined by biophysical characteristics and features, within which particular uses and activities are promoted, encouraged, protected, or enhanced, and others are discouraged, restricted, or prohibited.

## Establishment of the Estuary Boundary

The Estuary Boundary is established as the line of aquatic vegetation, which is considered to be the same as the Mean High or Higher Water line (MHHW). It is recognized that there are differences in elevation and therefore variances between the vegetation line and the MHHW water line, but these have been considered in the mapping of the line. The boundary corresponds with the jurisdictional boundary of the Division of State Lands (DSL) under the Fill and Removal Law, and the U. S. Army Corps of Engineers under the Section 404 program of the Rivers and Harbors Act. Activities that would have a significant effect on the estuary, such as dredging or filling, require permits from both the state and federal governments under these programs.

## Designation of Estuary Management Units

In determining which management units within the estuary should be natural and which would be conservation, several criteria or considerations were used. These included:

1. The physical and biological characteristics;
2. The present zoning designation and degree of alteration;
3. The significance of the site in terms of size; and
4. The productivity of the areas in terms of the three most important production units: marsh, mudflat, or water.

## Natural Area Designations Criteria

Natural areas fall into one or more of the following criteria:

1. Water or wetlands areas which lack significant alteration;
2. Areas which perform resource support functions, such as important shoreline vegetation, mudflats, creeks and creek banks, algae and eel grass beds and important animal habitat e.g. breeding, nesting, and feeding habitat, fish feeding grounds and critical habitat buffers.
3. Areas of significant or extensive salt marshes or tideflats.

## Conservation Designation Criteria

1. Areas which have sustained alteration in the past and therefore have lower biological productivity than natural areas;
2. Areas which can withstand limited amounts of adjacent development or alteration, consistent with the intent of the overall goals and policies. Uses within the conservation management unit must be non-consumptive, in that the area is to be managed for resource protection.
3. Certain areas of the conservation management unit have been designated for higher levels of development, consistent with the resource capabilities of the area. These areas are where uses such as boat ramps, aquaculture, and other uses may be permitted on a conditional use basis.

**PURPOSE:** The purpose of the following goals and policies is to establish a basis for the conservation and development of the Necanicum Estuary. As mandated by the State Estuarine Resources Goal, The Comprehensive Plan must recognize and protect the unique environmental, economic and social values of each estuary and associated wetlands. As a conservation estuary, the Necanicum is designated for long-term uses that do not require major alteration of the estuary, except for purposes of restoration. Specific policies and standards are meant to support and further the goals.

**GOAL 1:** To maintain all identified marsh areas in their natural, productive condition.

**Policy 1-A:** As a conservation estuary, the Necanicum shall be managed primarily to protect its natural resource values. Permitted uses or activities in the estuary that result in significant alteration, including filling, dredging, rip-rap, road building and similar activities shall not be carried out in salt marshes or associated fresh-water wetlands.

**Policy 1-B:** Uses or activities that do result in alteration of estuarine areas shall only be permitted in areas of existing alteration. The Necanicum River in the vicinity of downtown Seaside, other than marshes, is generally considered capable of sustaining development, whereas the upper Necanicum, the Neawanna and the Neacoxie estuary areas are not.

**Policy 1-C:** The general priority (from highest to lowest) for use of estuarine resources shall be:

- Uses which maintain the integrity of the estuarine ecosystem;
- Water-dependent uses requiring estuarine location, consistent with the Oregon Estuarine Classification;
- Water-related uses which do not degrade the natural estuarine resources, values; and
- Non-dependent, non-related uses which do not alter, reduce, or degrade the estuarine resources and values.

**Policy 1-D:** Fill activities are allowed in Conservation management units only as part of the following uses or activities:

- Maintenance and protection of man-made structures existing as of October 7, 1977;
- Active restoration if a public need is demonstrated;
- Bridge crossing support structure if an estuarine location is required, no alternative locations exist, adverse impacts are minimized as much as feasible, and it is consistent with the resource capabilities of the area and purposes of the management unit;

- d. Aquaculture, high intensity water dependent recreation and minor navigational improvement if an estuarine location is required, a public need is demonstrated, no alternative upland locations exist for the portion of the use requiring fill, adverse impacts are minimized as much as feasible, and it is consistent with the resource capabilities of the area and the purposes of the management unit;
- e. Flood and erosion control structure, if required to protect a permitted water-dependent use and land use management practices and non-structural solutions are inadequate to protect the use.

Policy 1-E: There are presently no uses in the Clatsop County portion of the Necanicum Estuary which require dredging. The uses permitted by the County's Zoning Ordinance may require some dredging are aquaculture and boat ramps. These uses are not anticipated to generate sufficient dredge material disposal sites at this time. However, uses which generate dredge material shall develop a dredge material disposal program for the estuary prior to the issuance of a permit. If such projects would also require mitigation, a mitigation plan for the estuary shall also be developed.

- a. Dredging shall be allowed only in conjunction with a permitted use or activity. Dredging shall not be permitted unless it can be shown that there is a specific need and that adverse impacts are minimized as much as possible.
- b. Before action on a proposed marina, aquaculture facility, boat ramp, or other use which may require dredging or litigation, an estuary-wide dredge material disposal and mitigation plan shall be required.
- c. Dredge material shall not be deposited in the water, in other estuarine areas, or fresh water wetlands. Upland sites shall be utilized and engineering practices consistent with Army Corps of Engineers requirements shall be utilized. Where there is erosion occurring and biological productivity is low, beach nourishment may be considered as a means of disposal. Proposed dredge material disposal sites shall be carefully evaluated through the permit process and fully coordinated with appropriate State and Federal Agencies.

Policy 1-F: Permitted uses or activities, other than dredge or fill, shall be allowed only upon a showing that there is a public need, and estuarine location is required and no alternative upland sites exist, and adverse impacts are minimized as much as feasible.

Policy 1-G: The following uses and activities shall be permitted only after a demonstration that they are consistent with the resource capabilities of the area and the purposes of the management unit:

- Natural management units; restoration
- Conservation management units; high intensity water dependent recreation, maintenance dredging of existing facilities, minor navigational improvements, sand and gravel removal, bridge crossings, and water dependent uses requiring occupation of water surface by means other than fill.

Policy 1-H: In permitting uses or activities consideration shall be given to the cumulative impact of additional requests for like actions in the area. The total effect of all conditional uses shall remain consistent with the intent of the management unit and the resource capabilities of the area.

Policy 1-I: Actions which would potentially alter the integrity of the estuarine ecosystem shall be preceded by a clear presentation of the impacts of the proposed alteration, and a demonstration of the public's need and gain which warrant such modification or loss.

Policy 1-J: Where a use requires an estuarine location, construction on piling is preferred to filling.

GOAL 2: To manage areas and uses adjacent to marshes to protect the integrity of the marshes themselves.

Policy 2-A: In most areas, freshwater marshes that are adjacent to the estuary have been included within the estuary boundary. These areas are considered unsuitable for intensive development (filling and construction primarily), because of their resource value, poor suitability for development, and the effect development would have on the estuary.

Policy 2-B: Development that takes place in areas upland from the estuary shall respect the natural functions of the adjacent water areas. Shoreland standards should include as a minimum, control of vegetation removal, storm water runoff and public access. A general rule should be: the more intensive the development, the more careful the control of adverse impacts.

Policy 2-C: The proliferation of individual single purpose docks and piers shall be controlled through the encouragement of community facilities common to several uses and interests. The size and shape of docks or piers shall be limited to that required for the intended use. Alternatives to docks and piers, such as mooring buoys, dryland storage and launching ramps shall be investigated and considered.

GOAL 3: To encourage the restoration of the estuary and its physical and biological resources.

Policy 3-A: All jurisdictions and organizations with an interest in the productivity of the estuary should work together to encourage the U.S. Army Corps of Engineers or other agency to investigate the restoration of the mouth of the estuary in order to improve tidal and salinity patterns.

Policy 3-B: Development that takes place in areas adjacent to natural estuarine designations shall be carefully reviewed to insure that it is designed in a manner that will protect the integrity and function of the natural area. Additional buffers, setbacks or other controls may be required in order to carry out this policy.

Policy 3-C: Adverse impacts to estuarine resources resulting from dredge or fill activities permitted in intertidal or tidal marsh areas shall be mitigated by creation, restoration or enhancement of an estuarine area. The objective shall be to improve or maintain the functional characteristics and processes of the estuary such as its natural biological productivity, habitat and species diversity, unique features and water quality.

Actions exempted from the mitigation requirement above include:

- a. Removal or filling of less than 50 cubic yards of material or when an Oregon State Removal and Fill Permit is not otherwise required.
- b. Filling for repair and maintenance of existing functional dikes when there is negligible physical or biological damage to tidal marsh or intertidal areas;
- c. Rip-rap to allow protection of an existing bank line with clean, durable erosion-resistant material provided that the need for rip-rap protection is demonstrated and that this need cannot be met with natural vegetation;
- d. Filling for repair and maintenance of existing roads when there is negligible physical or biological damage to tidal marsh or intertidal areas.
- e. Dredging or filling required as part of an estuarine resource creation, restoration, or enhancement project agreed to by local, state and federal agencies, and
- f. Other proposed projects of activities where, upon determination of the Oregon Division of State Lands, the proposed alteration would have negligible physical, biological, and water quality impacts.



GOAL 4: To achieve an improved level of water quality in the estuary by the improvement of wastewater discharge, the careful control of storm water runoff, and the prevention of erosion of uplands areas.

Policy 4-A: The City of Seaside is attempting to rebuild its sewage treatment plant at the present time. The present level of discharge is causing severe water quality problems during peak summer months when stream runoff is low, tides are low and wastewater flows are high. Because of funding problems, EPA construction funds for the treatment plant appear to be postponed for several years. The cities and county, in conjunction with DEQ and State Fish and Wildlife, should: (1) investigate an interim solution to the problem to reduce the impact on water quality, and (2) investigate placement of the wastewater outfall so as to improve flushing of treated wastewater.

Policy 4-B: Because of the potential damage storm water runoff can cause in estuaries, standards for storm water drainage systems (stream, etc.) wherever possible, and for the dispersion of storm water from parking lots and streets prior to entering the estuary. Storm water outfalls shall always be directed away from significant marshes and tideflats.

Policy 4-C: The Oregon Forest Practices Act shall be strictly enforced to insure that logging and other forest management does not adversely impact the estuary. The State Department of Forestry should be made aware of the special characteristics of the estuary environment, and the need for special protection. Local governments should take an active role to insure the enforcement of the Forest Practices Act.

Policy 4-D: The County recognizes the authority of the following state agency statutes in managing activities that may affect the estuary's quality:

- a. The Oregon Forest Practices Act and Administrative Rules, for forested lands as defined by ORS 527.160—527-730 and 527.990.
- b. The programs of the Soil and Water Conservation Commission and local districts and the Soil Conservation Service.
- c. The non-point source of discharge water quality program administered by the Department of Environmental Quality under Section 208 of the Federal Water Quality Act as amended in 1972 (PC 92-500) and
- d. The Fill Removal Permit Program administered by the Division of State Lands under ORS 541.605-541.665.

GOAL 5: To protect riparian (streambank) vegetation within the Necanicum Estuary.

Policy 5-A: Streambank vegetation shall be protected in order to provide wildlife habitat, prevent shoreline erosion, filter storm runoff, protect structures from flood hazards, and for aesthetic purposes. Wherever vegetation must be removed, for rip-rap, public access, bridge placement, and so forth, efforts shall be made to replant after construction.

Policy 5-B: Through the building permit, zoning and subdivision approval processes, the County shall provide standards for setbacks of structures, fills or other alterations from the shoreline.

GOAL 6: To protect fish and wildlife habitat throughout the Necanicum estuary.

Policy 6-A: Fish and wildlife habitat of the Necanicum estuary system contributes a great deal to the environmental quality and economy of the area. Actions that would reduce the habitat value of the estuary shall be carefully evaluated in this light. The Oregon Department of Fish and Wildlife shall be consulted whenever such actions are proposed in order to determine the impacts.

GOAL 7: To increase the public understanding of the value and functioning of the estuary and the river.

Policy 7-A: The County strongly encourages school districts and the community college to continue programs in Marine Ecology and Oceanography in order to promote this goal.

Policy 7-B: The County should participate in a regional organization (such as CREST) that maintains a staff capable of evaluating development proposals and working with resource agencies.

Policy 7-C: Public access to the estuary shall be encouraged; development shall be reviewed as to how access will be provided.

GOAL 8: To foster cooperation among jurisdictions and agencies in the management of the estuary.

Policy 8-A: Since actions in the estuary extend beyond corporate boundaries, all jurisdictions on the estuary shall participate in the evaluation of development proposals affecting the estuary. This may be carried out in the state and federal permit processes, or through the conditional use or subdivision permit processes at the local level. The Oregon Department of Fish and Wildlife shall be used as a resource to evaluate the proposals.

Policy 8-B: The County recognizes the authority of the following state agency statutes in managing activities that may affect the estuary's quality:

- a. The Oregon Forest Practices Act and Administrative Rules, for forested lands as defined by ORS 527.160—527-730. and 527.990.

- b. The programs of the Soil and Water Conservation Commission and local districts and the Soil Conservation Service.
- c. The non-point source of discharge water quality program administered by the Department of Environmental Quality under Section 208 of the Federal Water Quality Act as amended in 1972 (PC 92-500) and
- d. The Fill Removal Permit Program administered by the Division of State Lands under ORS 541.605-541.665.

GOAL 9: To develop an implementation procedure that insures that estuarine development actions are consistent with the Estuarine Resource Goal of the State-wide Planning Goals.

Policy 9-A: Where a use could potentially alter the integrity of the estuarine ecosystem, the City shall require a clear presentation of the impacts of the proposed alteration; and a demonstration of the public's need and gain which would warrant such modification or loss. An impact assessment procedure is set forth in the Land & Water Development & Use Ordinance zoning ordinance. The impact assessment will be used to identify potential alterations of estuarine resources and values, determine whether potential impacts can be avoided and minimized, and to provide factual base information to assure applicable Policy Standards will be met. If the City requires additional information of an applicant, the City shall specify the nature of the assessment to addressing those standards and policies that the City determines are relevant.

Policy 9-B: Goal 16 requires that dredge, fill or other significant degradation of estuarine natural values, by man, be allowed only:

- a. if required for navigation or other water-dependent uses that require an estuarine location, and
- b. if a public need is demonstrated, and
- c. if no alternative upland locations exist, and
- d. if adverse impacts are minimized as much as feasible.

The County will apply the above standard to all dredge or fill activities during review of these projects, through the conditional use procedure. The County will rely on the existing Corps of Engineers permit process to determine when a significant degradation other than dredge or fill, may occur. In this process, a preliminary assessment is completed for every permit application and a determination is made as to whether the project would cause significant impacts. A public notice is then issued containing either a finding of no significant impact (FONSI), or a determination that there will be a significant impact and an Environmental Impact Statement is required. Any agency, governmental jurisdiction or other interested party has the opportunity to challenge the Corps determination, or to ask for a public hearing. Therefore, an opportunity is provided for any party to supply information that insignificant degradation or reduction of natural values

would occur in a specific project. The County will apply the above 4-part standard to all projects which the Corps has determined will involve significant impacts and requires an Environmental Impact Statement.

In addition to the Necanicum Estuary Plan Policies, Clatsop County also establishes the following policies:

1. Expand definitions that accompany the permitted use tables.
  - a. Use is the end to which a land or water area is ultimately employed. A use often involves the placement of structures or facilities.
  - b. Activity is any action taken either in conjunction with a use or to make a use possible. Activities do not in and of themselves result in a specific use. Most activities may take place in conjunction with a variety of uses.
2. Permitted with Standards, (PS). Uses and activities may be permitted under a Type II procedure, subject to:
  - a. Policies of the Comprehensive Plan.
  - b. The general requirement that the use or activity be designed and conducted in a manner that will minimize, so far as practical, any resultant damage to both the ecosystems of affected aquatic and shoreland areas and the public's use of the water, and
  - c. The Standards of the Land & Water Development & Use Ordinance.
3. Conditional (C) Uses and activities may be permitted under a Type II procedure. The use or activity must be found to be consistent with:
  - a. Policies of the Comprehensive Plan,
  - b. The standards of the Land & Water Development & Use Ordinance,
  - c. The general requirement that the use or activity be designed and conducted in a manner that will minimize, so far as practical, any resultant damage to both the ecosystems of aquatic and shoreline areas and the public's use of the water, and,
4. Uses and activities must also be consistent with applicable state and federal agency permits and regulations.

<u>USE/ACTIVITY</u>	<u>NATURAL</u>	<u>CONSERVATION</u>
1. Aquaculture, water dependent portions		C
2. Boat Ramp		C
3. Bridge Crossings		C
4. Commercial development		C
5. Communication facility		C
6. Docks, piers, moorages		C
7. Industrial development		C
8. Marina		C
9. Navigational Aids	P.S.	P.S.
10. Residential development		C
11. Sanitary sewer outfall		C
12. Storm water outfall		C
13. Underwater cables and pipelines	C	C

ACTIVITIES

1. Dikes, temporary		P.S.
2. Dredging, maintenance		C
3. Dredging, new		C
4. Dredge material disposal		C
5. Filling		C
6. Mining and mineral extraction		C
7. Piling		C
8. Research & education, observation	P.S.	P.S.
9. Restoration, passive	P.S.	P.S.
10. Restoration, active	C	C
11. Shoreline stabilization, structural	C	C
12. Shoreline stabilization, vegetative	P.S.	P.S.

LEGEND: C= Permitted as conditional use through a Type II procedure

PS= Permitted with a review through a Type II procedure

Blank= Not Permitted

The Mecanicum Estuary boundary, as discussed, was drawn around all water bodies, salt marshes, tideflats, and freshwater marshes adjacent to the Mecanicum and its tributaries below the head of tide. The line of mean higher high water (MHHW) was used in most cases, but in some situations the line of non-aquatic vegetation was more appropriate.

The Shorelands boundary as drawn follows the 100-year flood plain line in most situations, except where extensive development has taken place. In such cases, the boundary is either one hundred feet (100') upland from the estuary boundary or conforms to a major man-made feature, such as a road or building.

The Estuary and Shorelands boundaries were drawn by the Estuary Committee using a composite aerial photo (Scale: 1"=100'). The photogrammetry at two-foot contour intervals was done by CH2M Hill in 1973 as part of the HUD Flood Study.

#### SHORELANDS POLICIES

##### 1. Protection of Marsh Areas

Development of land adjacent to marshes can have a serious effect on the biological integrity of the marsh itself. In order to insure compatibility, standards shall control the development through shoreline setbacks, protection of riparian vegetation, control and setbacks of fills, maintenance of natural drainage patterns, careful placement of storm water and other utility systems, and aesthetic standards. Particular attention shall be given to the control of erosion adjacent to water areas. Temporary measures to control runoff during construction shall be employed and revegetation plans shall be filed with building permits. Uses that could contaminate adjacent marsh areas, such as gasoline stations or oil depots, shall be prohibited.

##### 2. Public Access to the Waterfront

Consistent with the policy to protect marshes and tideflats, public access to the waterfront shall be maintained and improved. This access may take the form of trails, viewpoints, or other low intensity uses: waterfront parks, small scale piers, boat docks or boat launching areas; bridges that provide for fishing, sitting or viewing; and in developed areas, commercial uses that take advantage of their proximity to the water, such as restaurants. Primary attention shall be given to the use of publicly owned lands for public access, such as street ends or other public lands. Private use of private shorelands is legitimate and shall be protected. Special consideration shall be given to make areas of the estuary shoreline available to the handicapped or other persons with limited mobility.

### 3. Protection of Riparian Vegetation

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Because of the value that streambank vegetation has for wildlife habitat, water quality protection, prevention of erosion and other purposes, it shall be maintained and protected. In certain areas, removal of large trees may be necessary to prevent blowdowns, but such removal shall be carefully evaluated with the assistance of the Oregon Department of Fish and Wildlife, and the U.S. Soil Conservation Service. In any case, structures, parking lots, roads, fills, utilities or other uses or activities shall be kept away from the shoreline a distance of at least thirty feet (30'). Location on the shoreline shall be considered justification for a setback variance on the non-shoreline side of a lot in cases where the size of the lot would not permit such a setback. Each case must be carefully reviewed by the Planning Commission. Setbacks from natural areas shall be a minimum of fifty feet (50').

### 4. Uses Adjacent to the Estuary

The Necanicum Estuary is valuable for its natural values and is not considered a water body useful for waterborne commerce. It is not anticipated that shipping or water-dependent industry will ever be accommodated here. The types of water-dependent and water-related uses given highest priority on the shorelands adjacent to the Estuary are recreational and are mentioned in the policy on public access. Priorities for shoreland uses (from highest to lowest) shall be to:

- a) Promote uses which maintain the integrity of the estuaries of coastal waters.
- b) Provide for water-dependent uses;
- c) Provide for water-related uses
- d) Provide for non-dependent, non-related uses which retain flexibility of future use and do not prematurely and inalterably commit shorelands to more intensive uses;
- e) Provide for development including non-dependent, non-related uses, in urban areas compatible with existing or committed uses;
- f) Permit non-dependent, non-related uses which cause a permanent or long term change in the features of the coastal shorelands only upon a demonstration of public need.

The priority of uses shall be reflected in the Land and Water Development and Use Ordinance.

### 5. Dredge Material Disposal and Restoration

Inasmuch as the Necanicum Estuary is designated conservation and minimal dredging is permitted for uses such as small moorages, aquaculture or restoration, it is not anticipated that large volumes of material will be in need of disposal. However, dredge material shall be disposed of in a manner that is least disruptive of the environment. No water or wetlands areas shall be used for disposal. Upland sites other than freshwater marshes shall be utilized and good engineering practices shall be employed to protect water quality. Where active erosion is occurring and biological productivity is low, beach nourishment may be sufficiently coarse for this purpose. Dredge material disposal shall be carefully evaluated through the permit process.

General priorities for shoreline stabilization for erosion control are (from highest to lowest):

- a) Proper maintenance of existing riparian vegetation;
- b) Planting of riparian vegetation;
- c) Vegetated rip-rap;
- d) Non-vegetated rip-rap;
- e) Grains, bulkheads, or other structural methods.

Structural shoreline stabilization methods shall be permitted only if:

- a) Flooding or erosion is threatening a structure of an established use; or
- b) There is a demonstrated public need in conjunction with a water-dependent use; and
- c) Land use management practices or non-structural solutions are inappropriate because of high erosion rates, or the use of the site; and
- d) Adverse impacts on water currents, erosion, and accretion patterns of aquatic life and habitat are avoided or minimized.



## STANDARDS

The following standards are intended to be included in the zoning ordinance conditional use standards of the City of Seaside, Gearhart, or Clatsop County. It is the intention of the plan to provide a set of standards for each use or activity in the permitted use table. The standards are arranged alphabetically. As other uses or activities are added to the table, additional standards must be devised. The standards must also be in conformance with the goals and policies of the comprehensive plan.

These standards were adopted from those of the Columbia River Estuary Taskforce, the City of Bay City, and the standards of state and federal resource agencies.

## AQUACULTURE USE

DEFINITION: The raising, feeding, planting and harvesting of fish and shellfish, including associated facilities necessary to engage in the use.

1. Structures and activities associated with an aquaculture operation shall not unduly interfere with navigation.
2. Water diversion or other shoreline structures shall be located so as not to unduly interfere with public shoreline access. Public access to the facility shall be provided consistent with safety and security considerations.
3. Aquaculture facilities shall be constructed to blend in, and not detract from the aesthetic qualities of the area. In developed areas, views of upland owners shall be given consideration in facility design.
4. Water diversion structures or manmade spawning channels shall be constructed so as to maintain minimum required stream flows for aquatic life in the adjacent stream.
5. The potential impacts of introducing a new fish or shellfish species (or race within a species) shall be carefully evaluated so as to protect existing aquatic life in the stream and estuary.
6. Aquaculture facilities shall be located far enough away from sanitary sewer outfalls to the extent that there will be no potential health hazard.
7. Water discharged from the facility shall meet all federal and state water quality standard and any conditions attached to a waste discharge permit.

## BOAT RAMPS

1. Boat ramps requiring fill or dredging shall be evaluated under fill or dredging requirements. (Fill or removal of 50 cubic yards or less do not require permits from the U. S. Army Corps of Engineers or the Division of State Lands). Necessary permits will be obtained.
2. Boat ramps shall not be located in marsh areas or tideflats, and should be located in areas with a significant degree of alteration. Water depths shall be adequate so that dredging is not necessary.
3. Boat ramps shall be compatible with surrounding uses, such as natural areas or residential areas.

## DOCK/MOORAGE

DEFINITION: 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. Floathouses, which are used for boat storage, net-drying and similar purposes, are also included in this category.

1. Community docks or moorages shall be given higher priority than private individual docks or moorages.
2. Where a private individual dock is proposed, the applicant must provide evidence that alternative moorage sites such as nearby marinas, community docks or mooring buoys are not available, are impractical or will not satisfy the need.
3. Evidence shall be provided by the applicant that the size of the dock or moorage is the minimum necessary to fulfill the purpose.
4. Covered or enclosed moorage shall not be allowed except in connection with a commercial or industrial use where such shelter is necessary for repair and maintenance of vessels and associated equipments, such as fishing nets, etc.
5. Open pile piers or secured floats shall be used for dock construction. Fills in aquatic areas to create a dock or moorage are not permitted.
6. Piers and floats shall extend no further out into the water than is needed to affect navigational access. Conflicts with other water surface uses, such as fishing or recreational boating shall be minimized.
7. Floats in tidally-influenced areas shall be located such that they do not rest on the bottom at low water.

## FILL

DEFINITION: Fill is the placement by man of sediment or other material in an Aquatic area (which may create new shorelands) or on shorelands to raise the elevation of the land.

1. Fills shall be permitted for active restoration, aquaculture, placement of communications facilities, water-dependent recreation such as marinas, and flood and erosion control structures.
2. Where fills are permitted, the fill shall be the minimum necessary to accomplish the proposed use.
3. Fills shall be permitted only after it is established through environmental impact assessments that negative impacts on the following factors will be minimized:
  - a. Navigation
  - b. Productive estuarine habitat
  - c. Water circulation and sedimentation patterns
  - d. Water quality
  - e. Recreation activities
4. Where existing public access is reduced, suitable public access as part of the development project shall be provided.
5. Aquatic areas shall not be used for sanitary landfills or the disposal of solid waste.
6. Fill in an intertidal or tidal marsh area shall not be permitted.
7. Fills in CONSERVATION Shorelands and Aquatic areas shall be allowed only if consistent with the resource capabilities of the area and the purpose of the CONSERVATION designation. Fills are not permitted in natural areas.
8. Fills shall be permitted only in areas where alteration has taken place in the past, such as the rip rap bank of the Necanicum River in downtown Seaside.
9. The following uses and activities shall be permitted with the following findings of fact:
  - a. Maintenance and protection of man-made structures (rip rap or other shoreline protection) existing as of October 7, 1977;
  - b. Active restoration if a public need is demonstrated;
  - c. Aquaculture if:
    - 1) an estuarine location is required;
    - 2) a public need is demonstrated;

- 3) No alternative upland locations exist for the portion of the use requiring fill; and
  - 4) Adverse impacts are minimized as much as feasible;
- d. High-intensity water-dependent recreation and minor navigational improvements if:
- 1) The findings of 1.c.(1)-(4) are made; and
  - 2) If consistent with the resource capabilities of the area and the purposes of the management unit; and
- e. Flood and erosion control structures if:
- 1) Required to protect a water-dependent use, as otherwise allowed in 1.b.-d.
  - 2) Land use management practices and nonstructural solutions are inadequate to protect the use;
  - 3) There is no alternative upland locations for the portion of the use being protected;
  - 4) An estuarine location is required by the use;
  - 5) A public need is demonstrated; and
  - 6) Adverse impacts, to include those on water currents, erosion and accretion patterns, are minimized as much as feasible.

## LAND TRANSPORTATION FACILITIES

DEFINITION: Highways, railroads, bridges and associated structures and signs which provide for land transportation or motorized and/or nonmotorized vehicles (excluding logging roads).

1. Land transportation facilities shall not be located in wetlands or aquatic areas except where bridge crossings on pilings are needed.
2. Highways, railroads and bridges should be designed and located to take advantage of the natural topography so as to cause minimum disruption of the shoreline area. Causeways across aquatic areas shall not be permitted.
3. The impacts of proposed rail or highway facilities on land use patterns and physical/visual access shall be evaluated.
4. Culverts shall be permitted only where bridges are not feasible, and shall be large enough to protect water quality, salinity regime and wildlife habitat.

MAINTENANCE DREDGING - Necanicum River only.

DEFINITION: The removal of sediment or other material from a naturally occurring or man-made channel for the purpose of improving water flow or improving navigation.

1. Dredging shall not occur in marshes, tide flats, or other productive subtidal areas as determined by the state and federal permit process.
2. Dredging shall be permitted in areas of the Necanicum River with lower productivity and only to the extent necessary to achieve a minor navigational improvement.
3. Dredging shall be permitted for high intensity recreation purposes, including a moorage or small marina, where such use conforms with the above standards and the goals of this plan.
4. Dredging other than for aquaculture or restoration shall be limited to the main channel of the Necanicum River.



## MARINAS

DEFINITION: Marinas are 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/moorages by their larger scale and scope of landside services.

1. The applicant shall provide evidence to show that existing marina facilities are inadequate to meet the demand and that existing facilities cannot feasibly be expanded.
2. Marina facilities shall be designed and constructed so as to minimize negative impacts on navigation, water quality, sedimentation rates and patterns, fish rearing or migration routes, important sediment-dwelling organisms, birds, other wildlife, tidal marshes and other important vegetative habitat. An impact assessment shall normally be required.
3. Flushing and water circulation adequate to maintain ambient water quality shall be provided by design or artificial means. A calculated flushing time shall be presented as evidence that this standard has been met.
4. The size of the proposed facility, particularly that portion occupying the water surface, shall be the minimum required to meet the need. In this regard, new facilities shall make maximum use of dry boat moorage on existing shoreland areas.
5. Means for preventing contaminants from entering the water shall be provided. Equipment shall be available on-site for clean-up of accidental spills of contaminants. Sewage, storm drainage and fish wastes shall not be discharged directly into the water.
6. Marina facilities should provide for maximum public access and recreation use, consistent with safety and security considerations. Walkways, seating, fishing areas and similar facilities should be provided.
7. Covered or enclosed water moorage shall be minimized, except as needed for maintenance, repair or construction activities.
8. Marina facilities shall be located only in areas of existing shoreline development on the Necanicum River where its location would not eliminate marsh areas, and where water depths are sufficient so that new dredging is not required.

## NAVIGATION STRUCTURES

DEFINITION: Pile dikes, groins, fills, jetties, and breakwaters that are necessary to maintain navigation channels, control erosion or otherwise improve water flow.

1. Evidence will be presented to the (city) (county), through the state or federal permit processes, that the structure(s) will not negatively affect currents, flushing characteristics, adjacent shorelines, marshes or fish habitat. Aesthetic factors shall be considered.
2. Applicants for in-water structures will present evidence why other means of addressing the problem are not feasible, such as riprap on the shoreline, or floating structures.
3. All structures shall be of minor scale, and shall make no major alteration to the estuarine ecosystem.

## PILINGS

DEFINITION: The driving of wood, concrete, or steel piling into the bottom in aquatic areas to support piers or docks, bridges or other permitted uses.

1. Piling for a use permitted in the estuary shall be approved only after the applicant has established that adverse impacts on navigation, estuarine habitat and processes, water circulation and sedimentation patterns, water quality and recreational activities are minimized.
2. The piling will meet all state and federal engineering standards.
3. Pilings shall be used in lieu of fill wherever the use is engineering feasible. The number of pilings shall be the minimum necessary to accomplish the proposed use.

## RESTORATION/RESOURCE ENHANCEMENT - ACTIVE

DEFINITION: Restoration is replacing or restoring original attributes or amenities such as natural biological productivity and aesthetic or cultural resources which have been diminished or lost by past alterations, activities or catastrophic events. Active Restoration involves the use of specific remedial actions such as removing dikes or fills, installing water treatment facilities, or rebuilding or removing deteriorated urban waterfront areas. Passive Restoration is the use of natural processes, sequences or timing to effect restoration after the removal or reduction of adverse stresses. Resource Enhancement is the use of artificial means such as hatcheries or rearing ponds to improve the quantity or quality of a specific resource.

1. Conditional use application for active restoration/resource enhancement should be accompanied by an explanation of the purpose of the project and the resource(s) to be restored or enhanced. The project shall be allowed only if consistent with the resource capabilities and purpose of the designation of the area and the other adjacent uses.
2. Aquaculture shall be evaluated under those standards.

## SHORELINE STABILIZATION

DEFINITION: The protection of the banks of tidal or non-tidal stream, river or estuarine waters by vegetative or structural means.

### A. General Standards

#### 1. Preferred Methods

Proper management of existing streamside vegetation is the preferred method of stabilization, followed by planting of vegetation. Where vegetative protection is inappropriate (because of the high erosion rate, the use of the site or other factors) structural means such as rip-rap may be used as a last resort.

In the placement of stabilization materials, factors to be considered include, but are not limited to: effects on bird and wildlife habitat, uses of lands and waters adjacent to the bank, effects on fishing areas, effects on aquatic habitat, relative effectiveness of the various structures, engineering feasibility, cost and erosion, flooding and sedimentation of adjacent areas.

2. Emergency repair to shoreline stabilization facilities is permitted, notwithstanding the other regulations in these standards, subject to those standards imposed by the State of Oregon, Division of State Lands and the U.S. Army Corps of Engineers.
3. Conditional use application for shoreline stabilization shall be based on a demonstration of need and consistency with the intent of the designation of the area and the resource capabilities of the area. Impacts shall be minimized.

### B. Standards for Revegetation and Vegetation Management

1. Plant species shall be selected to insure that they provide suitable stabilization and value for wildlife. Justification shall be presented as to the necessity and feasibility for use of a bank with a slope greater than 2:1 (horizontal to vertical). Trees, shrubs and grasses native to the area are generally preferred.
2. The area to be revegetated should be protected from excessive livestock grazing or other activities that would hinder plant growth.

### C. Standards for Rip-Rap

1. Good engineering and construction practices shall be used in the placement of rip-rap, with regard to slope, size, composition and quality of material, excavation of the toe trench, placement of a gravel fill blanket and operation of equipment in the water. State and federal agency regulation should be consulted in this regard.

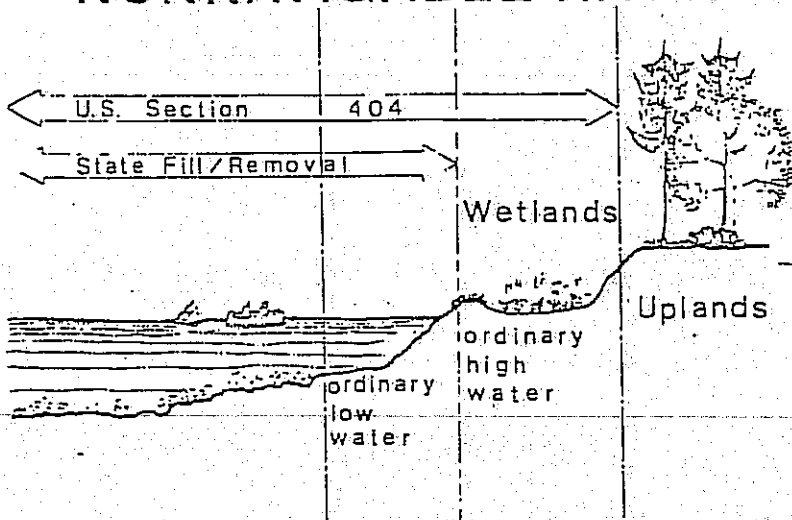
2. Rip-rapped banks should be vegetated to improve bird and wildlife habitat, where feasible.
3. Shoreline protection measures shall not restrict existing public access to public shorelines.
4. Shoreline protection measures should be designed to minimize their impacts on the aesthetic qualities of the shoreline.
5. Bankline protection is not in itself a way to increase land surface area. Where severe erosion has occurred, fill may be used to obtain the desired bank slope and restore the previous bank line. Any extension of the bank-line into traditional aquatic areas shall be subject to the standards for fill. Disruption of tidal marsh, tidal flat and productive sub-tidal areas shall not be permitted.
6. Construction of shoreline protection measures shall be coordinated with state and federal agencies and local interests to minimize the effects on aquatic resources and habitats. Relevant state and federal water quality standards shall be met. Stream channelization should be avoided.
7. Use of fill material for shoreline protection shall be permitted for maintenance of man-made structures existing as of October 7, 1977.

## UTILITIES

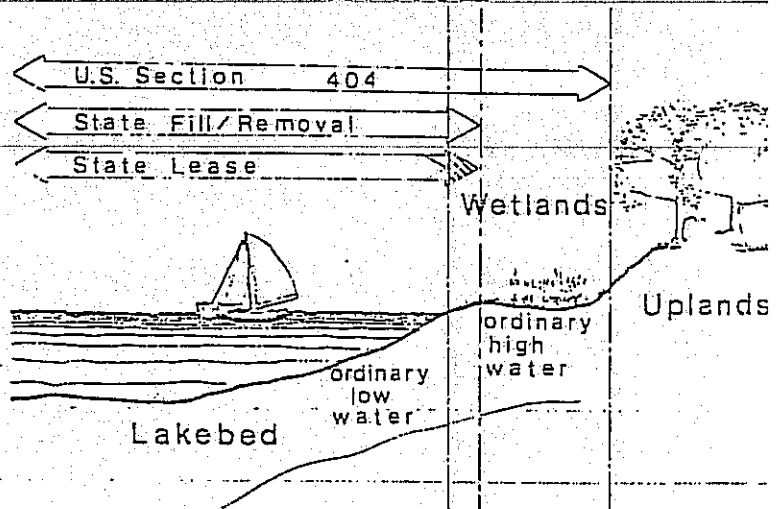
DEFINITION: Towers, facilities and lines for communication and power transmission; waste water treatment facilities; storm water and treated water outfalls (including industrial); public water, sewer and gas lines; solid waste disposal.

1. Overhead electrical or communication transmission lines shall be located so as not to unduly interfere with migratory bird flyways and significant habitat or resident waterfowl, birds of prey and other birds. In cases of serious conflict, utility facilities should be located underground.
2. Applications for a utility facility, including cable crossings, shall provide evidence as to why an aquatic site is needed, the alternative locations considered, and the relative impacts of each. Crossings shall avoid disrupting marsh areas wherever it is engineering feasible.
3. Utility facilities shall not be located on new fill land unless part of an otherwise approved project and no other alternative exists.
4. Above-ground utility facilities shall be designed to have the least adverse effect on visual and other aesthetic characteristics of the area.
5. Effluents from point-source discharges shall meet all applicable state and federal water and air quality standards. Monitoring shall be carried out so as to determine the on-going effects on the estuarine environment.
6. After installation or maintenance is completed, banks shall be replanted with native species or otherwise protected against erosion. The pre-project bank-line shall be maintained as closely as possible.
7. Storm water shall be directed into existing natural drainages wherever possible, and shall be dispersed into several locations so as to minimize the impact on the estuary. When adjacent to salt marshes and/or natural areas, special precautions shall be taken to insure contamination of the marsh by oil, sediment or other pollutant does not occur. This may be through use of holding ponds, weirs, dry wells, or other means.

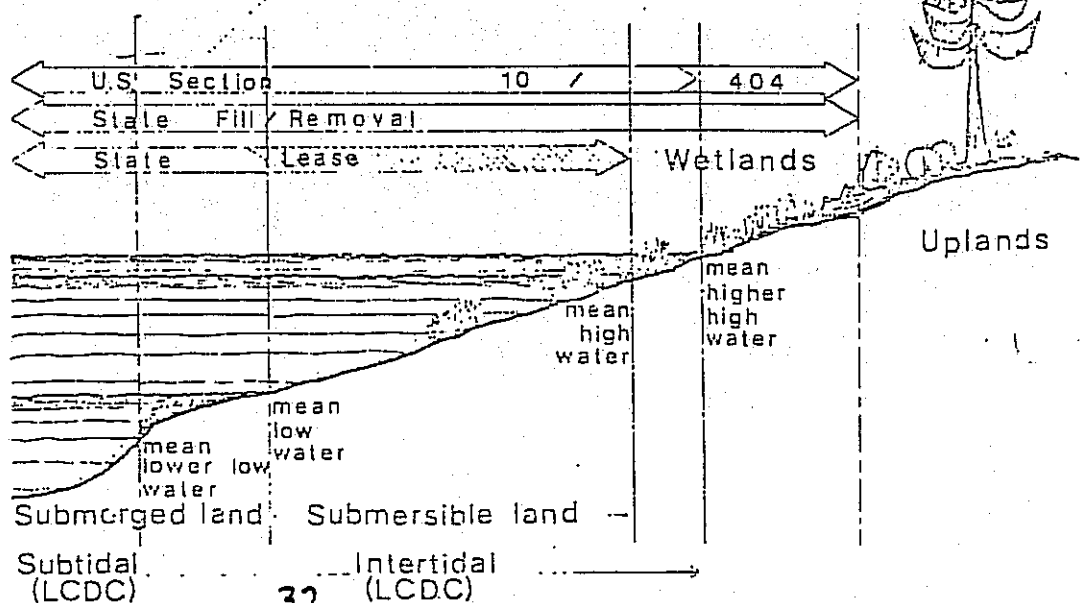
# NONNAVIGABLE RIVER



# LAKE



# ESTUARY





PACIFIC OCEAN

GEARHART

OREGON

SEASIDE

TYPE of OWNERSHIP

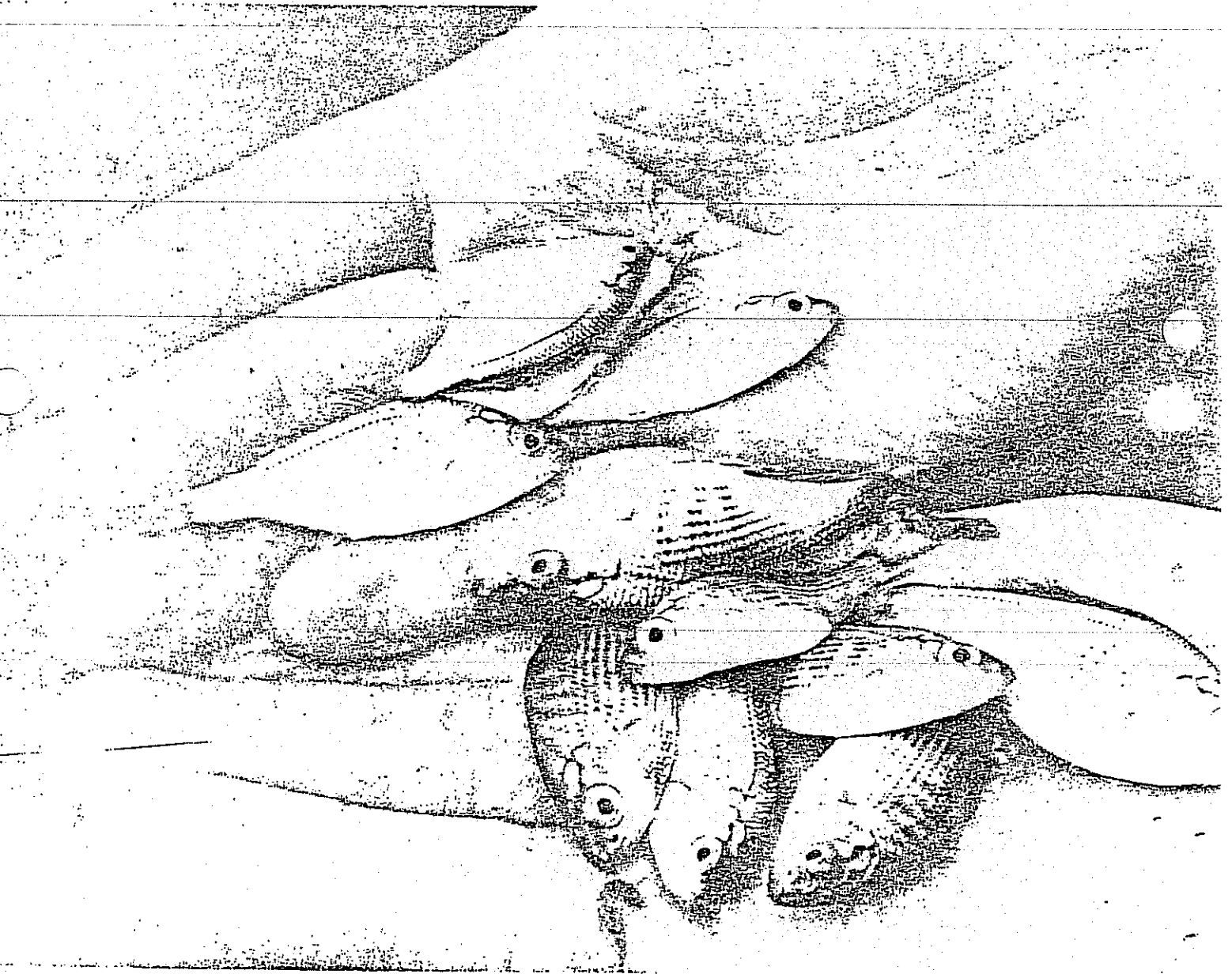
State of Oregon

Private

Port, County, Federal, or City

TIDELAND OWNERSHIP MAP  
of  
NECANICUM RIVER  
STATE of OREGON  
DIVISION of STATE LANDS  
1973

# NECANICUM ESTUARY



*INVENTORY*

NECANICUM ESTUARY

INVENTORY

NEAL MAINE  
E-3 AWARENESS

CLATSOP COUNTY, OREGON

JUNE 1979

Fish Drawings by Ron Pittard-Searep Studio  
Line Drawings by Walt Linstrom, Clatsop County Planning Dept.  
Photography by Neal Maine

Preperation of this report was financially aided through grants from Land Conservation and Development Commission, with funds obtained from NOAA, and appropriated from section 305, 306 of the Coastal Zone Management Act of 1972.

Special thanks to the following people for their help;

Ed Johnson-field work and write-up on sediments section

Norm Kujala-identification of plankton(Oregon Ocean Services)

Harry Nehls-review of section on birds

Warren Knispel-field work and review of fish section(Dept. of Fish & Wildlife

Bob Emmitt-identification of benthic animals(National Marine Fisheries)

## NECANICUM RIVER ESTUARY

### INVENTORY

This Necanicum River Estuary Inventory is the first attempt to compile and research information on the estuary system, and is not intended to fill all the voids of knowledge. It will provide some basic biological and physical information for use in the local planning process. Although there are still some blank spots in the study it is adequate to move into the planning process which will help delineate the next step in the information gathering. This initial document will be the tool which illustrates and stimulates the further need of study in the future.

Up to the initiation of the LCDC grant sponsored study of the Necanicum Estuary there was very little information to use for effective planning. Because of the size of the Necanicum Estuary along with other smaller estuaries in Oregon, little attention was paid to them. A new awareness is being generated about the small ocean contact units because of the key role they play in coastal ecology and their link with Coast Range watersheds. It is hoped that this study will help amplify that awareness in Clatsop County and serve as the springboard to a comprehensive plan for the Necanicum Estuary system.

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SECTION A

(Physical)

## DRAINAGE BASIN

The Necanicum River-Neawanna Creek-Neacoxie system drains a total of 87 sq. miles. The average yearly freshwater yield of the system is 220,200 ac-ft. with an average annual precipitation of 100 inches. The basin consists primarily of forests (93.6% 40,500 acres), cropland (1.2% 500 acres), and rangeland (1.2% 500 acres).

The Necanicum Estuary measures less than 2000 feet at its mouth and covers about 278 acres. Maximum depth varies from 9-15 feet becoming very shallow at the mouth.

The estuary consists of the Necanicum River, Neawanna Creek, Mill Creek, and Neacoxie Creek. The Necanicum-Neawanna system drains an area of 87 sq. miles with the source of the Necanicum at river mile 21.2, elevation 1360 feet.

The mouth of Neawanna Creek enters the estuary from the North bank at river mile 1.2. Neawanna Creek is approximately 7 miles in length with its source at an elevation of 880 feet. Mill Creek, which enters the Neawanna at 1.5 miles and drains Stanley Lake, is a short 400 yd. from the lake system. At the present time Mill Creek tidal water is controlled by tide gates at its mouth.

The mouth of Neacoxie Creek enters the estuary from the North bank of river mile 0.2. The Neacoxie is less than 4 miles in length with its source at Sunset Lake, elevation approximately 25 feet.

PRELIMINARY  
SUBJECT TO REVISION:

# NECANICUM WATERSHED

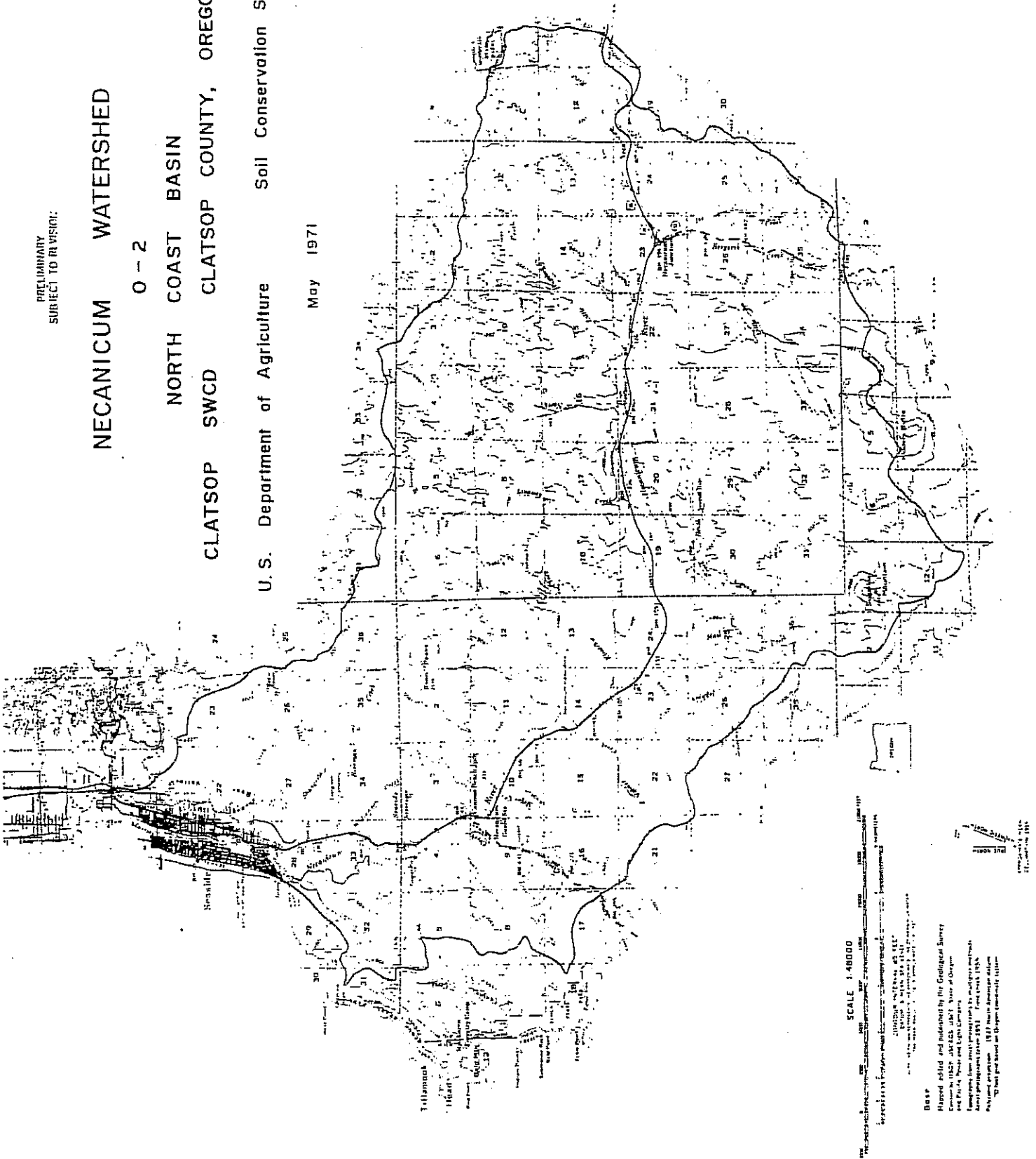
0 - 2

NORTH COAST BASIN

CLATSOP SWCD CLATSOP COUNTY, OREGON

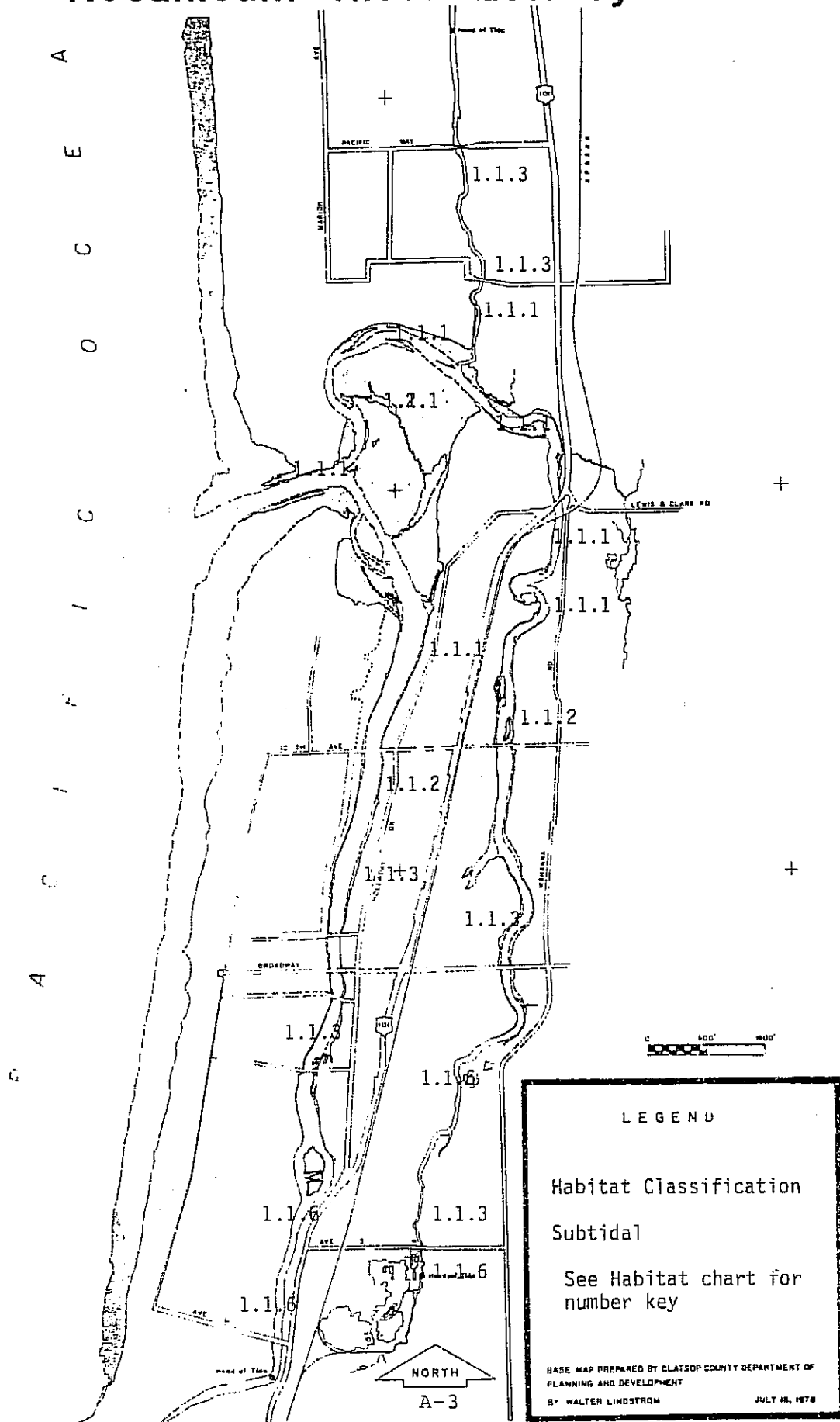
U.S. Department of Agriculture Soil Conservation Service

May 1971





# N Necanicum River Estuary



# ESTUARINE HABITAT CLASSIFICATION SYSTEM

System ----- Estuarine

Subsystem ----- 2. Intertidal

Class ---- 1. Shore

2. Flat

3. Aquatic  
Bed

4. Beach/  
Bar

5. Tidal  
Marsh

1. Sand	2. Sand/Mud (Mixed)	3. Mud	4. Shell	5. Wood Debris/Organic	6. Cobble/Gravel	9. Seagrasses	10. Algal	1. Sand	6. Cobble/Gravel	11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub
2. Sand/Mud (Mixed)	3. Mud	4. Shell	5. Wood Debris/Organic	6. Cobble/Gravel	9. Seagrasses	10. Algal	1. Sand	6. Cobble/Gravel	11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub	
3. Mud	4. Shell	5. Wood Debris/Organic	6. Cobble/Gravel	9. Seagrasses	10. Algal	1. Sand	6. Cobble/Gravel	11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub		
4. Shell	5. Wood Debris/Organic	6. Cobble/Gravel	9. Seagrasses	10. Algal	1. Sand	6. Cobble/Gravel	11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub			
5. Wood Debris/Organic	6. Cobble/Gravel	9. Seagrasses	10. Algal	1. Sand	6. Cobble/Gravel	11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub				
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9. Seagrasses	10. Algal	1. Sand	6. Cobble/Gravel	11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub						
10. Algal	1. Sand	6. Cobble/Gravel	11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub							
1. Sand	6. Cobble/Gravel	11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub								
6. Cobble/Gravel	11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub									
11. Low Salt Marsh	12. High Salt Marsh	13. Fresh Marsh	14. Shrub										
12. High Salt Marsh	13. Fresh Marsh	14. Shrub											
13. Fresh Marsh	14. Shrub												
14. Shrub													

Sub-  
Class

System ----- Estuarine

Subsystem ----- 1. Subtidal

Class --- 1. Unconsolidated  
Bottom

2. Rock  
Bottom

3. Aquatic  
Bed

1. Sand	2. Sand/Mud (Mixed)	3. Mud	4. Shell	5. Wood Debris/Org.	6. Cobble/Gravel	7. Boulder	8. Bedrock	9. Seagrasses	10. Algal
2. Sand/Mud (Mixed)	3. Mud	4. Shell	5. Wood Debris/Org.	6. Cobble/Gravel	7. Boulder	8. Bedrock	9. Seagrasses	10. Algal	
3. Mud	4. Shell	5. Wood Debris/Org.	6. Cobble/Gravel	7. Boulder	8. Bedrock	9. Seagrasses	10. Algal		
4. Shell	5. Wood Debris/Org.	6. Cobble/Gravel	7. Boulder	8. Bedrock	9. Seagrasses	10. Algal			
5. Wood Debris/Org.	6. Cobble/Gravel	7. Boulder	8. Bedrock	9. Seagrasses	10. Algal				
6. Cobble/Gravel	7. Boulder	8. Bedrock	9. Seagrasses	10. Algal					
7. Boulder	8. Bedrock	9. Seagrasses	10. Algal						
8. Bedrock	9. Seagrasses	10. Algal							
9. Seagrasses	10. Algal								
10. Algal									

Subclass

Modified from  
"Classification  
of Wetlands and  
Deep-Water Habi-  
tats of the United  
States", Fish and  
Wildlife Service,  
U.S. Department  
of Interior,  
October 1977.

## SEDIMENTS OF THE NECANICUM ESTUARY

The intent of this portion of the report is to determine the major distribution pattern for the various size sediments in the estuary. All the data were collected during the week of August 28, 1978, and any conclusions must be limited to the conditions prevalent at that time.

The techniques employed were recommended and explained by Gary Muhlberg<sup>1</sup>. The results should be considered as starting points for future studies as the data are presented as general information. However, the expenditures required to obtain precise assessment were far beyond the nature and scope of this study.

### Technique and Sampling Method

Sediments were collected by boat for most of the stations with a grabbing device. Each productive grab produced approximately 100 milliliters of sediments which were placed in plastic bags. Using the following sieves: 1 millimeter (very coarse sand); .5 millimeter (coarse sand); .25 millimeter (medium sand); .125 millimeter (fine sand); and .063 millimeter (very fine sand); plus a collecting basin for the sediments smaller than .063 (silt and clay fraction) the sediments were separated. The actual technique involved measuring a sample which varied between 6 and 10 milliliters wet volume then washing it through the piled sieves with the aid of a spray bottle. Once completely sieved, the sediments were washed into a 10 milliliter graduated cylinder, one screen at a time, with data being recorded as the volume accumulated from each screen. The Wentworth scale<sup>2</sup> (Strahler, pg. 374)\* was used to classify the sediments into various sand and silt-clay categories. In all, twenty samples were collected and sieved (see map for locations), ten from the Necanicum, seven from the Neawanna Creek and three from Neacoxie Creek.

\*picture of scale included

<sup>1</sup>Muhlberg, Gary, Instructor of Oceanography, Clatsop Community College. Personal conversation, August 14, 1978.

<sup>2</sup>Strahler, Arthur, The Earth Sciences, New York, Harper & Row, 1971. pg. 374 (1967)

## Realm of Deposition

In surveying the literature, it does not appear to me that an absolute or uniform method of naming and defining various portions of the river exists. However, Kulm & Byrne<sup>3</sup> have used a system in an estuarine environment which I consider somewhat similar to the Necanicum to define components. Basically, three units -- marine, marine fluviatile and fluviatile were identified. In their work, grain size and mineral content were used to make the separation; lacking the mineral assessment makes our boundary more arbitrary.

The marine zone is described as one having vigorous tidal action, normal marine salinity, fine to medium sand grain size and sediments similar to that of the adjacent beaches and dunes.

The fluviatile zone is that area which lies between the freshwater head of estuary and a point where sediment intrusion are last felt, brackish water conditions prevail, and poorly sorted sediments ranging from silt to coarse sand in grain size are found.

The marine fluviatile comprises that which lies between the marine and fluviatile zones. Normal marine to brackish water conditions are found, a wide scope of sediments are found ranging from well to poorly sorted which vary from silt to medium size sand grains.

By referring to the Necanicum Estuary map and the percent of sand charts, one can see that boundaries have been established which roughly delineate each of the three environments. Using a study done by Twenhofel<sup>4</sup> (pgs. 42, 43) the arbitrary boundary that I have drawn between marine and marine fluviatile zones on the Necanicum corresponds very well with that defined by Kulm & Byrne<sup>5</sup>.

<sup>3</sup>Kulm, L.D. & John V. Byrne, Estuaries (Sediments) of Yaquina Bay, Oregon, Washington D.C., American Association for the Advancement of Science, Publication #83.

<sup>4</sup>Twenhofel, W.H., Mineralogical & Physical Composition of the Sands Oregon Coast from Coos Bay to Mouth of Columbia River, Department of Geology & Mineral Industries, State of Oregon, Bulletin No. 30.

<sup>5</sup>Kulm, Estuaries (Sediments) of Yaquina Bay, Oregon.

It is important to point out that the present Seaside Sewer System outfall appears to lie within the marine zone. In my estimation, affluent particulate matter from the overloaded system pumped into the marine zone under low tide, low river runoff conditions coupled with the principle of flocculation could have a devastating effect on the overall stable productive capacity of the entire estuary.

The principle of flocculation is explained by Barnes<sup>6</sup> as follows and applies primarily to fresh water entering an estuarine environment: silt particles (less than .063 millimeters in size) are transported in suspension in the lower reaches of most rivers and are discharged into adjacent estuaries. On contact with a medium containing high concentrations of cation (sodium from the salt, sodium chloride) these silt particles tend to flocculate -- clump together and sink more speedily. Flocculation and fall velocities of the particles are affected by temperature and the amount of organic and inorganic matter in suspension in addition to salinity.

Although the floccules tend to sink they may be carried into outflowing fresh water by the circulation system upon which they will deflocculate and a flocculation/deflocculation cycle can result. Some will reach and adhere to the substratum; however, many will be resuspended by current action at ebb tide and if the concentration of sinking floccules is very high (10 grams silt per .1 liter of water) liquid mud may form which will flow as a layer near the bottom. Although the rate of sediment deposition has not been established for the Necanicum system, in most estuaries net deposition exceeds erosion so that there is an overall accumulation of mud. Generally, some 2 millimeters of mud accumulate per year<sup>7</sup>.

It appears to me that such factors as temperature of the streams, marine and sewer effluent, as well as suspended silt load of the river system, amount of organic sewage discharge, accumulation rate of mud in the marine fluviatile, and salinity cycles need further study. I have been prompted to mention this because of the very noxious smelling sediments taken from Station 6 on the Necanicum.

<sup>6</sup>Barnes, R.S.K., Estuarine Biology, London, Edward Arnold Limited, 1974.

<sup>7</sup>Twenhofel, Mineralogical & Physical Composition of the Sands.  
pg. 7

In establishing the three zones on the Neawanna River system it becomes more apparent why this method of classification must be flexible and arbitrary rather than precise. The marine zone on the Neawanna extends much further inland than on the Necanicum. Although it hasn't been factually documented in this paper, the tidal velocity during the ebb and flood are much higher on the Neawanna than on the Necanicum or Neacoxie.

The factors which influence this are (1) the angle of entry from sea to estuary; (2) the constriction on the Neawanna versus the widening on the Necanicum as one proceeds upriver; and (3) underlying erosional resistive rock structure.

Referring to the Tideland Map of the Necanicum River, you will note that the Necanicum widens at a point which corresponds with the point where the marine zone ends and the marine fluvial zone begins. Specimen indicators further establish this as the transition area. Viewing the Neawanna one finds a very much different situation. Here the waterway becomes smaller thus confining the volume and thereby increasing the velocity.

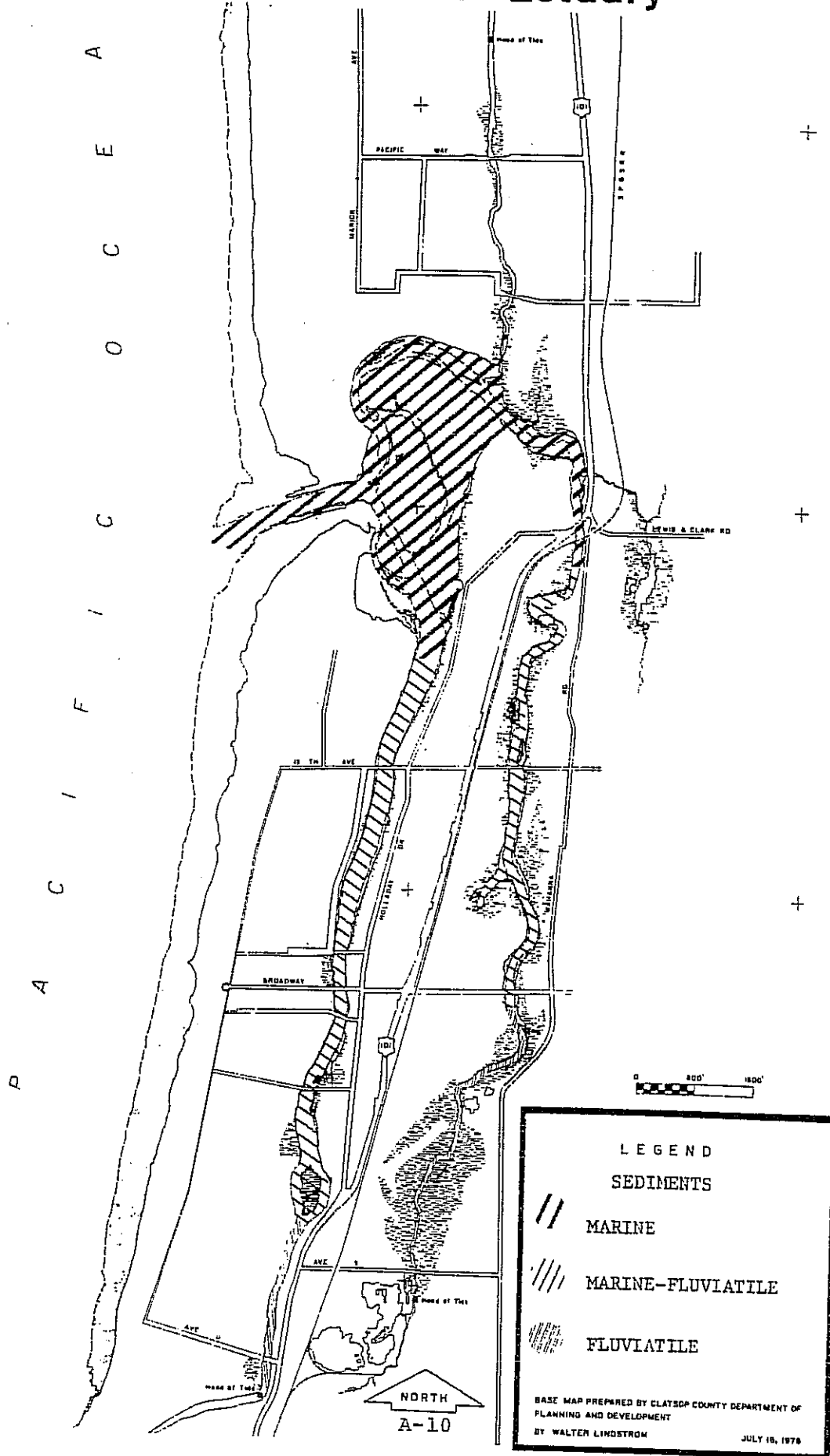
Based on the angle of entry it appears that the Neawanna system at its mouth would receive its water at a slightly higher initial velocity than the Necanicum. Proceeding upstream on the Neawanna, this water is further funnelled, allowing the velocity to be maintained. Near the 101 Bridge a large boulder outcropping reduces the scouring action, enabling the stream to maintain a shallow depth. This boulder outcropping apparently runs underneath the railroad tracks through Seaside and crosses under the Necanicum just above Station 10. In fact, this boulder structure separates the marine fluvial from the fluvial on the Necanicum. I am somewhat amazed to find this marine environment extending beyond a point somewhere between the school district bus barn and the 12th Avenue Bridge. However, this contention is supported by specimen indicators and sediment sampling.

Station 7 located off the Broadway Park dock provided the highest percent of very coarse sediment for any point in the estuary. It would be of interest if this source could be more clearly identified. Certainly, the erosion rates have been greatly accelerated in recent years due to intensified building projects primarily east of the river. The effect this has on biomass capacity of this system should be monitored.

The third and final tributary, Neacoxie Creek, is an excellent example of what happens in a system when man-made constrictions are imposed. Initially, this creek must be considered a marine fluvial which makes it the only water source in the estuary that lacks a marine zone. This projection is based on particle

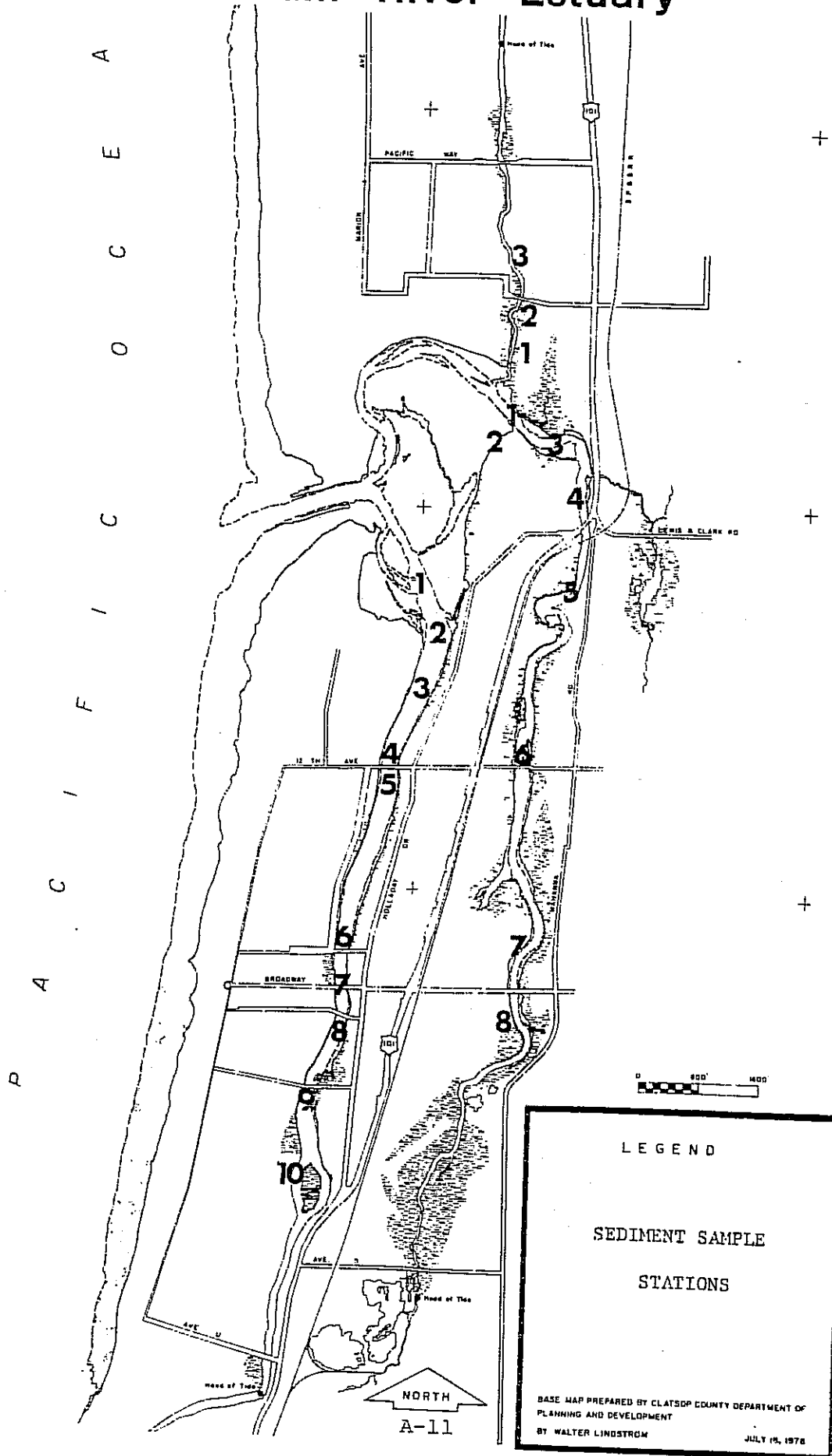
size of the sediments; however, a marine algae has been identified which would make this marine fluviatile assessment questionable. Finally, the culvert located at the north end of Gearhart certainly has inhibited normal marine intrusion. When one views the sediment analysis from the south as compared with the north side of the culvert, it becomes obvious what this constriction has done. Minimally, the silt-clay component has doubled over that found to the south. Potentially, this drastic change has and will continue to have an adverse effect on this system.

# Necanicum River Estuary





# N Necanicum River Estuary



## CLIMATE

The climate of the Seaside-Necanicum Estuary is strongly related to a number of aspects of the local wind patterns, latitude, and ocean shore conditions. Not only is the weather pattern related to the activities of the residents but also has a significant effect on the salinity of the estuary from freshwater runoff during winter storms, the effect of tidal influences during storms, the movement of fish upstream during fall rains, the local ocean temperature, and the amount of local fog that will be hanging over the area.

### Atmospheric Conditions

The correlation between the atmospheric circulation and ocean circulation is high and operates to a degree as a single unit. The pattern in the winter would see persistent winds from the southwest bringing with it a substantial amount of rain. The winter weather pattern often originates in the Gulf of Alaska with a counter-clockwise direction and determines the basic weather pattern during the winter months. The summer weather pattern is characterized by clockwise circulation around a high pressure center that brings winds from the north and the west, moderate temperatures, little rain and much fog. These conditions are variable and can change, bringing atypical weather during anytime of the year.

### Davidson and California Currents, Coastal Upwelling

Although the relationship to the major currents, winds, and upwelling are not well understood at this time, they will be described briefly here.

#### Davidson Current:

In winter and early spring the cold waters near the coast are shifted north as a warmer northward current develops near shore. This is a fairly strong current of up to one half mile per hour.

#### California Current:

This generally only applies to principal southward surface current that occurs in the summer months, although it does extend to great depths in some areas off shore.

### Coastal Upwelling:

Because the surface water of the ocean does not move directly before the wind, but slips off at an angle of as much as  $45^\circ$  to the right, thus the prevailing northwest winds that blow parallel to our coast push the surface waters away from the land. To replace the water that is shifting seaward, cold nutrient laden water moves to the surface (Chart 1 and 2). This upwelling process is very important to the productivity of the near-shore areas as biological cycles begin with the utilization of the nutrients. This process can also provide cold nutrient water to become available to move into the estuary.

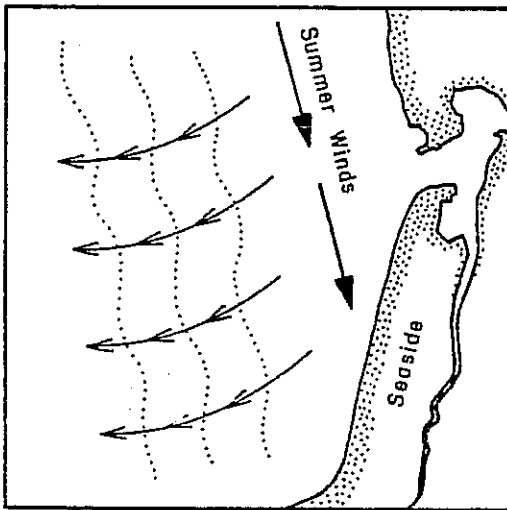


Chart 1. Upwelling - Surface View

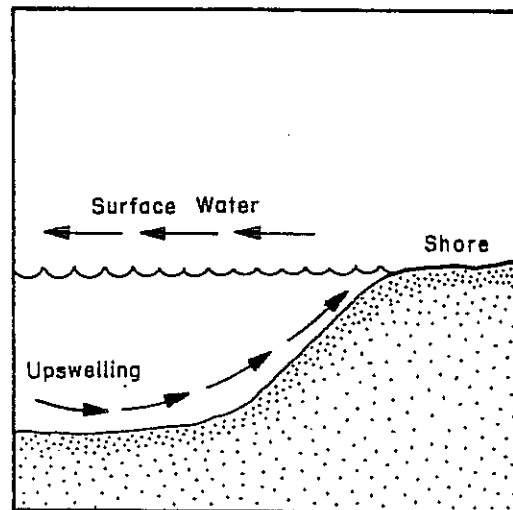


Chart 2. Upwelling in Crosssection

### Weather Related Hazards

An in-depth study of flood condition and tidal correlation has been done by Soil Conservation Service, Flood Hazard Analysis, March 1976 and the U.S. Department of Housing and Urban Development, Flood Insurance Study, January 1978. These materials should be referred to for information flood hazard conditions in the Necanicum Estuary and related tributaries.

# Monthly Climatic Data

From 1953 to Date  
For Seaside Area

<u>Month</u>	<u>Mean Precipitation Inches</u>	<u>Mean Temperature</u>	<u>Wind Speed mph</u>	<u>Wind Direction</u>
Jan	11.26	41.3	9.3	E
Feb	7.66	43.9	8.9	ESE
Mar	7.51	44.4	9.0	SE
Apr	4.77	47.4	8.6	WNW
May	2.76	52.1	8.4	NW
Jun	2.53	56.6	8.3	NW
Jul	1.13	59.9	8.3	NW
Aug	1.54	60.6	7.8	NW
Sep	2.96	58.3	7.3	SE
Oct	6.56	52.5	7.4	SE
Nov	10.11	46.7	8.4	SE
Dec	11.74	43.0	9.2	ESE
Mean	70.73	50.6	8.4	

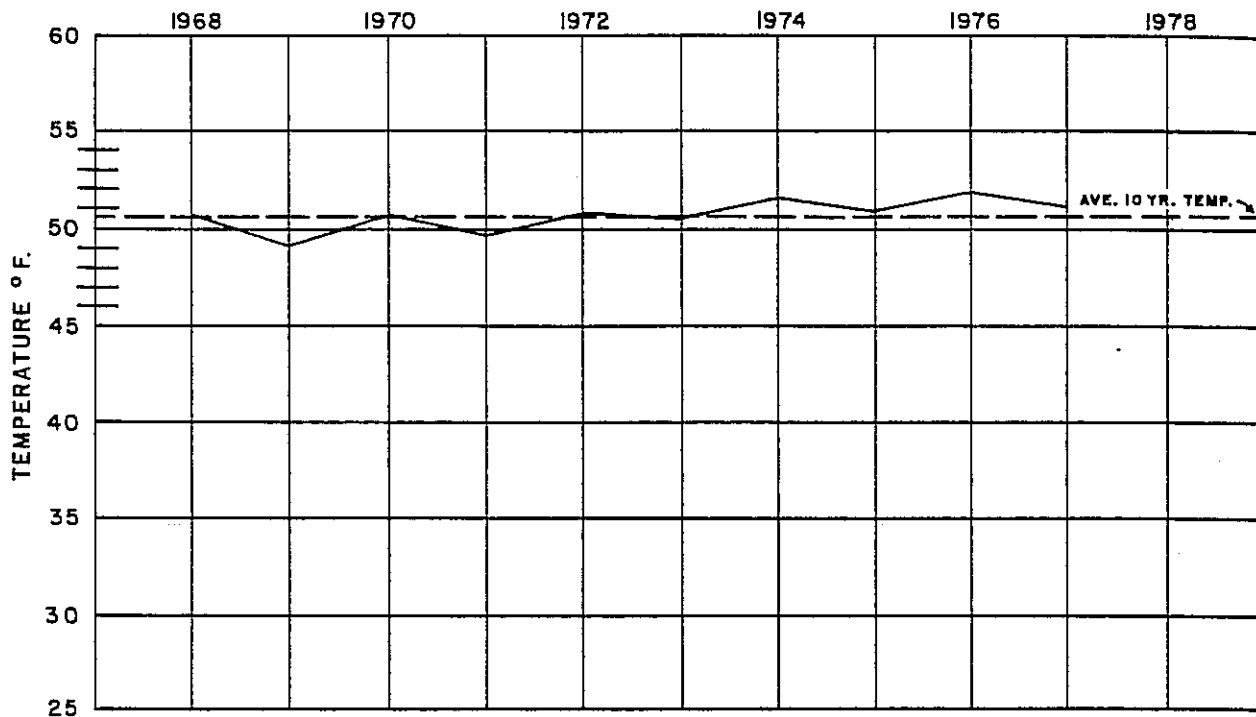
## Extremes

Temperature High 101 F., July 1942  
 Rainfall 36.07 inches, December 1933  
 Rainfall 24 hour 6.98 inches, January 1919  
 Low Temperature 6 F., December 1972  
 Snow Fall 26.3 inches, January 1969  
 Snow Fall 24 hour 10.8 inches, January 1971

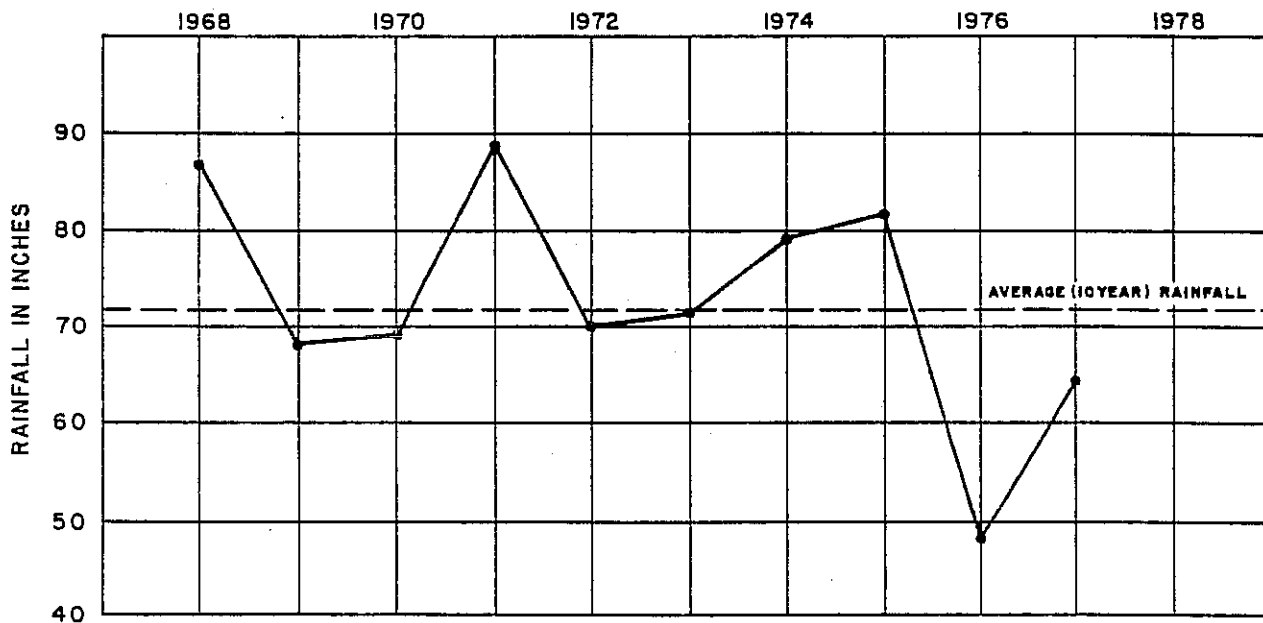
From: U.S. Department of Commerce, Local Climatological Data 1977.

# TEMPERATURE AND RAINFALL—SEASIDE AREA

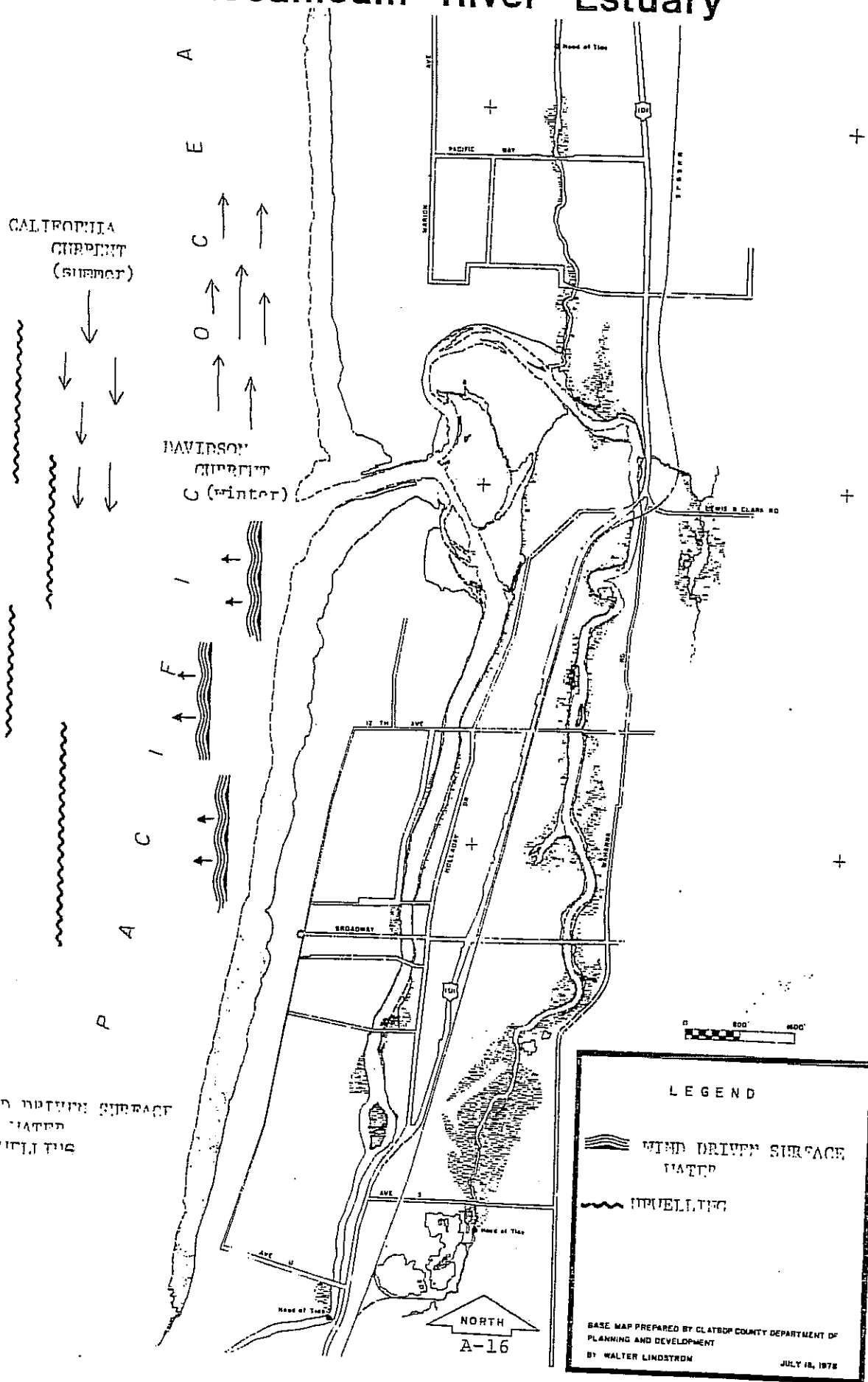
## TEMPERATURE



## RAINFALL



# <sup>z</sup> Necanicum River Estuary



## Tidal Action (Necanicum Estuary)

One of the most obvious physical phenomenon in the estuary is the daily cycles of tidal action. Each lunar day generates two high waters and two low waters, one of the high waters being higher than the other (HHW) and one of the low waters being lower than the other (LLW).

This action produces the unique conditions of bringing ocean water into the estuary and significantly changing the water level in the environment every 6 hours and 12 minutes as the tide cycles from low to high water. This particular event causes a series of sequential events that are significant to the condition of the estuary. In addition to bringing about a daily environment that allows a unique group of organisms to survive, it also brings about a predictable series of physical events. These are best described in an engineering report by John Locket on the Necanicum estuary.

"The significant point to recognize in the tidal pattern is the characteristic of the falling tide between the times of higher high water and lower low water which creates the maximum range of ebb flow conditions during the tidal cycle. The entire tidal prism, defined in the following paragraph, is discharged from the estuary in this long ebb run-out period. This results in the maximum velocities in the estuary which may be attributed to the tidal exchange phenomenon.

Flow Attributable to the Tidal Phenomenon--The tidal prism of an estuary is defined as the net volume of water which would flow into the estuary from the ocean during an average floodtide period with no upland inflow. The Necanicum River, as it emerges into the open estuary opposite the Seaside High School, has an average width of about 700 feet. Considering that the mean range of tide at this point in the river is about eight feet and that the lower four miles of the river are subject to tidal influence, the tidal prism of the Necanicum River may be visualized as a wedge of water having average dimensions of 700 feet (average) in width and eight feet in height at its base (opposite the Seaside High School), which dimensions gradually decrease in height to zero at a point four miles upstream. Reducing this to mathematics, the tidal prism of the Necanicum River ( $P_t$ ), may be expressed as follows:

$P_t = \frac{w r_t l}{2}$ , where:

$w$  = average width opposite Seaside High School (700 feet)

$r_t$  = mean range of tide (8 feet)

$l$  = length of tidal influence (4 miles)

or,

$$P_t = \frac{700 \times 8 \times 4 \times 5,280}{2} = 59,136,000 \text{ Cubic Feet}$$

Dividing this number by the number of cubic feet in an acre-foot (43,560),  $P_t$  becomes

$$P_t = \frac{59,136,000}{43,560} = 1,350 \text{ AF (acre-feet), which closely checks the volume of the tidal prism reported above.}$$

As this average volume of water is discharged from the Necanicum River opposite the Seaside High School during the period of 6.21 hours in which the tide recedes from the higher high to the lower low levels, the average flow attributable to the tidal phenomenon,  $Q_t$ , becomes:

$$Q_t = \frac{59,136,000}{6.21 \times 3600} = 2,650 \text{ CFS (Cubic Feet per Second)}$$

River Flow--Although, as indicated above, there are no field measurements of the fresh water discharge of the Necanicum River, it is possible, knowing the mean annual precipitation over the river basin, to arrive at a reasonable estimate of the magnitude of peak river discharges. The Portland District, Corps of Engineers, reports that the mean annual precipitation over the Necanicum River basin amounts to about 100 inches of rainfall annually. Applying this, the total river length of 21 miles, together with average stream surface slope of 65 feet per mile, the Portland District, by use of the regional frequency approach, has estimated peak flows of the Necanicum River as follows:



<u>FLOOD</u>	<u>PEAK DISCHARGE</u>
2-year Frequency	6,000 C.F.S.
5-year Frequency	7,900 C.F.S.
10-year Frequency	9,000 C.F.S.
25-year Frequency	10,300 C.F.S.
50-year Frequency	11,200 C.F.S.
100-year Frequency	12,000 C.F.S.

#### Tidal Datum Plane

Because of the legal and planning significance based on the tidal datum (sea level datum) it is important that it be understood in relationship to the effect it has on the Necanicum Estuary.

Of the two daily high waters, one is a higher high water and the average height of higher high water over a considerable period of time in any locality is designated as mean higher high water (MHHW). Likewise, the lowest of the low waters is considered the sea level datum plane for the Pacific coast of the United States. Based on this data the National Ocean Survey of the National Oceanic and Atmospheric Administration has made approximate determinations of the elevation of MHHW, with respect to MLLW at several selected localities along the northern Oregon coast which range from +7.5 feet at the Columbia River entrance, +8.3 feet at Point Adams, +7.8 feet at Nehalem, and +7.5 feet at Barview.

In an effort to determine the precise elevation of MHW in the Necanicum Estuary, the Portland District Corps of Engineers, with assistance of the National Ocean Survey, in the fall of 1971 installed two temporary tide gauging stations in the Necanicum River at Seaside.

Data Collected 1971.

Datum Plane	Elevation of Datum Plane (feet)		
	Seaside <sup>1</sup>		Indian Beach <sup>2</sup>
	Sewage Plant	12th St. Bridge	
MHHW	4.9	5.3	4.1
MHW	4.2	4.6	3.4
SLD	0.0	0.0	0.0
MLW			-2.6
MLLW			-3.9

MHHW = Mean Higher High Water

MHW = Mean High Water

SLD = Sea Level Datum

MLW = Mean Low Water

MLLW = Mean Lower Low Water

<sup>1</sup>Two months of observation, November and December 1971.

<sup>2</sup>31 high and low waters, observed from 27 January to 14 February, 1972.

As the data indicates, it can be seen what the choking effect caused by the mouth of the river has on the full impact of the tidal fluctuations in the near ocean and the estuary. This is of extreme importance when MHHW is used to set boundaries and determine planning procedures for the estuary.

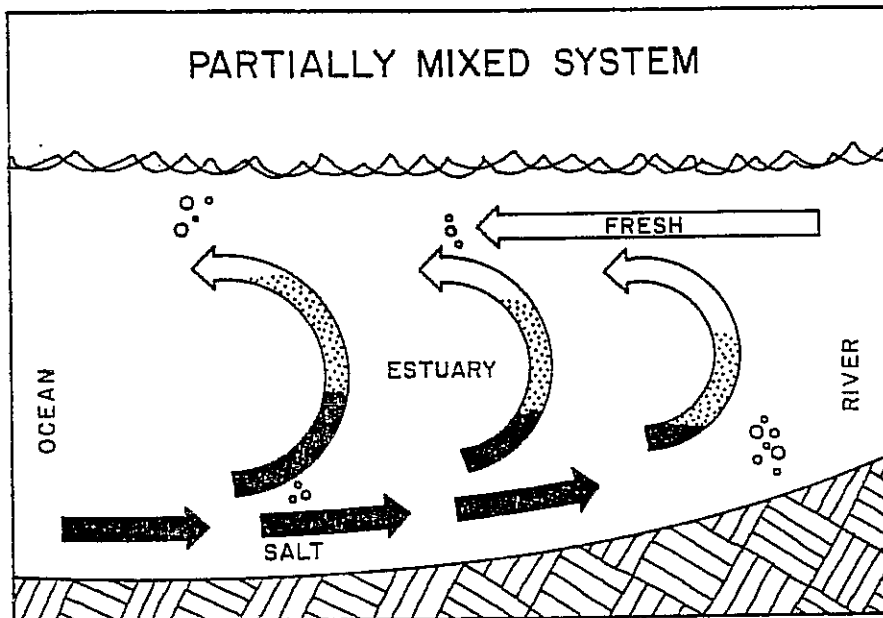
## SALINITY

**Mixing Classification:** Mixing refers to the dilution of salt water and fresh water in the estuary. Salt water is brought in by the tides and fresh water flows in from the rivers and streams. Because of a number of physical factors, such as magnitude of fresh water inflows and the shape of the estuary, the proportions of fresh to salt water can vary widely. (Estuarine Resources OCCDC)

The Necanicum Estuary appears to fall into OCCDC classification of a partially mixed system which they have described in the following way.

The partially mixed system has a difference between the salinity of surface and bottom waters, but without a sharp interface. Relatively moderate to strong tides contribute the energy required to bring about moderate mixing between the surface fresh water and the bottom salt water. Moderate runoff also leads to greater mixing as a sharp interface is not maintained. The estuary has a moderate depth to width ratio which enhances mixing. The difference between the surface salinity and the bottom salinity is 4 percent to 19 percent.

This classification is based on the mixing type with predominates the estuary circulation through the year. Additional data collected during the balance of the year will provide background information for final classification of the Necanicum Estuary.



## Salinity Factors

The nature of the salinity intrusion into the estuary is significant beyond the effect of influencing the water level. Because of the nature of marine water and its saline condition, the way that it interacts with the freshwater and its eventual release for the estuary entrapment, it should be well understood before any modification of influence is brought to bear upon this delicate system.

Because of the increased density of the marine water it can be visualized as a wedge of water moving in under the freshwater system of the estuary and under low flow conditions spending a significant amount of time in the estuary (in some cases beyond the complete tide cycle). This intruded water lays on the bottom and carries with it any material that has been added (such as effluent from sewage outfalls) and in addition provides habitat for marine organisms in top layer freshwater environment.

This condition is particularly true in the Necanicum estuary. (See page A-18) Data collected demonstrates that even on extreme low water cycles it was common to find almost marine conditions in the bottom water at sampling stations up to station No. 4 with a 1/3 meter layer of Necanicum River water running over the top of the dense marine water.

Sampling of this water demonstrated the presence of marine plankton and marine fishes on a continuous basis during low flow conditions.

In contrast, during high flow conditions resulting from heavy rainfall periods, there were more homogenous conditions with freshwater being the dominant condition. Heavy rainfall caused a great deal of mixing in the estuary, making short term barriers of freshwater conditions common.

## Saline Conditions of Tributaries

Necanicum--Because of the degree of freshwater contributed by the Necanicum, the overall salinity is somewhat reduced with most of the estuarine organisms being found only in the very lowest part of the river.

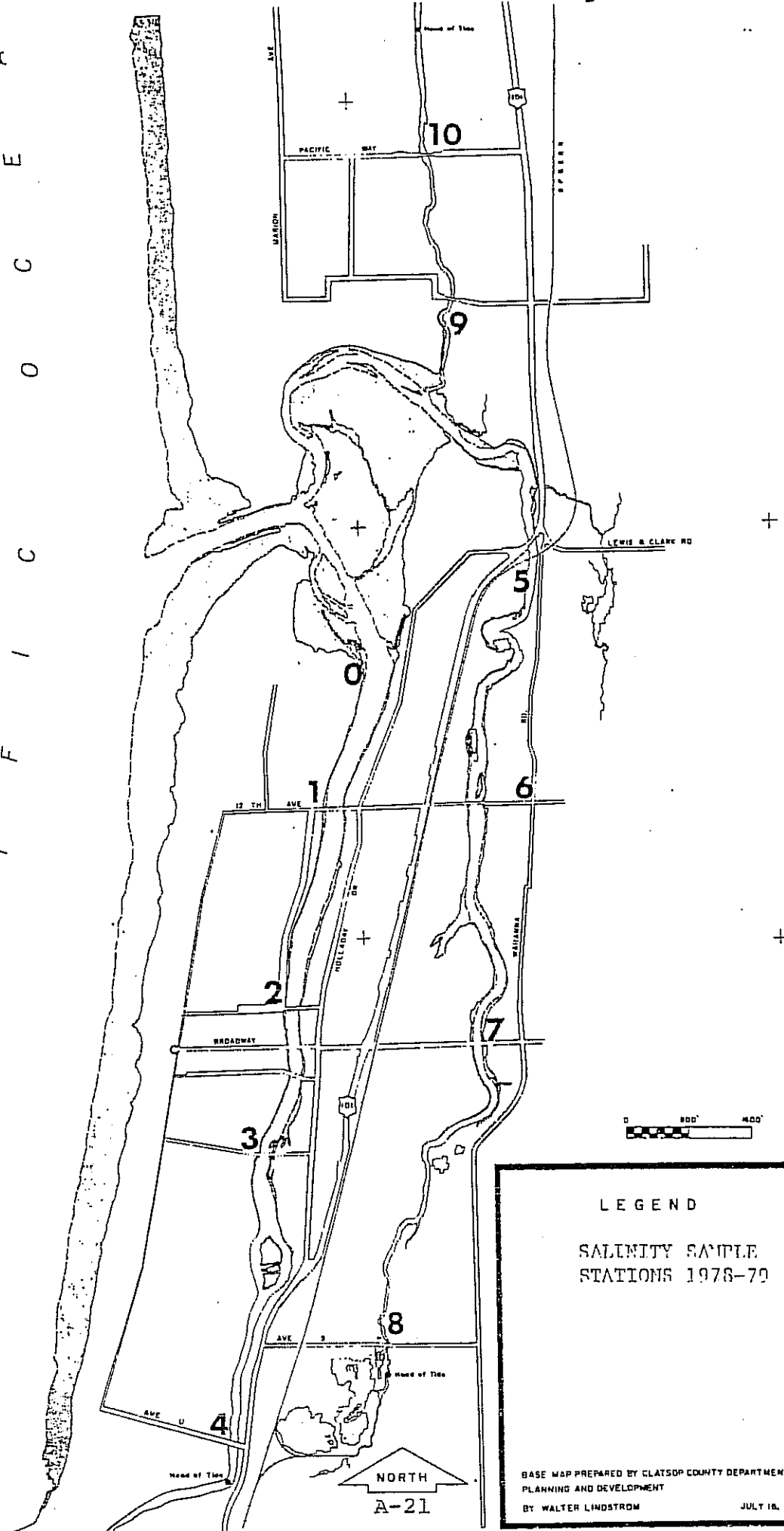
Neawanna--The angle of entry of marine water and low flow conditions allow the overall salinity to be somewhat higher than the Necanicum with a good population of saline demanding organisms in this part of the estuary. (significant eelgrass beds, ghost shrimp, obelia, fucus)

Neacoxie--Because of the presence of marine (estuary adapted) organisms up to the first culvert, the saline conditions demonstrate that they are adequate to support these organisms. Culverts on this tributary reduce the marine intrusion into the upper estuary.

SALINITY PATTERNS  
NECANICUM ESTUARY

DATE	RUN OFF	STATION NO.	SAMPLING TIME	TIDE & TIME	SALINITY ‰	WATER TEMP.
Aug 21	Low	#1 Necanicum	9:35 a.m.	9:31 a.m. -0.6 (LW)	TOP 17.1 BOT. 29.5	15.6 15.3
Aug 21	Low	#2 Necanicum	9:45 a.m.	9:31 a.m. -0.6 (LW)	TOP 25.5 BOT. 30.2	15.5 14.8
Aug 21	Low	#3 Necanicum	9:55 a.m.	9:31 a.m. -0.6 (LW)	TOP 4.3 BOT. 30.2	15.4 14.8
Aug 21	Low	#4 Necanicum	10:05 a.m.	9:31 a.m. -0.6 (LW)	TOP 0.4 BOT. 24.5	15.3 15.6
Aug 21	Low	#1 Necanicum	4:45 p.m.	3:41 p.m. 8.4 (HW)	TOP 9.7 BOT. 30.6	17.3 15.5
Aug 21	Low	#2 Necanicum	4:30 p.m.	3:41 p.m. 8.4 (HW)	TOP 5.0 BOT. 30.0	16.9 15.5
Aug 21	Low	#3 Necanicum	4:15 p.m.	3:41 p.m. 8.4 (HW)	TOP 3.2 BOT. 29.4	16.5 15.5
Aug 21	Low	#4 Necanicum	4:11 p.m.	3:41 p.m. 8.4 (HW)	TOP 0.7 BOT. 23.8	16.1 16.9
Nov 19	High	#5 Neawanna Railroad Tr.	3:30 p.m.	2:46 p.m. 7.8 (HW)	TOP 1.4 BOT. 1.7	7.0 6.9
Nov 19	High	#1	3:15 p.m.	2:46 p.m. 7.8 (HW)	TOP 0.4 BOT. 0.4	6.6 7.0
Nov 19	High	#3	3:00 p.m.	2:46 p.m. 7.8 (HW)	TOP 0.3 BOT. 0.3	-- 6.5
Jan 14	Low	#0 Necanicum Sewage Plant	2:45 p.m.	1:24 p.m. 7.5 (HW)	TOP 21.2 BOT. 30.0	6.6 7.0
Jan 14	Low	#3 Necanicum	3:15 p.m.	1:24 p.m. 7.5 (HW)	TOP 2.2 BOT. 26.9	6.6 6.8
Aug 25	Low	#10	3:10 p.m.	(LW)	6.1	18.6

P A C I F I C O C E A N



# LEGEND

SALINITY SAMPLE  
STATIONS 1978-79

BASE MAP PREPARED BY CLATSOP COUNTY DEPARTMENT OF  
PLANNING AND DEVELOPMENT  
BY WALTER LINDSTROM

JULY 18, 1978

NORTH  
A-21

## Temperature

Temperature variation in the Necanicum system covers a wide range and needs to be considered in reference to the effect on plant and animal populations and the eventual effect on dissolved oxygen (D.O.).

Temperature ranged from a high of 21.3 c. down to a low of 4.8 c. The variation conformed to seasonal patterns, to terrestrial temperatures, the temperature of the watershed runoff and ocean water intrusion temperature. Because of the shallow depth of the Necanicum estuary and its contained state, a great amount of energy is absorbed and stored in these waters, allowing for extreme temperatures in the summer during maximum solar radiation. This is important because of the lost oxygen holding capacity during high temperatures. Variations exist in temperature from top to bottom waters with temperature difference of from 1 to 3 c. between water (see chart).

Crisis conditions could occur during summer periods when maximum amounts of effluent are being processed (as populations peak in summer months) and released in the estuary. Temperatures climb to above 20 c. and D.O. levels dip dangerously low. This combination of events could produce lethal conditions for estuary organisms and planning should be done with these maximums in mind.

### Sample Temperatures (c.)

August		November		January		June	
<u>Top</u>	<u>Bottom</u>	<u>Top</u>	<u>Bottom</u>	<u>Top</u>	<u>Bottom</u>	<u>Top</u>	<u>Bottom</u>
20.6	16.7	7.0	6.9	6.6	7.0	20.2	18.8
15.6	15.3	6.1	7.2	4.8	6.6	21.9	18.9
21.3	18.0	6.6	7.4			17.8	16.0

SECTION B

(Biological)



## PLANKTON

This group of organisms includes those that are weak swimmers and are at the mercy of the water movement (other than vertical movement), floating organisms, and drifting life. This group would include the bacterioplankton (bacteria), phytoplankton (plants), and zooplankton (animals).

Plankton plays an important role in the food web of the Necanicum estuary and during specific times of the year marine plankton becomes the major component of the estuary plankton. This section will deal with only the zooplankton and phytoplankton. The variables that effect the growth and reproduction are extensive and are beyond the scope of this inventory. It can be pointed out that physical and biological factors are vital to the success of these organisms in maintaining a viable ecological setting for maintenance of estuary life. Alterations of any of the physical and biological constituents should be given major consideration in developing an estuary management policy.

### Phytoplankton

Phytoplankton is that part of the planktoners represented by diatoms (single celled plants), dinoplalgellates, and planktonic algae. Phytoplankton represents what some call the "hidden flora" because it is so inconspicuous in our environment. In the Necanicum estuary this is particularly true. In fact, without the aid of the microscope this important plant group would go totally unnoticed. Yet it makes up one of the most significant parts of the energy conversion units of the estuary. It is almost impossible to collect either a sand, mud, or water sample and not find hundreds of diatoms after the sample is prepared for microscopic observation.

Phytoplankton in its production of stored chemical energy, utilizes nitrogen, phosphate, and carbon dioxide. In addition, the diatoms population needs silicate to be used in the formation of a glass-like cast that surrounds its cell structure. Because of the plant qualities of these organisms they need light to carry on the life process and, therefore, are confined to the surface waters and water that will allow light transmission (water with low turbidity).

### Factors Affecting Phytoplankton Growth:

Light, as has been mentioned, becomes a limiting factor and should be considered with the following aspects in mind. The means by which phytoplankton cells use the radiant energy; the intensity of the incident light, the way it is affected as it passes through the water. The availability of base nutrients

is another important factor. These factors are of particular importance when you consider our latitude in Clatsop County, the amount of cloud cover we have during the year and the amount of silt that moves into our river from the terrestrial environment. One of the most obvious reactions to the light intensity change is the tremendous phytoplankton blooms that occur in the early spring along the coast. Great brownish masses, appearing somewhat like an oil spill are blown on the local shores and are obvious in the surf line. Examination shows that they are blooms of phytoplankton by the millions that are responding, by reproducing, to the increased light duration and intensity.

Because of the low flow conditions and relative high saline conditions of the Necanicum estuary during July, August and September (see Chart S1) a nearly marine condition exists on a continuous basis, which allows for many marine species to maintain a healthy population in the estuary. Plankton tows in late July and early August were producing almost totally marine populations of diatoms.

The filamentous diatom *Melosira* is dominant enough in the estuary to identify it within a community structure. One of the obvious communities in the Neawanna is the zoestra-melosira community. *Melosira* is also dominant in the substrate sample and algae mats. A number of the diatoms that normally grow as a part of the benthic community become dislodged from tidal action and become a part of the planktonic group. As a result these organisms contribute to the available food supply for zooplankton and filter feeders.

Note: For some reasons not yet determined the Neawanna tributary demonstrates a tremendous diatom bloom in the spring not observed in the Necanicum and Neacoxie tributaries.

#### Partial Species Lists of Phytoplankton in the Necanicum Estuary:

<u>Bacillaria sp.</u>	<u>Skeletonema sp.</u>
<u>Rhizosolenia sp.</u>	<u>Biddulphia longicruris</u>
<u>Coscinodiscus centralis</u>	<u>Nitzschia closterium</u>
<u>Chaetoceros sp.</u>	<u>Melosira moniliformis</u>
<u>Thalassionema nitzchiodes</u>	
<u>Asterionella japonica</u>	<u>DINOFLAGELLATES</u>
<u>Chaetoceros debilis</u>	
<u>Thalassiosira decipiens</u>	<u>Noctiluca sp.</u>
<u>Ditylum sp.</u>	<u>Peridinium sp.</u>

Net tows were made at high and low water cycles for comparison of populations present. (see Chart P1 for tow stations)

Chart Explanation:

The density of phytoplankton to the water volume will be rated only as high, medium, and low relative to the water sampled. Sample density is related to the relative density of the individuals within the sample.

- (D) Dominant -- organism makes up the major portions of the sample (there may be more than one species in this category).
- (M) Many -- a number of individual organisms, but not the dominant organism.
- (I) Individuals -- isolated species present in the sample.

# PHYTOPLANKTON INVENTORY

	<u>July</u>	<u>August</u>	<u>January</u>	<u>March</u>
Plankton Density	High	Medium	Low	Very High
SPECIES				
Bacillaria sp.	I	I	-	-
Rhizosolenia sp.	I	I	-	I
Chaetoceros sp.	D	M	-	D
Thalassionema nitzchiodes	I	I	I	M
Asterionella japonica	M	M	-	M
Chaetoceros debilis	M	M	M	M
Thalasssisira deciapiens	D	M	I	I
Ditylum sp.	I	-	-	I
Skeletonema sp.	I	I	-	-
Biddulphia sp.	M	I	I	M
Nitzschia closterium	I	-	-	I
Melosira moniliiformis	D	D	-	I
Coscinodiscus centralis	I	I	I	I
Dinoflagellates				
Noctiluca sp.	I	-	-	-
Peridinium sp.	-	I	-	I

## Macro Algae:

In general the macro-algae population of the Necanicum estuary is low and includes few species. One of the most conspicuous limiting factors is the lack of substrate for holdfast attachment of the larger algae. In those areas where there is adequate substrate (rocks, logs, and rip-rap) a good population of algae takes hold. There are only a few rock outcroppings with the rest of the substrate being sand and mud in the lower estuary.

The algae populations for the most part are confined to the Neawanna and Neacoxie.

### Species List for the Necanicum Estuary

Ulva lactuca  
Fucus distichus  
Enteromorpha sp. (2)  
Cladophora gracilis  
Polysiphonia pacifica

## Eel Grass:

Shallow water eel grass small populations in the Neawanna tributary of the Necanicum estuary. The total area is less than one acre and confined to the 1 to 2 ft. shore areas. The eel grass population is quite variable as to success from year to year.

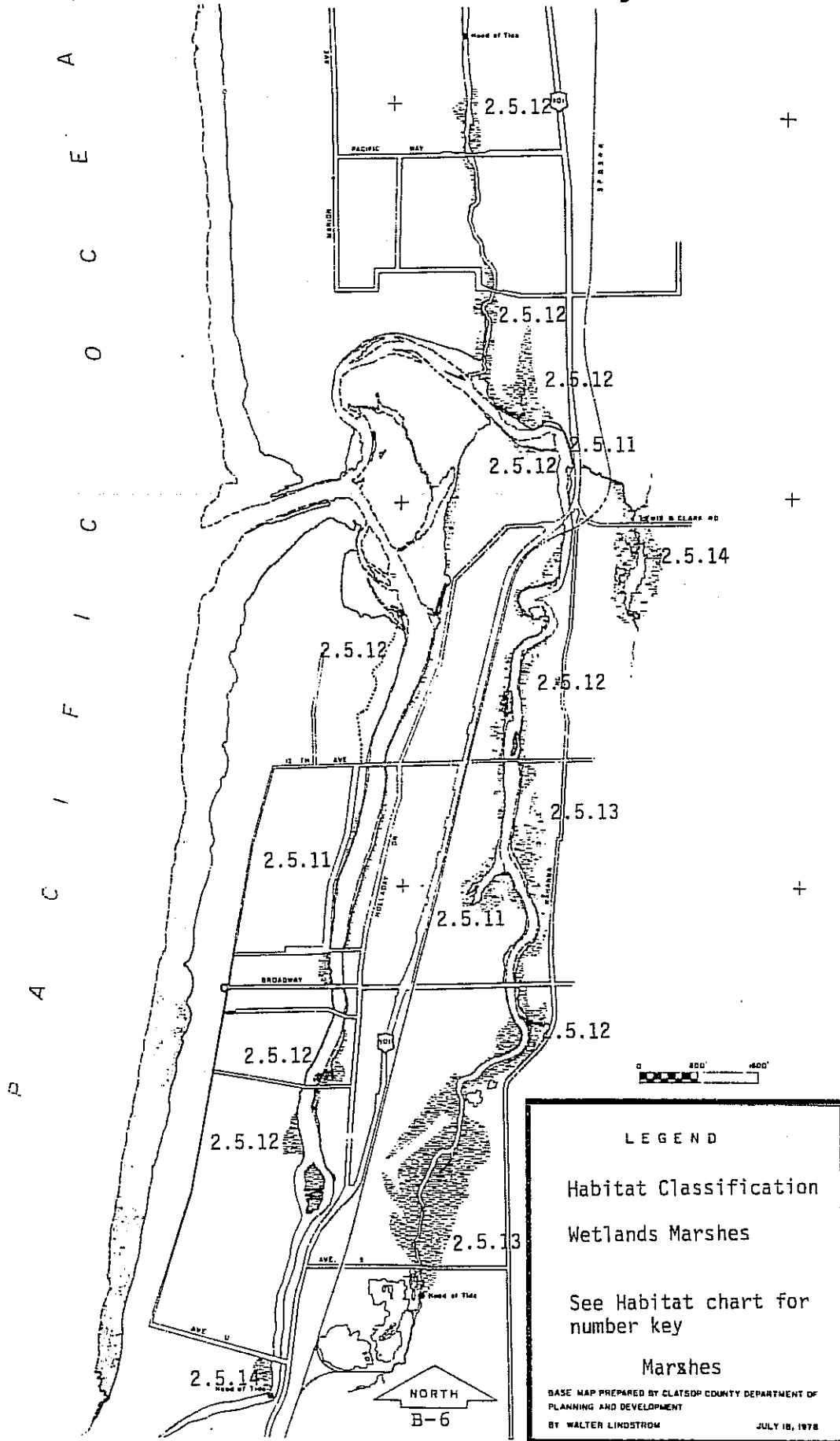
Zostera marine, which is one of the rare members of the spermatophyte plants that grows in aquatic saline conditions, is normally submerged by water on a continuous basis. Because of its tolerance for saline waters and the need to be protected from wave shock it is normally found in estuarine waters.

Eel grass is an important part of the estuarine ecosystem because it provides large amounts of detritus. It provides a hiding and breeding place for many fishes and invertebrates. And a large number of polychaete worms and crustaceans are found among its rhizomes. It also provides substrate and habitat for diatoms, algae, and crustaceans.

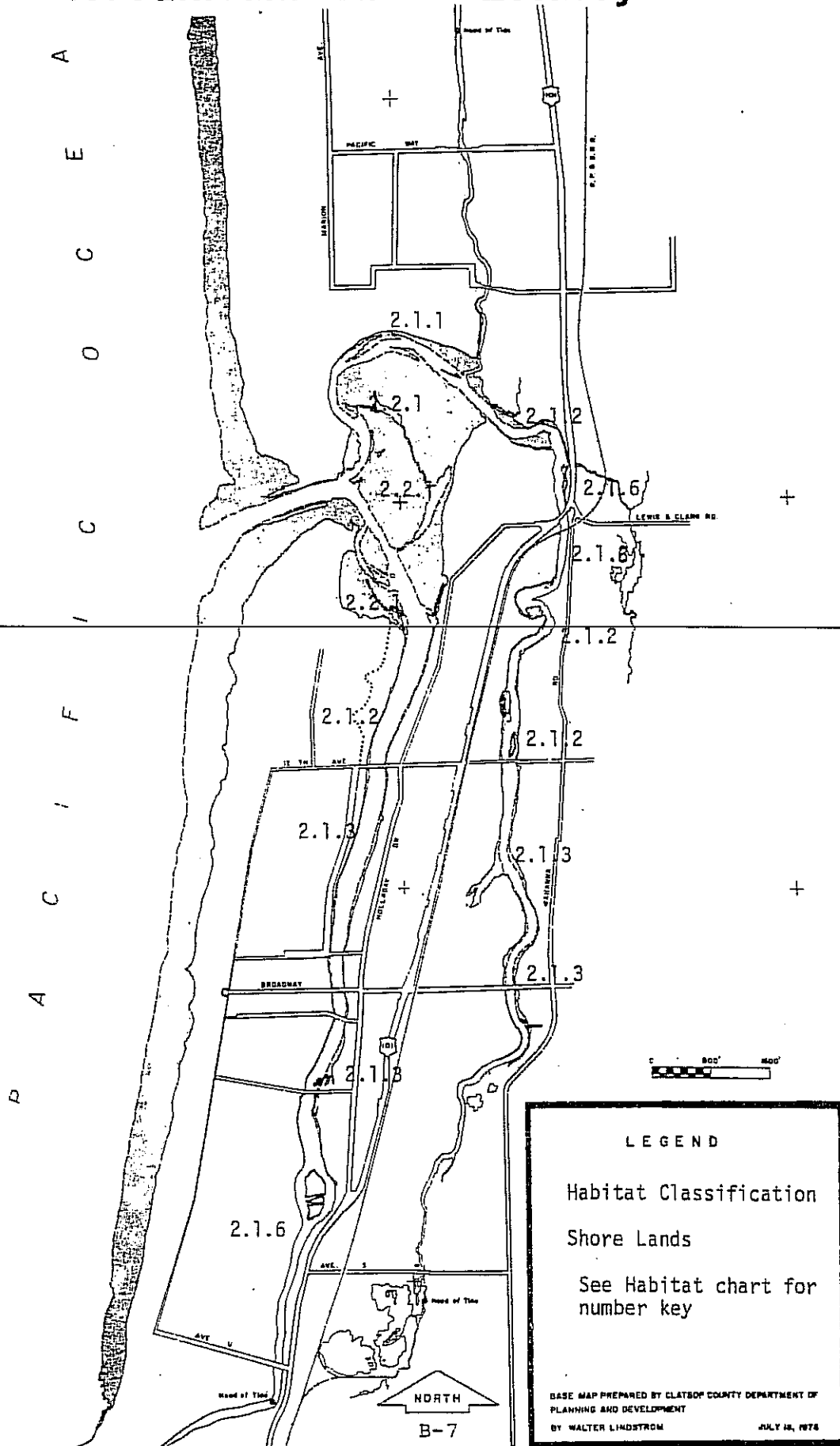
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# N Necanicum River Estuary

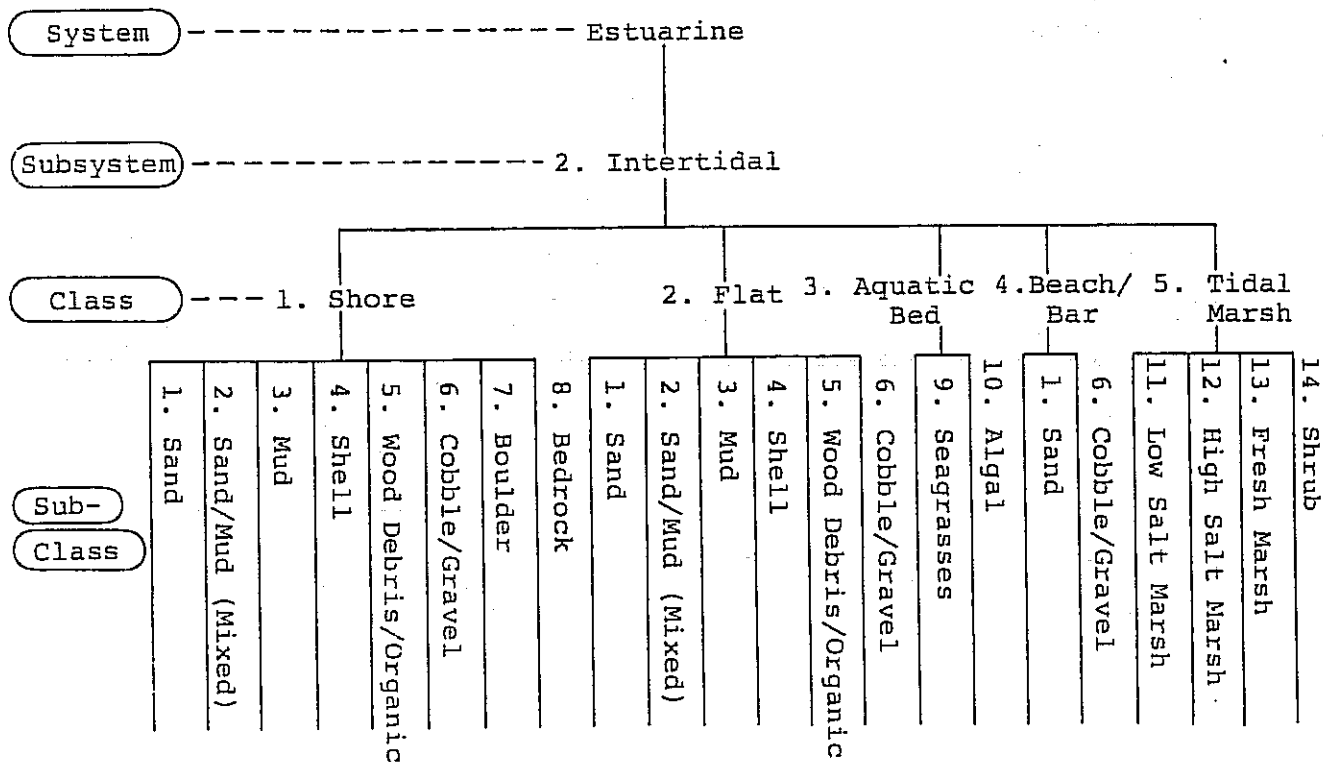


# N Necanicum River Estuary

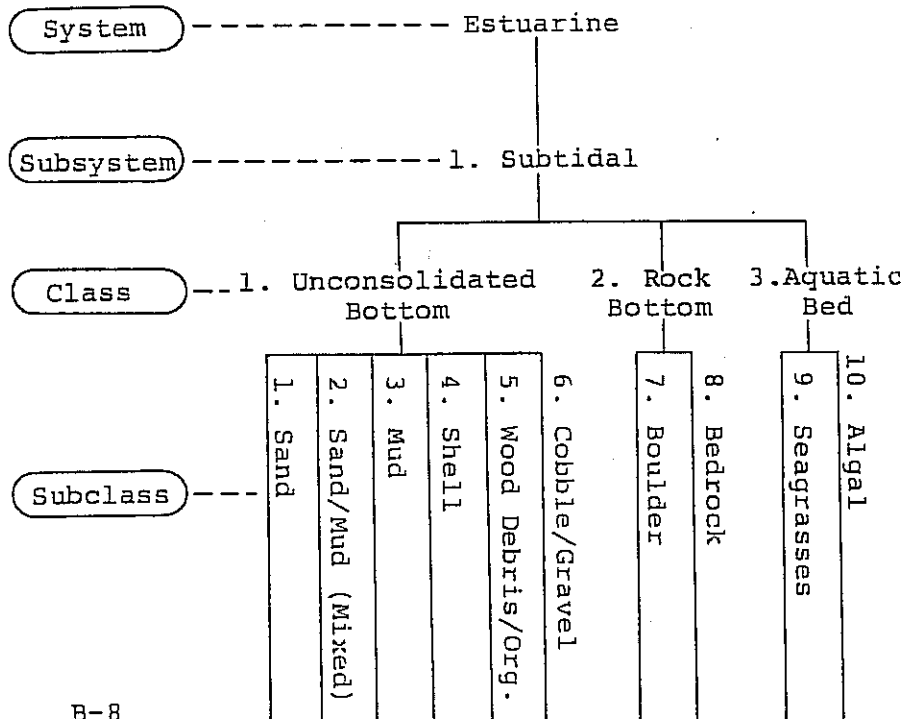




# ESTUARINE HABITAT CLASSIFICATION SYSTEM



Modified from  
"Classification  
of Wetlands and  
Deep-Water Habi-  
tats of the United  
States", Fish and  
Wildlife Service,  
U.S. Department  
of Interior,  
October 1977.



## ESTUARINE MARSHES

The marshes of the Necanicum River Estuary include those marshes, tidelands and shallow waters associated with tidal influence that produce a unique habitat that can be identified by the invasions of particular kinds of marsh plants. In the Necanicum River Estuary, of the 278 acres of estuary, approximately 150 acres fall into this description. Although there are no vast expanses of marshes, there are still enough small isolated units to possibly maintain the vitality of the estuary. The marshes of the Necanicum Estuary run 4.5 kl in the Necanicum system, 6 kl in the Neawanna, and 2 kl in the Neacoxie system.

Using the following definition (O.C.C. & D.C. 1974) for tidal marsh wetlands, "The tidal marsh wetland type is composed of those communities of vascular aquatic and semi-aquatic vegetation rooted in poorly-drained, poorly aerated soil, which may contain varying concentrations of salt occurring from lower high water inland to the line of non-aquatic vegetation." The following topics will be considered in this section: (1) Role of Tidal Marshes in Estuary Dynamics, (2) Biological Systems, (3) Formation of Marshes and Their Succession, and (4) Marsh Inventory of the Necanicum Estuary.

The vital role that estuary wetlands play in the natural cycle of the estuary has only been recently realized to the degree that management programs have been instituted to protect this resource. With estuaries being far more productive than most other types of habitats (Chart M1) and that productivity being of direct benefit to man, serious consideration should be given to their protection. Confirming studies are just now being done on the west coast, as they have on the east coast a number of years ago, to demonstrate the specifics of that productivity and its benefit.

TABLE M1

General Orders of Magnitude of Gross Primary Productivity  
In Terms of Dry Weight of Organic Matter Fixed Annually

<u>Ecosystem</u>	<u>gms/M<sup>2</sup>/year</u> <u>(grams/square meters/year)</u>	<u>lbs/acre/year</u>
Land deserts, deep oceans	Tens	Hundreds
Grasslands, forests, eutrophic lakes, ordinary agriculture	Hundreds	Thousands
Estuaries, deltas, coral reefs, inten- sive agriculture (sugar cane, rice)	Thousands	Ten-Thousands

(From: The Conservationist 1971, The Role of Tidal Marshes,  
Dr. Eugene Odum)

## BIOLOGICAL SYSTEMS

The most vital link in the food chain in this aquatic environment is the marsh plants as they process solar energy in the presence of chlorophyll, carbon dioxide and water to produce carbon compounds. In this process the marsh plants assimilate and convert phosphorous and nitrogen into compounds that are necessary for many of the estuary organisms. The success of these photosynthetic plants in converting sunlight into stored chemical energy will determine the productivity of the estuary marshes and the eventual productivity of the whole estuary.

As opposed to the terrestrial (dryland) environment where much of the green plant is consumed and put into the energy cycle when it is alive, the marsh plant serves the greatest importance in the system as it dies and forms the base of the food chain as decaying plant matter (detritus). Also important in this discussion is the fact that the nutrient fertilizers are cost free as products from the tidal action and freshwater runoff, as opposed to high yield agricultural crops which demand a huge investment of petroleum based nutrient fertilizers for an energy return.

The organic debris resulting from this plant decay is maintained within the estuary and becomes the foundation for the energy cycle. (i.e. In an intertidal salt marsh, less than 10 percent of living plant material is consumed by herbivores and 90 percent goes the way of the detritus-feeders and decomposers [Teal, 1962]). The decay is a result of bacteria colonization which significantly increases the protein content of the original particle. In addition the detritus may be consumed directly by a host of estuary animals such as amphipods, clams, shrimp, and worms as well as other forms. In turn these organisms become food for organisms higher in the food chain, such as fish, birds and ultimately man.

The storage aspect of the estuarine marshes are not to be overlooked in this cycle. The marshes play an important role in the storage of nutrients that become a buffer against heavy stress on seasonal shortage (e.g. winter). As described by Clark (1974): marsh grass in its entirety--roots, leaves, flowers, stems--provide storage upon which the regularity of nutrient supply to the estuarine food chain depends.

This brief description in no way describes the intricacies of food cycles in estuaries. It is used here only to demonstrate the role of the marsh plants and their significance as the base of the food pyramid as decaying organic matter.

In addition the marshes contribute to the productivity of the estuary by providing favorable conditions for the increased growth of algae by reducing the turbidity of the water and by decreasing velocity of the water during heavy runoff. Because of this unique environment, associated mud flats become biological gardens for the growth of diatoms (single-celled algae) and other algae.

### Fish and Wildlife Habitat

The role of the marshes, in addition to the energy factors, is significant in providing habitat for a number of associated animals. Although the total acreage is low in the Necanicum River Estuary, it still provides important habitat for raccoons, mink, otter and a number of other small mammals. Because of the urbanization of much of the associated marshes, animal movement is restricted to the more open areas.

One of the most critical and least obvious to the layman is the role that marshes play during the high tide cycle in providing habitat for the fishes. This is especially true of the anadromous fishes, such as coho salmon and steelhead during their downstream migration. As the salmon spend a period of time in the estuary before their migration to the sea, the daily flood of large areas of low marsh is critical to their survival. The marsh fringes provide protection and an important food in the form of small aquatic animals that are plentiful in the marshes because of the detritus cycle.

Marsh habitats are important to both migrant and resident birds. Not only does the marsh provide habitat for the nesting cycle, but is important as a food supply to many local and migrant species. Census counts show particularly heavy use by migrating birds and ongoing use of the high marsh by resident birds.

Some of the uses of the marsh are very subtle and for the most part go unnoticed. An example is the role that the sedges play in the life cycle of the lady bug beetle. In July and early August the beetle larva can be seen moving up the sedge plants very near the water's edge and within a few days thousands of lady bug adults can be observed emerging from the sedge marshes. The most accessible location for observation is near the Broadway bridge on the east side of the Neawanna. The marshes as breeding and hatching habitat for insects takes on new meaning when we consider the importance of the insects in maintaining important ecological balance, as in the case of the lady bug beetle who is a predator and preys upon aphids.

## Marshes-Control Erosion and Store Water

Wetland vegetation can play an important role in providing stability to shorelands by protecting them from the erosive forces of heavy winter runoff and storm driven tides. At the same time they help control the rate of runoff by reducing the velocity of the runoff. Because of the nature of the marsh substrate they are also critical in storing water during low water periods.

## Water Quality Control

Within certain limits, wetlands and associated marsh plants can play an important role as natural purifying agents of water. As long as the surface area of marshes are maintained they have a tremendous potential for absorbing nitrogen and phosphorous from sewage. Each wetland has a limited capacity and to exceed that would deplete the oxygen needed for a balanced ecological system. Coastal rivers already carry a large supply of oxygen depleting nutrients; therefore, the use potential of the marshes as water purifying agents must be balanced with their ability to handle the peak loads. In the case of the Necanicum Estuary almost 50% of the marsh area has been covered over with fill, thereby reducing the potential for water quality functions.

Because the shallow estuary waters trap and hold heat which reduces the impact of cold ocean waters and mountain water this may have important impact on growth cycles and reproduction rates of marsh plants.

## Recreation Value

Marshes can withstand limited impact and do not recover well from inappropriate use. They have recreational value to the hunter, the fisherman, the nature enthusiast and photographers. In considering uses of marsh area serious consideration should be given to the nature of the recreation use that it does not cause irreversible damage to the marsh and wetlands.

In addition the marsh serves an intrinsic aesthetic function as open space and as an expected associated part of an estuary system. This function is difficult to measure but should be considered in the decision making process for local planning.

## FORMATION OF MARSHES AND THEIR SUCCESSION

The marshes and marsh potential area are generally going through some type of progressional change to build the site to a more complex community. In the early formation of marshes the substrate is invaded by one of the early colonizers (in the Necanicum they would normally be woody glasswort or salt grass) which acts as a substrate binder. As the colonization continues and the area traps more substrate, other talophytes begin to establish themselves. In the Necanicum we could expect seaside arrow grass, seaside plantain, and Jaumea to become part of the understory. This stabilized environment would cause a rise in elevation resulting in a vegetation pattern of Lyngbyes' sedge, tufted hairgrass, salt rush, and Pacific silverweed. There are a number of variations from this pattern but this represents a sequence that could be expected. This process may involve a period of years to occur and will be influenced by the nature of the substrate (sand or silt) and by the major water influence (salt or fresh).

Marshes appear to constantly be in a stage of advancing to the next higher form with little likelihood of regressing to a previous condition. At this time there are only a few isolated sites where marsh formation, in the earliest stages, is occurring in the Necanicum River Estuary. Most of this activity is in the lower part of the Neawanna system. In general the marshes of the Necanicum system are in the immature high marsh condition advancing to the mature high marsh environment.

### Tidal Marsh Classification

#### Marsh Class:

Higher intertidal land forms that are predominantly covered more than 30% by erect, rooted herbaceous or woody hydrophytes. The tidal marsh generally occurs from lower high tide inland to the line of non-aquatic vegetation.

#### Description:

Water often moves through marshes in non-vegetated channels. The tidal marshes are a main source of primary production for the bay. Oregon tidal marsh plants are persistent, that is they are dominated by species that normally remain standing at least until the next growing season. Like flats, marshes tend to be either in equilibrium or increasing in elevation and expanding onto adjacent flats. Seldom under natural conditions would a marsh revert to a flat or a high marsh to a low marsh.

### Subclasses of Tidal Marshes:

- (1) Low Salt Marsh. Low Salt Marshes are entirely flooded by most high tides and, therefore, are capable of adding to the estuarine food supply on a daily basis. Tidal runoff is generally diffuse rather than contained in deep ditches. Five Oregon Low Salt Marsh categories are currently used: Low Sand Marsh, Low Silt Marsh, and Sedge Marshes in more saline areas; and Bullrush and Sedge Marshes, and Gravel Marshes in areas subject to lower salinities.
- (2) High Salt Marsh. High Salt Marshes usually rise abruptly 30 cm to 1 meter above the adjacent flat, shore or low marsh. The substrate is typically high in organics -- often as an organic mat over clay. The marsh surface is just covered by most higher high tides. Tidal runoff follows well defined channels. The marsh surface is relatively level. Two main High Salt Marsh categories are currently used: Immature, being somewhat lower with less defined channels and a greater variety of plant species; and Mature, with well defined features and vegetated mainly by grasses, rushes and forbes.
- (3) Fresh Marsh. Fresh Marsh occurs inland of salt marsh where the substrate is non-saline, or as the surgeplain marsh in the upstream portion of the estuary where fresh water under tidal influence periodically inundates the marsh. Vegetation is herbaceous with sedge, bullrush and cattails usually dominating.
- (4) Shrub. Shrub wetlands may occur as the inland extent of the estuary. In Oregon, willow is the primary semi-aquatic woody plant that is likely to occur. Willow, however, does not tolerate salt and so is associated with estuarine Fresh Marsh rather than Salt Marsh. Some trees may be found in these areas.

## MARSH INVENTORY OF THE NECANICUM ESTUARY

- (1) This marsh represents one of the largest marsh areas of the Necanicum system that is still basically in its original condition. It is bordered on the river's edge by a low salt marsh that grades to a high salt marsh. The low salt marsh is characterized by woody glasswort, salt grass, Jaumea and seaside plantain.

With a change in elevation the area demonstrates plant characteristics of a high marsh with tufted hairgrass, and salt grass. Increased elevation sees the vegetation type moving to Pacific silverweed, creeping bent grass, tufted hairgrass and salt rush. The deeply carved channels are bordered with Lyngbyes' sedge.

Because of the sand dune like nature of some of the area, plants that are more representative of sand dunes can be found, such as large headed sedge beach pea and American dune grass. At the very south end of the identified marsh a sedge marsh can be found.

- (2) Although most of the identified section of the estuary is filled on the west side, there are small patches of sedge marsh on the west side and a slightly large border on the east shore also of sedge marsh and tufted hairgrass.
- (3) A small low salt marsh only a block long between the Oceanway Bridge and Broadway Bridge. A sedge marsh is located on both sides of the estuary and grades to a high marsh environment of Pacific silverweed, tufted hairgrass, and seaside dock on the west side.
- (4) A small island that has become a high marsh environment of tufted hairgrass and Pacific silverweed. An associated sedge marsh on the east shore grading to a high marsh of tufted hairgrass, Pacific silverweed and Seaside Dock
- (5) This marsh area is a portion of what is left of a large land fill. This particular site is a good example of a mature high marsh with a wide variety of marsh plants. The dominant plants being represented by tufted hairgrass, and Pacific silverweed.
- (6) Two large islands located in the middle of the estuary. Bordered by sedge marsh and grading to a high marsh of tufted hairgrass, Pacific silverweed and Lyngbyes' sedge. A part of the southern island has gone through a successional process to now be supporting a small stand of willow and a few spruce.



- (7) This area is high in the estuary system and is characterized by a number of freshwater plants and should be considered as a fresh marsh even though it is not above the line of salt water intrusion. The plant species are represented by freshwater sedge, cattail and Pacific silverweed.

#### Neawanna System

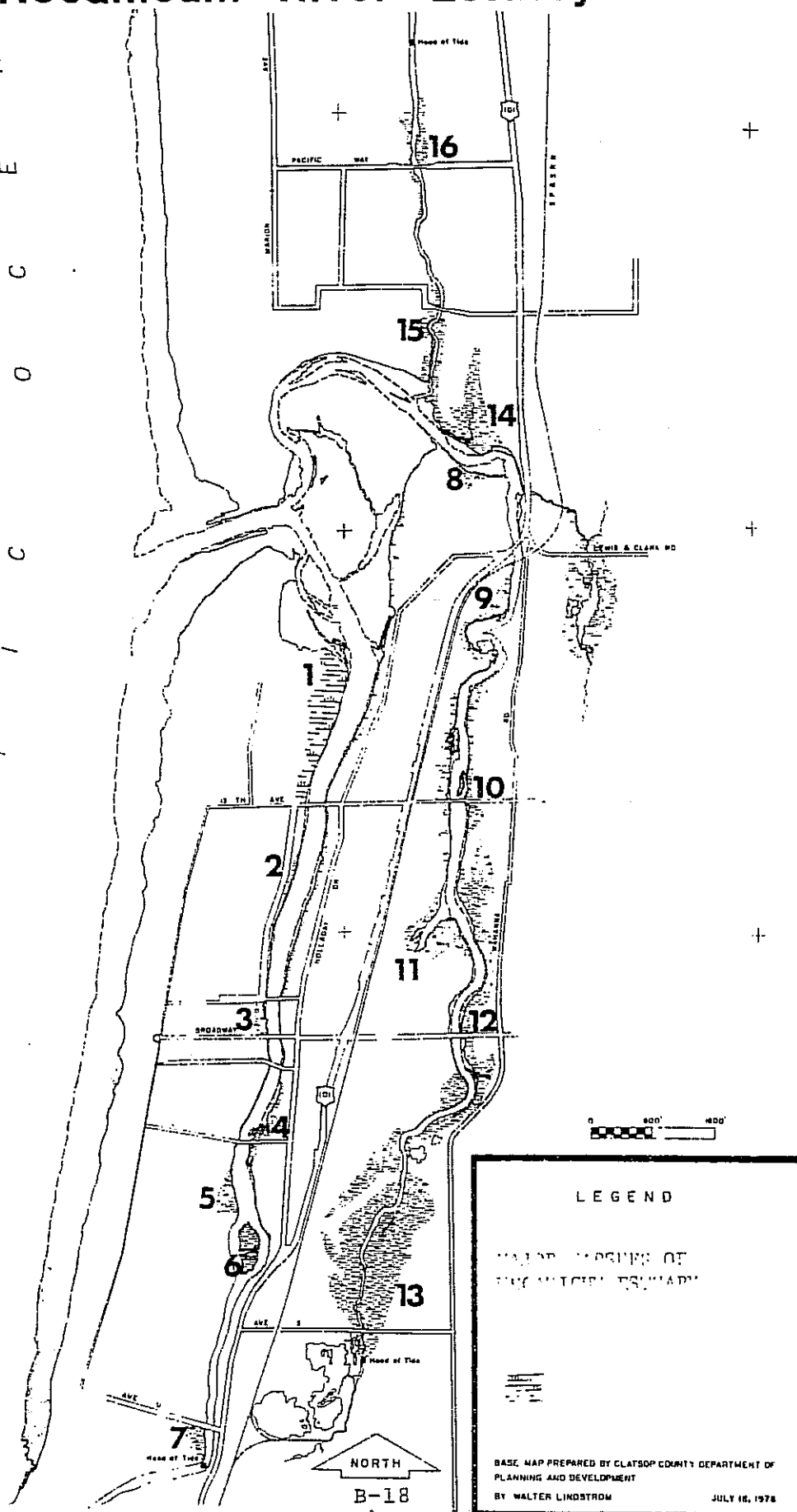
- (8) A small marsh of the Neawanna that is left from a diking and filling project. A low salt marsh is just starting to build in this area and is being colonized by woody glasswort and salt grass. The shore section is a high salt marsh represented by woody glasswort, salt grass, Jaumea, fox tail grass, seaside plantain and American dune grass in the higher elevations.
- (9 & 10) High salt marshes bordering the Neawanna. These marshes have similar elevations and common plant structures. They are border marshes that run parallel with the shoreline. The plant population is made up of woody glasswort, Hordium, salt grass, salt bush, Jaumea, tufted hairgrass, salt rush, Pacific silverweed, and American dune grass.
- (11) This site represents the largest sedge marshes of the Necanicum Estuary. It is flooded by most high tides. The Lyngbyes' sedge surrounds a large mud flat that drains this area. A recent fill has covered some of the high marsh environment that surrounds this sedge marsh. This marsh may well represent the source for much of the organic debris that moves into this part of the estuary system.
- (12) A shore border high marsh with much the same character as marsh 9 & 10 with the addition of two stands of great American bullrush and a Lyngbyes' sedge marsh on the near shore of this high marsh. Large populations of lady bugs have been observed hatching in this particular sedge area. The beetles use the sedge to move onto during their larval stage before turning into the flying adults.
- (13) This marsh is high in the Neawanna estuary and is demonstrating a transition from a salt marsh environment to the fresh marsh condition. This is the single largest marsh area in the system. The plant population is represented by tufted hairgrass, Pacific silverweed, salt grass and a scirpus species found in fresh marshes.

#### Neacoxie System

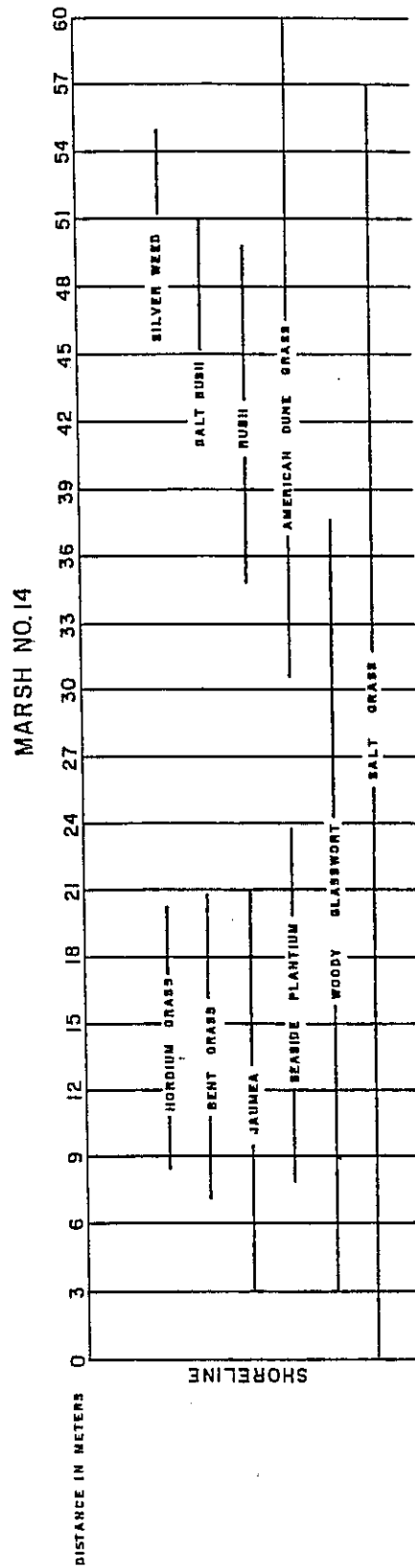
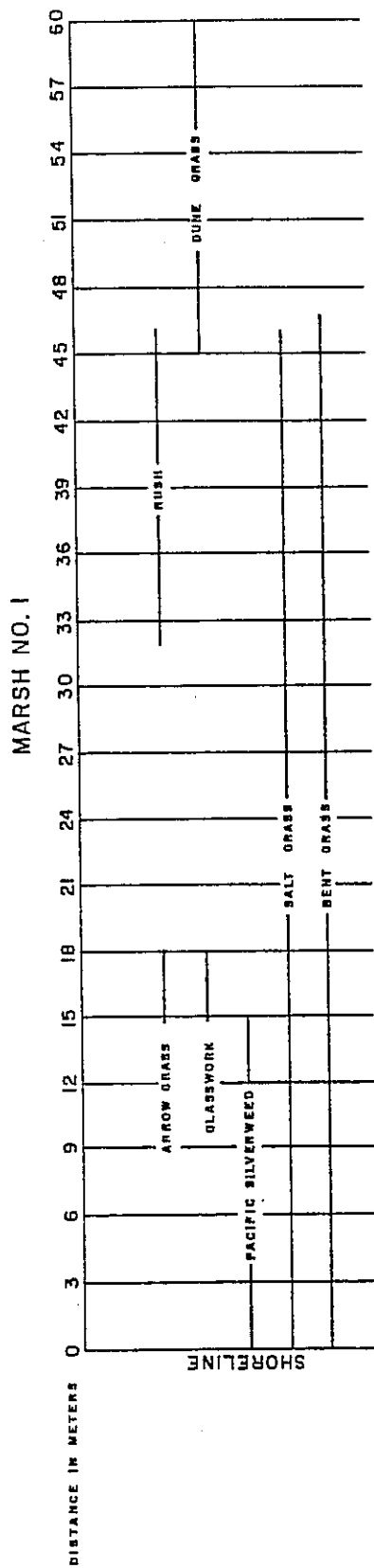
- (14) A large open space marsh area at the confluence of the Neacoxie and Neawanna. A broad flat high marsh that grades into a shrub marsh on the Northern end. The shoreline plants are a typical cover of woody glasswort, Jaumea, and salt grass. The upper reaches of the marsh are dominated by American dune grass. This marsh represents the largest salt marsh in the estuary and should have specific protection.

- (15) The Neacoxie tributary of the estuary has a continuous wetland along its shores to the head of tide. This is a narrow marsh and is characterized as a high marsh with near shore populations of Jaumea and salt grass. The elevated parts of the marsh consist of creeping bent grass, Pacific silverweed, salt bush, sea milkwort, salt rush and seaside arrow grass. A culvert below this marsh limits the tide movement.
- (16) This marsh environment is near the identified head of tide and is also limited by a second culvert. The marsh would fall into the high marsh class and is invaded by spike rush, triglochin, Pacific silverweed and Lyngbyes' sedge.

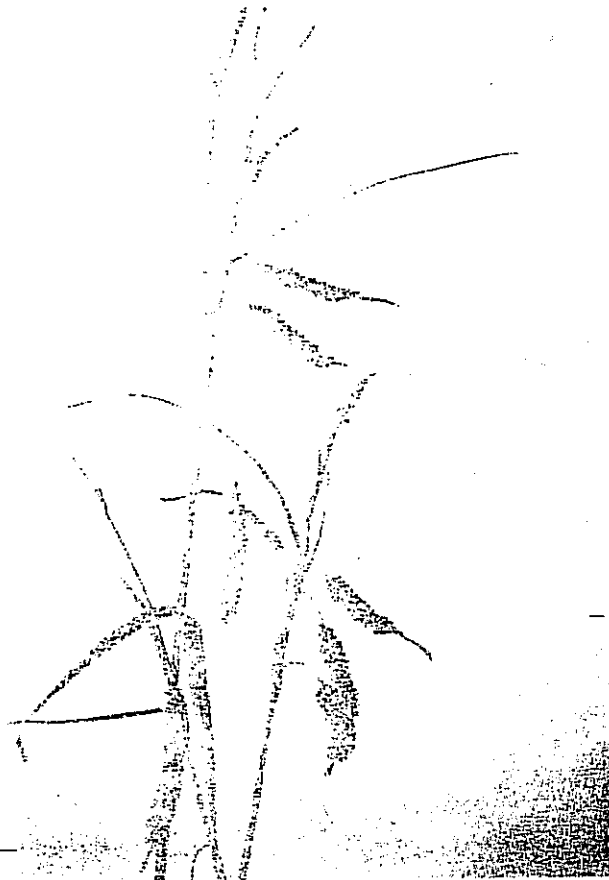
Q. A. E. C. C. C. A.



# MARSH PLANT DISTRIBUTION—NECANICUM ESTUARY



# Marsh Plants



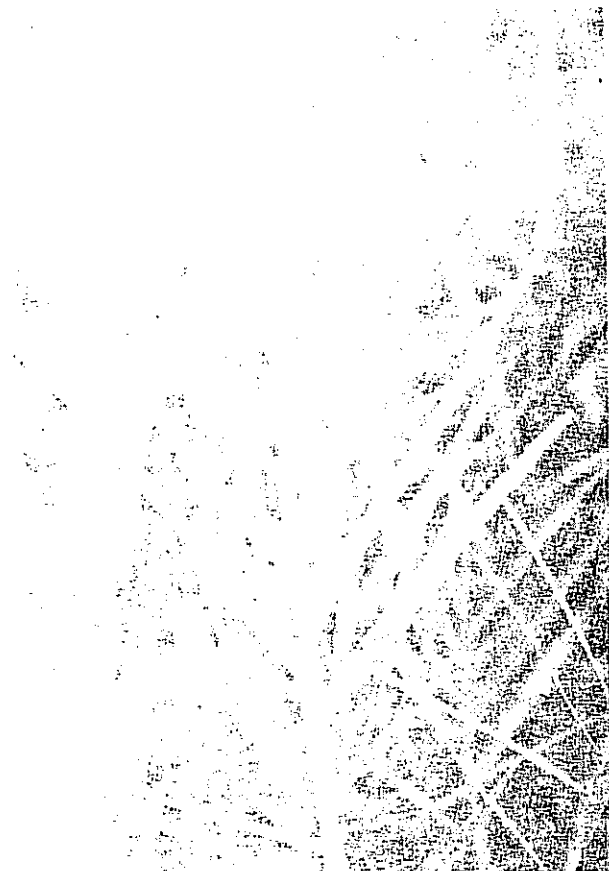
SEDGE



GLASSWORT



PACIFIC SILVER WEED



GRASS



TUFTED HAIRGRASS

Checklist of Necanicum Estuary  
Marsh Plants

<u>Common Name</u>	<u>Scientific Name</u>
European Beach Grass	<u>Ammophila arenaria</u>
Thrift	<u>Armeria maritima</u>
Bent Grass	<u>Arostis alba</u>
Salt Bush	<u>Atriplex patula</u>
Slough Sedge	<u>Carex obunupta</u>
Large-Headed Sedge	<u>Carex macrocephala</u>
Lyngbyes' Sedge	<u>Carex lyngbyei</u>
Salt Marsh Dodder	<u>Cuscuta salina</u>
Tufted Hairgrass	<u>Dischampaia caepitosa</u>
Salt Grass	<u>Distichlis spicata</u>
Spike Rush	<u>Eleocharis sp.</u>
American Dune Grass	<u>Elymus mollis</u>
Tall Fescue	<u>Festuca sp.</u>
Sea Milkwort	<u>Glaux sp.</u>
Fox Tail	<u>Hordeum sp.</u>
None	<u>Jaumea carnosa</u>
Baltic Rush	<u>Juncus balticus</u>
Beach Pea	<u>Lathyrus japonicus</u>
Seaside Plantain	<u>Plantago maritima</u>
Pacific Silverweed	<u>Potentilla pacifica</u>
Seaside Dock	<u>Rumex sp.</u>
Ditch-grass	<u>Puppia sp.</u>
Woody Glasswort	<u>Salicornia virginica</u>
None	<u>Scirpus macrocarpus</u> (freshwater)
Three Square Grass	<u>Scirpus maritimus</u>
Seaside Arrow Grass	<u>Triglochin maritima</u>

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## Zooplankton

The zooplankton-phytoplankton interrelationship is an important factor in the dynamics of the estuary system. The phytoplankton makes up the food supply consumed by the zooplankton and it is dependent upon an ample supply. As a result the zooplankton functions as a first order consumer in the estuary food cycle. In turn the zooplankton becomes the basis of a chain of predator prey cycles in the estuary that leads to success of a major part of the food web in the estuary.

Zooplankton cycles and population changes are a characteristic factor of this group. As salinity and freshwater vary through the year, the shift in individual zooplankton and their numbers responds accordingly. Just how populations change in the Necanicum estuary will not be known until studies have been completed.

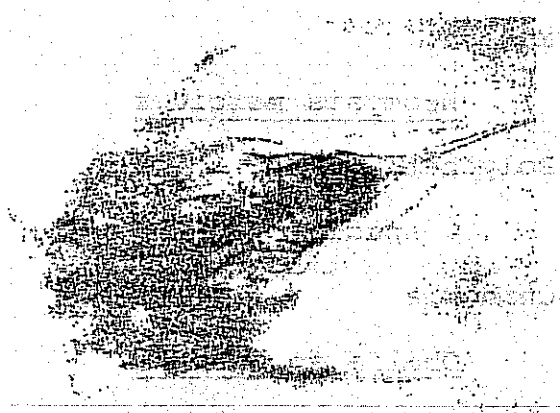
Zooplankton is not a homogenous group but is made of many individuals that are passing through a plankton stage of their life cycle (in the Necanicum estuary the nauplius stage of the barnacle is one of the most obvious parts of the plankton, page photo ). Other examples would include the fish eggs and larva, benthic worm larva, and many of the crustacean and echinoderms. Other parts of the zooplankton population include forms that spend their entire life as plankton, such as the copepods and cladocerans. Most of the major phyla of organisms show up as plankton at some point in their life cycle. A number of these examples can be found on page .

Because no definitive studies have been done on the ecological aspects of the zooplankton, the assessment must remain as a generalized view of plankton in estuaries and an inventory species list which will display the general populations during the year. Very few of the organisms are permanent residents of the estuary but are tidal in nature and come to this estuary as a part of the marine tidal population. A few individuals originate from the Neacoxie, Mill Creek, Neawanna and the Necanicum tributaries.

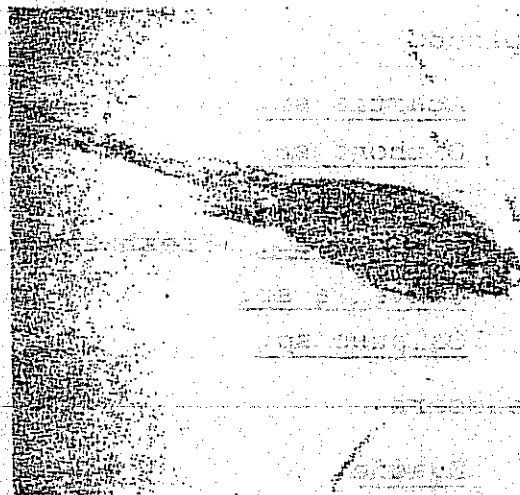
Inventory studies conducted during the summer of 1978 show an almost total marine condition owing to the high salinity of the estuary in the summer.



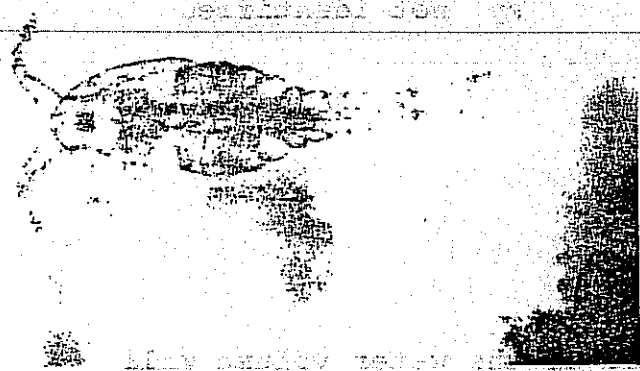
# Plankton



BARNACLE LARVA



COPEPOD



CYCLOPS-COPEPOD



POLYCHETA LARVA



CRAB LARVA (zoea)



MEDUSA-OBELIA

# Necanicum Estuary Zooplankton

## Copepoda

Acartia sp.  
Oithona sp.  
Eurytemora sp.  
Cyclops sp. (Freshwater)  
Canvella sp.  
Calanus sp.

## Cladocern

Evadne

## Ctenophores

Pleurobrachia sp. (Spring)

## Gastropoda

Clam larva

## Mysids

Neomysis mercedis

Polycheta larvae

2 species

Cnidaria

Obelia sp. medusa

Decapoda larvae

Crab zoea

Cirripedia

Barnacle nauplius

Fish Eggs

sp. not identified

## Chart Explanation

The density of zooplankton relative to the water volume will be rated only as high, medium and low. Sample density is related to the relative density of the individuals within the sample.

- (D) Dominant--makes up the major portions of the sample (there may be more than one species in this category),
- (M) Many--a number of individuals, but not the dominant organism,
- (I) Individuals--isolated species present in the sample.

# ZOOPLANKTON INVENTORY

	<u>July</u>	<u>August</u>	<u>January</u>	<u>March</u>
Zooplankton Density	High	Medium	Low	Low
SPECIES				
Copepod				
Acartia sp.	D	D	M	I
Oithona sp.	M	M	M	-
Eurytemora sp.	I	I	-	-
Canuella sp.	I	I	-	-
Calanus sp.	I	I	-	-
Cyclops sp.	I	I	-	-
Harpacticoid	-	-	I	M
Evadne	I	I	-	-
Ostracoda	-	I	-	M
Pleurobranchia sp.	-	-	-	I
Clam larva	I	I	-	-
Neopysis mercidis	M	M	-	-
Polycheta larva	I	I	I	M
Medusa (sp)	M	-	-	I
Crab larva	I	-	-	I
Barnacle larva	D	D	-	M
Fish Eggs	I	-	-	-

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## NECANICUM ESTUARY BENTHIC ANIMALS

The bottom sediments of the Necanicum Estuary system provide habitat for a large group of animals that make up the benthos. These organisms range in size from microscopic plants and animals to large animals such as clams and ghost shrimp. Much of the population found in the infauna (organisms that live within the sediments) is microscopic. The epifauna is made up of those organisms that live on or just above the sediment surface.

Organisms of the benthos may range in size from those that could be considered microscopic, such as bacteria, protozoa, fungi, algae and diatoms. Each of these organisms plays an important role in the stability of the estuary with the bacteria being of particular importance in the decomposition cycle. Nematode worms and hargacticoid copepods make up an intermediate group of organisms that are less than 1 mm in size and are normally restricted to the top few centimeters of sediment.

The larger more conspicuous organisms that can be seen with the unaided eye make up the balance of the fauna of the benthos. Crab, shrimp, clams, polychaete worms, barnacles and mussels make up the typical examples of this group.

The larger organisms can be divided into three feeding types: selective particle feeders, deposit feeders and filter feeders. Selective particle feeders may be scavengers, predators or herbivores, feeding on whole organisms they capture or fragments of plants or animals. Fishes, crabs, and some worms and other mobile species fall into this category. The food is primarily organic material and broken down by mechanical and chemical processes. Wastes are combined with mucous and often form distinctive fecal pellets which may make up a significant percentage of the bottom sediments.

Deposit feeders include worms that move through the sediment ingesting and utilizing what organic material is contained therein and discarding the remains as feces. Other deposit feeders bury themselves in the sediment. Using siphons or other extensions they suck up detritus that has recently fallen to the bottom. These animals are unselective in what they feed upon, but they often have efficient sorting mechanisms. The feces of these deposit feeders may contain a high percentage of inorganic material.

Filter feeders draw in water and particulate matter. Most clams and mussels use tiny hair-like cilia to create currents of water over a mucous network which traps particles. Others, such as

tube-dwelling worms, may force water through their borrows by body movements.

The feeding habits of benthic animals can have a significant effect on the sediments and overlying waters. Deposit feeders turn over huge quantities of sediments and bring oxygen to deeper layers. Filter feeders and some deposit feeders remove detrital and particulate material from the water and sediment surface. These animals play an important role in partially breaking down organic matter for the microorganisms which complete the mineralization.

Of particular importance is the interrelationship of a number of the benthic invertebrates in being utilized as the major food supply for the estuarine fishes, in particular the downstream migrating salmon juveniles that spend an important part of their life cycles in this habitat.

ECOLOGICAL CONCERNS: that mud and sand flat areas must be maintained at all cost as habitat for benthic organisms and that release of juvenile fishes be controlled in relationship to the productive potential of the Necanicum Estuary.

Management policies should speak to this topic in relation to fish release by the state agencies and those that are released by private hatcheries.

Special consideration is given to the ghost shrimp (Callianassa californiensis) because of the dense population in the lower estuary and its role in the substrate.

\*Callianassa is considerably elongated, which is possibly a direct response to its method of living, and is rather brightly colored, even though always hidden in the mud. Adult individuals average from two to three inches in length and vary from a whitish yellow to orange-red. Their one outstanding feature is the possession of an exceedingly large cheliped, which may be either the right or left.

Callianassa is found most abundantly in tidal regions of from zero to plus one foot and restricted to bottoms of mixed sand and mud of a sufficiently tenacious consistency to allow the construction of burrows of a rather permanent nature. Neither very loose sand nor very soft mud will serve.

\*Description by G.E. MacGinitie from "The American Midland Naturalist".

The animal is occupied almost constantly in extending or adding new tunnels to its burrows, which often connect with those of other individuals.

Callianassa feeds by sifting the sand for its contained detritus. As in burrowing, the sand is drawn in from the face of the tunnel; but unlike the actual burrowing, the sand is sifted by the hairs on the dactyls of the second and third legs and scraped off by the hairs of the third maxillipeds. From these, by a series of movements of the mouth parts, it finds its way to the oesophagus.

A sifted load of sand for an average-sized Callianassa will approximate one-half to one cubic centimeter, the amount of material deposited around one entrance between low tides. At this rate the soil would be turned over in 240 days to a depth of thirty inches, which is the approximate limit of depth to which the animals burrow.

Egg laden females may be found at any time throughout the year but are more numerous during the latter part of June and July. The eggs are carried by the female until the embryos have reached the zoea stage, when hatching takes place. They subsequently pass through a larval stage and at the next molt become like the adult and settle to the bottom.

Dungeness crab populations reach high levels at various times during the year. During low runoff periods cancer crabs may be found in the estuary on a continuous basis because of the saline conditions of the water. As winter runoff increases they tend to move in and out with the tide cycles.

Crabs that were caught and marked by number in the Neawanna during August demonstrated that the population was generally on the move. Crabs were trapped in pots and numbered on the shell and released. Of the 75 marked only 5 were recaptured during a one week study.

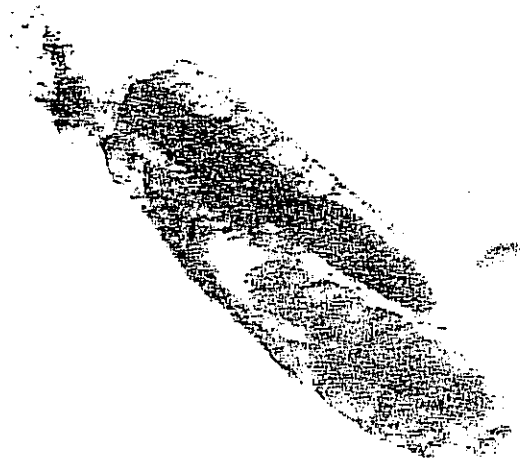
Extensive crabbing by sportsmen occurs in the July and August seasons throughout the estuary. As many as 25 crab rings have been observed at 12th Avenue Bridge with additional fishermen in boats working crab rings. Success on legal adults is generally fair with hundreds of immature crabs being caught and released each day.

Crabbing would be considered the second most popular recreation use of the estuary behind fishing.

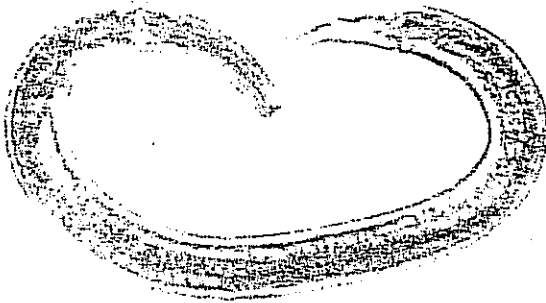
# Benthic Organisms



CLAM LARVA



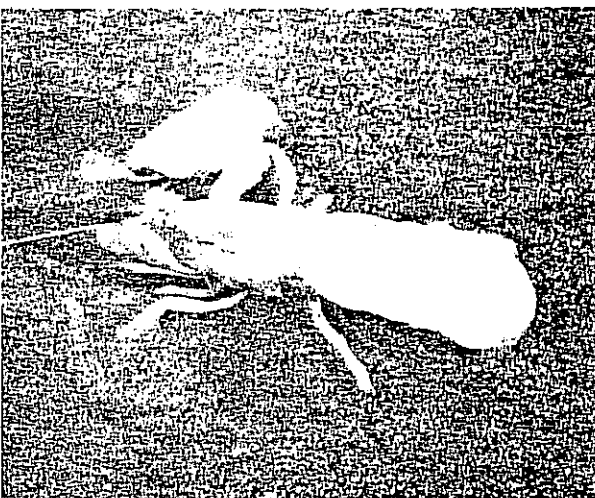
HARPACTICOID COPEPOD



NEMATODE WORM



DIATOMS



GHOST SHRIMP



COROPHIUM



SPECIES LIST  
(incomplete)

Hydrozan

Obelia sp.

Annelida

Nemertea, 2 species

Oligochaeta

one species unidentified

Polychaeta

Hobsonia florida

Nephyts sp.

Sternaspidae (family)

Unidentified species--2

Bivalvia

Mytilus edulis (mussel)

Mya arenaria (softshell clam)

Tellina salmonea (pink clam)

Tellina sp. (white clam)

Crustacea

Corophium salmonis

Amphithoe sp.

Gammaridea

Eohaustorium estuaris

Callinassa californiensis (ghost shrimp)

Balanus glandula (barnacle)

Cancer magister (dungeness crab)

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## FISHES OF THE NECANICUM RIVER ESTUARY

The Necanicum River Estuary provides habitat for a number of fishes of which almost all could be considered marine species. Because a number of species are migratory, the estuary is used as an intermediate transfer habitat for the anadromous fishes who move through the estuary to freshwater. Other species could be considered tidal as they move in and out with the tidal exchange or remain in the estuary during high salinity periods.

The fishes of the Necanicum system have no direct commercial value but are fishes that may spawn and spend their juvenile stages in the estuary system and become important in the offshore ocean fishery (e.g. flounders, salmon and perch).

During the high tide cycle the estuary condition in the Necanicum system approaches the marine quality and produces no freshwater barriers to marine fish during low flow periods. The conditions that must be considered seriously are the low water cycle in which the anadromous (migrating to freshwater) fish may find barriers in water quality during low flow and low tides for adults and juveniles. Not only must the water quality in the ocean meet particular standards, but the tributary waters and the impounded estuarine water must maintain a level of quality that it provides a transfer area for these fishes.

With the exception of the Pacific Staghorn Sculpin and the Shiner Perch most of the fish species use the estuary during specific times of the year and with some relationship to their reproductive cycle. In the case of the anadromous fish, there is an upstream migration in the fall and a subsequent downstream migration of the juveniles in the spring. The adult time in the estuary is relatively short while the juveniles spend longer (weeks) periods of time in the estuary feeding before the eventual migration to the ocean.

Because some of these fish move through the estuary during the lowest flow periods and high temperature periods this has the potential for a low oxygen condition to exist in the estuary and associated water. Any significant effect on these factors would have a serious effect on these fish and their survival.

Steelhead (Salmo gairdneri gairdneri):

A small native population and a Fish and Wildlife managed stocking program makes the Necanicum system very productive for steelhead, with spawning escapement of approximately 2300 fish. In recent years the fishing pressure on this species has increased in the estuary part of the Necanicum system.

The fish has high water quality demands for its success, not only in moving through the estuary but for the downstream migrants that spend an important period of time in the estuarine water, feeding and growing before their migration to the ocean.

### Tidal Fishes

This group of fish (shiner perch, striped perch, pile perch, walleye perch, starry flounder, staghorn sculpin, surf smelt, anchovy, herring, and pipe fish) for the most part move into the estuary during the tidal cycle and move out again within a fairly short period of time (from a single tidal cycle to a period of weeks). During low flow conditions in July, August, and September the estuary reaches nearly marine conditions in respect to the salinity and is not a serious limiting factor for marine fishes. The use of the estuary includes spawning, feeding, protection and as a nursery for young.

### Fish Description

#### Coho (Silver) Salmon (Oncorhynchus kisutch):

Silver salmon runs are limited to the Necanicum, Neawanna, and Mill Creek tributaries of this system. A spawning escapement of approximately 1200 silvers has been estimated by the Fish and Wildlife Department for the Necanicum system. A small population of undetermined numbers runs in the Neawanna drainage.

Silver salmon move into the estuary in early September and move upstream into the freshwater system with the early fall rains. The spawning cycle begins in early November and continues into January. These fish are utilized by the recreation fishermen to a moderate degree in the estuary and at a low level in the river. After the spawning cycle in the upper tributaries the hatching fry spend the next year in the river feeding and growing until the spring downstream migration into the estuary for another period of feeding and growth.

#### Chum Salmon (Oncorhynchus keta):

There is a small run of Chum salmon that occurs sporadically and reaches a few hundred fish on peak years. This fish has no recreational fishing potential and enters the Necanicum system almost unnoticed.

#### Cutthroat Trout (Salmo clarki clarki):

This fish is represented by a good run in the Necanicum (approximately 5000) that enter the river from the ocean in July and run until October. This fish is eagerly sought after by the

recreational fisherman in the estuary and in the Necanicum River. This fish spawns in January and February with fingerlings moving into the estuary in the spring and then moving to the open ocean.

Active management programs by the Oregon Department of Fish and Wildlife have been ongoing in the Necanicum system for sometime. Steelhead trout have been planted on a yearly basis for the last 10+ years with the average spring plant of about 50,000 fish. The utilization of the steelhead has been very extensive by the resident and out of area recreation fisherman.

The following data presents the stocking program for salmon species in the Necanicum system.

1976 - 6,000 Coho smolts  
39,000 Fall Chinook smolts  
630 Coho adults

1977 - 75,000 Coho smolts

1978 -103,000 Coho smolts  
98,000 Fall Chinook smolts

The full impact of this stocking program will not be known for some time. At this writing a few 3 year Fall Chinook have returned to the Necanicum.

## Seining Results, August 1978

Results include numbers of fish caught with a 100' beach seine. There were 5 sets with the following total catch.

Necanicum (1 kl from mouth) 3 sets	Neawanna (2 kl from mouth) 2 sets
Shiner Perch	Striped Perch
Adults 51	Juveniles 16
Juveniles 1,993	Shiner Perch
Starry Flounder 19	Juveniles 162
Staghorn Sculpin 36	Pile Perch
Surf Smelt 23	Juveniles 38
Salmon	Staghorn Scuplin 14
Juvenile Chinook 2	Three Spine Stickleback 1
	Bay Pipe Fish 1

## Spawning and Nursery Role of Estuary

The Necanicum River Estuary, like the rest of the estuaries on the Oregon coast, plays an important role as a nursery for many organisms. Because of the protected waters, abundant food supply and lack of ocean predators, the perch, starry flounder and salmon spend an important amount of time in this estuary system.

The feeding surface area is almost doubled each day as the tide floods across mud flats and into the marshes. Because of this factor the carrying capacity of the estuary is much greater than appears to the casual observer. In addition the tide brings with it a certain amount of usable energy from the ocean system and the offshore upwelling.

A Starry Flounder tagging program in the Necanicum has demonstrated this role to a degree with flounder tags being returned from commercial draggers as far away as Ocean Shores, Washington in 35 fathoms of water.

NECANICUM RIVER ESTUARY  
FISH SPECIES LIST

<u>Common Name</u>	<u>Scientific Name</u>
Coho salmon	<u>Oncorhynchus kisutch</u>
Chum salmon	<u>Oncorhynchus keta</u>
Chinook salmon	<u>Onchorhynchos tschawytscha</u>
Steelhead	<u>Salmo gairdneri gairdneri</u>
Cutthroat trout	<u>Salmo clarki clarki</u>
Shinner perch	<u>Cymatogaster aggregata</u>
Striped perch	<u>Embiotoca lateralis</u>
Pile perch	<u>Rhacochilus vacca</u>
Walleye perch	<u>Hyperprosopon argenteum</u>
Redtail perch	<u>Amphistichus rhodoterus</u>
Starry flounder	<u>Platichthys stellatus</u>
Pacific staghorn sculpin	<u>Leptocottus armatus</u>
Surf smelt	<u>Hypomesus pretiosus</u>
Northern anchovy	<u>Engraulis mordax</u>
Pacific herring	<u>Clupea herengus pallasii</u>
Bay pipe fish	<u>Syngnathus griseolineatus</u>
Carp	<u>Cyprinus carpio</u>
Three spine stickleback	<u>Gasterosteus aculeatus</u>
Pacific lamprey	<u>Entosphenus tridentatus</u>
Sturgeon (green)	<u>Acipenser medirostris</u>

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versity Extension Service, Oregon State University, 1974.



WATERBIRDS OBSERVED  
IN NECANICUM ESTUARY

<u>Species</u>	<u>Habitat</u>
Canada Goose	sand flats (migration)
Brant	sand flats (migration)
Snow Goose	sand flats (migration)
White Fronted Goose	
Mallard	bays and marshes
Pintail	most fresh water marshes
Cinnamon Teal	marshes
Woodduck	backwaters of rivers and streams
Canvasback	open marshes
Lesser Scaup	salt marshes, estuaries (in winter)
Greater Scaup	on the coast (in winter)
Common Goldeneye	lakes and bogs in coniferous forests
Barrow's Goldeneye	on bays along coast (in winter)
Bufflehead	forest with small ponds, open water near forest
Surf Scoter	coastal waters (during winter)
Common Merganser	open water
Red Breasted Merganser	lakes and rivers (winters on saltwater)
Hooded Merganser	on coasts (in winter)
Pelican (80 individuals 1976)	
Horned Grebe	coastal bays, oceans (in winter)
Eared Grebe	lakes and sloughs
Western Grebe	open water, bays and lakes
Pied-billed Grebe	open water of any size (in winter on migration)
American Coot	marshes and vegetated ponds
Harlequin Duck	near rushing water (nesting) rocky seashores (winter)
Greenwinged Teal	marshes and lakes
American Wigeon	open marshy areas
White Winged Scoter	seacoasts (in winter)

<u>Species</u>	<u>Habitat</u>
Common Loon	bays and coves along coast (in winter)
Arctic Loon	seacoast (in winter)
Red Throated Loon	seacoast (in winter)
Brandt's Cormorant	bays and estuaries
Pelagic Cormorant	coastal waters, bays
Double Crested Cormorant	freshwater lakes, rivers and the sea
Caspian Tern	sand flats, coastal water
Common Tern	sand flats, open water

Although the Necanicum River Estuary is not a large area it does serve as an important site for a number of waterbird species. The estuary provides feeding and resting sites for migrating birds in season, but does not provide important habitat for nesting of migratory birds.

Of particular importance are the haul out areas on the west side in the lower estuary. Many of the water associated species use this area during the fall and winter. The open sand flats are also important as rest areas and overnight stations for migrating birds. Harry Nehls, author of Shorebirds of Oregon has the following to say about the Necanicum River Estuary. "The Necanicum River Estuary has long been considered an important section of the Northern Oregon Coast for migrant birds. It is used primarily as a safety stop if sudden changes in the weather catches migrants between Tillamook Head and the mouth of the Columbia River. It is also a secondary feeding and resting area. Waterbird populations are extremely high most of the year just offshore and on the flats from Tillamook Head northward to north of Brays Harbor, so it is important to have emergency stopping places all along this area."

<u>Species</u>	<u>Habitat</u>
<u>Long-legged Wading Birds</u>	
Great Blue Heron	shoreline
Green Heron	shoreline
American Bittern	marsh, grassland
Snowy Egret (single sighting)	

<u>Species</u>	<u>Habitat</u>
<u>Raptors</u>	
Red Tailed Hawk	woodlands
Bald Eagle (rare visitor)	water edge
Marsh Hawk	marsh, grassland
Rough-legged Hawk	Open marshes
American Kestrel	open country
<u>Shorebirds and Gulls</u>	
Semipalmated Plover	saltwater, mudflats
Killdeer	inland beaches and coastal fields
Whimbrel	mudflats and dunes
Lesser Yellow Legs	mudflats
Northern Phalarope	open water
Spotted Sandpiper	any body of water that is surrounded by vegetation and woods
Least Sandpiper	tidal mudflats
Western Sandpiper	seacoast (in winter)
Dunlin	seacoast (in winter)
Sanderling	sandy beaches (migration and through winter)
Black-bellied Plover	seashores and mudflats (in winter)
Snowy Plover	sandy or alkaline shores
Short Billed Dowitcher	mudflats
Black Turnstone	shores of Pacific coast (in fall and winter)
Glaucous-winged Gull	bays and estuaries
Western Gull	bays, estuaries and rivers
California Gull	bays and rivers
Mew Gull	bays and estuaries
Herring Gull	coastal areas (in winter)
Thayer's Gull	among other gulls on the Pacific coast (in winter)
Ring-billed Gull	mostly on seacoast (in winter)
Bonaparte's Gull	bays and estuaries
Heerman's Gull	open water

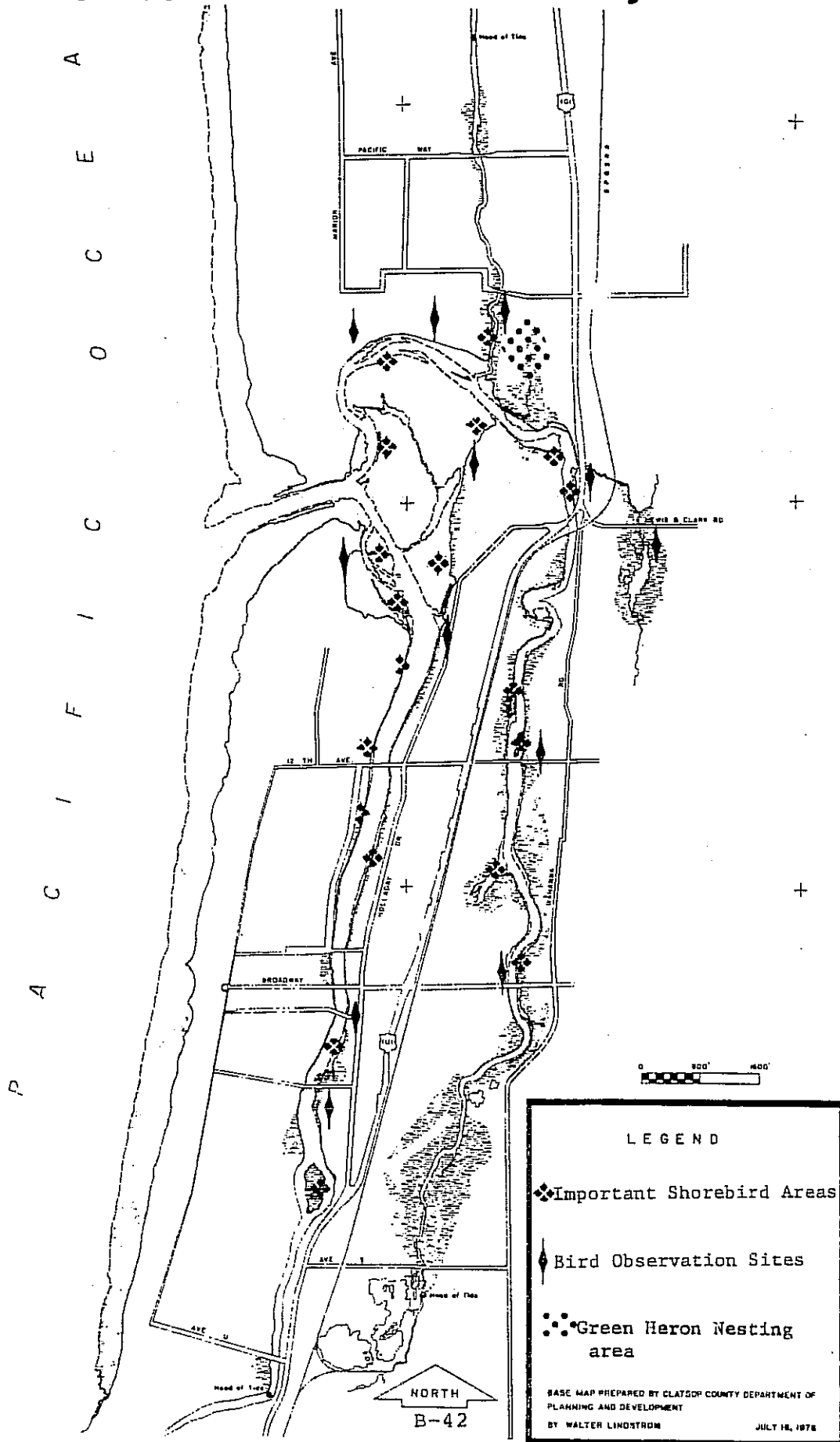
<u>Species</u>	<u>Habitat</u>
<u>Other Birds of the Estuary Shoreline and Forest</u>	
Rufous Hummingbird	conifers, edges
Belted Kingfisher	rivers, streams, ponds and seashore
Red Shafted Flicker	open forest
Hairy Woodpecker	coniferous stands, deciduous trees
Downy Woodpecker	tree willow, alder
Violet-green Swallow	breeds in forests, wooded foothills
Barn Swallow	open country, near water
Steller's Jay	conifers, tree willow
Common raven	grasslands
Common Crow	tide flats, open country
Black-capped Chickadee	woodlands
Bushtit	deciduous growth, in coastal forest
Wrentit	alder stands
Bewick's Wren	tree willow
American Robin	wooded habitat, meadows
Waried Thrush	conifers and deciduous forest
Ruby-crowned Kinglet	conifers
Cedar Waxwing	conifers
Starling	urban areas
Yellow Warbler	shrub willow, scotch broom
Yellowthroat	marsh edges, tree willows
House Sparrow	urban areas, farms
Golden-crowned Sparrow	coastal brushland (winter)
Western Meadowlark	grassland, meadows
Brown-headed Cowbird	fields, willow
Brewer's Blackbird	fields
House Finch	trees, urban areas
American Goldfinch	tree willow, brushy areas

<u>Species</u>	<u>Habitat</u>
Rufous-sided Towhee	forest edges, thicks, woodlands
White-crowned Sparrow	forest edges, clearings
Fox Sparrow	thickets, edges of conifers
Western Tanager	conifers
Red Winged Blackbird	marsh, willow
Savannah Sparrow	open grassland, savannas, salt marshes
Junco	openings and edges of conifers and mixed woods
Song Sparrow	forest edges, clearings, thickets, and marshes with open grassy feeding areas
Ring Neck Pheasant	dune grass and associated scrub land

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# N Necanicum River Estuary



## LEGEND

◆ Important Shorebird Areas

◆ Bird Observation Sites

••• Green Heron Nesting area

BASE MAP PREPARED BY CLATSOP COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT  
BY WALTER LINDSTROM  
JULY 18, 1978

## ANIMALS OF THE NECANICUM ESTUARY

### Large Mammals

Because of the extensive development around much of the estuary, large mammals are not in great abundance. Only two species are identified for this report. The Blacktailed deer and the Roosevelt Elk find their way into the undeveloped high marshes and adjacent forest during the winter months when they move to lower areas to feed.

### Small Mammals

The aquatic mammals in the estuary area include the river otter, mink, beaver, and muskrat. Although the Necanicum estuary does not provide a great deal of habitat for these furbearers there are small populations in the upper estuary. Because of the small populations these animals are not trapped extensively.

Terrestrial animals found in association with the estuary include raccoons, opossums, coyotes, striped skunk, longtailed weasel, and other less obvious species (listed in Table A1). As with many terrestrial animals the water "edge environment" from the wetlands to willow and forest areas plays an important role in the feeding and breeding cycle of these animals.

Each of the various habitats associated with the estuary contain a variety of small animals such as shrews, mice, squirrels, chipmunks, and various other small animals.

### Reptiles and Amphibians

Frogs, salamanders, and snakes are most representative of this group and are found more in association with small streams and wet lands adjacent to the estuary.

### Marine Mammals

On rare occasions individual Harbor Seals will migrate into the Necanicum estuary during high tidal cycles.



ANIMAL INVENTORY  
OF NECANICUM ESTUARY

Table A1

This inventory includes only those that have  
been live trapped or observed by the author.

Large Mammals

Roosevelt Elk (Cervus canadensis)  
Black Tail Deer (Odocoileus hemionus)

Small Mammals

River Otter (Lutra canadensis)  
Muskrat (ondatra zibethica)  
Mink (Mustela vison)  
Raccoon (Procyon lotor)  
Beaver (castor canadensis)  
Longtailed Weasel (Mustela frenata)  
Striped Skunk (Mephitis mephitis)  
Coyote (Canis latrans)  
Norway Rat  
Pacific Jumping Mouse (Zapus princeps)  
Brush Rabbit (Sylvilagus bachmani)  
Chickaree (Tamiascirus douglasii)  
Townsend Chipmunk (Eutamias townsendi)  
Western Gray Squirrel (Sciurus grieseus)  
Vagrant Shrew (Sorex bendirei)  
Townsend Mole (Scapanus townsendi)  
Opossum

Marine Mammals

Harbor Seal (Phoca vitulina)

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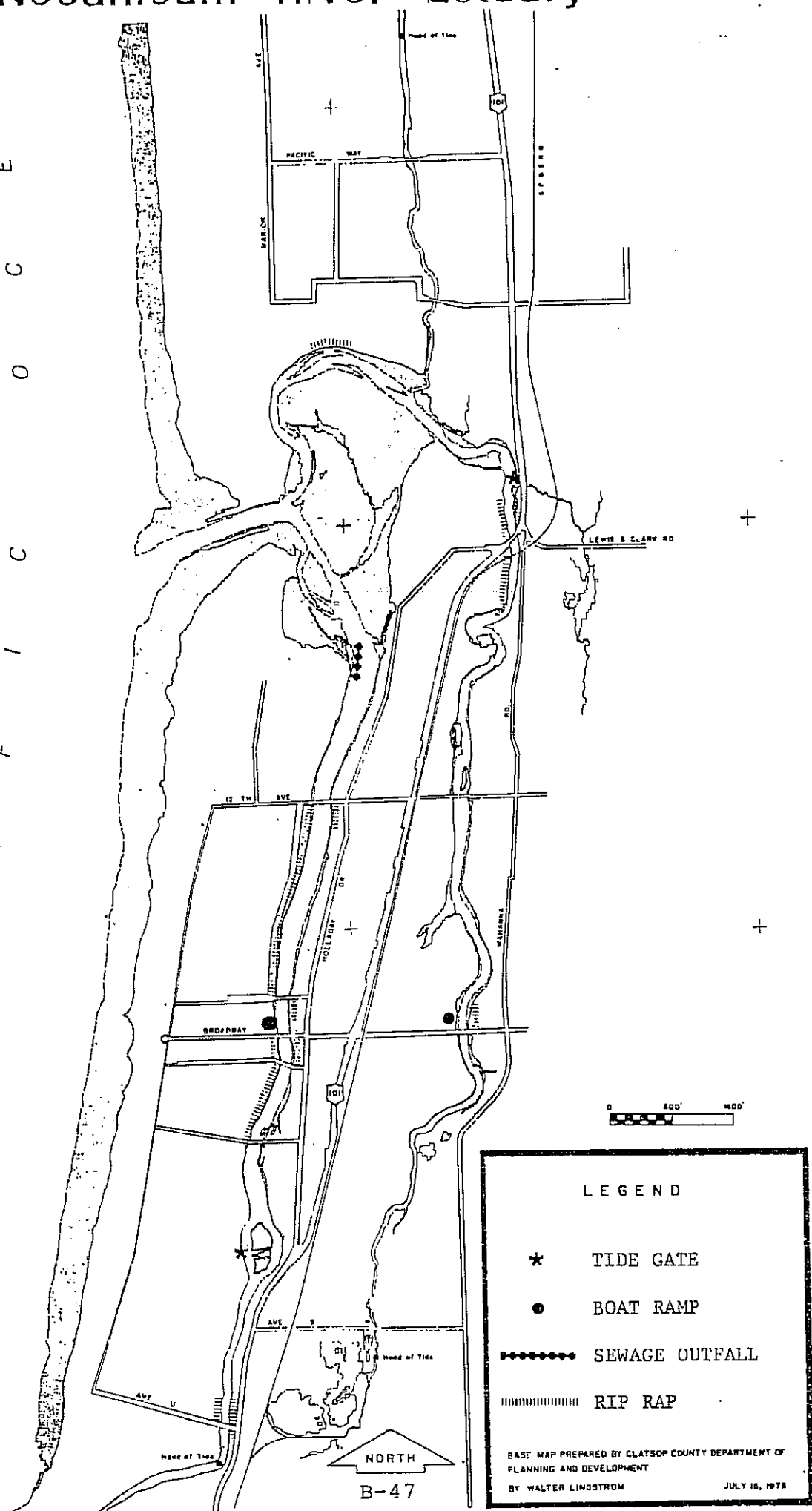
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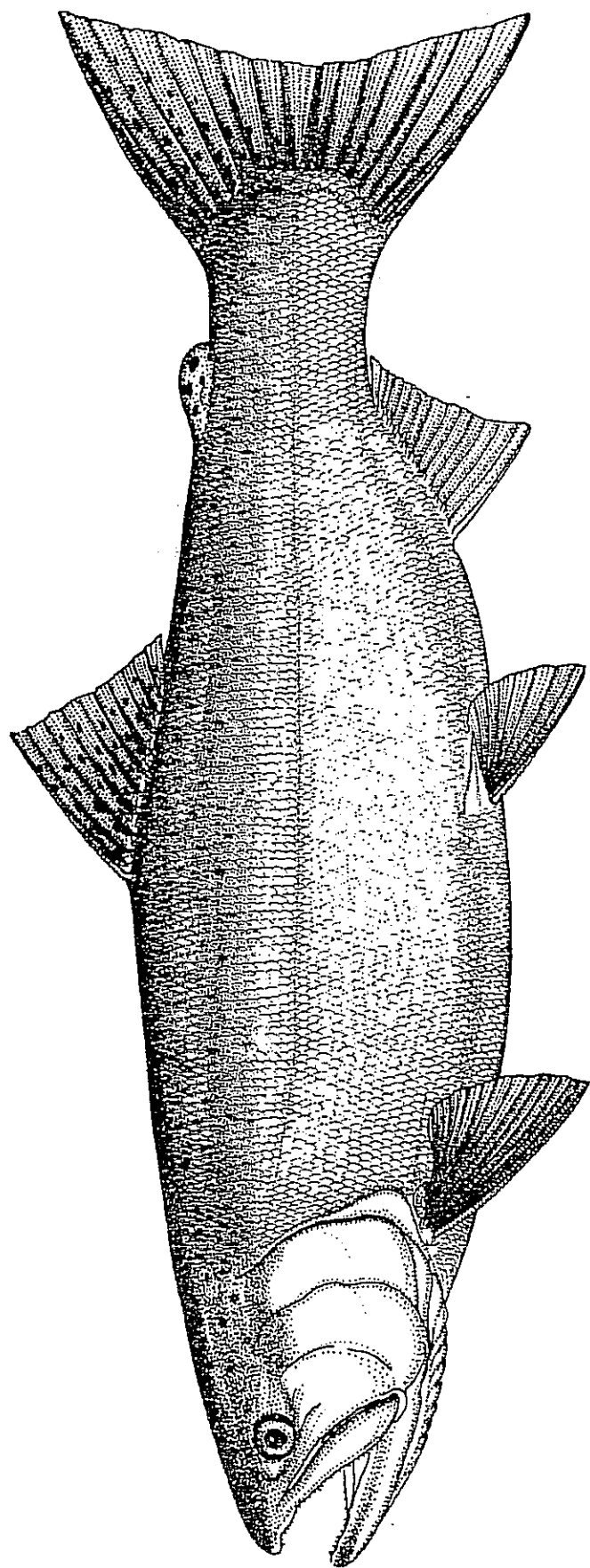
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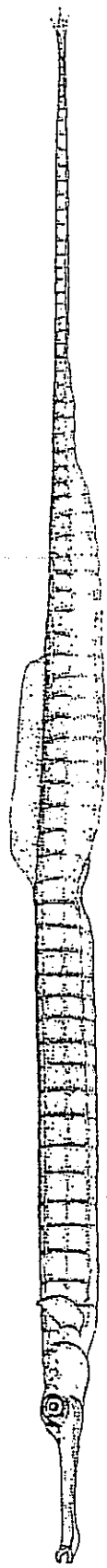
SECTION C  
(Urban Impacts)

Existing Uses  
(to be included later)

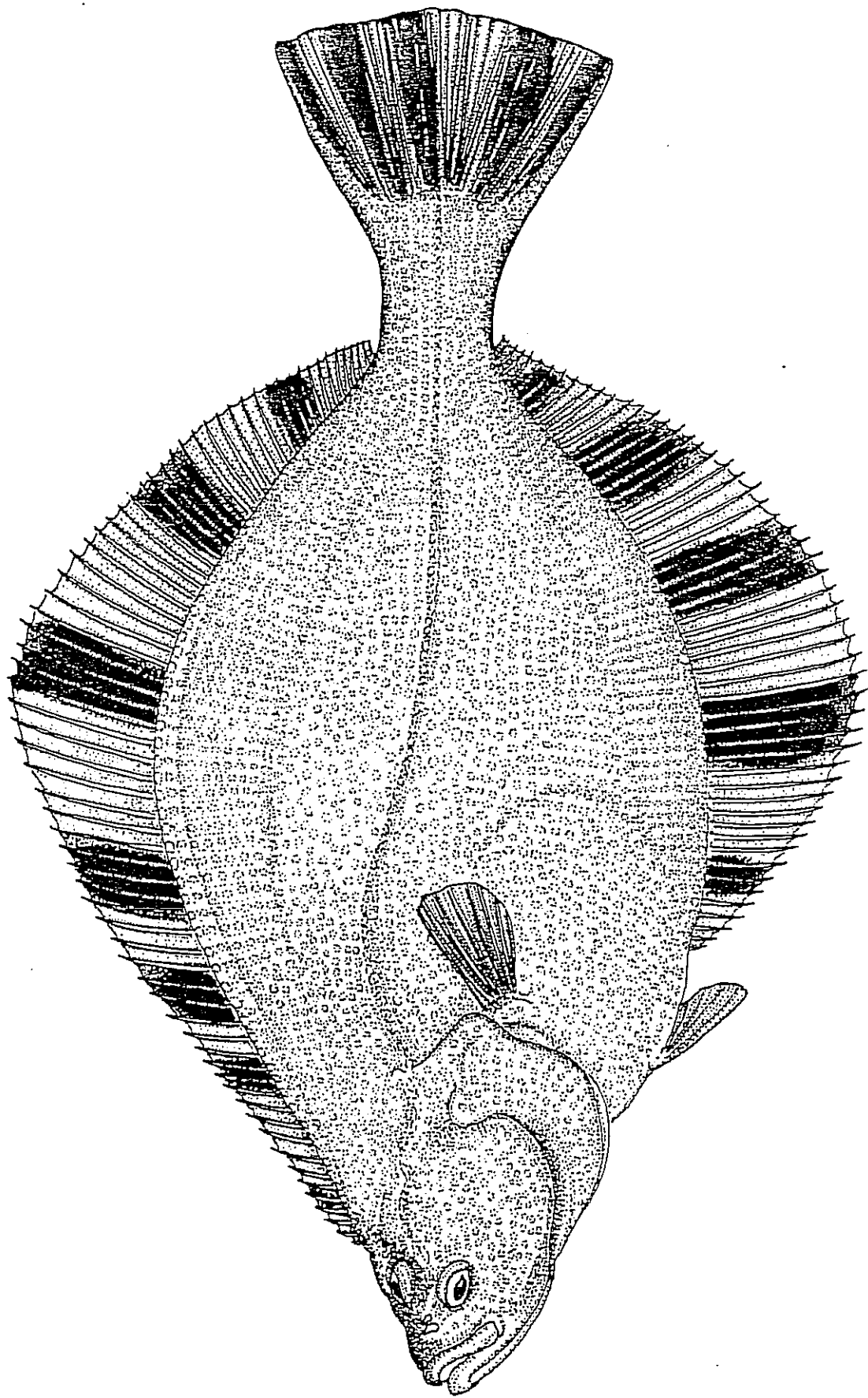




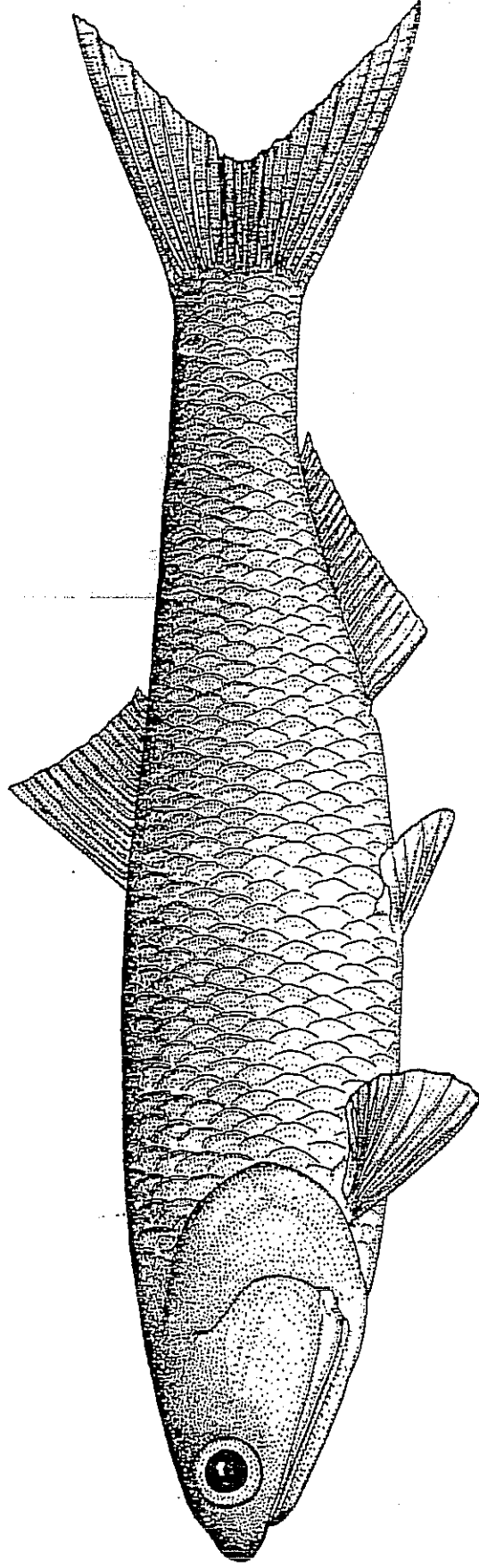
*Oncorhynchus kisutch* Coho Salmon



*Syngnathus griseolineatus* Bay Pipefish

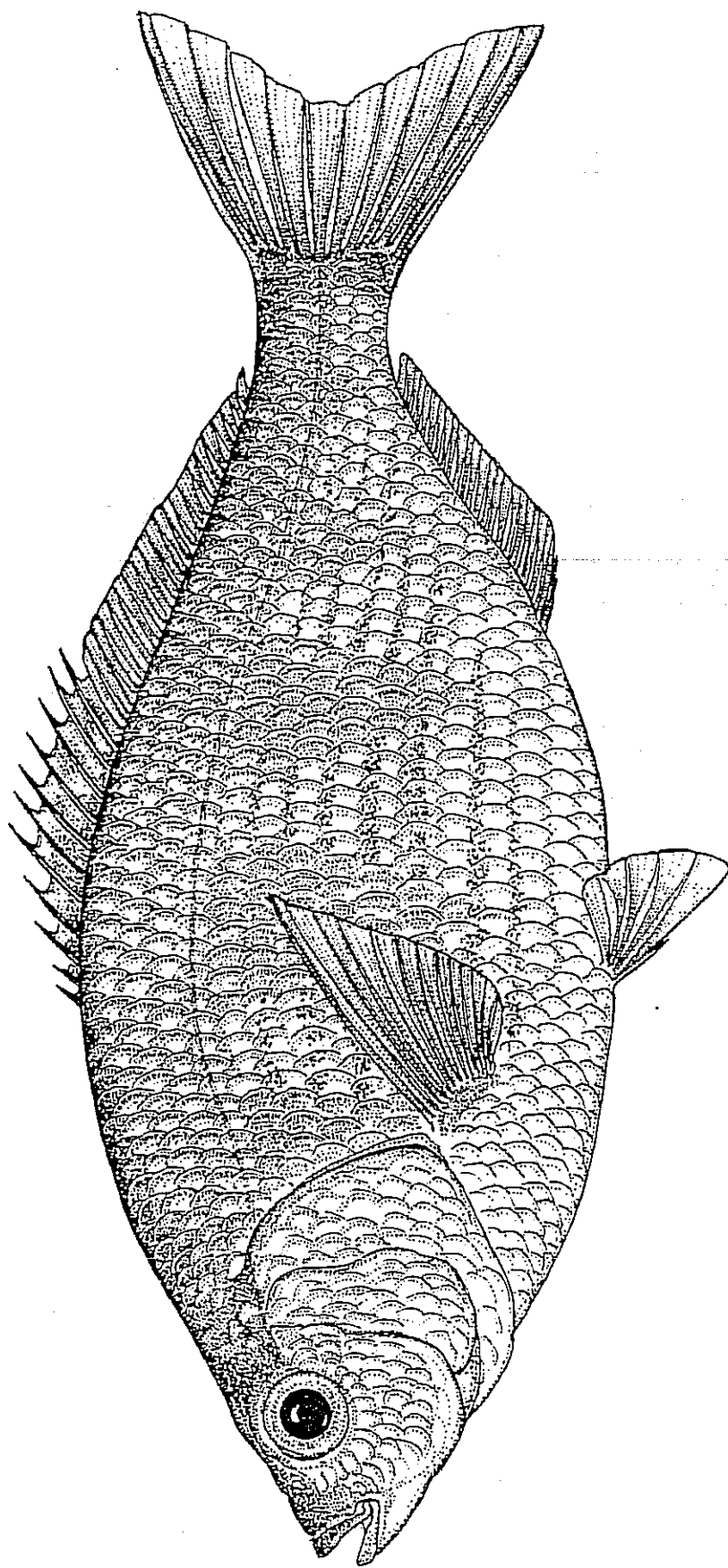


*Paltichthys stellatus*    Starry Flounder

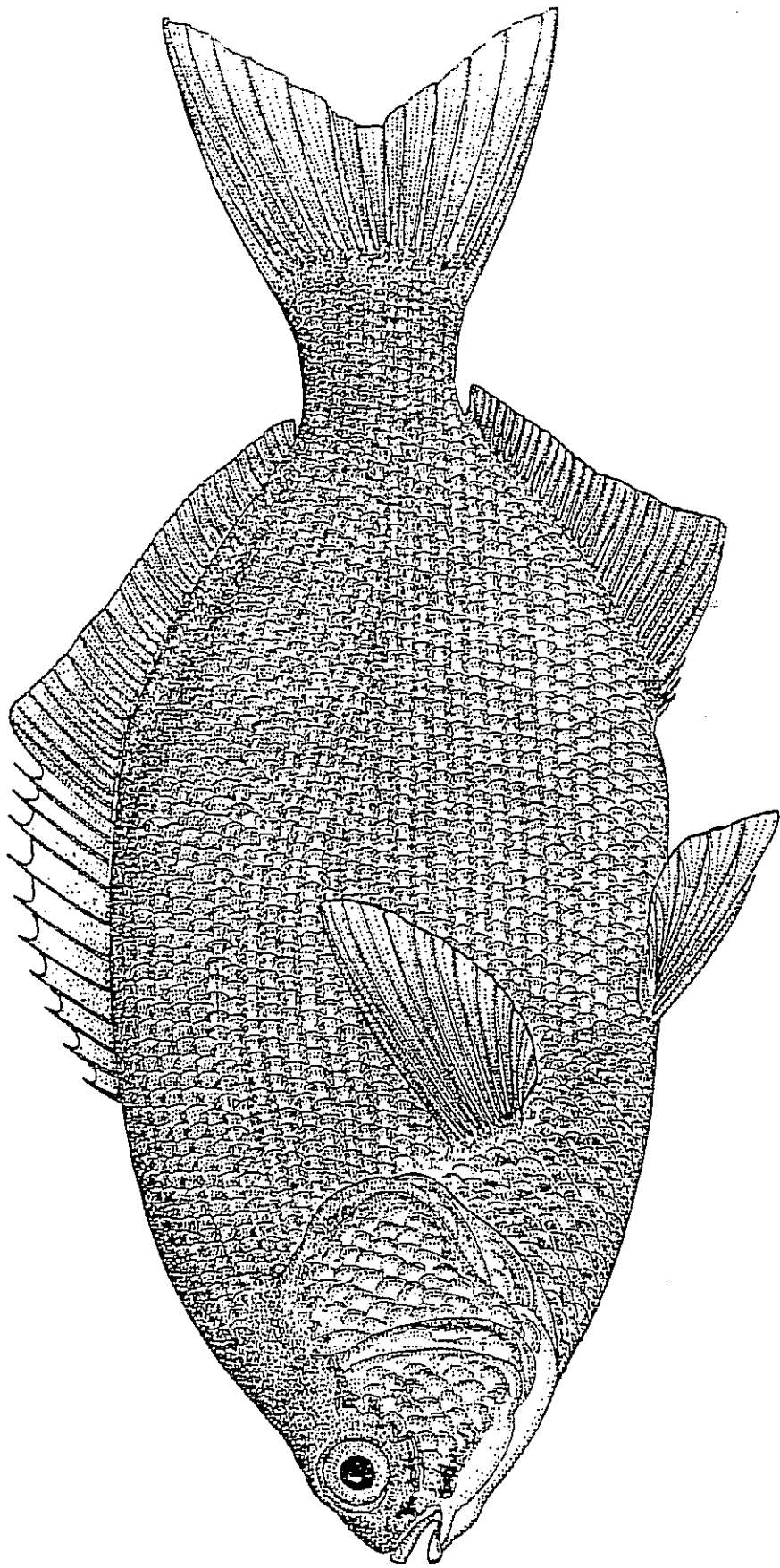


*Engraulis Mordax*      Northern Anchovy

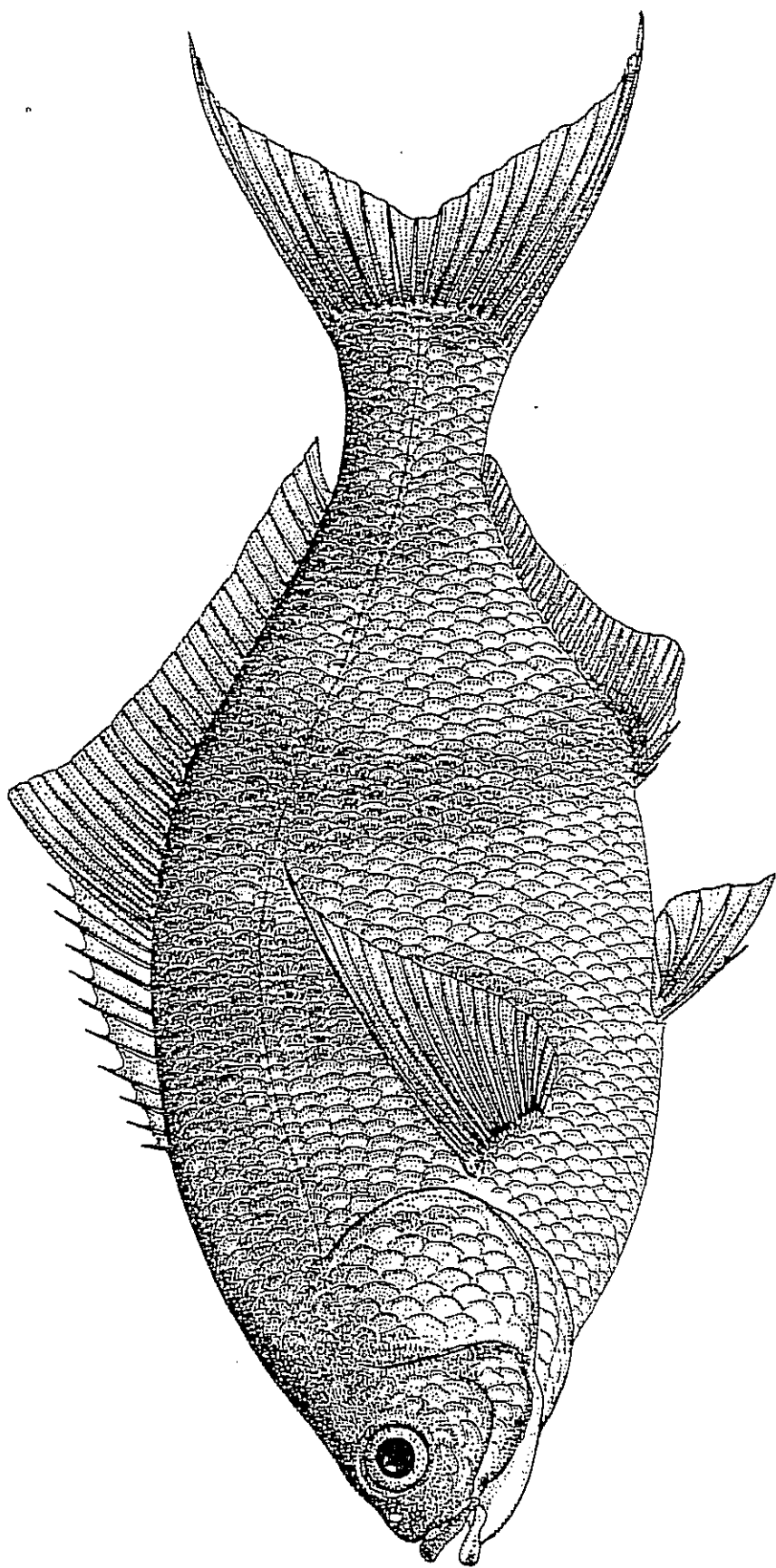




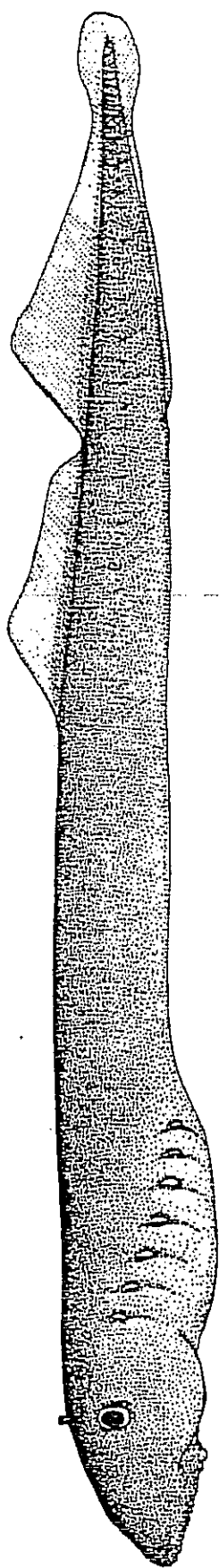
*Cymatogaster aggregata* Shiner Perch



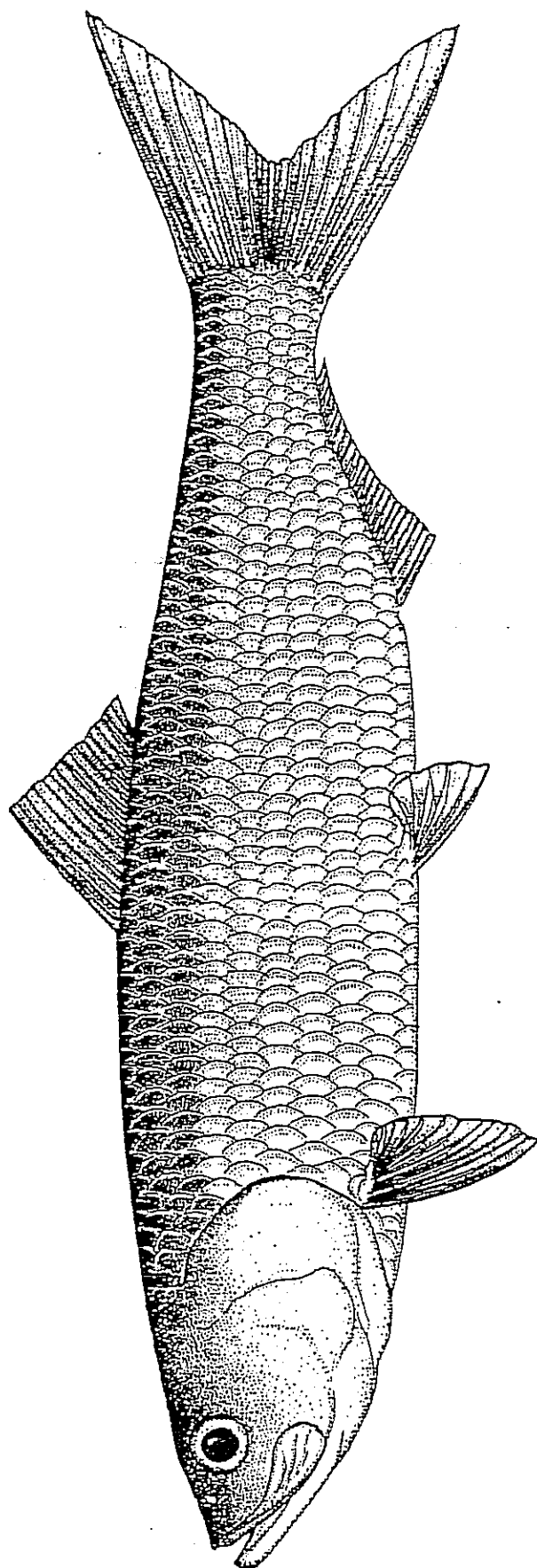
*Emblotoca lateralis*      Striped Seaperch



*Rhacochilus vacca*    Pile Perch



*Entosphenus tridentatus* Pacific Lamprey



*Clupea harengus pallas* Pacific Herring

## ECOLA CREEK ESTUARY AND SHORELANDS \*

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4. Ecola Creek Estuary Shorelands Inventory	6
5. Ecola Creek Estuary Planning Goals	6
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\* Ord. 92-5 , dated June 10, 1992

## 1. INTRODUCTION

The Ecola Creek Estuary and Coastal Shorelands Element is part of the Clatsop County Comprehensive Plan. This element fulfills the County's Comprehensive Planning needs for the Ecola Creek Estuary under Statewide Planning Goals 16 and 17.

The inventory information contained within this element has been derived from several sources: the Cannon Beach Urban Growth Boundary Plan, Cannon Beach Wastewater Treatment Plan, and from a memo written by Rainmar Bartl and Duncan Thomas for Clatsop County. This plan element was originally developed in 1983. It was updated in 1992.

An exception has been adopted by the County (1985) to allow Cannon Beach to expand its wastewater treatment plant into Ecola Creek Estuary wetlands. The area covered by the exception has since been added into the Urban Growth Boundary.

## 2. PLANNING REQUIREMENTS

Statewide Planning Goals 16 and 17 are addressed in this plan element as they pertain to the Ecola Creek Estuary. Statewide Planning Goal 16, Estuarine Resources, establishes the following specific goals:

*To recognize and protect the unique environmental, economic, and social values of each estuary and associated wetlands; and*

*To protect, maintain, where appropriate develop, and where appropriate restore the long-term environmental, economic, and social values, diversity and benefits of Oregon's estuaries.*

Statewide Planning Goal 17, Coastal Shorelands, establishes the following specific goals:

*To conserve, protect, where appropriate, develop and where appropriate restore the resources and benefits of all coastal shorelands, recognizing their value for protection and maintenance of water quality, fish and wildlife habitat, water-dependent uses, economic resources and recreation and aesthetics. The management of these shoreland areas shall be compatible with the characteristics of the adjacent coastal waters; and*

*To reduce the hazard to human life and property, and the adverse effects upon water quality and fish and wildlife habitat, resulting from the use and enjoyment of Oregon's coastal shorelands.*

The planning requirements performed by the County under these goals are outlined below, and carried out in the rest of this plan element, and in the County's Land and Water Development and Use Ordinance.

Goal 16 Inventory Requirements: information on the nature, location and extent of physical, biological, social and economic resources.

Goal 16 Comprehensive Plan Requirements:

- Identify each estuarine area;
- Describe and maintain the diversity of important and unique environmental, economic and social features within the estuary;
- Classify the estuary into management units;
- Establish policies and use priorities for each management unit using the standards and procedures set forth below.
- Consider and describe in the plan the potential cumulative impacts of the alterations and development activities envisioned. Such a description may be general but shall be based on the best available information and projections.

Goal 16 Implementation Requirements:

- Impact Assessment
- Dredging and Filling Restrictions
- Existing State and Federal Programs
- Minimum Fresh-water Flow Rates
- Mitigation
- Dredged Material Disposal
- Single-purpose Docks
- Restoration Areas
- State Agency Planning Responsibilities

Goal 17 Inventory Requirements: information on the nature, location and extent of geologic and hydrologic hazards and shoreland values, including fish and wildlife habitat, water-dependent uses, economic resources, recreational uses, and aesthetics.

Goal 17 Comprehensive Plan Requirements:

- Identify coastal shorelands (which includes estuarine shorelands)



- Establish policies and uses of coastal shorelands
- Establish policies and uses of coastal shorelands in accordance with the Goal's standards.

**Goal 17 Implementation Requirements:**

- Forested Shorelands
- Mitigation Sites
- Dredged Material Disposal Sites
- Riparian Vegetation
- Erosion Protection
- Public Access

### 3. ECOLA CREEK ESTUARY INVENTORY

Ecola Creek is a well-mixed tidal creek having very low estuarine biological and moderate terrestrial values. The head of tide is between 250 and 350 feet upstream of the Highway 101 bridge. The estuarine portion of Ecola Creek (that is, the tidally-influenced portion) is slightly more than one-half mile long. The upstream limit of salt water intrusion is not known. Most of the estuary is in the Cannon Beach City Limits and UGB.

The Statewide Planning Goals define an estuary as:

*A body of water semi-enclosed by land, connected with the open ocean, and within which salt water is usually diluted by freshwater derived from the land. The estuary includes: (a) estuarine water; (b) tidelands; (c) tidal marshes; and (d) submerged lands. Estuaries extend upstream to the head of tidewater.*

Ecola Creek has no definable major tracts of salt marsh, tideflats, or seagrass or algae beds. According to the *Estuarine Resources of the Oregon Coast*, by the Oregon Coastal Conservation and Development Commission, 1974, Ecola Creek may qualify as a Type III or "Conservation Estuary" (areas to be designated for long-term uses of renewable resources and that do not require major alteration of the estuary, except for purposes of restoration). The report also states that due to the existence of minimal estuarine characteristics, Ecola Creek may also be considered a "drowned tidal creek". For these reasons, Ecola Creek was found not to warrant a natural designation. The entire tidal portion of the creek has been designated conservation. Ecola Creek has sediments of mixed sand, gravel, and mud. These sediment types combined with low salinity limit use of Ecola Creek to small anadromous fish runs of coho and steelhead trout. But for its size, Ecola Creek sustains a fairly large run of native searun cutthroat trout.

The land edge character upstream from the Highway 101 bridge is moderately diverse. The study, *Development and Evaluation of Wetlands/Marsh Wastewater Treatment System*, undertaken for the City of Cannon Beach, identified three habitat types: blackberry/alder, alder/sedge, and spruce/alder.

In 1983, the City of Cannon Beach proposed using approximately 15 acres of the 100 acre wetland area adjacent to the southern edge of Ecola Creek for a wetlands/marsh wastewater treatment system. Development of that system resulted in the filling of approximately .03 acres of estuarine area. The County adopted an Exception to the Estuarine Resources Goal and the Coastal Shorelands Goal to permit this development (see Exceptions, Appendix B). The area covered by the exception has since been added into the Urban Growth Boundary.

#### 4. ECOLA CREEK ESTUARY SHORELANDS INVENTORY

The Estuary Coastal Shorelands Boundary around the Ecola Creek Estuary is 50 feet landward measured from the line of Mean Higher High Water (MHHW), or measured from the upper limit of aquatic vegetation when it is present. The Boundary extends further where wetlands adjacent to the estuary itself are included. The boundary is shown on the attached map.

#### 5. ECOLA CREEK ESTUARY PLANNING GOALS

The Ecola Creek Estuary is classified as a *conservation* estuary. The Estuarine Resources Goal describes a conservation estuary or management unit as :

*In all estuaries, except those in the overall Oregon Estuary classification which are classed for preservation, areas shall be designated for long-term uses of renewable resources that do not require major alteration of the estuary, except for the purpose of restoration. These areas shall be managed to conserve the natural resources and benefits. These shall include areas needed for maintenance and enhancement of biological productivity, recreational and aesthetic uses, and aquaculture. They shall include tracts of significant habitat smaller or of less biological importance than those in (1) above [natural areas], and recreational or commercial oyster and clam beds not included in (1) above [natural areas]. Areas that are partially altered and adjacent to existing development of moderate intensity which do not possess the resource characteristics of natural or development units shall also be included in this classification.*

The Estuarine Resources Goal 16 allows the following uses in Conservation Aquatic management units:

- a. undeveloped low-intensity, water-dependent recreation;
- b. research and education observations;
- c. protection of habitat, nutrient, fish, wildlife and aesthetic resources;
- d. passive restoration measures;
- e. dredging necessary for on-site maintenance of existing functional tidegates and associated drainage channels and bridge crossing support structures;
- f. riprap for protection of uses existing as of October 7, 1977, unique natural resources, historical and archeological values; and public facilities;
- g. bridge crossings;
- h. communication facilities;

- i. active restoration of fish and wildlife habitat or water quality and estuarine enhancement;
- j. pipelines, cables and utility crossings, including incidental dredging necessary for their installation;
- k. installation and maintenance of tidegates in existing functional dikes;
- l. bridge crossing support structures and dredging necessary for their installation;
- m. active restoration for purposes other than those listed in (i); and
- n. temporary alterations.

## **6. ECOLA CREEK ESTUARY SHORELANDS PLANNING GOALS**

The Coastal Shorelands Goal identifies the following minimal extent of Coastal Shorelands:

1. Areas subject to ocean flooding and lands with 100 feet of the ocean shore or within 50 feet of an estuary or a coastal lake;
2. Adjacent areas of geologic instability where the geologic instability is related to or will impact a coastal water body;
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;
4. Areas of significant shoreland and wetland biological habitats whose habitat quality is primarily derived from or related to the association with coastal water areas;
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, dredge material disposal and mitigation sites, and areas having characteristics suitable for aquaculture;
6. Areas of exceptional aesthetic or scenic quality, where the quality is primarily derived from or related to the association with coastal water areas; and
7. Coastal headlands.

The Ecola Creek Estuary shorelands include lands identified under number 1, above, as well as riparian zones (number 3), and wetlands (number 4).

## **7. ECOLA CREEK ESTUARY AND SHORELAND POLICIES**

1. The Oregon Department of Fish and Wildlife considers Ecola Creek an important searun cutthroat trout stream. The Creek also contains a coho salmon and steelhead run. Activities which would further degrade the habitat value of the creek and its adjacent wetlands shall be prohibited.
2. Efforts to improve and protect the Ecola Creek wild run fishery are supported by Clatsop County.
3. Alterations to the shoreline of the Creek which would alter the flow of the stream are not permitted.
4. Riparian vegetation along Ecola Creek shall be protected, except where removal is permitted or when an Exception to the Coastal Shorelands Goal has been taken.
5. All activities in the Ecola Creek Estuary shall be coordinated with the City of Cannon Beach.
6. Adverse impacts to estuarine resources resulting from dredge or fill permitted in intertidal or tidal marsh areas shall be mitigated by creation, restoration or enhancement of estuarine areas. Such mitigation shall improve or maintain the functional characteristics and processes of the estuary, such as its natural biological productivity, habitats and species diversity, unique features and water quality. The cost of mitigation shall be included as part of project cost analysis.
7. Clatsop County will not require compensatory mitigation for actions in the Ecola Creek Estuary when exempt from the State of Oregon's mitigation requirements.
8. Clatsop County supports the development of the City of Cannon Beach's wetlands/marsh wastewater treatment system and has taken an Exception to the Estuarine Resources Goal and the Coastal Shoreland Goal to permit its development.
9. Filling of Ecola Creek or the adjacent wetlands shall be allowed only with permit approval from the Division of State Lands. Filling may require mitigation as prescribed by the Division of State Lands.
10. Dredging may be permitted only for:
  - a. Active restoration or estuarine enhancement;
  - b. Bridge crossing support structures;
  - c. Submerged cable, sewer line, water line, or other pipeline; or
  - d. Incidental dredging necessary for the construction of a through c above.

Dredging shall disturb the minimum area necessary for the project and shall be conducted so as to protect or enhance wetlands and other estuarine resources.

11. Proper management of existing streamside vegetation is the preferred method of shoreline stabilization, followed by planting of vegetation. Where vegetative protection is inappropriate (because of high erosion rate, the use of the site, or other factors), structural means such as riprap or bulkheading may be considered, if consistent with the restrictions in the estuarine zone.

12. Fill may be permitted only as part of the following uses and activities:

- a. Maintenance and protection of man-made structures existing as of October 7, 1977;
- b. Active restoration or estuarine enhancement;
- c. Bridge crossing support structure;
- d. In conjunction with a use for which an Exception has been taken.

13. The dredging and filling provided for in Policies 10 and 12 shall be allowed only:

- a. If required for navigation or other water dependent uses that require an estuarine location or if specifically allowed by the applicable management unit requirements of the State Estuarine Resources Goal;
- b. If a need (i.e., a substantial public benefit) is demonstrated and the use or alteration does not unreasonably interfere with public trust rights; and
- c. If no feasible alternative upland locations exist; and
- d. If adverse impacts are minimized.

Other uses and activities which could alter the estuary shall be allowed if the requirements in (b), (c), and (d) are met.

14. Where a use could potentially alter the estuarine ecosystem, the County shall require a clear presentation of the impacts of the proposed alteration.

15. As required by Statewide Planning Goal 16, Estuarine Resources, some development uses and activities in certain management zones must be consistent with the resource capabilities of the management zone or unit. A procedure for determining if a development is consistent with the resource capabilities of the zone is set forth in the County Development Code (Section 5.960 Resource Capability Determination).

The following uses must be shown to be consistent with the resource capabilities of the area and the purposes of the estuarine zone:

- a. Riprap shoreline stabilization for purposes other than protection of uses existing as of October 7, 1977, unique natural resources, historical and archeological values, and public facilities;
- b. Storm water and treated wastewater outfalls;
- c. Active restoration for purposes other than restoration of fish and wildlife habitat or water quality and estuarine enhancement;
- d. Bridge crossing support structures;
- e. Dredge, fill or piling necessary for the installation of uses listed above.

16. Temporary alterations are permitted to the estuary so long as they:

- a. Are of short term duration (generally less than 3 years.)
- b. Are consistent with the resource capabilities of the area; and
- c. Are such that the area and affected resources can be restored to their original condition, and
- d. Are needed to facilitate a use allowed by the plan.

17. The County shall rely on the Oregon Department of Environmental Quality (DEQ), and the Oregon Department of Agriculture where applicable to assess the impacts of actions affecting water quality, including wastewater effluent and the use of chemicals.

THE ECOLA CREEK ESTUARY PLAN  
PERMITTED USE ACTIVITY TABLE

1. Bridge Crossing and Bridge Crossing Support Structure	C
2. Diking	
Maintenance and Repair of Dikes	P
Temporary Dike	P
Emergency Dike Repair	P
3. Dredging	C
4. Fill	C
5. Restoration	
Passive	P
Active	C
6. Research and Educational Observations	P
7. Non-motorized Boating, Individual	P
8. Piling	C
9. Shoreline Stabilization	
Vegetative	P
Riprap	C
10. Storm Water and Treated Wastewater Outfalls	C
11. Submerged Cable, Sewer Line, Water Line, or other Pipeline	C
12. Temporary Alterations	C
13. Estuarine Enhancement	C
P:	Permitted uses and activities may be undertaken subject to the standards set forth in the zoning ordinance and applicable State and Federal regulations.
C:	Conditional uses and activities may be undertaken subject to written findings, adopted after a public hearing, that the proposed use or activity is consistent with the policies of the comprehensive plan, appropriate zoning standards and, where required, that the use or activity is consistent with the resource capability of the area and the purpose of the estuary zone.



PACIFIC

OCEAN

ELK

CANNON BEACH CITY LIMITS

CANNON  
BEACH

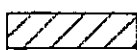
EAC ZONE @ 250 FT  
FROM BRIDGE

ESTUARY BOUNDARY  
@ 1000 FT FROM  
HEAD OF TIDE

LW

LW

ELK CREEK ESTUARY

 ESTUARY & WETLANDS

# Ocean and Coastal Lake Shorelands



Riparian Vegetation

## V. OCEAN AND COASTAL

## LAKE SHORELANDS (Goal 17)

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## V. OCEAN AND COASTAL LAKE SHORELANDS

### 1. INTRODUCTION

Clatsop County has ocean and coastal lake shorelands that extend from the mouth of the Columbia River Estuary to Cape Falcon, a linear distance of approximately 33 miles. In addition to this 33 mile length of ocean shorelands, Clatsop County shorelands also include lands contiguous to three estuaries, (discussed above, including tidally influenced portions of their tributary rivers and streams) and five coastal lakes. Careful planning of these ocean and coastal lake shoreland areas is necessary in order to maintain both the environmental and economic resources and benefits of coastal shorelands.

From an environmental perspective, ocean and coastal lake shoreland areas are important because of their direct and significant impact on coastal water bodies through the flow of runoff water from land drainage. The quality, volume and rate of this runoff is affected by the activities which occur in shoreland areas and associated coastal watersheds, and itself affects the quality of the aquatic habitat in adjacent coastal water bodies. Freshwater marshes and riparian vegetation in coastal shorelands purify runoff water by retarding water flows and thereby promoting settling of suspended solids and infiltration of runoff water through the soil. Freshwater marshes and riparian vegetation are also valuable wildlife and waterfowl habitat.

From an economic perspective, the ocean and coastal lake shorelands of Clatsop County are important because of the direct or indirect contribution of shoreland resources to two of Clatsop County's basic industries. A 1977 Input-Output Model for Clatsop County lists the basic industries of Clatsop County as:

- 1) timber and wood-processing;
- 2) fish and fish processing, and
- 3) recreation and tourism;

The forested lands within ocean and coastal lake shorelands contribute to the County's timber industries. The exceptional aesthetic and scenic qualities of Clatsop County's ocean and coastal lake shorelands serve to draw people to the area for recreation and tourism. The attractiveness of these shorelands as locations for vacation homes, or for primary residences, is indicated by the fact that most of Clatsop County's major population centers are adjacent to ocean or estuarine shorelands. Ocean and coastal lake shorelands contribute to the recreation and tourism industry.

Planning for ocean and coastal lake shoreland areas is necessary to obtain a balance between conservation of the environmental resources of shorelands and utilization of the economic resources and benefits of coastal shorelands. The planning process must consider both environmental and economic resources, as well as geologic and hydrologic hazards within coastal shorelands which could impact these resources. Examples of hazard areas include areas of coastal flooding or erosion, wind erosion, areas within the 100-year floodplain, and active and inactive landslide areas and other geologic hazards. Only careful planning will ensure that shoreland development is compatible with both the natural hazards of coastal shorelands and the values of adjacent coastal water bodies.

## 2. STATE PLANNING REQUIREMENTS FOR OCEAN AND COASTAL LAKE SHORELANDS

The objective of Goal 17, Coastal Shorelands is:

"To conserve, protect, where appropriate develop and where appropriate restore the resources and benefits of all coastal shorelands, recognizing their value for protection and maintenance of water quality, fish and wildlife habitat, water-dependent uses, economic resources and recreation and aesthetics. The management of these shoreland areas shall be compatible with the characteristics of the adjacent coastal waters; and

To reduce the hazard to human life and property, and the adverse effects upon water quality and fish and wildlife habitat, resulting from the use and enjoyment of Oregon's coastal shorelands."<sup>1</sup>

To accomplish this objective, Clatsop County is required to develop a comprehensive plan for coastal shorelands based on two sets of requirements: coastal shoreland boundary identification requirements and use and activity requirements. To provide base data for use in identification of a coastal shoreland boundary, Goal 17 requires that an inventory of geologic and hydrologic hazards, fish and wildlife habitat, water-dependent uses, economic resources, recreational uses and aesthetic resources be conducted within a "coastal shoreland planning area" which is defined as:

- "(1) All lands west of the Oregon Coast Highway as described in ORS 366.235, ... and
- (2) All lands within an area defined by a line measured horizontally:
  - (a) 1000 feet from the shoreline of estuaries; and
  - (b) 500 feet from the shoreline of coastal lakes."<sup>2</sup>

This inventory of features within the "coastal shoreland planning area" is used to establish the extent of coastal shorelands. Goal 17 requires that the extent of identified shorelands shall include at least:

- "(1) Lands which limit, control, or are directly affected by the hydraulic action of the coastal water body, including floodways;
- (2) Adjacent areas of geologic instability;

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<sup>1</sup>A 1977 Input-Output Model for Clatsop County, Oregon State University Extension Service. 1978.

<sup>2</sup>L.C.D.C. Statewide Planning Goals and Guidelines, p. 18.

- (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;
- (4) Areas of significant shoreland and wetland biological habitats;
- (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;
- (6) Areas of exceptional aesthetic or scenic quality, where the quality is primarily derived from or related to the association with coastal water areas; and
- (7) Coastal headlands."<sup>1</sup>

Lands designated as coastal shorelands are subject to both general priorities for the overall use of coastal shorelands, as well as specific use priorities for certain special shoreland areas. Goal 17 establishes the following general priorities for coastal shoreland uses:

"General priorities for the overall use of coastal shorelands (from highest to lowest) shall be to:

- (1) Promote uses which maintain the integrity of estuaries and coastal waters;
- (2) Provide for water-dependent uses;
- (3) Provide for water-related uses;
- (4) Provide for non-dependent, non-related uses which retain flexibility of future use and do not prematurely or inalterably commit shorelands to more intensive uses;
- (5) Provide for development, including non-dependent, non-related uses, in urban areas compatible with existing or committed uses;
- (6) Permit non-dependent, non-related uses which cause a permanent or long-term change in the features of coastal shorelands only upon a demonstration of public need."<sup>2</sup>

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<sup>1</sup>Ibid.

<sup>2</sup>L.C.D.C. Statewide Planning Goals and Guidelines, pp. 18-19.

Goal 17 also establishes the following specific use priorities for the following areas within coastal shorelands:

- "(1) Major marshes, significant wildlife habitat, coastal headlands, exceptional aesthetic and archaeological sites shall be protected. 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.
- (2) Shorelands in urban and urbanizable areas especially suited for water-dependent uses shall be protected for water-dependent recreational, commercial and industrial uses. Some factors which contribute to this special suitability are:
  - (a) deep water close to shore with supporting land transport facilities suitable for ship and barge facilities;
  - (b) potential for aquaculture;
  - (c) protected areas subject to scour which would require little dredging for use as marinas; and
  - (d) potential for recreational utilization of coastal water or riparian resources.
- (3) Shorelands in rural areas other than those designated in (1) above shall be used as appropriate for:
  - (a) farm uses as provided in ORS Chapter 215;
  - (b) propagation and harvesting of forest products consistent with the Oregon Forest Practices Act;
  - (c) private and public water-dependent recreation developments;
  - (d) aquaculture;
  - (e) water-dependent commercial and industrial uses and water-related uses only upon a finding by the governing body of the county that such uses satisfy a need which cannot be accommodated on shorelands in urban and urbanizable areas;
  - (f) subdivisions, major and minor partitions and other uses only upon a finding by the governing body of the county that such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas and are compatible -- with the objectives of this goal to protect riparian vegetation and wildlife habitat and



- (g) a single family residence on existing lots, parcels or units of land when compatible with the objectives and implementation standards of this goal."1

In addition to the Comprehensive Plan requirements for coastal shoreland boundary identification and coastal shoreland uses and activities, Goal 17 also establishes six (five non-estuarine) implementation requirements dealing with the following areas or features within coastal shorelands:

- (1) Forested lands - Implementation Requirement 1 requires the Oregon Department of Forestry to recognize the unique and special values of coastal shorelands, and to develop (in conjunction with other state and federal agencies) forest management practices and policies which protect and maintain these special shoreland values and forest uses.
- (2) Floodplain areas - Implementation Requirement 2 requires that floodplain areas be managed to promote uses and development which is consistent with the hazards to life and property.
- (3) Riparian vegetation - Implementation Requirement 5 requires that riparian vegetation be maintained, and where appropriate, restored and enhanced where consistent with water-dependent uses.
- (4) Structural shoreline stabilization - Implementation Requirement 6 establishes a preference for land use management practices and non-structural solutions over structure-1 solutions to problems of erosion and flooding, and requires that structural solutions be designed to minimize adverse impacts on water currents and erosion and accretion patterns.

### 3. OCEAN AND COASTAL LAKE SHORELAND INVENTORY AND BOUNDARY

#### Methodology for Shoreland Inventory

The Clatsop County ocean and coastal lake shoreland boundary was established through an inventory of all areas within the "coastal shoreland planning area" defined by Goal 17 which are outside of the Urban Growth Boundary of an incorporated city.

The purpose of this inventory was to determine the location of the seven features which are required by Goal 17 to be included within coastal shorelands. The following section lists these seven features and briefly describes the methodology used to identify these areas.

1. Lands which limit, control or are directly affected by the hydraulic action of the coastal water body, including floodways.

These areas include:

All areas within the coastal shoreland planning area which lie within either the 100-year flood boundary or an area of 100-year flood coastal flood (as identified on the Flood Boundary and Floodway Map, Clatsop County, or (CH2M Hill, 1978) and

See maps 3, 10 and 17, pages 40, 47, and 54.

2. Adjacent areas of geologic instability.

The term "adjacent areas of geologic instability" is interpreted as geologic hazard areas which are caused by the action of a coastal water body, or have the potential to adversely impact a coastal water body. Geologic hazard areas which are caused by the action of a coastal water body include rapidly or slowly retrograding coastlines, and areas where wave erosion is undercutting headlands and terraces, causing shoreline retreat. Geologic hazard areas with potential to impact a coastal water body include active and inactive landslides and faults, and landslide topography.

The Background Report and County-wide Element on Natural Hazards provides detailed landslide topography for the County. It notes that the Southwest Coastal Planning Area has a history of major landslides (Martin Ross, A Field Inventory of Geologic Hazards from Silver Point to Cove Beach, Clatsop County Oregon). Other coastal landslide topography areas are noted in Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties, Oregon (Bulletin 74, State of Oregon Department of Geology and Mineral Industries, 1972) and through the Soil Conservation Service (SCS) detailed mapping of soils. SCS prepared an inventory of soils which became hazardous at certain slopes. See Table 2 in Natural Hazards Background Report. These three sources indicate that development of hillsides containing landslide topography could initiate landslides. For this reason landslide topography within 500 feet of coastal lakes and adjacent to other coastal waters has been considered as an area of geologic instability if the area contains an identified hazard or contains slopes in excess of 20% for Astoria silt loam, Svensen loam, Tolovana silt loam, Winema Silty clay,

Ecola silt loam; in excess of 50% for Klickitat stony loam; in excess of 60% Hembre silt loam, Kilchis silt loam; for Terrace Escarpment soils (Natural Hazards Background Report) and is in a zone with a minimum lot size of less than 20 acres.

In summary, adjacent areas of geologic instability include:

- a) Areas of geologic hazards identified in A Field Inventory of Geologic Hazards from Silver Point to Cove Beach, Clatsop County, Oregon (Martin Ross, 1978);
- b) The following areas of geologic instability within the coastal shoreland planning area, as identified in Environmental Geology of the Coastal Region of Tillamook and Clatsop Counties, Oregon (Bulletin 74, State of Oregon Department of Geology and Mineral Industries, 1972):
  - i Active and inactive landslides (including those identified on pp. 77-80 of Bulletin 74 which are caused by wave undercutting of headlands and terraces)
  - ii Faults
  - iii Landslide topography within 500 feet of coastal lakes in areas with soils and associated slopes identified in Table 1 (Soils Hazardous in Relation to Mass Movement) in the Clatsop County Comprehensive Plan Natural Hazards Background Report which are in a zone with a minimum lot size of less than 20 acres.

See maps 2, 9, and 16, pages 39, 46 and 53.

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.

As noted in Clatsop County's Goal 5 element the study, "Significant Shoreland and Wetlands Habitat of the Clatsop Plains", prepared for the Coastal Shoreland portion of Clatsop County, established criteria for defining the extent of riparian vegetation along rivers and streams. See Appendix A.

The LCDC Statewide Planning Goals and Guidelines, p. 24, defines riparian vegetation as vegetation situated on the edge of the bank of a river or other body of water. Riparian vegetation performs several important functions: it maintains water temperature and quality and thus reduces the occurrence of stream bank erosion that can result in increased stream sedimentation; it provides habitat for the breeding, feeding and nesting of aquatic and upland wildlife and waterfowl species; and it protects the aquatic ecosystem from unnecessary human disturbances. Riparian vegetation can consist of any of the following plant communities: trees and shrubs growing on uplands adjacent to the river or stream; trees and shrubs growing in a wetland; and an emergent marsh or low shrub wetland. Riparian vegetation is not agricultural crops, land managed as pasture, horticultural or landscaped areas, or unvegetated areas.

Riparian vegetation was identified by Duncan Thomas in his report to Clatsop County entitled Significant Shoreland and Wetland Habitats in the Clatsop Plains, 1982. The following factors were considered during the identification of riparian areas:

- 1) Riparian vegetation types
- 2) Width and location of riparian zones
- 3) Functions of riparian vegetation
- 4) Definitions of "shoreline"
- 5) The extent of riparian vegetation  
(1) within riparian zones (2)
- 6) Non-riparian vegetation within riparian zones
- 7) Riparian zones around significant wetlands

1) Riparian Vegetation Types

- a) Trees and shrubs growing on upland adjacent to an aquatic area.
- b) Trees and shrubs (taller than 12 ft.) growing in wetland (Sect. 7).
- c) Non-significant emergent marsh or low shrub wetland, except where this is managed for agricultural use.

2) Width and Location of Riparian Zones

- a) In a zone up to 50 feet wide from the shorelines of:
  - lakes of surface area exceeding 1 acre.
  - estuaries up to the heads of tide.
  - larger creeks and rivers (average annual flow exceeding 100 cu. ft/sec.)
  - areas of significant wetland habitat, except where the wetland vegetation is trees and shrubs exceeding 12 ft. in height (Sect. 7).
- b) In a zone up to 30 feet wide from the shorelines of:
  - smaller creeks (average annual flow less than 100 cu. ft/sec.)
  - diked sloughs of width exceeding 15 ft. for some of their length.

3) Functions of Riparian Vegetation

- a) It maintains water temperature and quality and enhances fish habitats.
- b) It provides bank stabilization.
- c) It provides habitats for the breeding, feeding and resting of both aquatic and upland wildlife species.
- d) It protects aquatic ecosystems from unnecessary human disturbance.

4) Definitions of "Shoreline"

- a) On estuaries, the line of non-aquatic (upland) vegetation, or mean higher high water where vegetation is absent.
- b) Ordinary high water on lakes, rivers and other bodies of non-tidal water.
- c) On significant wetland areas the shoreline is defined here as the boundary of the significant area.

5) The Extent of Riparian Vegetation (1) Within Riparian Zones  
(2)

Within the riparian zones defined in section 2, riparian vegetation defined in section 1 may extend for all or for only a part of the maximum zone width from the shoreline. Riparian vegetation ends at either:

- a) The landward boundary of the zone defined in section 2, or
- b) Within the zone riparian vegetation may end at the boundary with non-riparian vegetation defined in section 6.

6) Non-riparian Vegetation Within Riparian Zones

Riparian vegetation is not agricultural crops, land managed as pasture, horticultural or landscaped areas, or unvegetated areas.

7) Riparian Zones Around Significant Wetlands

Wetland areas dominated by woody plants exceeding 12 feet in height fulfill the riparian functions described in section 3. Around an area of significant wetland, the riparian vegetation may be composed entirely or partially of forested wetland (Figure 3).

For inventory purposes, the zone of riparian vegetation on rivers or river segments with an average annual flow exceeding 100 cubic feet per second (cfs) is defined as fifty feet on either side of the river. On rivers, river segments, or streams with an average annual flow of less than 100 cfs., the zone of riparian vegetation is defined as 30 feet on either side of the river. (The shoreline being defined as the ordinary high water line on a stream or river). However, where the extent of shrub wetlands or forested wetlands adjacent to a river or stream is greater than thirty or fifty feet, the zone of riparian vegetation is defined to include all of the shrubs or forested wetland. Where there is emergent wetland vegetation adjacent to a river or stream, the zone of riparian vegetation is defined to be fifty feet from the landward extent of the emergent wetlands vegetation.

With the riparian zone, riparian vegetation may extend for all or only a portion of the maximum zone width. Riparian vegetation ends at one of the following:

- (1) the fifty foot or thirty foot boundary described above; or
- (2) the extent of shrub or forested wetlands; or
- (3) fifty feet from the landward extent of emergent wetland vegetation; or
- (4) within the zone, riparian vegetation may end at the boundary with non-riparian vegetation; or
- (5) at a man-made obstruction, such as a road or dike which prevents vegetation on the landward side of the obstruction from fulfilling riparian vegetation functions described above.

Waters producing or rearing fish have been identified by the Oregon Department of Fish and Wildlife in their report "Fish and Wildlife Habitat Protection Plan for Clatsop County", September, 1976. "Map 2 of the Fish and Wildlife Habitat Protection Plan for Clatsop County" illustrates these streams. In areas where the plan identifies major marshes, significant wildlife habitat on riparian vegetation in coastal shorelands and subject to forest operations governed by the Forest Practices Act, the Act and Forest Practices Rules administered by the Department of Forestry will be used to protect the natural values of these resources and to maintain riparian vegetation.

The County will develop plan policies and zoning ordinance provisions to protect riparian vegetation within the riparian zones.

The inventory of lakes in Clatsop County shall be those identified in the document titled "Lakes of Oregon, Volume 1, Clatsop, Columbia, and Tillamook Counties", prepared by the U.S. Department of Interior, Geologic Survey in 1973. According to this report the following lakes within the Coastal Shoreland planning area are: Slusher Lake, Smith Lake, Sunset (Neacoxie Lake, Taylor (Carnahan) Lake, Triangle Lake, Wild Acé Lake and West Lake.

Generally, the uses or developments that result in, or require occupation of water surface area, removal of riparian vegetation, filling or removal, increased sedimentation, or chemical or biological pollution may conflict with the protection of fish habitat. This would depend on the characteristics of the area and the design of the development being proposed.

For inventory purposes the zone of riparian vegetation on lakes with a surface area exceeding one acre is defined as fifty feet (see above criteria).

Within the riparian zone, riparian vegetation may extend for all or only a portion of the maximum width. Riparian vegetation ends at one of the boundaries identified above under stream vegetation.

See maps 4, 11 and 18, pages 41, 48, and 55.

4. Areas of significant shoreland and wetland biological habitat.

All areas identified as coastal shoreland wetlands in the report Significant Shoreland and Wetland Habitats in the Clatsop Plains by Duncan Thomas are included within the Clatsop County's Coastal Shoreland Boundary. See Appendix B.

Areas identified in the report Oregon Natural Areas Data Summary for Clatsop County report were reviewed individually. The following sites are located within the Ocean and Coastal Lake Shorelands area (outside of Urban Growth Boundaries and Estuarine Resources and associated Coastal Shoreland areas):

- a) Cullaby Lake South (See Appendix A)
- b) Slusher Lake
- c) Carnahan (Taylor Lake) (See Appendix A)
- d) Ecola State Park
- e) Clatsop Beach
- f) Oswald West State Park (the portion west of Highway 101)
- g) Tillamook Head Rocks
- h) Unnamed Rocks
- i) Sealion Rocks
- j) Bird Rocks
- k) Haystack Rock
- l) Needles
- m) Unnamed Rock
- n) Jockey Cap
- o) Lion Rock
- p) Castle Rock
- q) Gull Rock

The following is a brief description of the sites listed above:

- a) Cullaby Lake South see Appendix A.
- b) Slusher Lake - The dune lake is approximately 20 acres in size and owned by the Military Department, State of Oregon. See Significant Shoreland and Wetland Habitats in the Clatsop Plains Report listed as Site (CP 5) for description and mapping. The water area is currently zoned A-4 Aquatic Natural and the shoreland is zoned S-3 Natural Shorelands.
- c) Carnahan (Taylor) Lake see Appendix A.
- d) Ecola State Park (and Elmer Feldenhiemer Preserve) - The properties are owned by the State of Oregon and comprise 1,908.64 acres. (Ecola 1303.64, Elmer Feldenheimer 605). Ecola State Park contains bald eagles' nests as identified in the Clatsop

County Goal 5 Open Space, Scenic/Historic Areas and Natural Resources report. Other areas of the park provide nesting sites and feeding grounds for other ocean and shoreland birds and study opportunities of a recent landslide area, rock intertidal area and offshore kelp beds rich in marine life. Existing areas of developed recreational facilities within the State Parks are excluded from the above description.

- e) Clatsop Beach - This area identified by the Oregon Natural Areas Data Summary for Clatsop County Report extends from Clatsop Spit to the Gearhart UGB. Characteristics include associated dunes adjacent to the beach, a fairly pristine beach, the rare silverspot butterfly and razor clams. Vehicles are able to utilize portions of the beach for segments of the year. The beach is administered by the Oregon Department of Transportation Parks and Recreation section.
- f) Oswald West State Park (the portion west of Highway 101) - The site portion of Oswald West State Park in Clatsop County comprises 291.43 acres most of which is east of Highway 101. The site is in the Sitka spruce zone and contains significant stands of old Western hemlock and Douglas fir. Characteristics include two creeks, basaltic headland, trails, short sands beach (Tillamook County) and wildlife. The site does not meet the Douglas fir/salal 100-150 year old element of the Oregon Natural Heritage Plan. Existing areas of developed recreational facilities within the State Park is excluded from the above description.
- g) through q) All of these rocks have been designated Natural in the Clatsop County Comprehensive Plan. They are part of the Oregon Islands Wilderness and are discussed in the Clatsop county Background Report for Goal 5 Open Spaces, Scenic/Historic Areas and Natural Resources.

See maps 4, 11, and 18 pages 41, 48 and 55.

- 5. Areas needed for water-dependent and water-related uses, including areas of recreational importance which utilize coastal waters and riparian resources, areas appropriate for navigation and port facilities, and areas having characteristics suitable for aqua-culture.

- A. To determine the extent of coastal shorelands (ocean and coastal lake shorelands) in Clatsop County, an inventory of areas necessary for water-dependent and water-related uses was conducted using the following information sources:

- 1. Oregon State Game Commission (1972) Clatsop and Columbia County Lakes and Reservoirs: Master Plan for Angler Access and Associated Recreational Uses. Sites identified were at:

Smith Lake  
Sunset Lake

The following areas necessary for water-dependent and water-related uses were included within the extent of ocean and coastal lake shorelands:



- a) Existing or proposed County, State, or Federal public recreational areas and facilities such as parks, campgrounds, scenic waysides, marinas and moorages for recreational boats, and boat ramps or other public access points to coastal water bodies;
  - b) Existing private recreational areas, such as commercial resorts and campgrounds;
- B. Areas having characteristics suitable for aquaculture.
- a) Salmon
    - 1) Sites may be located a short distance above the mouth of small direct tributaries to the ocean which essentially do not have tidal influence; and
    - 2) the following streams and their tributaries and included tidal reaches are available to siting of private salmon hatchery release and recapture facilities.
      - aa) Columbia River system below Tongue Point
      - bb) Youngs River including Klaskanine River below Battle Creek Slough
      - cc) Lewis and Clark River below Johnson Slough
      - dd) Skipanon River below Taylor Lake outlet
      - ee) Necanicum River below Neawanna Creek
  - b) Non-salmon and shell fish - areas suitable for this type of aquaculture include
    - 1) small tributaries to the ocean
    - 2) Columbia River system
    - 3) Youngs River system
    - 4) Lewis and Clark River system
    - 5) Skipanon River
    - 6) Necanicum River system
    - 7) Pacific Ocean
- C. Navigation and port facilities not applicable for coastal lakes; see Estuarine Resources and associated Coastal Shorelands Section for the Columbia River and Necanicum River Estuaries.
- D. Riparian vegetation - See subsection 3 above entitled "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"

Specific "areas needed for water-dependent and water-related uses, including areas of recreational importance which utilize coastal waters and riparian resources, areas appropriate for navigation and port facilities, and areas having characteristics suitable for aquaculture" are shown on maps 6, 7, 13, 14, 20 and 21 pages.

See maps 7, 14, and 21 pages 44, 51 and 58.

- This includes the following areas that derive their primary quality from their association with coastal water bodies i.e. ocean and coastal lakes:

off shore rocks

active dunes (first foredune immediately adjacent to the beach)

- Within Ecola, Oswald West, and Ft. Stevens state Parks, the designation of areas of exceptional aesthetic and scenic quality has been limited to coastal headlands, undeveloped portions of active dune areas and sandspits. Although all areas with the state parks are usually attractive, the coastal headlands, active dune and sandspits have exceptional aesthetic and scenic qualities because of the lack of developed recreational facilities, and because of the variety and/or extent of coastal views provided in these areas.

- Active dune areas have been identified for areas in the Clatsop Spit area (Ft. Stevens State Park) and from Warrenton south to the Gearhart UGB in the report Stability of Coastal Dunes, Clatsop County, Oregon Second Draft by Leonard Palmer. Active dune areas of exceptional aesthetic or scenic quality are limited to the immediate foredune adjacent to the beach. Areas committed to residential use in the Surf Pines area are not included as areas of exceptional aesthetic scenic quality.

- These are protected by Oregon Beach Law (ORS 390).

- Areas of exceptional aesthetic or scenic quality (i.e., exceptional aesthetic resources) and other areas of scenic quality are listed under Coastal Shorelands Inventory and mapped on Maps 5, 12, and 19 pages 42, 49 and 56. (exceptional aesthetic resources)

Coastal headlands are identified in the Visual Resource Analysis of the Oregon Coastal Zone (Oregon Coastal Conservation and Development Commission, 1974). Although the scale of mapping in the report is not large enough to determine exact boundaries it is sufficient to make the following determination:



3. Site: Gull Rocks, Castle Rocks and other offshore islands.  
Maps 18 and 19 pages 55 and 56.  
Location: West of T4N R10W Sections 6, 7, 18, 19, 30 & 31  
Classification: 1. Significant shoreland and wetland habitat (Map 19 exceptional aesthetic resource)  
Discussion: The islands are a significant seabird habitat which are included in the Oregon Islands Wilderness  
Base Zone: Natural Shorelands (NS).
4. Site: Oswald West State Park (Arch Cape Tunnel area). Maps 19, 20, 21 pages 56, 57 and 58.  
Location: T4N R10W section 30  
Classification: 1. Coastal headland  
2. Historic site  
3. Exceptional aesthetic or scenic quality  
Discussion: The tunnel is listed in the Statewide Inventory of Historic Sites and Buildings  
Base Zone: Recreation Management (RM).

ARCH CAPE TUNNEL TO SOUTH BOUNDARY OF CANNON BEACH URBAN GROWTH BOUNDARY (UGB)

5. Site: Arch Cape shoreland. Maps 16, 17 and 19 pages 53, 54 and 55.  
Location: T4N R10W Sections 19 and 30  
Classification: 1. Beach - exceptional aesthetic or scenic quality  
2. Hazard area, 100 year floodplain velocity zone  
3. Adjacent areas of geologic instability  
Discussion:  
Base Zone: Rural Service Area-Single Family Residential (RSA-SFR), Coastal Residential (CR).
6. Site: Hug Point State Park. Maps 17, 19, 20 and 21 pages 54, 56, 57, and 58.  
Location: T4N R10W Section 18  
Classification: 1. Hazard area, 100 year floodplain velocity zone;  
2. Public access and recreational use  
3. Exceptional aesthetic or scenic quality  
4. Area needed for water-dependent and water-related uses.  
Discussion:  
Base Zone: Recreation Management (RM).

7. Site: Arcadia shoreland. Maps 16 and 17 pages 53 and 54.  
Location: T4N R10W Section 7 and 18 (between Hug Point State Park and Arcadia Beach Wayside)  
Classification: 1. Hazard area, 100 year floodplain velocity zone  
 2. Adjacent areas of geologic instability  
Discussion:  
Base Zone: Coastal Residential (CR).
8. Site: Arcadia Beach Wayside. Map 16 page 53.  
Location: T4N R10W Section 7.  
Classification: Adjacent area of geologic instability.  
Discussion: Area is immediately south of the south Cannon Beach UGB where in 1974 a huge slide took out U.S. Highway 101.  
Base Zone: Recreation Management (RM).
9. Site: Silver Point. Map 16 page 53.  
Location: T4N R10W Section 6 and 7.  
Classification: Adjacent area of geologic instability.  
Discussion: Area is immediately south of the Cannon Beach UGB where in 1974 a huge slide took out U.S. Hwy. 101.  
Base Zone: Coastal Residential (CR).  
 Agriculture-Forest 20 (AF-20).  
 Open Space, Parks and Recreation (OPR).

NORTH CANNON BEACH UGB TO SOUTH SEASIDE UGB

10. Site: Tillamook Head. Maps 2-7 pages 39-44.  
Location: T5N R10W Sections 6 and 7  
 T5N R11W Sections 1 and 12  
 T6N R10W Sections 29, 30, and 31  
Classification: 1. Adjacent area of geologic instability  
 2. Exceptional aesthetic resource  
 3. Significant shoreland  
 4. Area needed for water-dependent and water-related uses  
 5. Coastal headland  
 6. Recreational importance  
 7. Historic site  
Discussion: This area is in Ecola State Park and Elmer Feldenheimer Forest Preserve administered by ODOT State Parks Division. The site has been identified as containing northern Bald Eagle nesting sites. Ecola State Park is also an important coastal recreation area. At Clark's Viewpoint a plaque commemorates the southern most extent of the Lewis and Clark Expedition in Clatsop County.  
Base Zone: Recreation Management (RM).

NORTH GEARHART UGB TO SOUTH WARRENTON UGB

11. Site: Clatsop Beach. Maps 9-12 pages 46-49.

Location: T7N R10W Sections 4, 9, 16, 21, 28 and 33

T8N R10W Section 29 and 33

From north Gearhart UGB to south Warrenton UGB

Classification: 1. Hazard area, 100 year floodplain velocity zone  
2. Adjacent area of geologic instability (first foredune)  
3. Exceptional aesthetic or scenic quality  
4. Significant shoreland habitat.

Discussion: The adjacent area of geologic instability comprises the first foredune (the immediate area east of the 100 year floodplain velocity zone).

Base Zone: Open Space, Parks and Recreation (OPR).  
Residential-Agriculture 5 (RA-5).  
Coastal Beach Residential (CBR).  
Military Reserve (MR).

12. Site: Del Rey Beach wayside. Map 14 page 51.

Location: T7N R10W Section 33

Classification: Area needed for water-dependent and water-related uses

Discussion: ODOT State Highway Division beach access, County Road access to beach

Base Zone: Open Space, Parks and Recreation (OPR).

13. Site: Sunset Beach access. Map 14 page 51.

Location: T7N R10W Section 33

Classification: Area needed for water-dependent and water-related uses

Discussion: County Road access to beach

Base Zone: Open Space, Parks and Recreation (OPR).  
Residential-Agriculture 5 (RA-5).

14. Site: Clatsop Plains Site #17 and northern extension of Gearhart Site #2. Map 11 page 48.

Location: T7N R10W Section 22, 27 and 34

West of Highway 101, north of Gearhart UGB, north and south of Del Rey Beach Road and north and south end of Surf Pines Road.

Classification: Significant shoreland and wetland habitat comprising about 30 acres.

Discussion: This is a northern extension of Gearhart sites #1 and 2. This is part of an extensive deflation plain/coastal lake system which extends from the Necanicum estuary north to Sunset Lake. Before extensive filling in Camp Riley it extended to Coffenbury Lake. The system has fisheries, waterfowl and other wetland values.

Base Zone: Lake and Wetlands (LW).

15. Site: Clatsop Plains Site #12. Maps 11 page 48.  
Location: T7N R10W sections 15, 22 and 27 West Lake. This lake is crossed by Highway 101 and the associated wetlands extend southwards beyond the southern end of the Delmoor Loop.  
Classification: 1. Significant shoreland and wetland habitat.  
2. Riparian Vegetation.  
Discussion: This site is approximately 126 acres in size. A coastal lake of medium depth, with its associated marshes and swamps. At higher water periods these wetlands are inundated with lake water. This lake is reported to support recreational fishing for warm-water game fish. Waterfowl winter over on this lake. Some breeding occurs.  
Base Zone: Lake and Wetlands (LW).
16. Site: Clatsop Plains Site #10. Map 11 Page 48.  
Location: T7N R10W Sections 4, 9, 10, 15  
T8N R10W Section 33  
A long narrow coastal lake (c. 15,600 feet) extending from Columbia Beach Road near Smith Lake south through Camp Rilea, between the golf course and U.S. Highway 101 and beyond Sunset Beach Road.  
Classification: 1. Significant shoreland and wetland habitat comprising about 73 acres  
2. Riparian vegetation.  
Discussion: At their widest places these shallow lakes have extensive sedge and water lily marshes with weed-filled water and swampy patches. Where they are narrow they become weed-filled water overhung by willows and riparian vegetation.  
Base Zone: Lake and Wetlands (LW).
17. Site: Clatsop Plains Site #11. Map 11 page 48.  
Location: T7N R10W Section 9, 16, 21 and 22  
Classification: Significant habitat comprising about 130 acres.  
Discussion: One of the largest and deepest coastal lakes, Sunset Lake is about 16,500 feet long, up to 640 feet wide and up to 19 feet deep. This lake supports populations of warm-water fish and there is a large recreational fishery. Waterfowl are often abundant, besides the large domestic flocks, and in bad weather, the lake is used for shelter by pelagic ocean species. The riparian vegetation has been heavily impacted.  
Base Zone: Lake and Wetlands (LW).
18. Site: Sunset Lake boat ramp. Map 14 Page 51.  
Location: T7N R10W Section 9  
Classification: Area needed for water-dependent and water-related uses  
Discussion: This is an existing site  
Base Zone: Open Space, Parks and Recreation (OPR).

19. Site: Clatsop Plains Site #5. Map 11 page 4E.

Location: T7N R10W Section 4 and 9

Wetlands, including Slusher Lake, deflation plains west of Sunset Lake

Classification: 1. Significant shoreland and wetland habitat comprising about 104 acres

2. Riparian vegetation

Discussion: West and south of Camp Rilea, the first and second deflation plains, behind the foredune area, are discontinuous. Instead of the large slough-sedge areas found further north, these are hollows in the dunes filled with slough sedge and hooker willow wetlands, and often containing coastal lakes. The largest of these is Slusher Lake, but there are several others which are perennially flooded. These lakes have some warm water fish and waterfowl values, while the associated swamps and marshes are used by waterfowl and other wetland birds. South of this site, the first deflation plain peters out gradually in a series of small seasonally inundated puddles. These were not found to be significant. This site has waterfowl and some fisheries value and is part of a large coastal ecosystem.

Base Zone: Aquatic Natural (AN).

Natural Shorelands (NS).

Lake and Wetlands (LW).

20. Site: Clatsop Plains Presbyterian Church. Map 14 page 51.

Location: T7N R10W Section 4

Classification: Historic site

Discussion: The church is listed as a historic site in the Statewide Inventory of Historic Sites and Buildings

Base Zone: Residential Agriculture 1 (RA-1).

21. Site: Clatsop Plains Site #7. Map 11 page 4E.

Location: T8N R10W Section 28 and 33 Smith Lake

Classification: 1. Significant shoreland and wetland habitat  
2. Riparian vegetation

Discussion: This site consists of two parallel deflation plains. The smaller one to the west is shallow, weed-filled water surrounded by swamps and marshes. The larger one to the east is connected to the first in several places by swamps, and contains the large but rather shallow Smith Lake. This lake is mostly open water which becomes weed-filled in summer; fringing marshes and swamps are narrow except at the southern end. It has heavy recreation usage from the surrounding property owners, and is reported to support several species of warm-water game fish. It is also an important overwintering area for waterfowl, principally coot and American widgeon, which may number many hundreds. Fisheries, recreational warm-water game fish, overwintering waterfowl. Local recreational use.

Base Zone: Lake and Wetlands (LW).

22. Site: Smith Lake boat ramp. Map 14 page 51.

Location: T8N R10W Sections 28 and 33

Classification: Area needed for water-dependent and water-related uses

Discussion: The site is proposed on a 3 acre site owned by Clatsop County. The lake contains numerous weeds and could become a problem for boating.

Base Zone: Single Family Residential (SFR-1).



23. Site: Clatsop Plains Site #6. Map 11 page 48.

Location: T8N R10W Section 29, 32, 33

West of Ridge Road, south of Columbia Beach Road (DeLaura Beach Road) to Camp Rilea

Classification: 1. Significant shoreland and wetland habitat  
2. Riparian vegetation

Discussion: A large shallow lake occupying two parallel deflation plains with a discontinuous dune ridge between them. This is a diverse wetland system, with large expanses of shallow water, sedge marshes, willow and spruce swamp and riparian vegetation. Since this area is permanently flooded, it supports populations of warm-water fish. The shallow marshy nature of this lake makes it unsuitable for fishing, but it is used extensively by waterfowl, particularly American widgeon. It probably supports breeding populations of waterfowl, such as mallard and wood duck, as well as other wetland bird species. The southward extension of this lake is narrow and long and is lined with trees. It should also contain warm-water fish, and is important to breeding water birds. An isolated four acre "puddle" (c. 400 feet west of the main site) with standing water, sedge and willow swamp, is also included in this site. It also has some importance to wetland birds. Important to waterfowl and aquatic mammals.

Base Zone: Lake and Wetlands (LW).

24. Site: Clatsop Plains Site #4. Map 11 page 48.

Location: T8N R10W Section 29

The first deflation plain east of the westernmost dune ridges. Extends from the City of Warrenton limits on the north south to Camp Rilea.

Classification: Significant shoreland and wetland habitat comprising 120 acres.

Discussion: A large deflation plain of relatively recent origin. At c. 18-22 feet above MSL, these wetlands are flooded at wet times of the year, particularly winter and spring, and dry out during the summer. The sandy soil has poor moisture retaining capacity. The vegetation is mostly dominated by slough sedge and hooker willow, while numerous small isolated dunes support upland vegetation. The main value of these wetlands is that they are part of a large, more or less natural coastal ecosystem: they are less valuable per acre than wetlands further inland. Wildlife use is by amphibians, small mammals, deer and many bird species, particularly birds of prey. Breeding and feeding of wetland birds, scientific/educational value as part of a coastal ecosystem.

Base Zone: Lake and Wetlands (LW).

NORTH WARRENTON AND HAMMOND UGBS TO COLUMBIA RIVER COASTAL SHORELANDS BOUNDARY

25. Site: Battery Russell (Fort Stevens State Park). Map 14 page 51.  
Location: T8N R10W Section 7  
Classification: Historic site  
Discussion: Ft. Stevens is the site of old gun emplacements that were used to guard the mouth of the Columbia River from possible enemy attack. This one and others are listed as a historical site in the Statewide Inventory of Historic Sites and Buildings  
Base Zone: Recreation Management (RM).
26. Site: Ft. Stevens Beach Access Points. Map 14 page 51.  
Location: T8N R11W Sections 1 and 12 Clatsop Spit  
Classification: Area needed for water-dependent and water-related uses  
Discussion: These beach access points are not for vehicles but are for pedestrians only.  
Base Zone: Recreation Management (RM).
27. Site: Clatsop Spit Beach. Maps 9, 11 and 12 pages 46, 48, and 49.  
Location: T8N R10W Section 7  
T8N R11W Section 1  
From north Warrenton UGB to South Jetty  
Classification: 1. Hazard area, 100 year floodplain velocity zone  
2. Adjacent area of geologic instability (first foredune)  
3. Exceptional aesthetic or scenic quality  
4. Significant habitat  
Discussion: The adjacent area of geologic instability comprises the first foredune (the immediate area east of the 100 year floodplain velocity zone).  
Base Zone: Recreation Management (RM).
28. Site: Clatsop Plains Site #1. Map 11 page 48.  
Location: T8N R10W Section 7  
Clatsop Spit west of Battery Russell south to Warrenton city limits  
Classification: Significant shoreland and wetland habitat  
Discussion: This enormous site is a mosaic of young deflation plain wetlands and sand dunes mostly of rather low elevation. The deflation plains are mostly dominated by slough sedge and hooker willow; they are flooded in winter and spring by high water tables, and also by very high tides. In summer, the sandy soil may be saturated or moist. A well developed young dune/deflation plain flora is present. The uplands are dominated by grass, principally introduced beach grass, and also some scrub. Black-tailed deer are present together with many smaller aquatic and terrestrial mammals. The area is important to avifauna, particularly migrating and overwintering populations. Many rare species have been recorded. It is important habitat for raptors, and has a resident population of marsh hawks and occasional use by many other species. The area is important to pelagic birds during

stormy weather. Endangered snowy plovers have nested here, particularly west of parking lot C. The area has been identified as important habitat by the Nature Conservancy, and as one of the State's most important birdwatching areas.

Base Zone: Recreation Management (RM).

29. Site: Clatsop Plains Site #2. Map 11 page 48.

Location: T6N R10W Section 7 and 8

Areas east of Battery Russell and east to Hammond town limits and south to Warrenton city limits

Classification: Significant shoreland and wetland habitat comprising about 40 acres

Discussion: This area supports relatively mature sand dune vegetation, with a mosaic of wetland and upland areas. The deflation plain wetlands are forested and large areas are inundated by the highest tides. Because the major hydrological influence is the sand dune water table, these wetlands were judged to be Goal 17, not Goal 16. Isolated dunes and dune ridges in this site support spruce/hemlock forest and are significant as riparian and upland habitats for birds and mammals. This site is in a complex area of great habitat diversity, closely associated with the Swash Lake estuarine area. It is important to deer, aquatic furbearers and to wetland bird species. The site also includes three areas of forested swamp on the south side of Jetty Road. Part of natural mature sand dune ecosystem, in close proximity to the estuary.

Base Zone: Recreation Management (RM).

30. Site: Seaside Site #1. Map 11 page 48.

Location: T6N R10W Section 32 and 33

Circle Creek wetlands south of Seaside Golf Course.

Classification: Significant shoreland and wetland habitat comprising about 20 acres in the County with adjacent areas in Seaside and Seaside UGB.

Discussion: This site is poorly drained, low-lying part of the Necanicum floodplain. It is separated from the ocean by the bar which supports Ocean View Way, and from the Necanicum River, into which it drains. It is mostly separated by the more elevated land adjacent to the river. Site is a typical natural river floodplain wetland for this region. The vegetation is mostly willow and spruce swamp, and the site has some fine old-growth spruce trees. It is enhanced by areas of emergent marsh and shallow water-lily covered lakes along Circle Creek, which meanders through the site.

Base Zone: Lake and Wetlands (LW).

31. Site: Clatsop Plains Site #20. Map 11 page 48.

Location: T6N R10W Section 16

Southeast of Seaside.

Classification: Significant shoreland and wetland habitat.

Discussion: This headwater swamp on the Neawanna is dissected by several small creeks, which support a small natural run of coho salmon (Maine). The swamps which also act as riparian zones around these creeks and the mill ponds are important elk habitat and are important habitat for nesting and feeding wetland birds species, probably included waterfowl breeding.

Base Zone: Lake and Wetlands (LW).

32. Site: Clatsop Plains Site #8. Map 11 page 48.

Location: TBN R10W Section 33 and 34.

South of Warrenton High School, east and west of old railroad right-of-way.

Classification: Significant shoreland and wetland habitat.

Discussion: An area of mostly forested wetland with some emergent marsh, adjacent to the Skipanon River. Besides fulfilling riparian functions, these wetlands are extensively used by wetland and upland avifauna, by aquatic furbearers and by deer.

Base Zone: Lake and Wetlands (LW).

## Description of Ocean and Coastal Lake Shorelands Boundary (OCLSB)

The extent of ocean and coastal lake shorelands in Clatsop County is defined by the Ocean and Coastal Lake Shoreland Boundary line described below. The OCLSB line (delineated on the Clatsop County Comprehensive Plan and Land and Water Development and Use Map and on Maps 8, 15, and 22 p. 45-59 defines the limits of the Shorelands Overlay/SO district and the Lake and Wetlands zone. The zones are described in other portions of this Section and in the Clatsop County Land and Water Development and Use Ordinance.

Coastal Shorelands include the following areas:

- 1) Areas containing one or more of the seven features described in the section "Methodology for Shoreland Inventory".
- 2) Other areas containing significant shoreland features and resources described in the section "Ocean and Coastal Lake Shoreland Inventory".
- 3) All other areas adjacent to coastal lakes which are:
  - a) within 200 feet of a coastal lake; or
  - b) between a coastal lake and a highway if the highway is closer than 200 feet to a coastal lake.

These areas (a & b) were included in the ocean and coastal lake shorelands boundary line because they are subject to development pressure for water-dependent development, as well as for non-water dependent development which benefits in some manner from the proximity of the coastal lake. The decision on the extent of area to include was based on review of existing development patterns in areas adjacent to coastal lakes. The review revealed that development adjacent to coastal lakes occurs most frequently within areas described above. The Lake and Wetlands zone and the development review mechanism in the Coastal Shorelands Overlay zone should serve to decrease the possibility of adverse impacts on coastal lakes caused by development on these adjacent lands.

## TILLAMOOK COUNTY LINE TO ARCH CAPE TUNNEL

1. From the Tillamook County line the boundary line follows U.S. Highway 101 north to the northernmost access road to Cove Beach and then follows the boundary of Oswald West State Park west and south to the Tillamook County line. See map 22.
2. From the Tillamook county line to the Arch Cape Tunnel the boundary line follows the easternmost line of the 100 year floodplain (velocity zone) and identifies geologic hazards to the north end of the Cove Beach subdivision where the line goes east to U.S. Highway 101 then north to the tunnel. These are the only factors identified in this area. See map 22.

#### ARCH CAPE TUNNEL TO SOUTH BOUNDARY OF CANNON BEACH URBAN GROWTH BOUNDARY (UGB)

1. From the Arch Cape tunnel on U.S. Highway 101 the line goes north to Webb Avenue, then west to the easterly line of the 100 year floodplain (velocity zone). The boundary line then follows the 100 year floodplain and identified geologic hazards north to the northern boundary line of the Arch Cape Sewer County Service District. The boundary line then goes east to U.S. Highway 101. These are the only factors identified in this area.
2. From this point the boundary line goes north along U.S. Highway 101 to the northern line of Hug Point State Park. The boundary line then goes west to an identified geologic hazard.
3. From this point the boundary line goes north along the eastern boundary of the 100 year floodplain (velocity zone) and identified geologic hazard areas to Arcadia Beach Wayside. The line then goes east to U.S. Highway 101. These are the only factors identified in this area.
4. From this point the boundary line goes north along U.S. Highway 101 to the northern boundary line of Arcadia Beach Wayside then goes west to the 100 year floodplain (velocity zone).
5. From this point the boundary line goes north along the easternmost point of the 100 year floodplain (velocity zone) and identified geologic hazards. The geologic hazard (Silver Point slide) intersects with U.S. Highway 101. These are the only factors in this area.
6. From this point the boundary line goes north along U.S. Highway 101 to the Cannon Beach UGB.

#### NORTH CANNON BEACH UGB TO SOUTH SEASIDE UGB

From the north line of the Cannon Beach UGB the boundary line follows the eastern boundaries of Ecola State Park and Elmer Feldenheimer Preserve to the south boundary of the Seaside UGB. See Map 8.

#### NORTH GEARHART UGB TO SOUTH WARRENTON UGB

The ocean and coastal lake shorelands boundary is as shown on Map 15. In areas where there is an "area of geologic instability associated with a coastal water body" the upland boundary is 25 feet from the identified hazard.

#### NORTH WARRENTON AND HAMMOND UGBS TO COLUMBIA RIVER COASTAL SHORELANDS BOUNDARY

The entire area is within the ocean and coastal lake shoreland boundary line.

#### 4. GENERAL POLICIES FOR OCEAN AND COASTAL LAKE SHORELANDS

##### General Use Priorities

###### Policy:

New shoreland development, expansion, maintenance or restoration of existing development and restoration of historic sites shall conform to the following general priorities for the overall use of ocean and coastal lake shorelands (in order of priority):

1. water-dependent uses;
2. water-related uses;
3. non-dependent, non-related uses which retain flexibility of future use and do not prematurely or inalterably commit ocean and coastal lake shorelands to more intensive uses;
4. development, including non-dependent, non-related uses, in Rural Service Areas (compatible with existing or committed uses);
5. non-dependent, non-related uses which cause a permanent or long term change in the features of ocean and coastal lake shorelands only upon a demonstration of public need.

##### Shoreland Development

###### Policy:

New shoreland development, expansion, maintenance or restoration of existing development; or restoration of historic waterfront areas shall be sited, designed, constructed and maintained to minimize adverse impacts on riparian vegetation, water quality and aquatic life and habitat in adjacent aquatic areas, and to be consistent with existing hazards to life and property posed by eroding areas and flood hazard areas.

To accomplish this:

- a. The requirements of the National Flood Insurance Program shall be used to regulate development in flood hazard areas within coastal shorelands.
- b. Shoreland setbacks shall be established to protect riparian vegetation and to recognize eroding areas (see Riparian Vegetation Section of this element);
- c. Priority shall be given to nonstructural rather than structural solution to problems of erosion or flooding;
- d. Existing state and federal authorities referenced in the Water Quality policies shall be utilized for maintaining water quality and minimizing man-induced sedimentation in aquatic areas.

##### Scenic Views and Public Access

###### Policy:

New shoreland development, expansion, maintenance or restoration of existing development and restoration of historic sites shall be designed to promote visual attractiveness and scenic views and provide, where appropriate, visitor facilities, public viewpoints and public access to the water. Existing public access to publicly owned shorelands shall be maintained.

### Multiple Use of Shorelands

#### Policy:

Multiple use of shorelands shall be encouraged when the integration of compatible uses and activities is feasible and is consistent with the intent of other Comprehensive Plan policies contained in this Plan element.

### Planned Development in Ocean and Coastal Lake Shorelands

#### Policy:

Clustering of non-water dependent and non-water related residential and commercial development on ocean and coastal lake shorelands shall be required in the Clatsop Plains planning area. No industrial development is permitted. Clustering of non-water dependent or non-water related residential, commercial or industrial development on ocean and coastal lake shorelands shall be encouraged in other planning areas through application of the Planned development overlay district (/PDO).

Development densities shall be compatible with significant shoreland resources and features identified in the Clatsop County Comprehensive Plan and with adjacent estuarine and associated coastal shoreland areas designated Natural or Conservation.



5. FINDINGS AND POLICIES FOR SIGNIFICANT SHORELAND RESOURCES: MAJOR  
MARSHES, SIGNIFICANT WILDLIFE HABITAT, COASTAL HEADLANDS, EXCEPTIONAL  
AESTHETIC RESOURCES AND HISTORICAL AND ARCHEOLOGICAL SITES

Findings for Compatibility of Low-Intensity Uses with the Protection of  
Natural Values of Significant Shoreland Resources

Clatsop County finds that:

- a. Uses and activities which are consistent with the protection of the natural values of significant shoreland resources are those uses which do not require developed facilities,<sup>1</sup> and which can be accommodated without adverse impact to an area or its resources;
- b. The following uses and activities are consistent with the protection of natural values of major marshes, significant wildlife habitat, coastal headlands, exceptional aesthetic resources and historical or archaeological sites:
  - (1) recreational uses such as hiking, fishing, hunting, photography, wildlife observation, sightseeing or beachcombing which can be conducted with only minor alteration (such as foot trails, simple interpretive devices or viewpoint signs) to an area or its resources;
  - (2) grazing and other farm uses (excluding farm structures) which do not require a development, building or mobile home placement permit from Clatsop County, or a Division of State Lands or U.S. Army Corps of Engineers permit.
  - (3) research or educational activities which maintain or enhance the natural characteristics of an area or its resources;
  - (4) harvesting wild crops.
- c. The following forest management activities are considered to be low-intensity activities within coastal headlands, exceptional aesthetic resources and significant historical and archaeological sites:
  - (1) fire, insect and disease control, reforestation and hazard tree removal, consistent with the Oregon Forest Practices Act, as long as the resource remains substantially unaltered.

Findings for Compatibility of Uses Permitted Under Existing Management  
Programs in Areas Containing Significant Shoreland Resources

1. Ft. Stevens State Park  
Clatsop County finds that:

- (a) A State Park Master Plan has been completed for Ft. Stevens State Park;

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<sup>1</sup>"Facility" is defined as a group or combination of structures that is built, installed or established to serve a particular purpose.

- (b) The Ft. Stevens State Park Master Plan separates lands within State Parks into land use categories, establish primary land use values and functions for each land use category, and specify compatible recreation activities and developments for each land use category;
- (c) The PRIMARY RESOURCE PROTECTION land use category contains lands with the following primary land use values and functions:<sup>1</sup>

"Vital park attractions, outstanding scenic features, major fish and wildlife habitats, historic and archaeological sites, unique ecological areas to be retained as natural park attractions for public inspiration, enjoyment, and scientific values."

Compatible recreation activities and developments within this land use category are:

"Foot-trail access, simple interpretive devices, viewing structures, passive water activities, limited recreation uses which have little impact on land resources."

- (d) The following areas containing exceptional aesthetic resources identified in the Clatsop County Comprehensive Plan have been included within the Primary Resource Protection land use category:

- (1) Fire Control Hill (adjacent to Battery Russell)
- (2) Active dune

- (e) The following historical sites identified in the Clatsop County Comprehensive Plan have been included within the Primary Resource Protection land use category:

- (1) Ft. Stevens State Park Military Reservation (Battery Russell areas).

All archaeological within Ft. Stevens State Park (as identified on the unpublished archaeological sites map) were also included within the Primary Resource Protection land use category.

- (f) The following significant wildlife habitat areas identified in the Clatsop County Comprehensive Plan in addition to those included within the Primary Resource Protection land use category:

- (1) Clatsop Plains Site #1
- (2) Clatsop Plains Site #2

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<sup>1</sup>"Primary land use values and functions", and "compatible recreation activities and developments", within the Primary Resource Protection land use category were taken from the Master Plan for Ft. Stevens State Park. Oregon State Parks Division, Sept., 1976, p. 33.

- (g) Activities permitted within the Primary Resource Protection land use category are consistent with the protection of natural values of coastal headlands, exceptional aesthetic resources, historical and archaeological sites, and significant wildlife habitat.

2. Oregon Islands Refuge

Clatsop County finds that:

- (a) The Oregon Islands National Wildlife Refuge in Clatsop County is designated as "significant wildlife habitat" and "exceptional aesthetic resources" in the Clatsop County Comprehensive Plan.
- (b) A National Wildlife Refuge is established to "provide protection and habitat for waterfowl, colonial birds, endangered species and other wildlife."<sup>1</sup>
- (c) There are no public use facilities in the Oregon Islands Natural Refuge in Clatsop County. Uses within this National Refuge are limited to low-intensity uses such as viewing and photographing birds and other wildlife and research and environmental education. These uses are consistent with the protection of natural values of significant wildlife habitat and exceptional aesthetic resources.

Findings for Farm Uses and Propagation and Harvesting of Forest Products in Coastal Headlands, Exceptional Aesthetic Resources and Historical or Archaeological Sites

1. Coastal Headlands

Clatsop County finds that:

- (a) The following coastal headland has been identified in the Clatsop County comprehensive Plan:
- (1) Oswald West State Park (Arch Cape Tunnel Headland)

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<sup>1</sup>National Wildlife Refuges of Region 1, U.S. Department of the Interior, Fish and Wildlife Service, April 11, 1977, p. 2.

## 2. Exceptional Aesthetic Resources

Clatsop County finds that:

- (a) The following exceptional aesthetic resources have been identified in the Clatsop County Comprehensive Plan:

- ( 1) Tillamook Head Rocks
- ( 2) Unnamed Rocks
- ( 3) Sealion Rocks
- ( 4) Bird Rocks
- ( 5) Haystack Rock
- ( 6) Needles
- ( 7) Unnamed Rock
- ( 8) Jockey Cap
- ( 9) Lion Cap
- (10) Castle Rock
- (11) Gull Rock
- (12) Arch Cape Tunnel Headland
- (13) Tillamook Head
- (14) Clatsop Beaches
- (15) Active Dune

- (b) With the exception of Oswald West, Ecola, and Elmer Feldenheimer, the exceptional aesthetic resources listed above are physically unsuited for farm use or propagation and harvesting of forest products.

- (c) Oswald West, is located within an area which is under the Oregon Parks Division management program which limits the intensity of farm use or propagation and harvesting of forest products to a level which is consistent with the protection of natural values of exceptional aesthetic resources.

## 3. Historical or Archaeological Sites

Clatsop County finds that:

- (a) The following significant historical sites have been identified in the Clatsop County Comprehensive Plan:

- (1) Arch Cape Tunnel (Oswald West State Park)
- (2) Clark's Viewpoint (Tillamook Head, Ecola State Park)
- (3) Clatsop Plains Presbyterian Church
- (4) Battery Russell

- (b) The following historic sites listed in (a) above occur in areas which are physically unsuited for farm or propagation and harvesting of forest products:

- (1) Clatsop Plains Pioneer Presbyterian Church
- (2) Battery Russell

(c) The remaining significant historical sites listed in (a) above and all identified significant archaeological sites within coastal shorelands are:

- (1) located in areas which are under the Oregon Parks Division management program which limits the intensity of farm use or propagation and harvesting of forest products to a level which is consistent with the protection of the natural values of significant historical and archaeological sites;
- (2) located within an area where farm and forest uses have been limited to those farm and forest uses described in Section 5 of this element, which are consistent with protection of natural values of coastal headlands, exceptional aesthetic resources, and historical and archaeological sites.

#### Policies for Protection of Natural Values of Significant Shoreland Resources

- a. Shoreland development shall be sited and designed to be consistent with the protection of the natural values of identified major marshes, significant wildlife habitat, riparian vegetation coastal headlands, exceptional aesthetic resources and significant historic or archaeological sites within the shorelands planning boundary identified in the Clatsop County Comprehensive Plan.
- b. Forestry operations within coastal shorelands shall be consistent with the protection of the natural values of major marshes, significant wildlife habitat and riparian vegetation. The State Forest Practices Act and Forest Practices Rules administered by the Department of Forestry shall be used to protect the natural values of these resources on commercial forest lands and other lands under the jurisdiction of the Forest Practices Act within coastal shorelands.

## G. FINDINGS AND POLICIES FOR PROTECTION OF RIPARIAN VEGETATION

### Findings:

Goal 17 Implementaiton Requirement 5 establishes the following requirements for the proteciton of riparian vegetation within coastal shorelands.

- "(5) Because of the importance of vegetative fringe adjacent to coastal waters to water quality, fish and wildlife habitat, recreational use and aesthetic resource, riparian vegetation shall be maintained; and where appropriate restored and enhanced, consistent with water-dependent uses."

Clatsop County feels that protection of riparian vegetation is important for coastal shoreland areas. Clatsop County recognizes, however, that under certain circumstances, maintenance of riparian vegetation according to the standards in the Land and Water Development and Use Ordinance is either impracticable or would place an undue restriction on the use of land. An obvious example is the case of a water-dependent use which requires direct access to or use of water. In this case, a certain amount of riparian vegetation must be removed in order to accommodate the use. Another example would be the case of an existing lot of record where maintaining riparian vegetation according to the standards in the Land and Water Development and Use Ordinance would reduce the buildable lot area to the extent that development on the lot would be precluded. Based on the experience of the Clatsop County Planning Department, a minimum depth of 45 feet is necessary in order to accommodate development.

It was not possible to estimate the impacts of removal of riparian vegetation in conjunction with a water-dependent use, since it was not possible to anticipate all areas in which water-dependent uses might be proposed. (This is particularly true in the case of individual private docks for recreational boat moorage). However, an attempt has been made to estimate the impacts of allowing removal of riparian vegetation to provide for development of small existing lots of record. The most recent Assessors maps available to the Clatsop County Planning Department were used to locate existing lots of record within the extent of coastal shorelands which could not be developed under the riparian vegetation standards.

Through examination of Assessors maps, lots of record which are too small to accommodate development under the riparian vegetation standards were located. Approximately 90% of these lots occur within areas which are built and committed to development, the incremental adverse environmental impact of allowing additional removal of riparian vegetation was considered to be more acceptable than the social and economic impacts produced by precluding development of these lots in order to achieve total protection of riparian vegetation. Map references are not made in a few cases where lots are located within a resource zone (EFU-38, F-80, F-38, AF-20).

Clatsop County finds that there is justification for reducing the requirements for protection of riparian vegetation in order to provide for direct access to water in conjunction with a water-dependent use, or to provide for development on existing platted or partitioned lots.

Policy:

Riparian vegetation shall be retained, except in cases where removal is necessary in order to provide for development of a lot of record existing as of the date of adoption of the Clatsop County Comprehensive Plan. Removal of riparian vegetation under these circumstances shall be the minimum possible to provide for the proposed use. Restoration and enhancement of riparian vegetation is encouraged, where appropriate and consistent with water-dependent uses.

## 7. IMPLEMENTATION POLICIES

1. Ocean and Coastal Lake Shorelands of Clatsop County shall be managed through implementation of the Clatsop County Comprehensive Plan by means of the Land and Water Development and Use Ordinance, which shall contain the Land and Water Standards, shoreland zones and zoning maps.
2. Clatsop County shall review the following for consistency with the Clatsop County Comprehensive Plan, zoning map, zoning ordinance and Land and Water use Standards:
  - (a) state or federal permit applications for uses and activities within shorelands;
  - (b) applications for Clatsop County Development Permits; including building and mobile home placement permits, development permits for flood hazard areas, preliminary subdivision plat applications and planned developments within coastal shorelands;
  - (c) A-95 project pre-application notifications, by means of referral from and comment to the Clatsop-Tillamook Intergovernmental Council.

Where applicable, procedures for review shall be developed as part of the Clatsop County Land and Water Development and Use Ordinance.

3. Clatsop County shall coordinate with local, state and federal agencies and citizen-advisory groups during implementation of the Coastal Shorelands element of the Clatsop County Comprehensive Plan. Clatsop County may convene an implementaiton conference as a means of coordination during the following:
  - (a) preparation of post-acknowledgment amendments to the Comprehensive Plan or Land and Water Development and use Ordinance;
  - (b) periodic updates of the Clatsop County Comprehensive Plan;
  - (c) review of recommendations and/or findings of fact for state or federal permit applications as a forum for discussion or resolution of disputes over regulatory functions.
4. Removal of algae, weeds and noxious plants from Coastal lakes east of U.S. Highway 101 may be allowed if acceptable to the Oregon Department of Fish and Wildlife and other state and federal agencies.
5. Uses of major marshes and significant wildlife habitat in the coastal shorelands will be consistent with the protection of their natural values. Riparian vegetation will be maintained.
6. Where the Plan identifies major marshes, significant wildlife habitat or riparian vegetation on lands in the coastal shorelands subject to forest operations governed by the Forest Practices Act, the Act and Forest Practices Rules administered by the Department of Forestry will be used to protect the natural values of these resources and to maintain riparian vegetation.
7. Uses in Coastal Headland, significant wildlife habitat, Exceptional Aesthetic Resources and Historical or Archeological Sites in Oswald West State Park, Ecola State Park and Elmer Feldenheimer Forest Preserve shall be limited to the protection of identified natural values.



## Appendix A

Note: Lakes east of Highway 101 - Cullaby, Carnahan (Taylor or Stricklin), Triangle and Unnamed (Lounsberry) Lakes

Clatsop County believes that the above lakes east of U.S. Hwy. 101 are not Coastal Lakes as defined in Statewide Planning Goals as "Lakes in the Coastal Zone that are created by a dune formation or that have a hydrologic surface or subsurface connection with saltwater."

Initial inventory information, specifically the documents

1. Visual Resource Analysis of the Oregon Coastal Zone  
by Oregon Coastal Conservation and Development Commission
2. Beaches and Dunes of the Oregon Coast by Oregon Coastal  
Conservation and Development Commission (except Stricklin  
[Taylor] Lake)

show these lakes as coastal or as adjacent to sand dunes. Upon closer examination through the use of detailed "Soil Interpretations for Oregon" (OR-Soils-1) developed by the U.S. Soil Conservation Service Clatsop County finds that the soils adjacent to the four lakes are Brallier peat (map reference 3A, see attached) with a depth of five (5) feet.

Carnahan Lake - Using the detailed soils maps the nearest sand dune is to the west over one-quarter (1-4) mile away; west of the Skipanon River. This area is underlain by the Astoria Formation which is comprised of shale and sandstone. Hydrologically, Carnahan Lake appears to have no outflow as none is shown on USGS topographic maps. Inflow results from run-off and precipitation. Lake levels appear to be stabilized through evaporation, transpiration and percolation. Actual outflow is minimal. The percolation that occurs appears to be into the Skipanon River drainage. The Skipanon River drains all four lakes, the land to the east and much of the land east of Highway 101. The Skipanon River flows north and empties into the Columbia River.

Cullaby Lake - The above discussion also applies to Cullaby Lake. Cullaby Lake flows into the Skipanon River. There is an extensive peat formation between the lake and the former Burlington Northern Railroad lines which are just east of U.S. Hwy. 101.

Triangle and Unnamed (Lounsberry) Lakes - These lakes are south of Cullaby Lake approximately two-thirds (2/3) of a mile. They are surrounded by Brallier peat, drain into Cullaby Creek which empties into Cullaby Lake.

See attached information:

1. Paul See, Geologist statement.
2. OR-ls for adjacent soils.
3. 5 soils maps of area.

PAUL D. SEE

300 SURF PINES ROAD  
SEASIDE, OREGON 97138  
738-5869

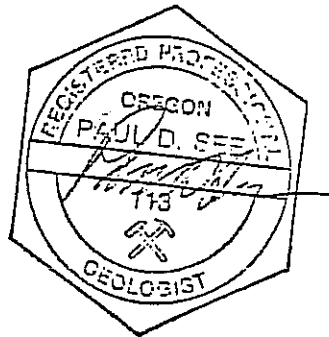


August 25, 1983

To Whom It May Concern:

At the request of Lou Larson, attorney at law, Astoria, Oregon, the following statement has been prepared as an abstract of a report now in progress on the geologic setting and genesis of Cullaby Lake, Sections 14, 15, 22 and 23, Township 7 North, Range 10 West, Clatsop County, Oregon.

It is my professional opinion based on many years of detailed observation that Cullaby Lake is not a coastal lake as defined by goal 17 of the LCDC Statewide Planning Goals and Guidelines. Rather, Cullaby Lake is surrounded on the north, east and south by Tertiary bedrock, and on the west by less obvious and almost continuous outcrops of the same formation.



OR-SOILS-1 12/72  
FILE CODE SOILS 12

SOIL INTERPRETATIONS FOR OREGON

U.S.D.A. SOIL CONSERVATION SERVICE

DATE: January, 1974 GEO

BRALLIER

SERIES

SOILS: 3

1. Brallier peat, 0-1% slopes
2. Brallier peat, 0-2% slopes
3. Brallier peat, 0-3% slopes

The Brallier series consists of very poorly drained peaty soils formed mainly of slightly decomposed fibrous organic residues from water tolerant plants. These soils occupy nearly level basins on tidelands and basins or flood plains along sluggish streams near tidelands. Where not cultivated, the vegetation is brush, willow, and spruce or tussock grasses. Elevation is from 0 to 8 feet. Average annual precipitation is 90 to 100 inches, average annual temperature is 50 to 52° F., and the frost-free period at 32° F. is 150 to 200 days.

Typically, the surface layer is about 6 inches of dark brown extremely acid peat. The subsoil is dark grayish brown and grayish brown strongly to extremely acid peat to about 40 inches, below which is very dark grayish brown and gray slightly acid peat and muck.

Permeability is moderate. Runoff is very slow to ponded. The erosion hazard is slight. The total available water holding capacity is 12 to 25 inches. The water supplying capacity is 20 to 26 inches.

Brallier soils are used mainly for hay, pasture, and wildlife habitat. These soils are in the Northern Pacific Coast Range and Valleys Land Resource Area (MLRA A1).

(Classification: Hemic Medisaprists; dysic, mesic family)

ESTIMATED SOIL PROPERTIES

DEPTH FROM SURFACE (in.)	CLASSIFICATION			COARSE FRACT. OVER 3 IN.	% OF MATERIAL PASSING SIEVE				LIQUID LIMIT	PLASTICITY INDEX	PERMEABILITY (in/hr)	AVAIL. WATER CAP. (in/in)	SOIL REACTION (pH)	SHRINK SWELL POTENTIAL
	USDA TEXTURE	UNIFIED	AASHO		#4	#10	#40	#200						
0-60	Peat or muck	Pt	A-8	0	Organic material					Non-plastic	.6-2.0	0.3-0.4	4.1-6.5	Moderate

DEPTH (in.)	CONDUCTIVITY (mmhos/cm)	CORROSIVITY		EROSION FACTORS	WIND EROD. GROUPS	FLOODING			HIGH WATER TABLE			HYDROLOGIC GROUP	
		STEEL	CONCRETE			K	T	FREQUENCY	DURATION	MONTHS	DEPTH (ft.)		KIND
0-60	---	High	High	--	--	--	---	---	Dec-Apr	0.0-2.0	Apparent	Jan-Dec	0
						CEMENTED PAN		BEDROCK		FROST ACTION		REMARKS	
						DEPTH (in.)	HARDNESS	DEPTH (in.)	HARDNESS				
						--		> 60		--			

SANITARY FACILITIES AND COMMUNITY DEVELOPMENT

SOURCE MATERIAL AND WATER MANAGEMENT

USE	SOIL	RATING	RESTRICTIVE FEATURES	USE	SOIL	RATING	RESTRICTIVE FEATURES
SEPTIC TANK ABSORPTION FIELDS	1,2,3	Severe	Floods, wet	ROADFILL	1,2,3	Poor	Wet, excess humus
SEWAGE LAGOONS	1,2,3	Severe	Floods, wet	SAND	1,2,3	Unsuited	Excess humus
SANITARY LANDFILL (TRENCH)	1,2,3	Severe	Floods, wet	GRAVEL	1,2,3	Unsuited	Excess humus
SANITARY LANDFILL (AREA)	1,2,3	Severe	Floods, wet	TOPSOIL	1,2,3	Unsuited	Wet
DAILY COVER FOR LANDFILL	1,2,3	Poor	Floods, wet, excess humus	POND RESERVOIR AREA	1,2,3	Severe	Excess humus
SHALLOW EXCAVATIONS	1,2,3	Severe	Floods, wet, excess humus	EMBANKMENTS DIKES AND LEVEES	1,2,3	Severe	Low strength
DWELLINGS WITHOUT BASEMENTS	1,2,3	Severe	Floods, wet, excess humus	DRAINAGE	1,2,3	Severe	Floods, wet
DWELLINGS WITH BASEMENTS	1,2,3	Severe	Floods, wet, excess humus	IRRIGATION	1,2,3		Not needed
SMALL COMMERCIAL BUILDINGS	1,2,3	Severe	Floods, wet, excess humus	TERRACES AND DIVERSIONS	1,2,3		Not needed
LOCAL ROADS AND STREETS	1,2,3	Severe	Floods, wet, excess humus	GRASSED WATERWAYS	1,2,3		Not needed

OR-SOILS-1 12/72  
FILE CODE SOILS 12

SOIL INTERPRETATIONS FOR OREGON

U.S.D.A. SOIL CONSERVATION

DATE: January, 1974 GEO: CLATSOP SERIES: SOILS: 5 1. Clatsop silty clay loam

The Clatsop series consists of very poorly drained soils that formed in fine textured alluvium consisting of tidal "mud". They occupy nearly level or depressional topography in coastal bays. Where not cultivated the vegetation consists of grasses, reeds and sedges. Elevation is 1 to 5 feet. Average annual precipitation is 60 to 100 inches, average annual temperature is 50 to 52° F, and the frost free period is about 202 days.

The surface layer is about 6 inches of peat mixed with some mineral soil that is underlain by mottled very dark grayish-brown silty clay loam about 7 inches thick. The subsoil is dark gray silty clay with common mottles about 33 inches to many feet thick.

Permeability is slow. Runoff is very slow to ponded. The erosion hazard is slight. The total available water holding capacity is 7 to 9 inches.

This soil is used mainly for hay, pasture and wildlife habitat. These soils occur in the Coast Range and Valley Resource Area (A1).

(Classification: Histic Humaquepts; fine, mixed, acid, mesic family)

ESTIMATED SOIL PROPERTIES

DEPTH FROM SURFACE (in.)	CLASSIFICATION			COARSE FRACT. OVER 3 IN.	% OF MATERIAL PASSING SIEVE				LIQUID LIMIT	PLAS-TICITY INDEX	PERMEA-BILITY (in/hr)	AVAIL. WATER CAP. (in/in)	SOIL REAC-TION (pH)	SHRINK SWELL POTEN-TIAL
	USDA TEXTURE	UNI-FIED	AASHO		#4	#10	#40	#200						
6-0	Peat	Pt	A-8	0		organic material			--	NP	0.6-2.0	.3-.4	4.5-5.0	Low
0-7	Silty clay loam	ML,OL	A-7	0	100	100	95-100	85-95	41-50	11-20	0.6-2.0	.15-.21	4.6-5.5	Mo
7-40	Silty clay, Clay	MH	A-7	0	100	100	95-100	85-95	50-60	15-25	.06-2.0	.15-.17	5.1-6.5	

DEPTH (in.)	CONDUCTIVITY (mmhos/cm)	CORROSION		EROSION FACTORS	WIND EROD. GROUPS	FLOODING			HIGH WATER TABLE			HYDRO-LOGIC GROUP
		STEEL	CONCRETE			FREQUENCY	DURATION	MONTHS	DEPTH (ft.)	KIND	MONTHS	
6-0	--	High	High	--	--	Frequent	Brief	Dec-Mar	0.0-1.5	Apparent	Nov-June	0
0-7	--	High	High	--	--	CEMENTED PAN		BEDROCK		REMARKS		
7-40	--	High	High	--	--	DEPTH (in.)	HARDNESS	DEPTH (in.)	HARDNESS	FROST ACTION		
						--		> 60		--		

SANITARY FACILITIES AND COMMUNITY DEVELOPMENT				SOURCE MATERIAL AND WATER MANAGEMENT			
USE	SOIL	RATING	RESTRICTIVE FEATURES	USE	SOIL	RATING	RESTRICTIVE FEATURES
SEPTIC TANK ABSORPTION FIELDS	1	Severe	Floods, percolates slowly, wet	ROADFILL	1	Poor	Wet, low strength
SEWAGE LAGOONS	1	Severe	Floods, wet	SAND	1	Unsuited	Excess fines
SANITARY LANDFILL (TRENCH)	1	Severe	Floods, wet	GRAVEL	1	Unsuited	Excess fines
SANITARY LANDFILL (AREA)	1	Severe	Floods, wet	TOPSOIL	1	Poor	Wet
DAILY COVER FOR LANDFILL	1	Poor	Wet, excess humus, thin layer	POND RESERVOIR AREA	1	Slight	Favorable
SHALLOW EXCAVATIONS	1	Severe	Floods, wet	EMBANKMENTS DIKS AND LEVEES	1	Moderate	Shrink-swell, excess humus
DWELLINGS WITHOUT BASEMENTS	1	Severe	Floods, wet	DRAINAGE	1	Severe	Floods, wet
DWELLINGS WITH BASEMENTS	1	Severe	Floods, wet	IRRIGATION	1		Not needed
SMALL COMMERCIAL BUILDINGS	1	Severe	Floods, wet	TERRACES AND DIVERSIONS	1		Not needed
LOCAL ROADS AND STREETS	1	Severe	Floods, wet, low strength	GRASSED WATERWAYS	1		Not needed

DATE: October, 1973 GRT, GEO Ecola SERIES SOILS: 13 1. Ecola silt loam, 20-60% slope

The Ecola series consists of well drained silt loam over silty clay loam soils developed in colluvium and residuum weathered from siltstone and shale on gently sloping to steep uplands. The native vegetation is Douglas-fir, Western hemlock, Sitka spruce, red alder, salal, salmonberry, vine maple, and sword fern. Elevation ranges from 100 to 2000 feet. The average annual air temperature is 50°F.; average annual precipitation is 80 to 100 inches; and the frost-free period (32°F.) is about 250 days.

The surface layer is very dark grayish brown, friable silt loam about 6 inches thick. The subsoil is dark yellowish brown slightly sticky and plastic silty clay loam about 31 inches thick. Depth to siltstone is 20 to 40 inches.

Permeability is moderate. Runoff is slow to rapid and the erosion hazard is high. Total available water holding capacity is 4 to 8 inches. The annual water supplying capacity is 18 to 22 inches. The effective rooting depth is 20 to 40 inches.

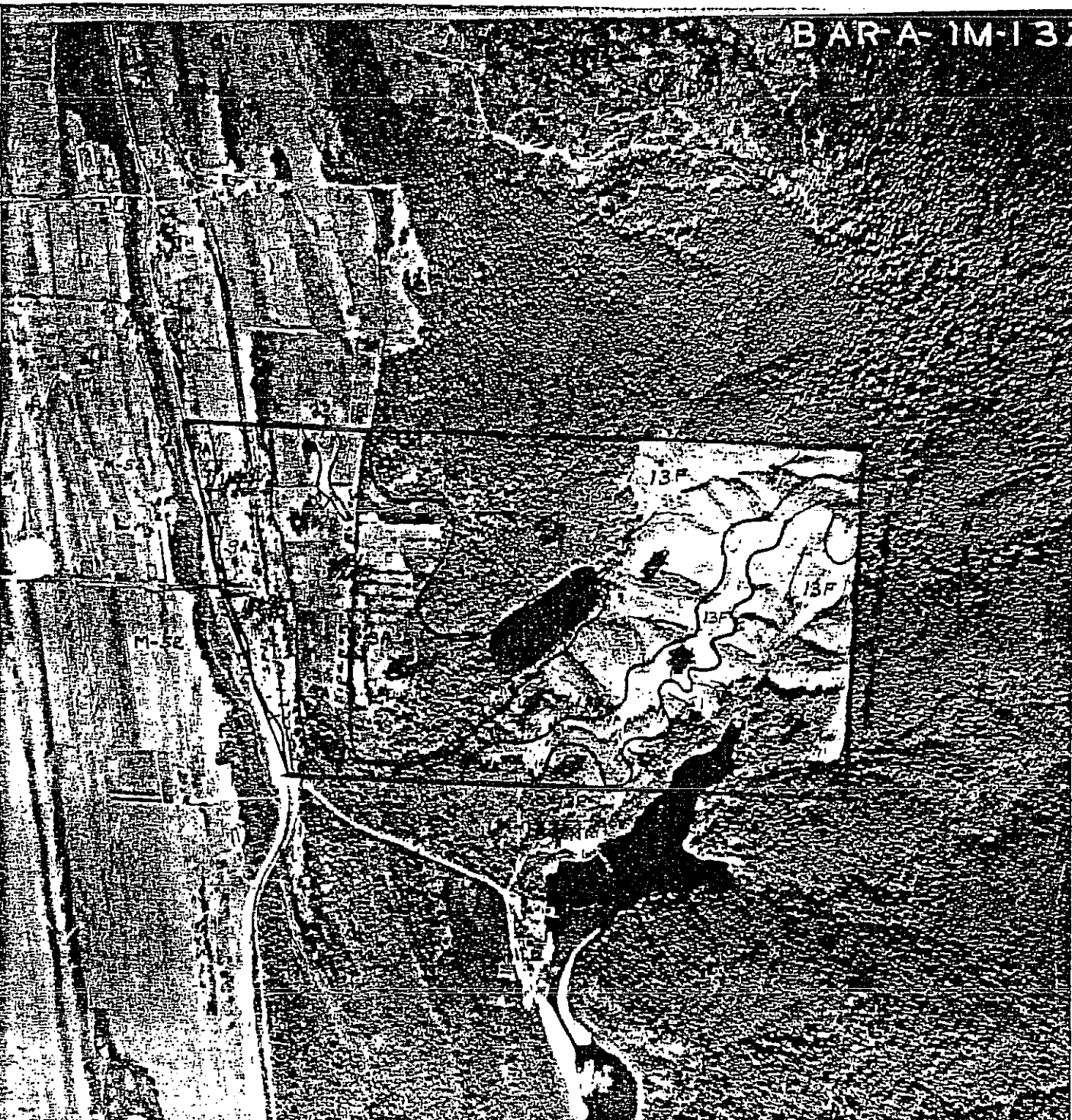
The soil is primarily used for timber production with homesites and permanent pasture as secondary uses. The soil occurs in Northwest Oregon within the Northern Pacific Coast Range and Valleys Land Resource Area (MLRA A-1).

(Classification: Typic (Andic) Haplumbrepts, fine-silty, mixed, mesic family).

ESTIMATED SOIL PROPERTIES

DEPTH FROM SURFACE (in.)	CLASSIFICATION			COARSE FRACT. OVER 3 IN.	Z OF MATERIAL PASSING SIEVE				LIQUID LIMIT	PLASTICITY INDEX	PERMEABILITY (in/hr)	AVAIL. WATER CAP. (in/in)	SOIL REACTION (pH)	SHRINK SWELL POTENTIAL
	USDA TEXTURE	UNIFIED	AASHTO		#4	#10	#40	#200						
0-6	Silt loam	ML	A-4	0	100	100	90-100	70-90	25-35	0-5	0.60-2.0	.19-.21	5.0-5.5	Low
6-37	Silty clay loam	ML	A-4	0	85-95	80-90	75-90	70-85	35-40	5-10	0.60-2.0	.19-.21	4.5-5.5	Moderate
37-50	Partially weathered siltstone													
DEPTH (in.)	CONDUCTIVITY (mmhos/cm)	CORROSIIVITY		EROSION FACTORS		WIND EROD. GROUPS	FLOODING			HIGH WATER TABLE			HYDROLOGIC GROUT	
		STEEL	CONCRETE	K	I		FREQUENCY	DURATION	MONTHS	DEPTH (ft.)	KIND	MONTHS		
0-6	-	High	High	.32	5	5	None			> 6			R	
6-37	-			.37			CEMENTED PAN	BEDROCK						
							DEPTH (in.)	HARDNESS	DEPTH (in.)	HARDNESS	FROST ACTION	REMARKS		
							-		20-40	rippable	-			
SANITARY FACILITIES AND COMMUNITY DEVELOPMENT							SOURCE MATERIAL AND WATER MANAGEMENT							
USE	SOIL	RATING	RESTRICTIVE FEATURES				USE	SOIL	RATING	RESTRICTIVE FEATURES				
SEPTIC TANK ABSORPTION FIELDS	1	Severe	Slope				ROADFILL	1	Poor	Slope				
SEWAGE LAGOONS	1	Severe	Slope, depth to rock				SAND	1	Unsuited	Excessive fines				
SANITARY LANDFILL (TRENCH)	1	Severe	Slope, depth to rock				GRAVEL	1	Unsuited	Excessive fines				
SANITARY LANDFILL (AREA)	1	Severe	Slope				TOPSOIL	1	Poor	Slope				
DAILY COVER FOR LANDFILL	1	Severe	Slope				POND RESERVOIR AREA	1	Severe	Slope				
SHALLOW EXCAVATIONS	1	Severe	Slope, depth to rock				EMBANKMENTS DIKES AND LEVIES	1	Severe	Slope				
DWELLINGS WITHOUT BASEMENTS	1	Severe	Slope				DRAINAGE	1		Not needed				
DWELLINGS WITH BASEMENTS	1	Severe	Slope, depth to rock				IRRIGATION	1	Poor	Slope				
SMALL COMMERCIAL BUILDINGS	1	Severe	Slope				TERRACES AND DIVERSIONS	1	Severe	Slope				
LOCAL ROADS AND STREETS	1	Severe	Slope				GRASSED WATERWAYS	1	Severe	Slope				

BAR-A-1M-132



USDA - SCS ADVANCE COPY - SUBJECT TO CHANGE

SUP COUNTY SOIL SURVEY, OREGON. 0 1/4 1/2 MILE

OF COPY 4.7 COPY FACTOR 33.3 NEG. SCALE 1.57 DATE COPIED APR. 1953



USDA - SCS ADVANCE COPY - SUBJECT TO CHANGE

P COUNTY SOIL SURVEY, OREGON. 0 1/4 1/2 MILE

OF COPY 4.7 COPY FACTOR 33.3 NEG. SCALE 1.57 DATE COPIED APR. 1953



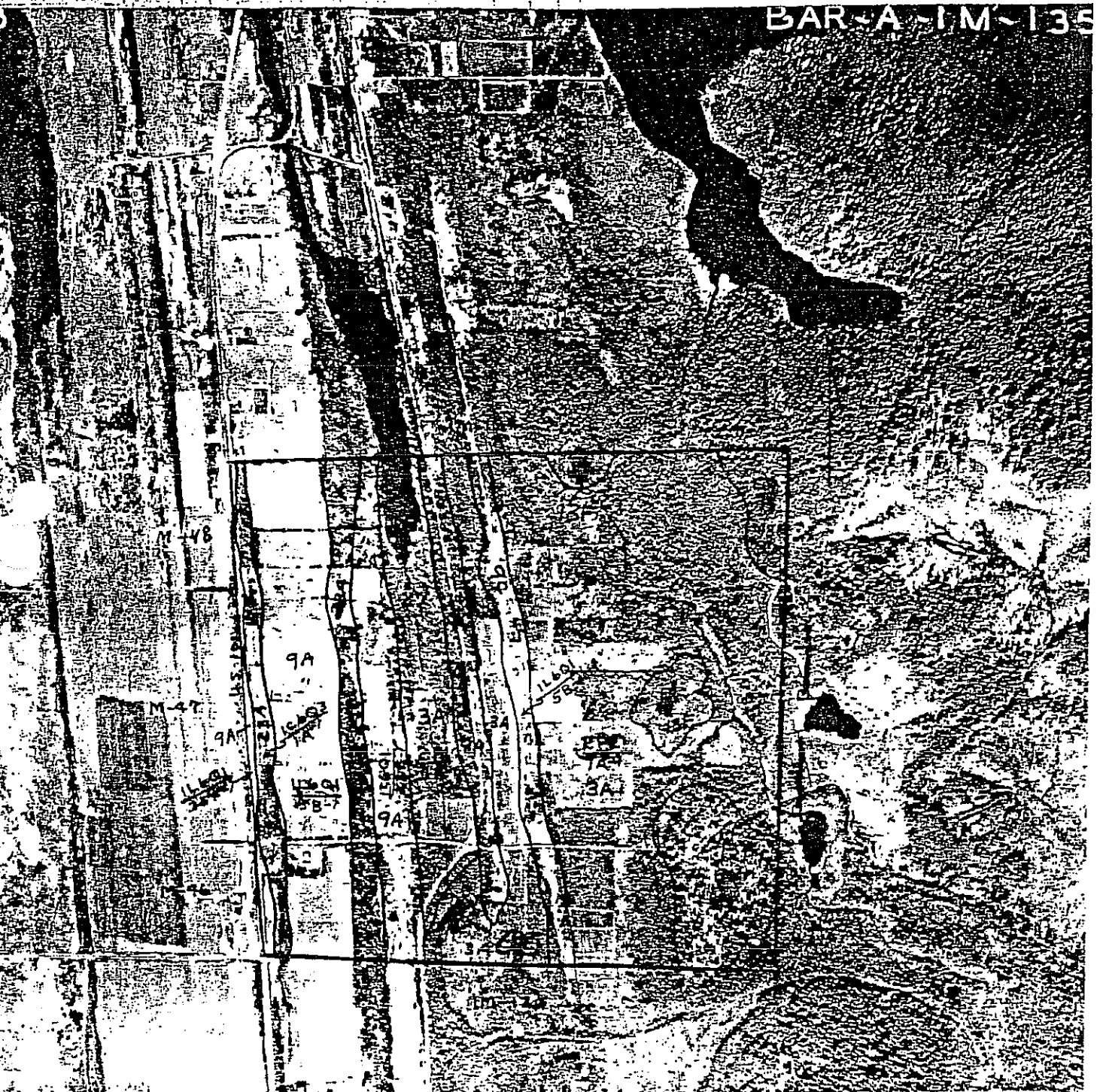
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CLATSOP COUNTY SOIL SURVEY, OREGON

OF COPY 4.7 COPY FACTOR 33.3 NEG. SCALE 1.57 DATE OF FILM APR. 53



BAR-A-1M-135



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COUNTY COIL CORNEY, CHERM. 0 1/2 20  
LE OF COPY 4.7 COPY FACTOR 22.5 NEAR SCALE 1:100,000 APP. 13

Sources used:

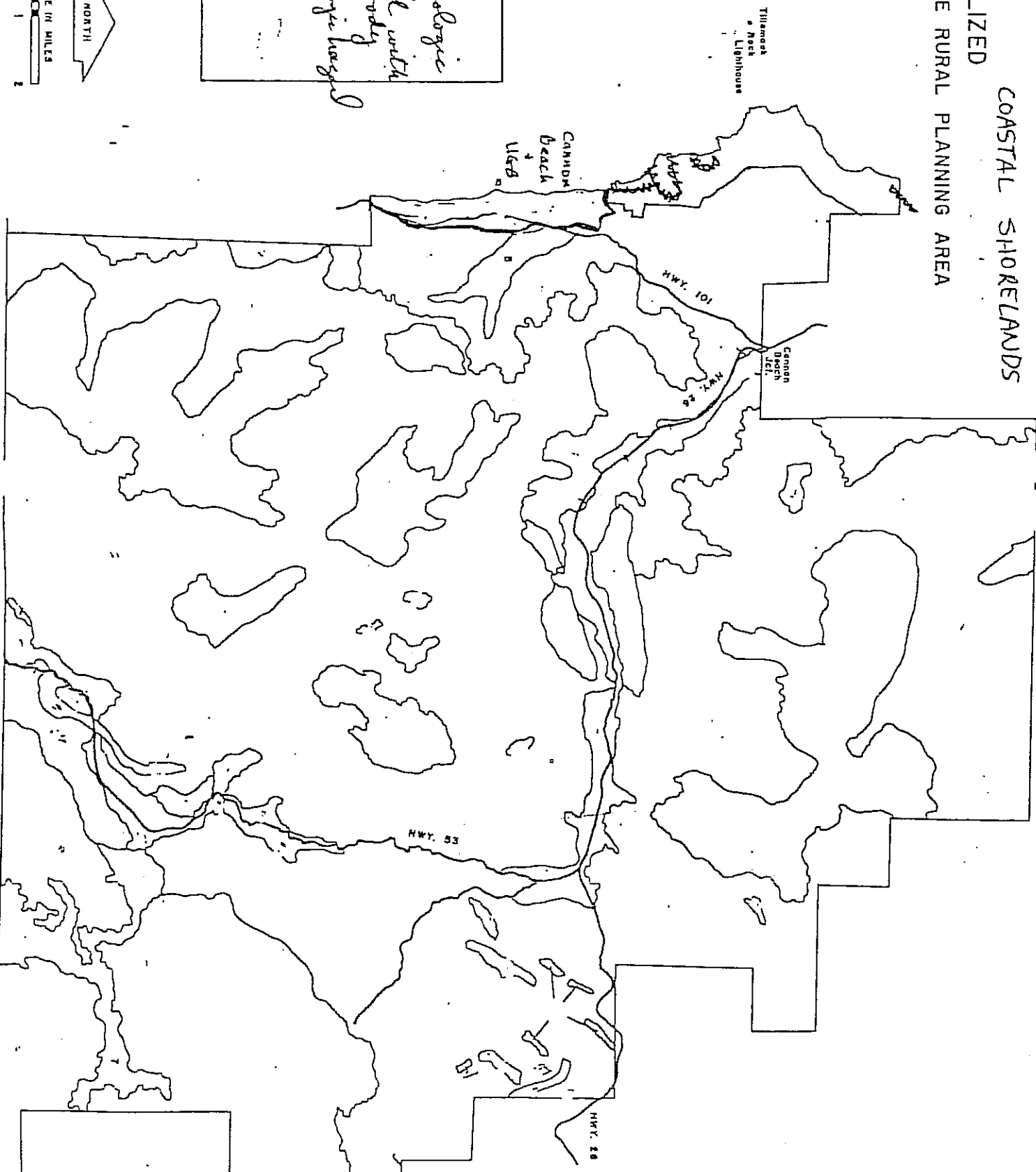
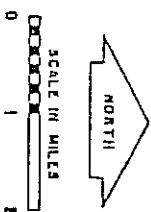
- Beaches and Dunes of the Oregon Coast by Oregon Coastal Conservation and Development Commission.
- Clatsop Plains Groundwater Protection Plan, Groundwater Evaluation Report by Sweet, Edwards and Associates, Inc., December, 1981.
- See, Paul. Letter from Paul See regarding geologic setting of Cullaby Lake dated August 25, 1983.
- U.S. Soil Conservation Service, Detailed Maps of Soil Interpretations for Oregon (OR-Soils-1).
- Visual Resources Analysis of the Oregon Coastal Zone by Oregon Coastal Conservation and Development Commission.

OCEAN AND COASTAL  
LAKE SHORELANDS (Goal 17)  
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For Detailed Mapping see maps in the Clatsop County Department of Planning and Development.	

# GENERALIZED COASTAL SHORELANDS SEASIDE RURAL PLANNING AREA

KEY  
area of geologic  
instability  
associated with  
under body  
3 geologic hazard



# MAP 3 GENERALIZED COASTAL SHORELANDS SEASIDE RURAL PLANNING AREA

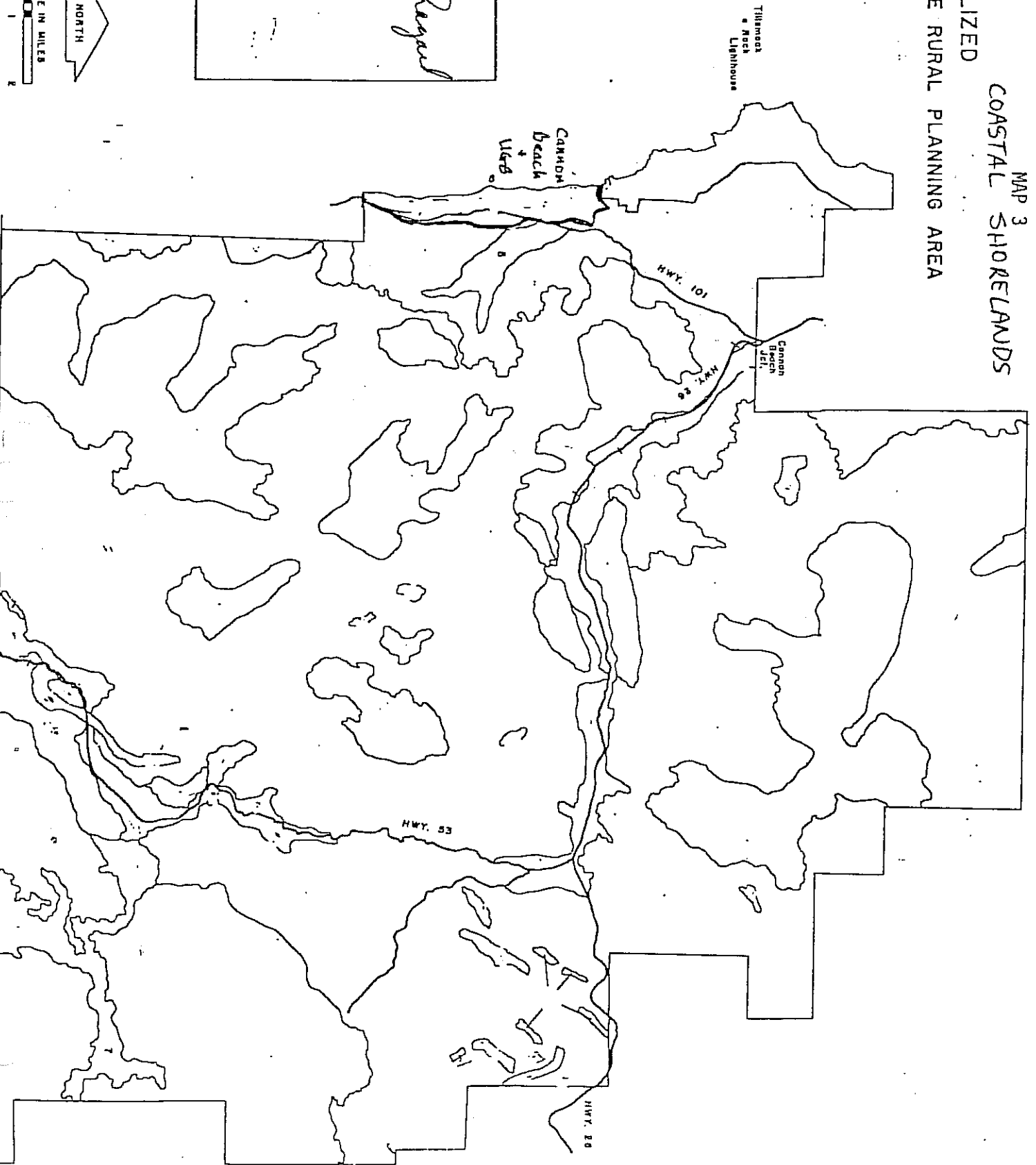
KEY

*Good Bay*  
*(H<sup>1</sup>UD)*  
*none*

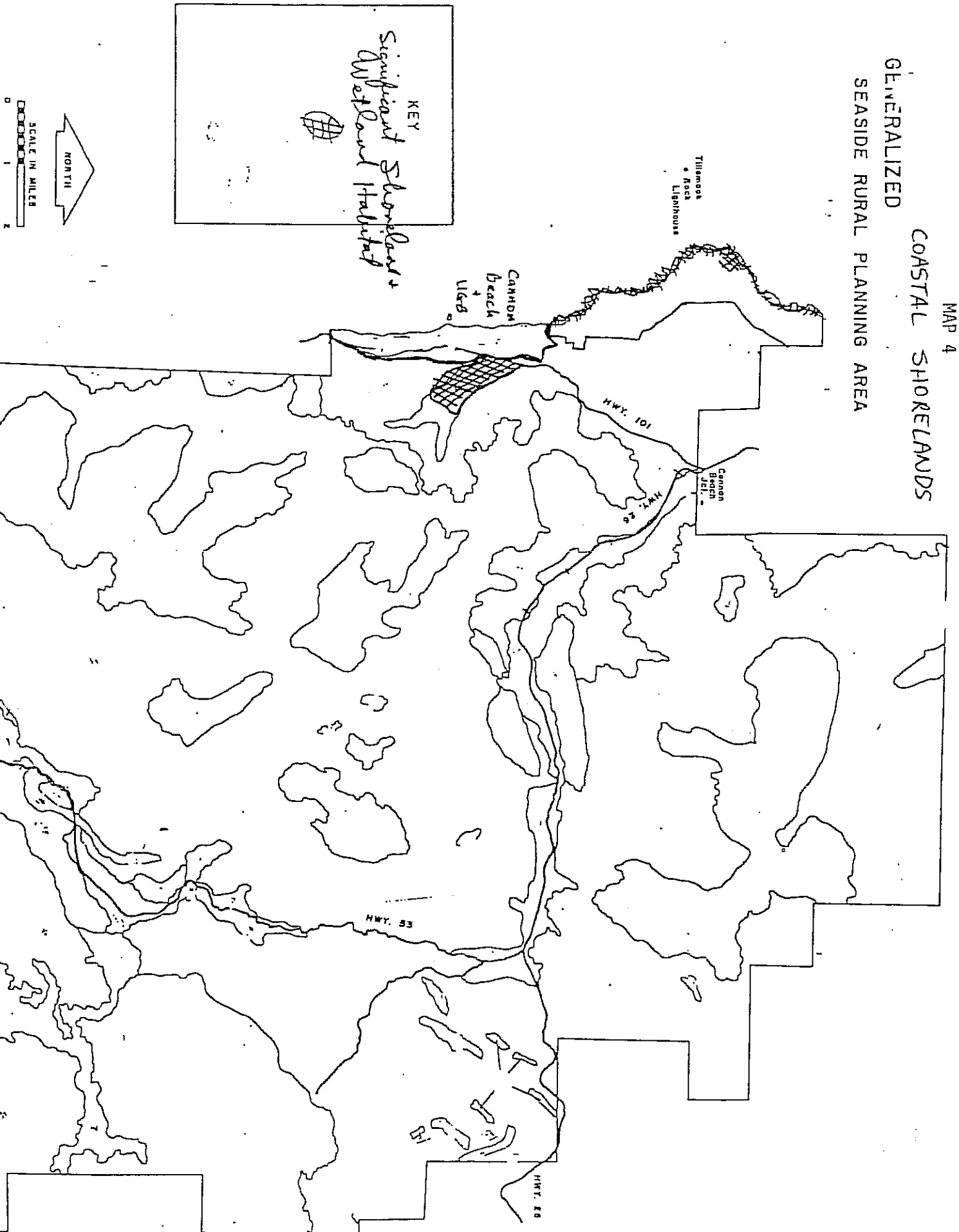
NORTH

SCALE IN MILES

1 2



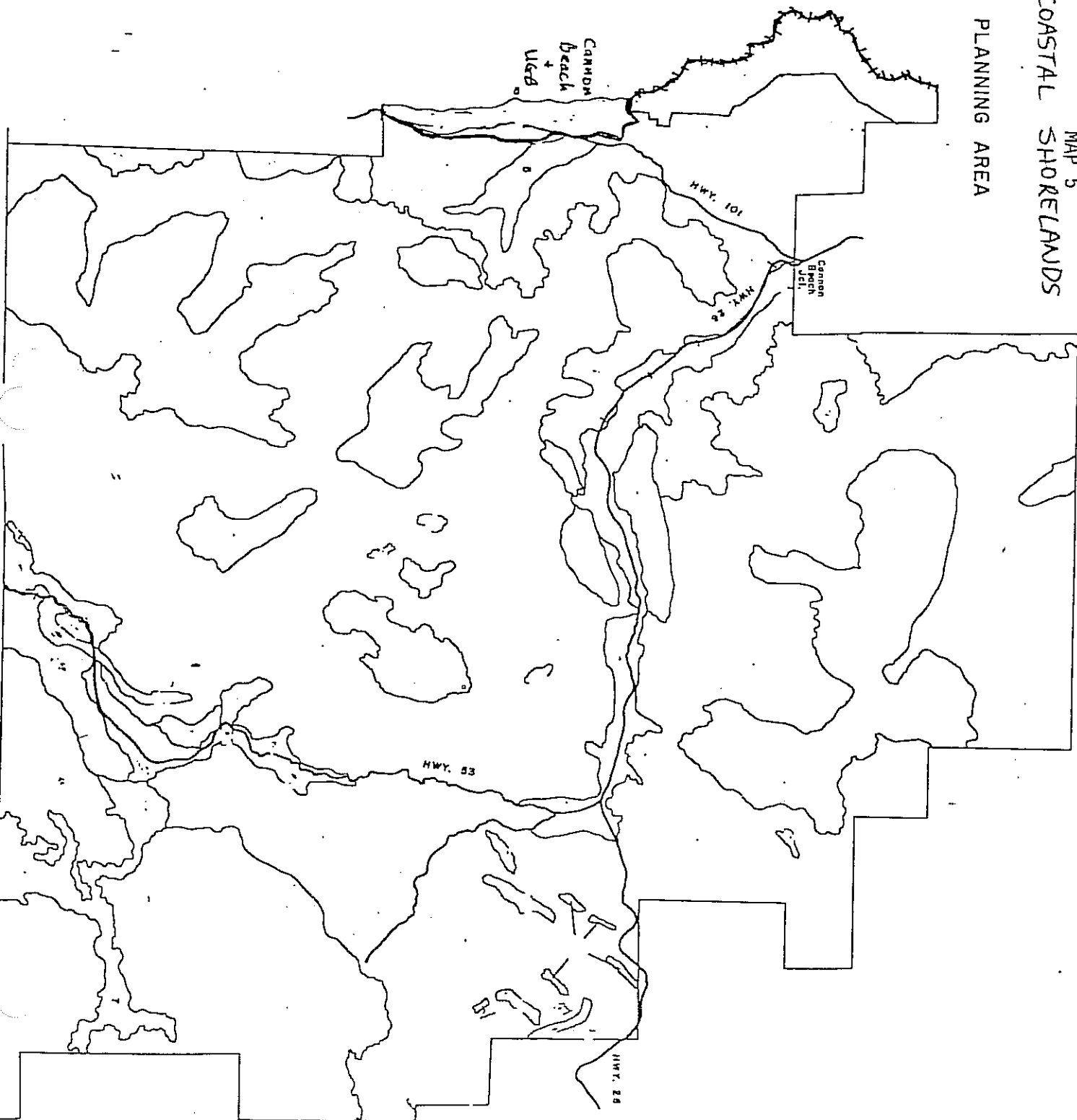
MAP 4  
GENERALIZED  
COASTAL SHORELANDS  
SEASIDE RURAL PLANNING AREA



# MAP 5 GENERALIZED COASTAL SHORELANDS SEASIDE RURAL PLANNING AREA

KEY  
 Exceptional Aesthetics  
 or Scenic Quality  
 +++++++  
 Beach, or Hardland  
 near

NORTH  
 SCALE IN MILES  
 0 1 2

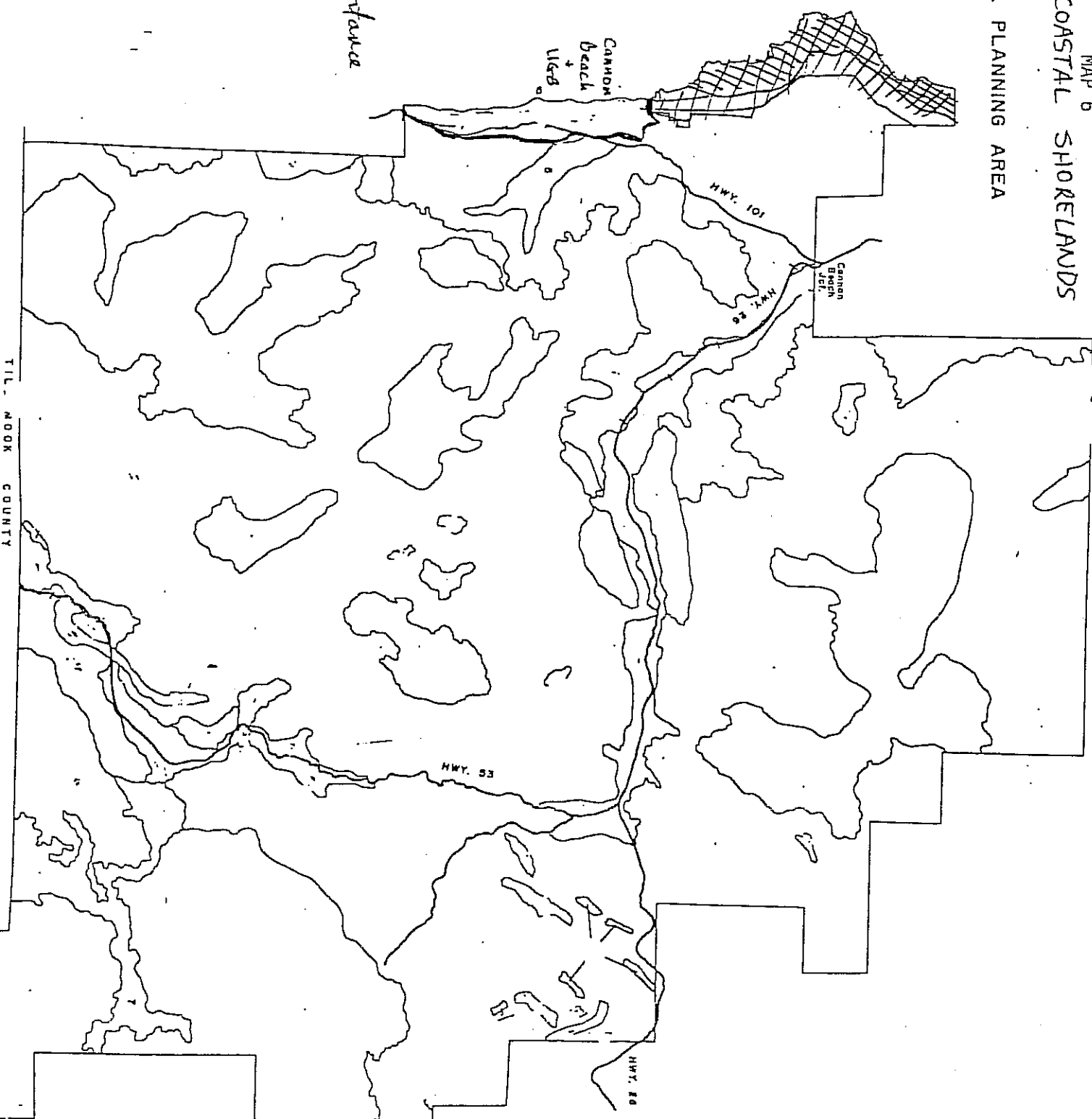
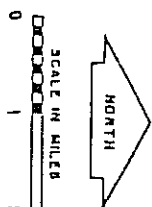
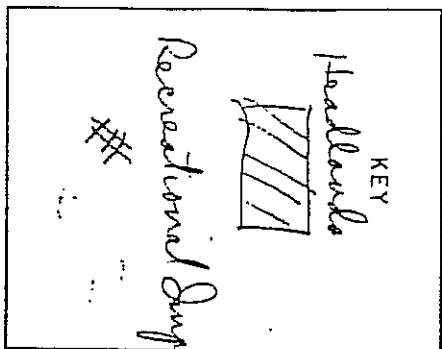


MAP 6  
GENERALIZED  
COASTAL SHORELANDS  
SEASIDE RURAL PLANNING AREA

Ecotia State Park +  
River Fieldhouse  
Riverview

Tillman  
+ Rock  
+ Lighthouse

Cannon  
Beach  
+  
Lighthouse





# GENERALIZED COASTAL SHORELANDS SEASIDE RURAL PLANNING AREA

Clarke Vair Point

Tillamook  
Lighthouse

Garner  
Beach  
Jett

HWY. 101

HWY. 26

HWY. 53

HWY. 26

Cannon  
Beach  
Wier

KEY

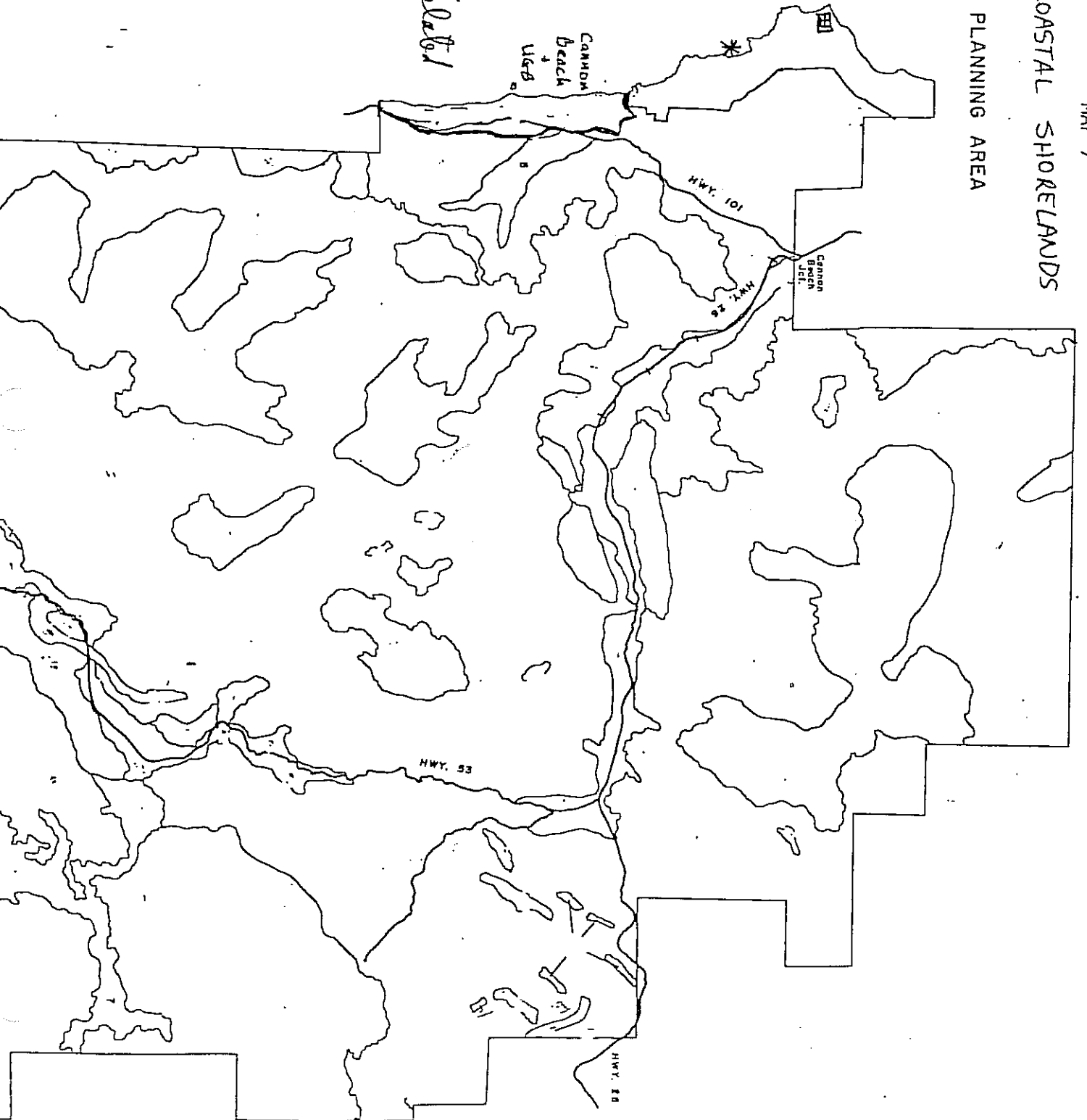
Area Maped for Water  
Deposited + Water Related  
Uses

\* Beach Areas

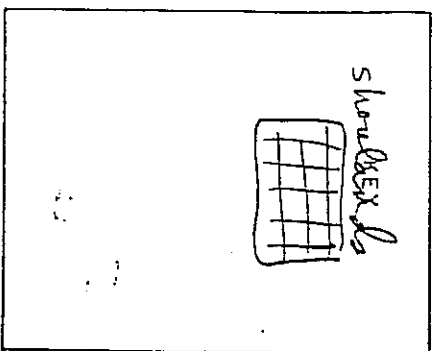
Historic Site



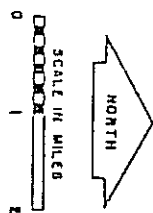
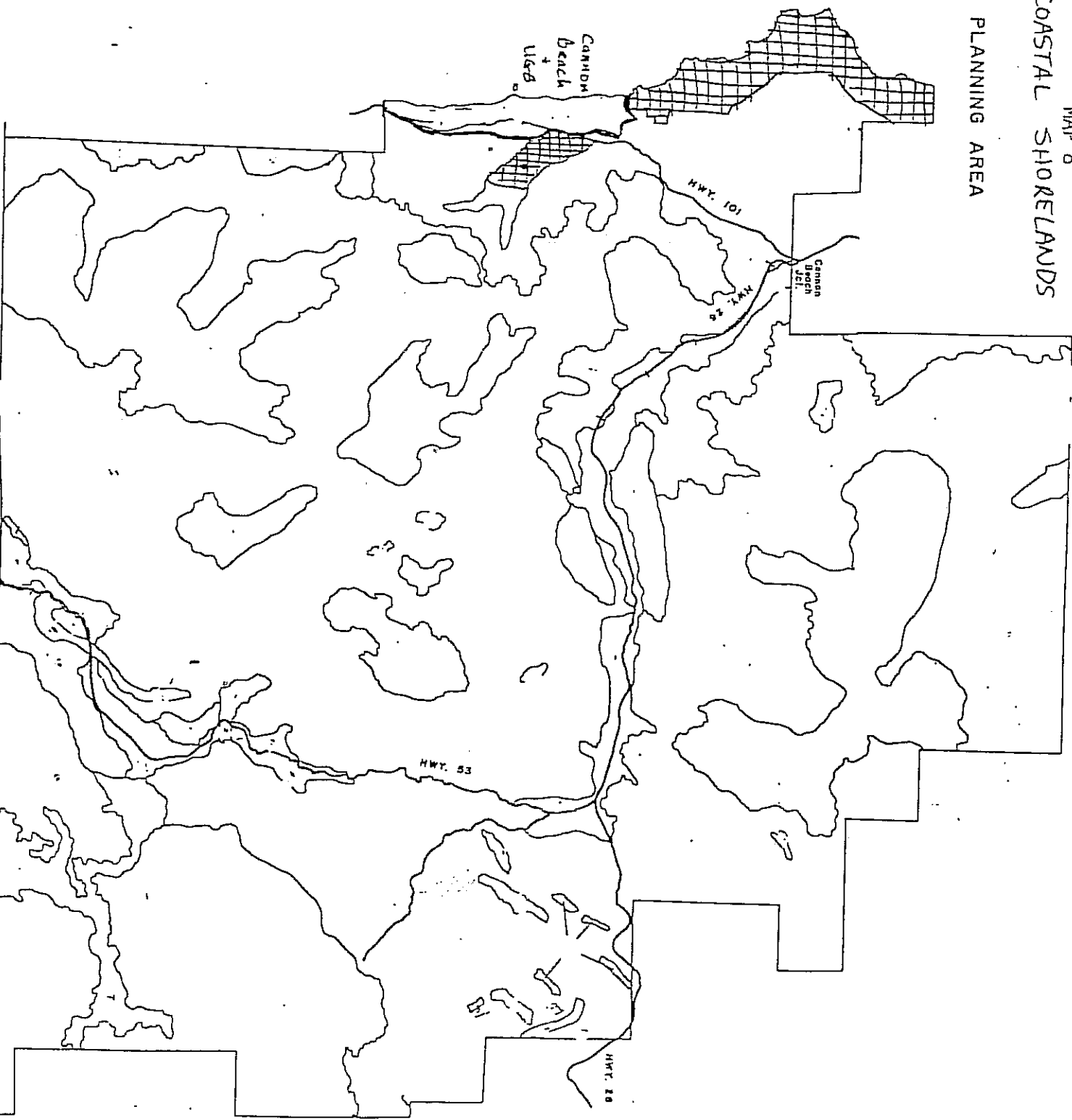
SCALE IN MILES  
0 1 2



# MAP 8 GENERALIZED COASTAL SHORELANDS SEASIDE RURAL PLANNING AREA

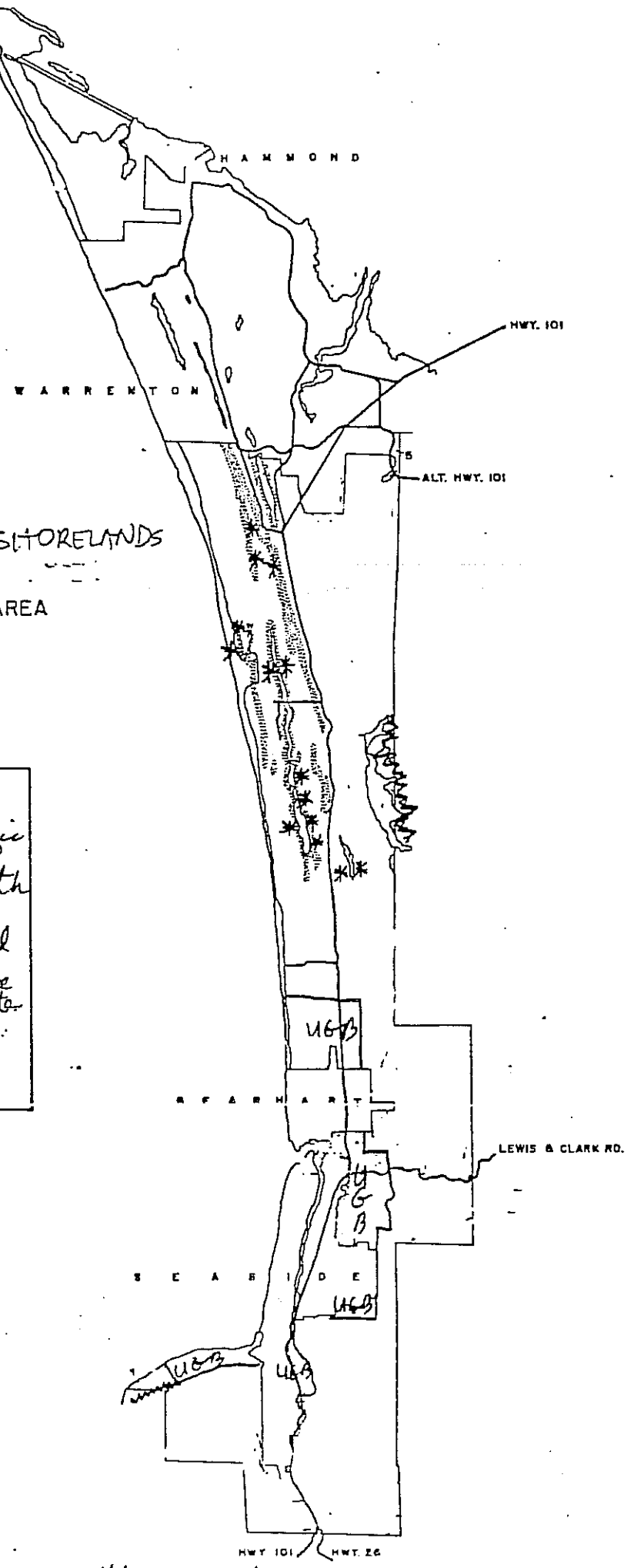
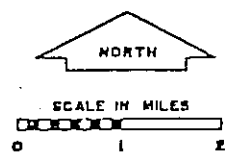


Tillamook  
Beach  
Lighthouse

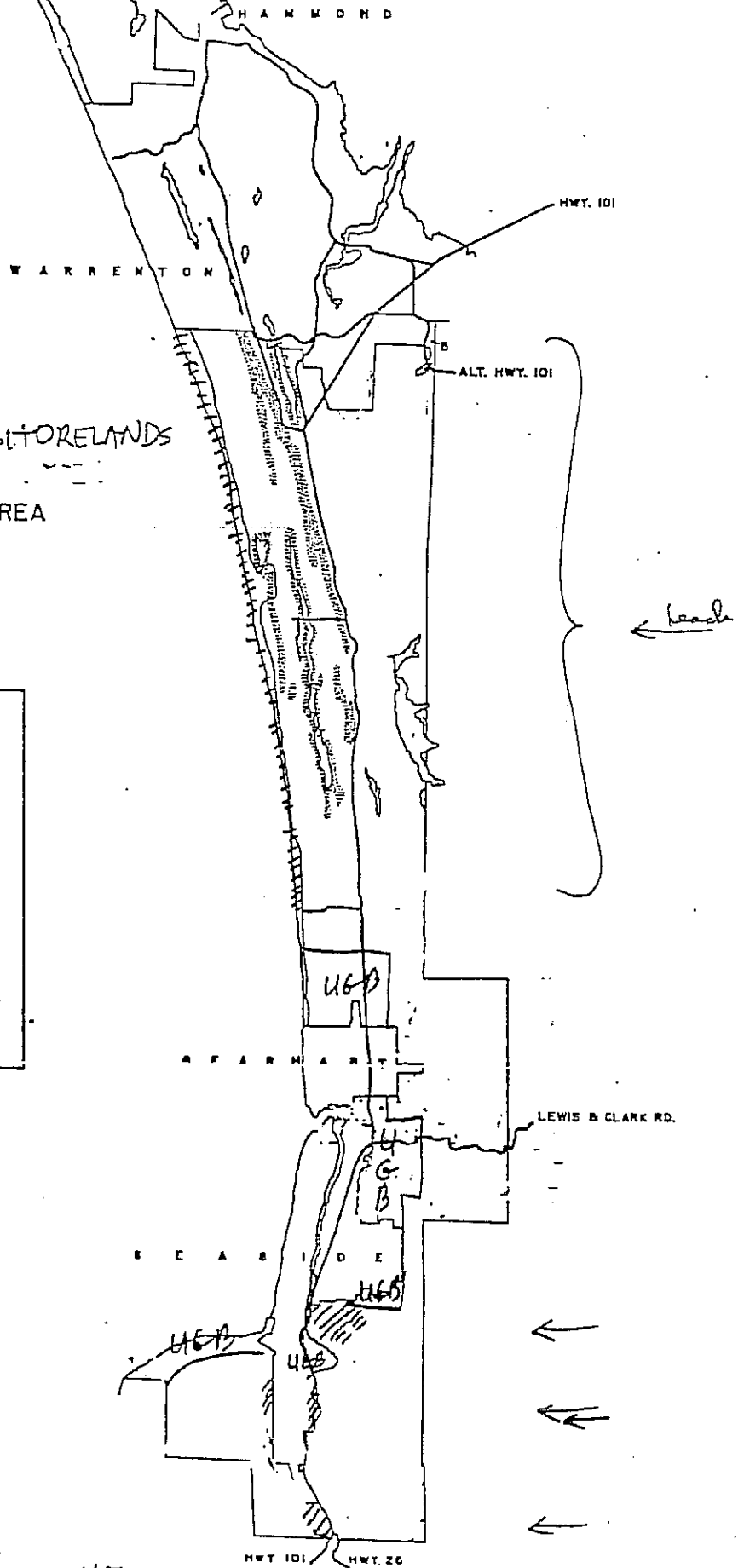
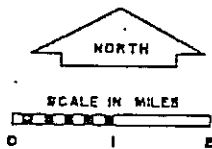
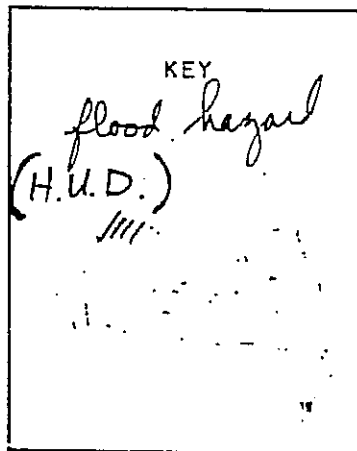


MAP 9  
COASTAL SHORELANDS  
GENERALIZED  
CLATSOP PLAINS PLANNING AREA

KEY  
*areas of geologic  
 instability  
 associated with  
 water body*  
*⊞ geologic hazard*  
*\* steep dune face  
 adjacent to water  
 body*

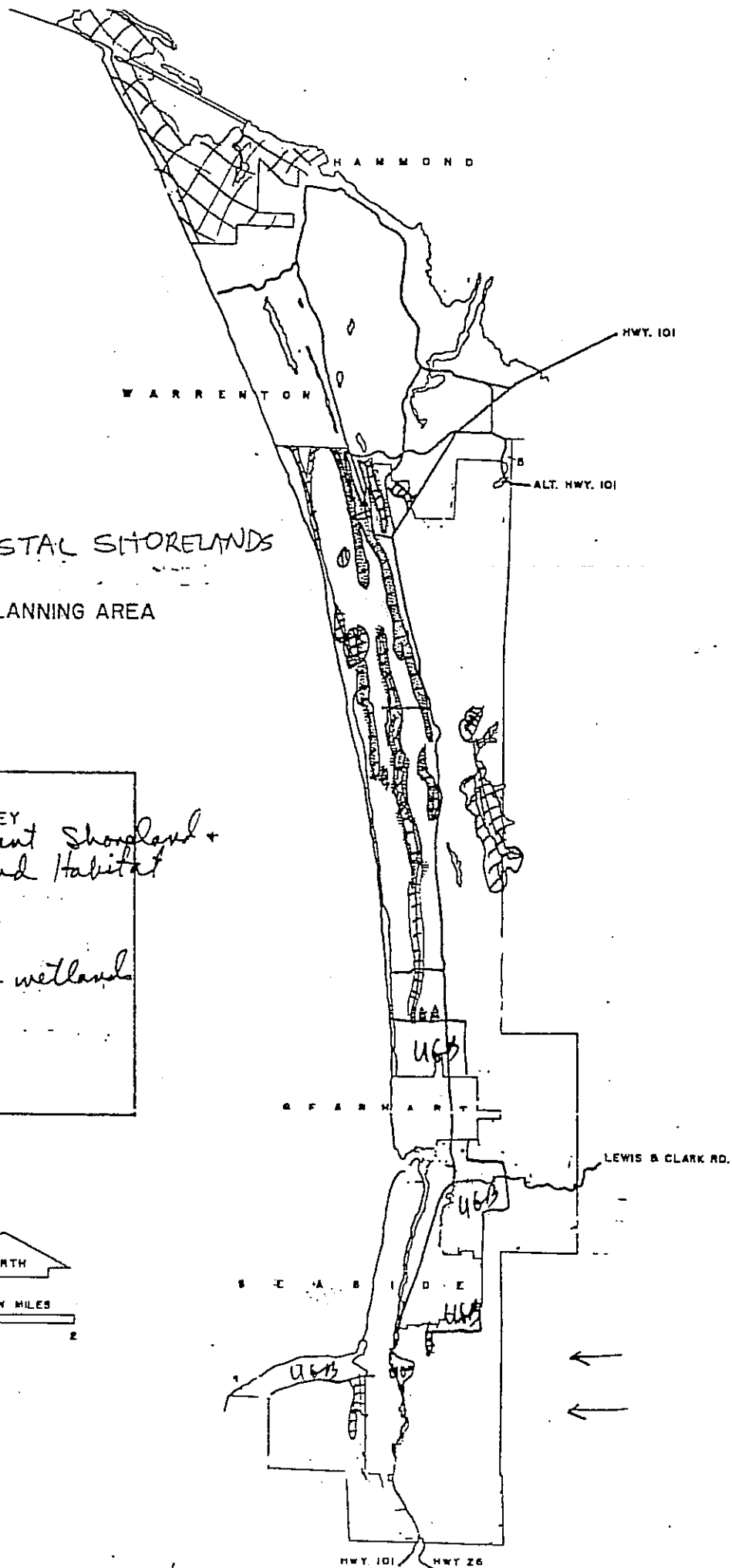
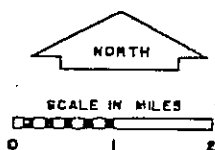
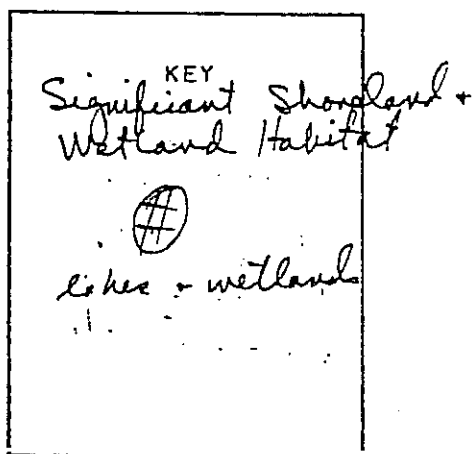


MAP 10  
 COASTAL STORELANDS  
 GENERALIZED  
 CLATSOP PLAINS PLANNING AREA

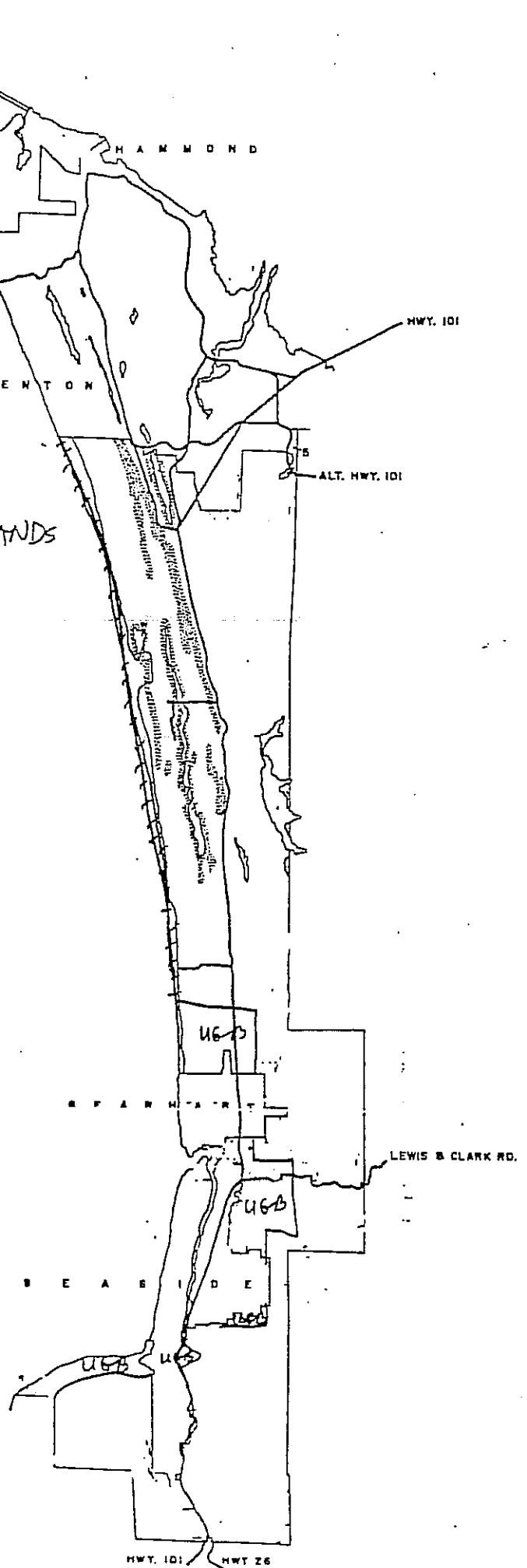
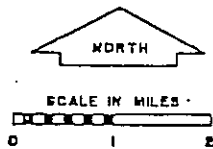
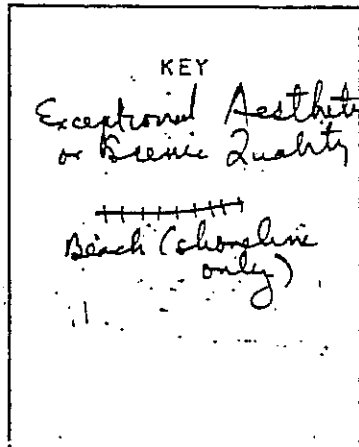


all Map

MAP 11  
 COASTAL SHORELANDS  
 GENERALIZED  
 CLATSOP PLAINS PLANNING AREA

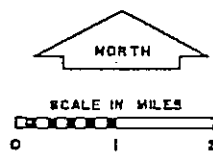
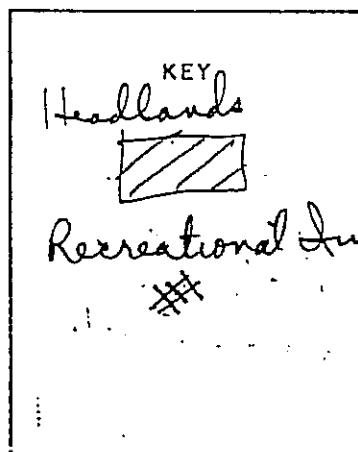


MAP 12  
 COASTAL SHORELANDS  
 GENERALIZED  
 CLATSOP PLAINS PLANNING AREA

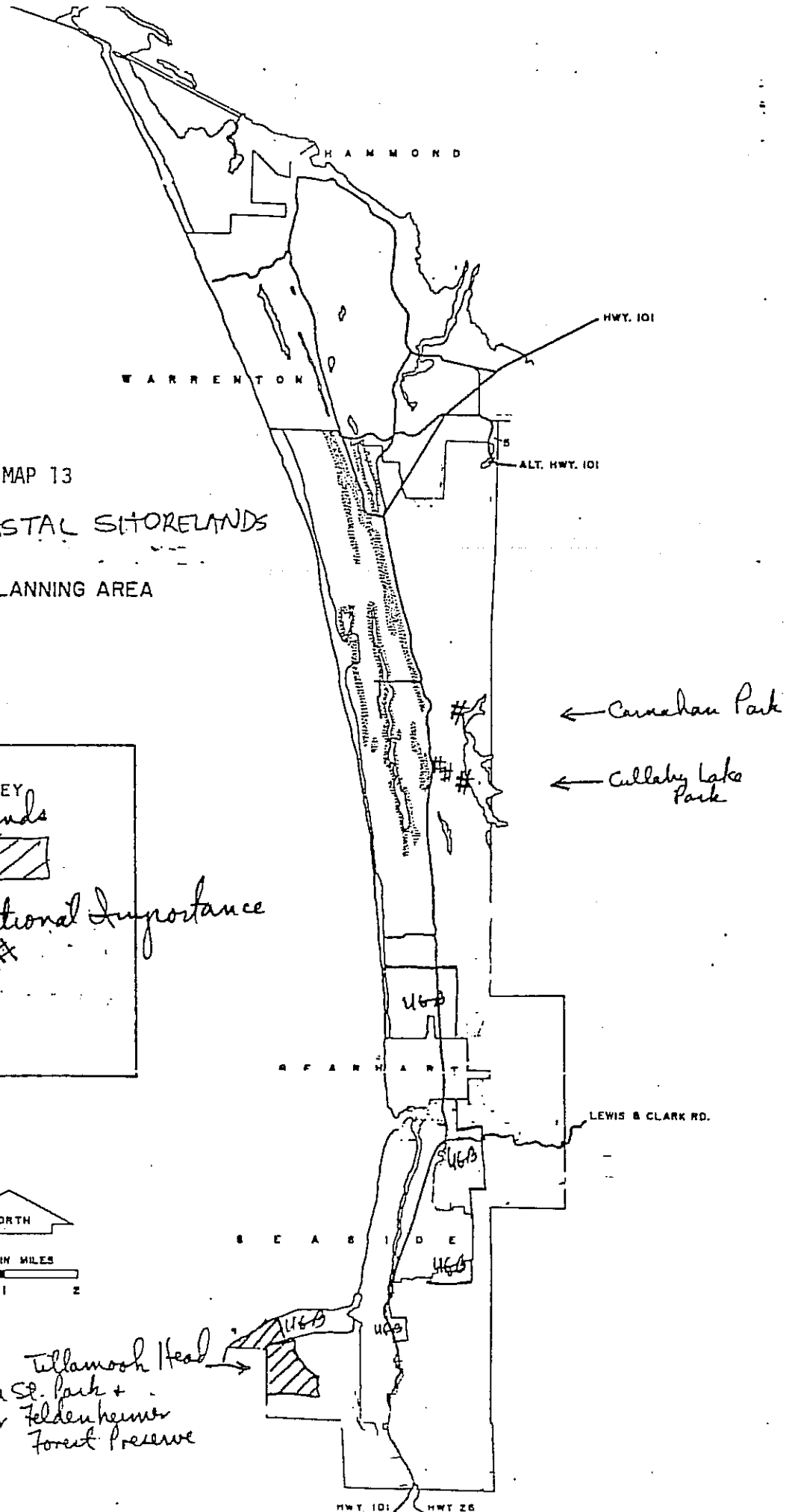


see Map

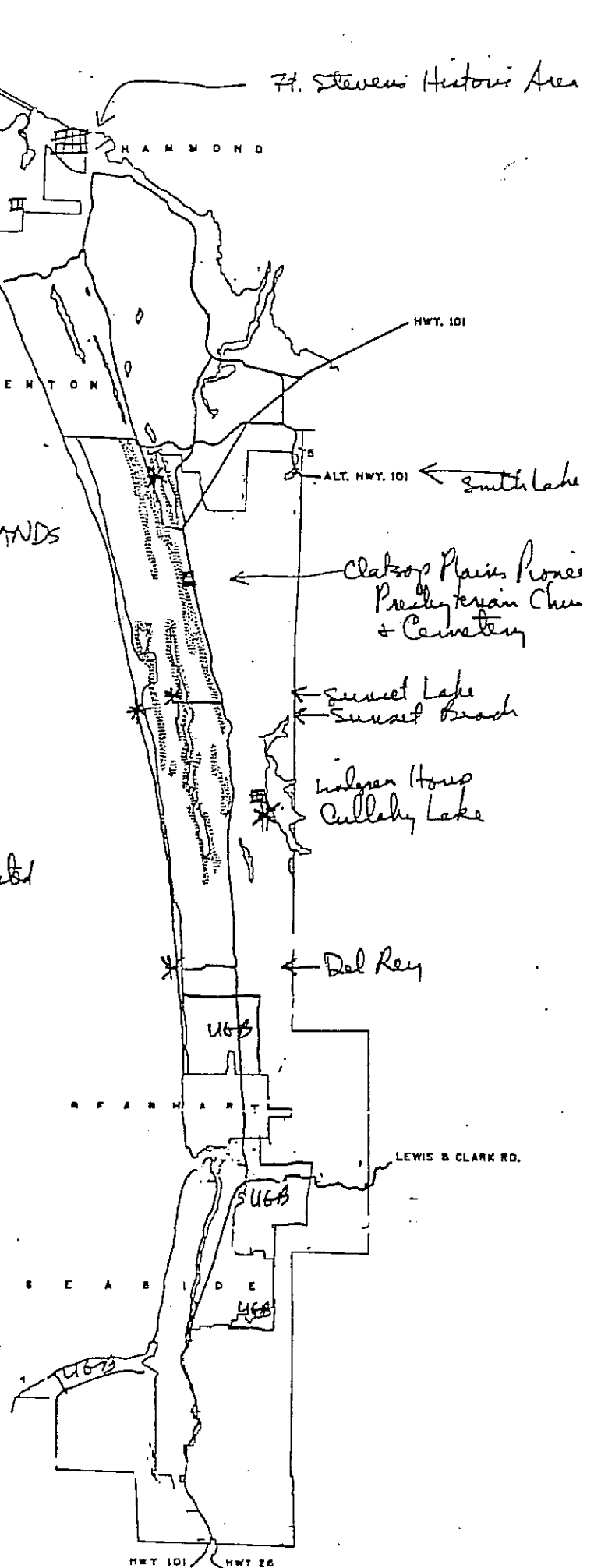
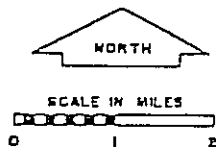
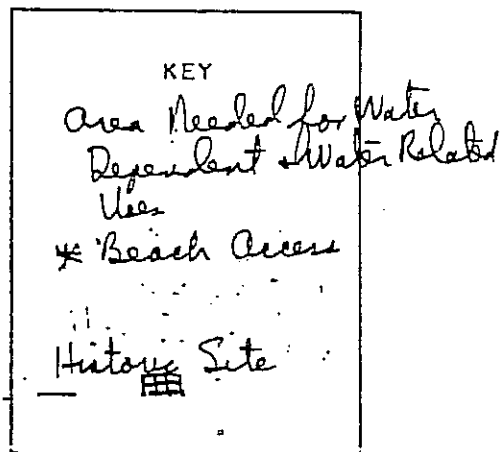
MAP 13  
 COASTAL SITORELANDS  
 GENERALIZED  
 CLATSOP PLAINS PLANNING AREA



Tillamook Head  
 Eckla St. Park +  
 Elmer Feldenknecht  
 Forest Preserve

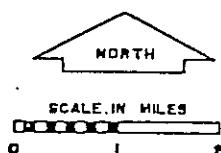
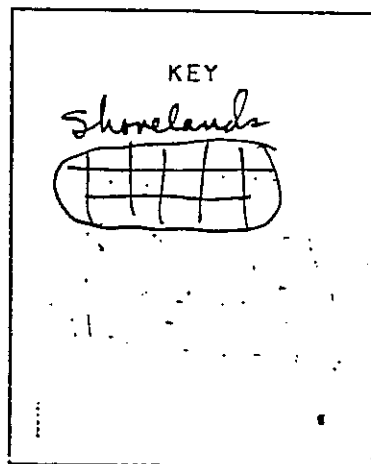


MAP 74  
GENERALIZED  
COASTAL SHORELANDS  
CLATSOP PLAINS PLANNING AREA





MAP 15  
GENERALIZED  
COASTAL SHORELANDS  
CLATSOP PLAINS PLANNING AREA



HAMMOND

WARRENTON

HWY. 101

ALT. HWY. 101

U6B

AFARMARY

LEWIS & CLARK RD.

SEASIDE

U6B

U6B

HWY 101 HWY 26

COASTAL SHORELANDS

GENERALIZED  
SOUTHWEST COASTAL PLANNING AREA

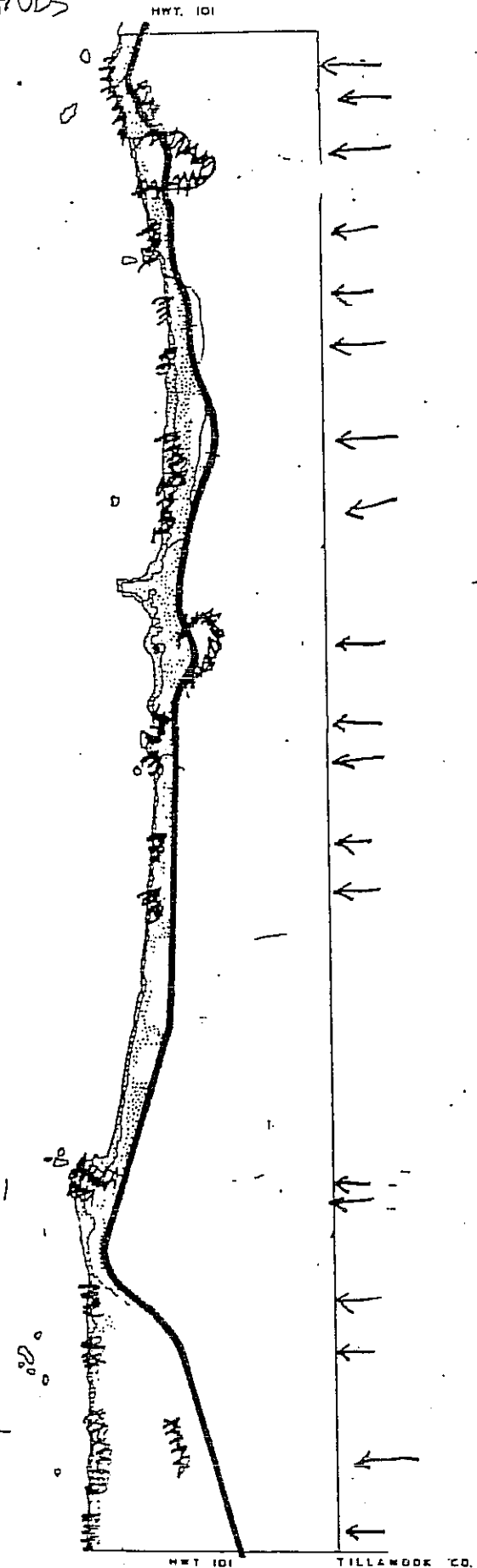
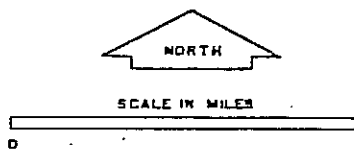
identified in the  
early Ross geologic  
study of the S.W.  
coast

KEY

areas of geologic  
instability  
associated with  
water body

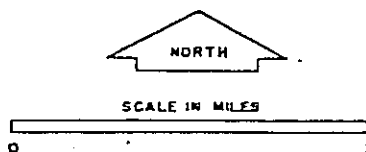
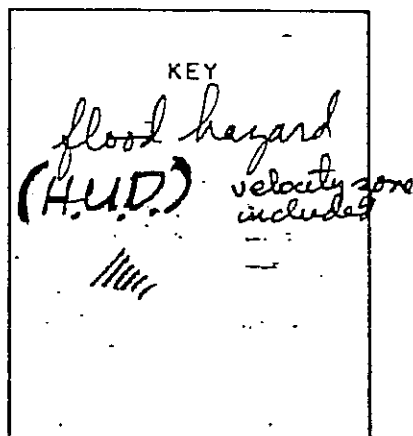
geologic  
hazards

retrograding  
along entire coastline



COASTAL SHORELANDS

GENERALIZED  
SOUTHWEST COASTAL PLANNING AREA

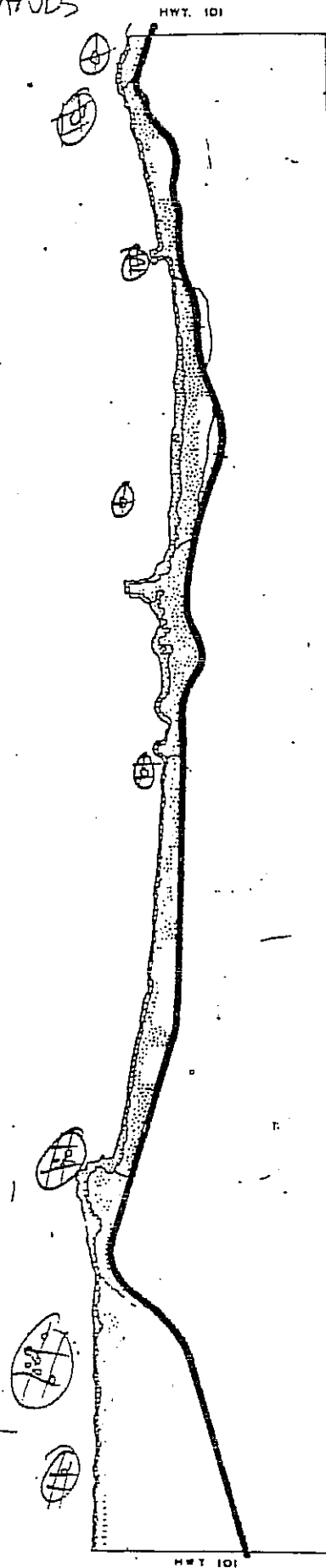
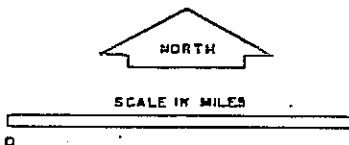
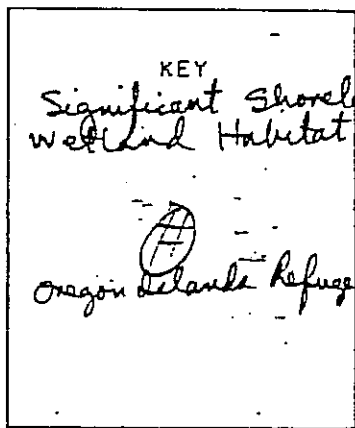


MAP 18

COASTAL SHORELANDS

GENERALIZED

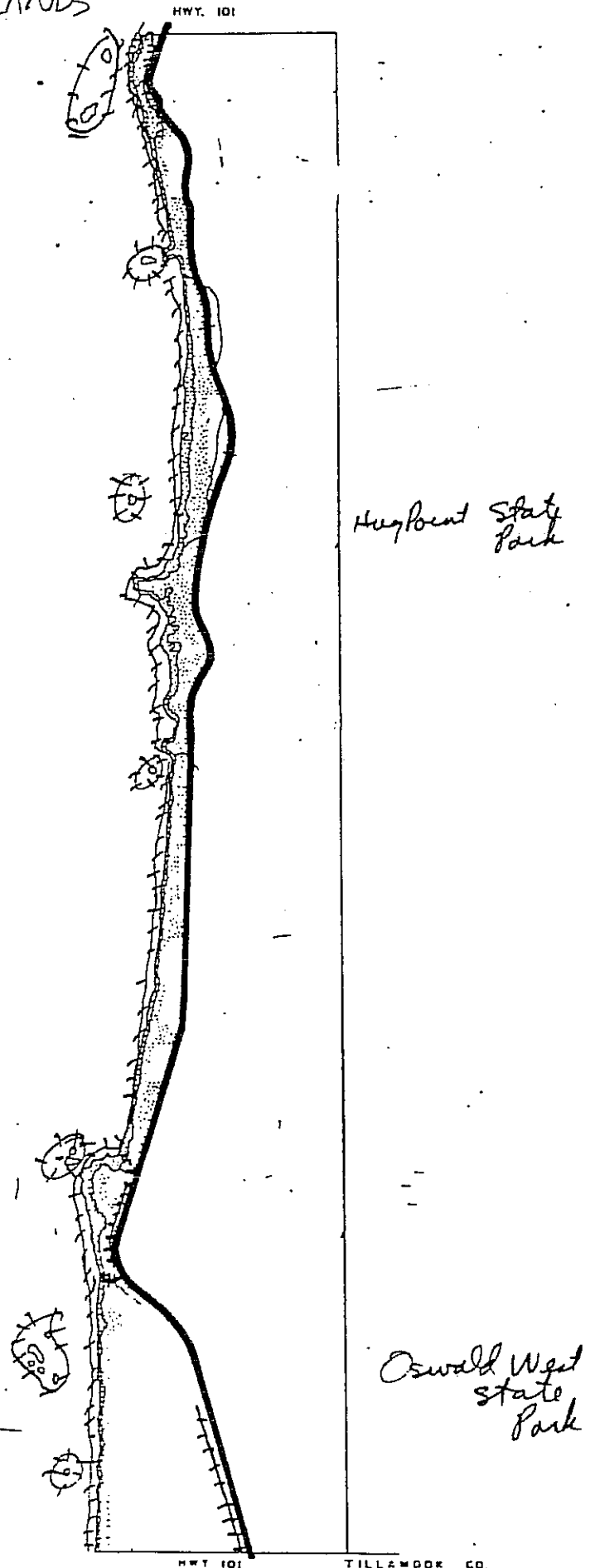
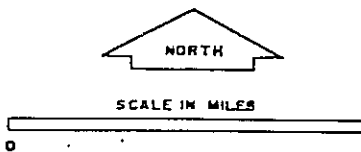
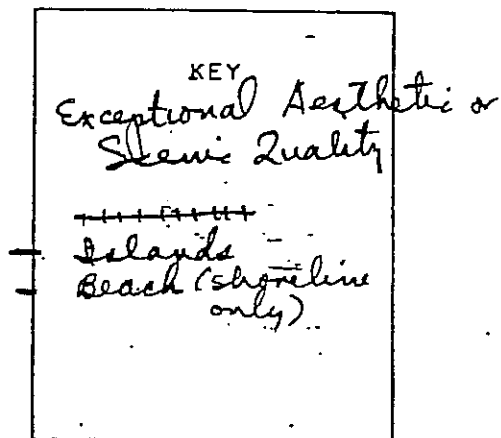
SOUTHWEST COASTAL PLANNING AREA



TILLAMOOK CO.

MAP 19  
COASTAL SHORELANDS

GENERALIZED  
SOUTHWEST COASTAL PLANNING AREA

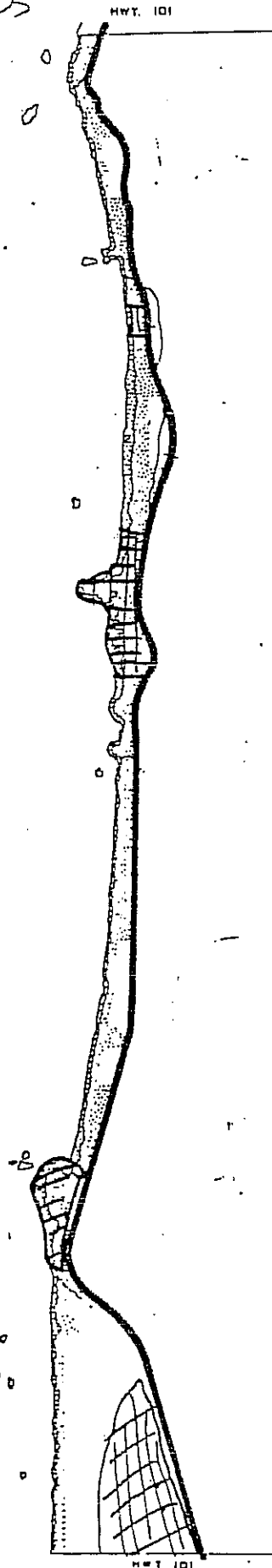
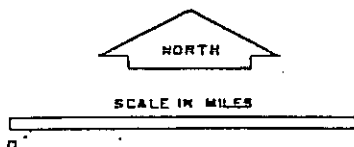
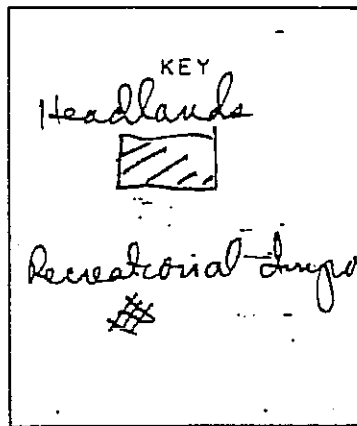


MAP 20

# COASTAL SHORELANDS

GENERALIZED

SOUTHWEST COASTAL PLANNING AREA



Acadia Beach  
Wayside

Hug Point State  
Park

Arch Cape Tunnel  
(Oswald West  
State Park)

Oswald W.  
State Park

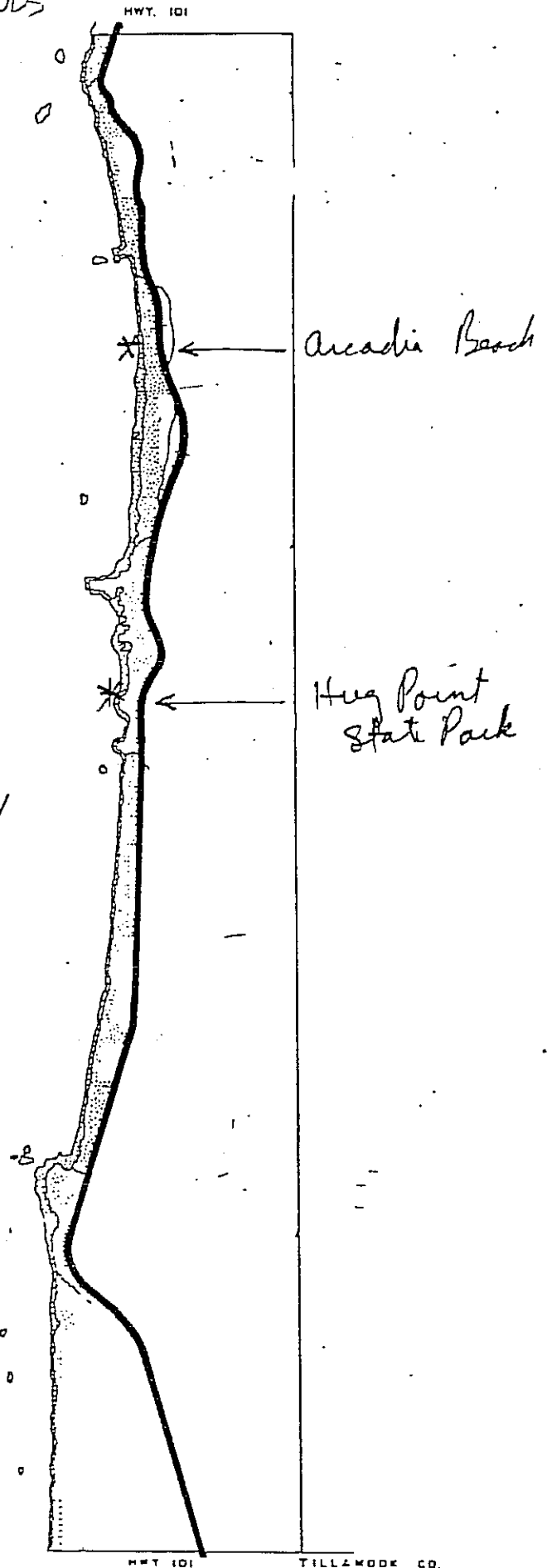
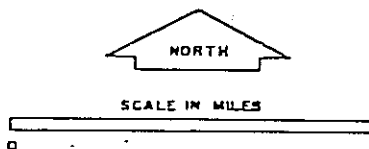
COASTAL SHORELANDS  
GENERALIZED  
SOUTHWEST COASTAL PLANNING AREA

KEY

Area Needed for Water  
Dependent & Water Related  
Uses

\* Beach Access (State only)

Historic Site  
(None)

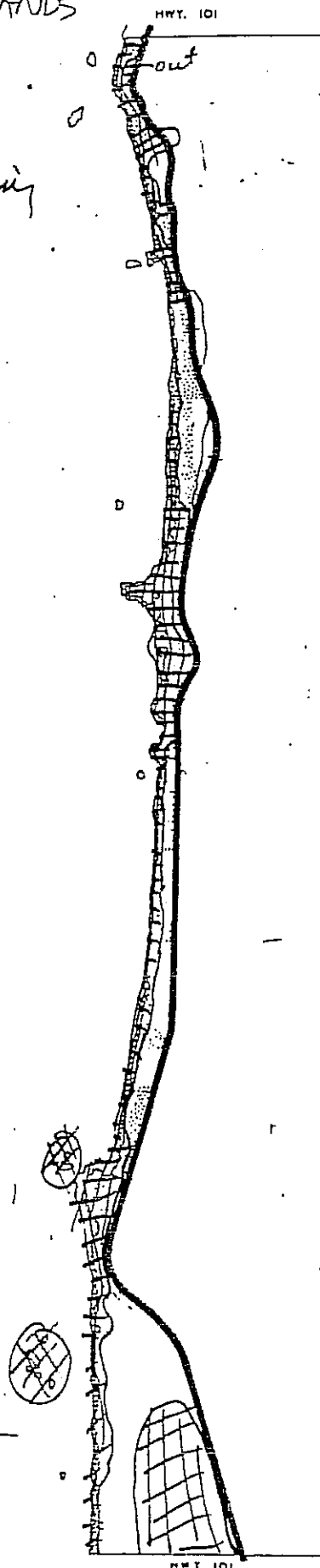
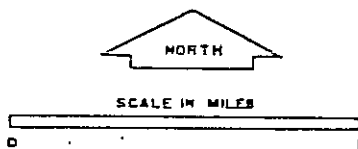
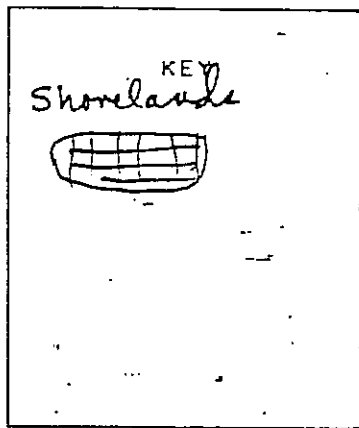


COASTAL SHORELANDS

GENERALIZED

SOUTHWEST COASTAL PLANNING AREA

(Detailed Map in Clatsop  
County Dept of Planning  
& Development)





SIGNIFICANT SHORELAND AND WETLAND HABITATS  
IN THE CLATSOP PLAINS

A report to CTIC and CREST from Duncan Thomas, identifying wetland, shoreland and riparian values, and describing the significant sites in the Clatsop Plains and the Columbia River Floodplain.

JUNE 1982

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Riparian Vegetation	4
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ii wetland management	9
iii significant wetlands	10
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## SIGNIFICANT SHORELANDS AND WILDLIFE HABITAT

This large coastal and estuarine area contains sand dune uplands together with deflation plain and peat bog wetlands. The sand dune uplands still supports some natural and semi-natural\* areas, and some of these are significant wildlife habitat under Statewide Planning Goal 17:

- 1) Foredune grasslands
- 2) Dune forests

Other types of upland habitat which are likely to be significant in Clatsop County are also outlined here:

- 3) Old growth forest
- 4) Dredge-spoil islands in the Columbia River
- 5) Critical wildlife habitat areas identified by ODFW.

### 1) Foredune Grasslands

The foredune ridge is widest and lowest at the northern end of the Clatsop Plains, where it is associated with extensive deflation plain wetlands. South of Sunset Beach the dunes become higher, and deflation plains are absent close to the ocean. The foredune grasslands extend from Clatsop Spit to the Necanicum Estuary; they are of variable width in Fort Stevens State Park, and about 500 - 700 ft. wide southwards from it.

The foredunes are of recent origin. The construction of the Columbia jetties at the turn of the century altered the pattern of sand movement along the coast, causing the growth of the sand dunes westwards into the ocean, until the coastline stabilized in its present location. Sand also blew inland, destroying natural vegetation on the older dunes, covering farmland and damaging property (USDA Circular 660, 1942). The foredunes were therefore stabilized during the 1930's by the US Department of Agriculture, using introduced beach

---

\* Semi-natural - an area which has received some human disturbance in the past, but now resembles a natural ecosystem.

grasses. These plantings were successful and the introduced species now behave as native grasses. In addition, a large number of native and introduced dune species colonized the foredunes, forming an extensive semi-natural grassland.

This dune grassland is locally important to wildlife species; in this predominantly forested region, grassland is rare except for lowland pastures. Consequently, the coastal grassland is important to the large numbers of bird and mammal species which feed on the seeds and shoots of grasses and other herbaceous plants, as well as to the predators, particularly birds of prey, which hunt in the grasslands. Migratory birds include flocks of snow buntings, Lapland longspurs and various sparrows. Raptors, which use the area regularly or occasionally, include marsh hawks, short-eared owls, snowy owls, red-tailed hawks, American kestrels, rough-legged hawks, peregrine falcons and probably other species. The dune grassland is extensively used by black-tailed deer.

Suitable uses of the foredunes are recreational: a limited number of access roads to the ocean beaches with parking lots and facilities, are appropriate; bike trails and footpaths are also suitable. Destruction of the grassland by heavy off-road vehicle use should be prevented, since this will lead to destruction of the grassland by moving sand and the loss of its resource value.

## 2) Dune Forests

The second dune ridge which is older than the foredunes, but whose vegetation was destroyed when the system became mobile, was planted with coastal pine (Pinus contorta var. contorta) and now supports an even-aged stand of this species. This community supports birds and mammals typical of coniferous forest in the area. The wildlife value of the coastal pine forest will increase as the trees mature, but is currently not very high. Good examples of this community occur in Fort Stevens State Park and in several localities south to Gearhart,

but have not been mapped as significant for this study.

Further inland the dunes may support forests of Sitka spruce and hemlock, often with a dense understory of berry-bearing shrubs such as salal, evergreen huckleberry and salmonberry. This is the climax vegetation of sand dunes on Gearhart fine sandy loam, and is therefore of scientific interest as a component of the dune ecosystem. It also supports populations of black-tailed deer and other mammals and birds. The best examples of this spruce/hemlock dune forest are in Fort Stevens State Park (in Warrenton and Clatsop County). In addition, there are a few other examples in Warrenton which have been mapped as significant. In all cases where significant spruce/hemlock forest has been identified, it is associated with coastal lakes and deflation plain wetlands, and consequently forms sand dune natural resource areas with high habitat diversity.

Recreational uses, including footpaths and bike trails are consistent with the protection of these uplands.

### 3) Old Growth Forest

Elsewhere in Clatsop County, examples of significant upland areas are natural ecosystems, particularly old growth forest. This habitat type has been so heavily impacted that insufficient acreage remains to supply the needs of natural resource protection. Thus, the remaining old growth forest in the County has exceptionally high resource value and should be protected. An investigation is needed to establish criteria for the protection of areas of mature forest to insure that some of these will eventually proceed to old growth. This might at least bring the resource up to a minimum level. Suitable actions would be the preservation of riparian corridors along rivers, scenic forest corridors along roads, and areas of potentially spectacular scenery, such as mountainsides along the coast and river canyons. Low intensity recreation is about the only use compatible with the protection of old-growth forest.

4) Dredge-spoil Islands in the Columbia River

Another habitat of significance to wildlife is dredge-spoil islands in the Columbia River. Because of their remoteness from human disturbance and protection from some predators, these are important bird nesting areas for gulls and Caspian terns and are also extensively used by fur-bearing mammals. Protection of these values is compatible with a number of other uses, such as dredge material disposal outside the nesting season.

5) Critical Wildlife Habitat Areas Identified by ODFW

The Oregon Department of Fish and Wildlife has defined the following areas of critical wildlife habitat in their report, "Fish and Wildlife Habitat Protection Plan for Clatsop County" (1976). These areas should be protected.

Critical habitat for Roosevelt Elk

Critical habitat for Columbia White-tailed Deer

Critical areas for the nesting of birds, particularly:

Snowy Plover (nests on young dunes)

Great Blue Heron (nests in colonies in mature trees)

Cliff and Island-nesting seabirds

Birds of prey, particularly Bald Eagle (and Osprey) nests

RIPARIAN VEGETATION

In Oregon, riparian vegetation is described in the Statewide Planning Goals as being an attribute of the shore adjacent to aquatic areas. A definition of riparian vegetation is therefore difficult, since it is dependent upon the characteristics of the aquatic area. The following seven sections fully describe the functional and spatial relationships between riparian vegetation and aquatic areas, and can be used for field identification. Where vegetation which meets these criteria is present,

it should be protected. The major tracts of riparian vegetation in the Clatsop Plains and Columbia River Estuary were mapped during this project.

Riparian vegetation is a difficult concept and is therefore discussed in some detail in seven sections below. These are:

- 1) Riparian vegetation types
- 2) Width and location of riparian zones
- 3) Functions of riparian vegetation
- 4) Definitions of "shoreline"
- 5) The extent of riparian vegetation (1) within riparian zones (2)
- 6) Non-riparian vegetation within riparian zones
- 7) Riparian zones around significant wetlands

1) Riparian Vegetation Types

- a) Trees and shrubs growing on upland adjacent to an aquatic area.
- b) Trees and shrubs (taller than 12 ft.) growing in wetland (Sect. 7).
- c) Non-significant emergent marsh or low shrub wetland, except where this is managed for agricultural use.

2) Width and Location of Riparian Zones

- a) In a zone up to 50 feet wide from the shorelines of:
  - lakes of surface area exceeding 1 acre.
  - estuaries up to the heads of tide.
  - larger creeks and rivers (average annual flow exceeding 100 cu. ft./sec.)
  - areas of significant wetland habitat, except where the wetland vegetation is trees and shrubs exceeding 12 ft. in height (Sect. 7).
- b) In a zone up to 30 feet wide from the shorelines of:
  - smaller creeks (average annual flow less than 100 cu.ft/sec.)
  - diked sloughs of width exceeding 15 ft. for some of their length.

3) Functions of Riparian Vegetation

- a) It maintains water temperature and quality and enhances fish habitats.
- b) It provides bank stabilization.
- c) It provides habitats for the breeding, feeding and resting of both aquatic and upland wildlife species.
- d) It protects aquatic ecosystems from unnecessary human disturbance.

4) Definitions of "Shoreline"

- a) On estuaries, the line of non-aquatic (upland) vegetation, or mean higher high water where vegetation is absent.
- b) Ordinary high water on lakes, rivers and other bodies of non-tidal water.
- c) On significant wetland areas the shoreline is defined here as the boundary of the significant area.

5) The Extent of Riparian Vegetation (1) Within Riparian Zones (2)

Within the riparian zones defined in section 2, riparian vegetation defined in section 1 may extend for all or for only a part of the maximum zone width from the shoreline. Riparian vegetation ends at either:

- a) The landward boundary of the zone defined in section 2, or
- b) Within the zone riparian vegetation may end at the boundary with non-riparian vegetation defined in section 6.

6) Non-riparian Vegetation Within Riparian Zones

Riparian vegetation is not agricultural crops, land managed as pasture, horticultural or landscaped areas, or unvegetated areas.

7) Riparian Zones Around Significant Wetlands

Wetland areas dominated by woody plants exceeding 12 feet in height fulfill the riparian functions described in section 3. Around an area of significant wetland, the riparian vegetation may be composed entirely or partially of forested wetland (Figure 3).



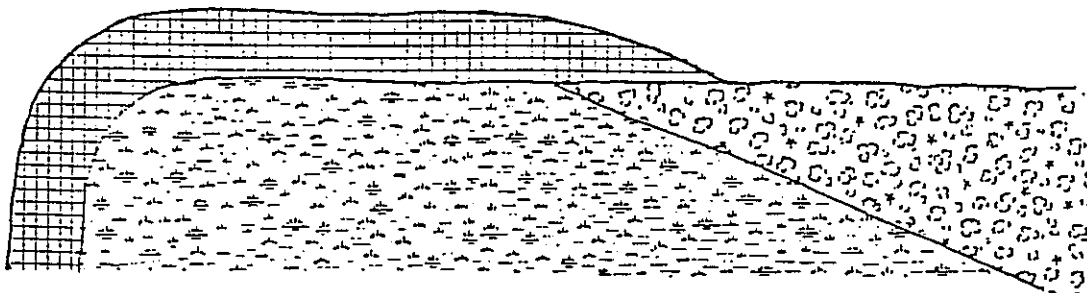


Figure 1. The location of a 50 ft wide riparian zone around a significant wetland area dominated partly by emergent vegetation and partly by woody vegetation exceeding 12 ft in height.



emergent & shrub  
wetland  
forested wetland  
12 ft tall.

} significant  
wetland



riparian  
vegetation

## WETLANDS DESCRIPTION

### i) WETLAND TYPES

In the Clatsop Plains, three kinds of wetlands were identified, each characterized by different hydrology. These are:

- 1) Young Deflation Plains
- 2) Older Deflation Plains
- 3) Peat Bogs
- 4) Columbia Floodplain and Necanicum Floodplain

- 1) Young deflation plains are found near the ocean in recently accreted areas. They are characterized by species: poor marsh or swamp vegetation on immature, sandy soils. The water-table fluctuates so that wetlands are flooded during wet times of year, and the soil surface is moist or even dry at other times. The ratio of standing water to other types of wetland is relatively low. These wetlands have rather low natural resource value, but their significance is enhanced on account of their great extent and because they are part of a fine, natural sand dune system with great habitat diversity.

- 2) Older deflation plains generally occur in the middle of the Plains, between foredunes with young deflation plains and the peat bogs. They are generally long (north-south axis) and narrow in shape, and contain coastal lakes with marshes, swamps and riparian vegetation. The ratio of open water to other wetlands is relatively high. The high natural resource values and the high habitat diversity of these areas makes them the most important of the wetland areas. These lakes depend upon the ground-water in the dune system. They are characterized by small drainage areas and often lack inflow and outflow channels. They are hydrologically dependent upon the movement of water through the coarse sand of the dune system, probably have slow turn-over rates, and are very susceptible to water pollution. The marshes and swamps may be flooded permanently or seasonally, but the surface soil - usually with high organic content - is permanently saturated.
- 3) Bogs occur in deflation plains or lagoons which have filled in with organic material. They are generally broad and occur furthest from the ocean, adjacent to Clatsop Ridge. Lakes are a less prominent feature than in old deflation plains, but some important ones are present. The gradual in-filling of lagoons and deflation plains by peat raises the surface relative to the water table, so that many areas of bog are seldom flooded, but remain saturated and poorly drained at all times due to the water-retaining properties of the soil. These wetlands have moderate natural values overall, but values may be high locally. Bogs occur in Hammond and Warrenton, along the Skipanon River, and from Cullaby Lake south to Stanley Lake. In the past, most bogs were drained for agricultural use, but some of these have subsequently reverted to a natural condition.
- 4) The Columbia River Estuary floodplain was formerly tidal marshes and swamps and is now diked. Significant wetlands in this area are likely to be substantially altered from their original condition. Natural resource areas which have been identified include tide-gated sloughs and areas of marsh and swamp. In most instances, the restoration of these wetlands to the estuary would be appropriate management. They

have moderate fish and wildlife value, and form a system of non-tidal wetlands associated with the estuary, thereby increasing the area's habitat diversity.

The Necanicum River and estuary are located at the southern end of the Clatsop Plains, and the coarse sand-scent peats of the dune system changes to riverine silts and gravels. As a result, small creeks, oxbows and ponds become more important features in Necanicum flood-plain marshes, which have moderate to high wildlife value.

RIVERINE HABITAT. Although the Clatsop Plains have extensive wetlands, these are not linked to important river systems, with the notable exception of the Necanicum River. Generally, drainage channels through the Clatsop Plains marshes are maintained by man, and where they are not maintained, become blocked by vegetation and by beavers. Riverine wetland and riparian habitat is therefore of very limited distribution and importance.

#### ii. WETLAND MANAGEMENT

The wetlands can be divided into open water areas and marshes/swamps for a discussion of management.

With open water areas, the main problem is likely to be eutrophication by septic tank leachate and fertilizer. At present, many lakes have a very dense growth of water-weed and algal blooms. If the eutrophication trend continues, areas with a high water residency time are likely to become oxygen-depleted and lose their fish and wildlife values. Naturally, these lakes tend to be oligotrophic, lacking dense, floating vegetation and algal blooms. Shoreline development may impact natural values around some of the larger lakes. Typical impacts are the destruction of riparian vegetation, and the proliferation of single-purpose docks. These should be avoided where possible and riparian restoration should be carried out where feasible.

The major causes of loss of natural values to marsh and swamp areas come from draining, filling and logging. These habitats are more susceptible to a variety of human disturbance than open water, because of the delicate nature of their surfaces, and the relative ease with which they can be filled. In general, marshes and swamps can only support a minimum of human activities, such as low-intensity recreation. Also, a limited number of structures on piling, such as footpaths or access ways to adjacent lakes are not incompatible with natural resource protection. Marsh areas in particular need a buffer zone of riparian vegetation on the shoreward side to protect them from excessive disturbance.

### iii SIGNIFICANT WETLANDS

For wetland classification, the USFWS system of Cowardin et al (1979) was followed. At the start of this project, all the possible wetland areas were delineated using aerial photographs, contour maps and soils maps. These areas were then visited to determine whether significant wetlands were present.

Significance of wetlands sites was a cumulative assessment of many features, the main ones being:

- Size: larger areas are more significant than smaller ones.
- Naturalness: the more natural or pristine, the greater the significance of a wetland.
- Habitat diversity: the presence of a diverse assemblage of natural wetland (and upland) habitats increases significance.
- Wetness: the significance of wetland areas is increased by the presence of permanent standing water.
- Habitat for rare or endangered species, critical habitat for game or non-game wildlife species increases significance.
- Heavy human disturbance of a wetland decreases its significance.
- Close proximity to dense housing development or industrial areas decreases significance.

The wetland areas were described in terms of plant communities, characteristic of different soils and hydrological regimes. These are listed in the following section.

These same criteria were also applied to wetlands in the Columbia River Floodplain. In this case, an additional criterion was the contribution made by the wetlands to the tidal ecosystem of the Estuary and the River.

#### iv WETLAND VALUES

Wetlands have been identified at both federal and state levels as being important fish and wildlife habitat. Nutrients from the groundwater and carbon dioxide are used by marsh plants to give levels of primary productivity which are often very high. This productivity is utilized by herbivores and detritovores, and eventually supports a wide range of important fish and wildlife species. Each wetland area is unique in the combination of values present, but for the Clatsop Plains area, the following species were identified as being common in the coastal lakes and other wetlands:

##### Overwintering and Breeding (\*) Waterfowl

American widgeon	Green-winged teal
Bufflehead	Ring-necked duck
Mallard (*)	Common merganser
Wood Duck (*)	
Hooded Merganser (*)	

##### Other Breeding Birds

American bittern	Pied-billed grebe
Sora rail	Song sparrows
Virginia rail	Red-winged blackbird
Green heron	Yellowthroat
Coot	Marsh hawks
And many other species.	

Pelagic birds which use the wetlands in winter: common loon, western grebe, cormorant species.

Warm water fish which may be taken as game species:

White crappie	Warmouth
Black crappie	Largemouth bass
Brown bullhead	Catfish
Yellow perch	Cutthroat trout (often stocked)
Bluegill	Rainbow trout (stocked)
Sunfish	

Medium and large mammals:

Nutria	Black-tailed deer
Beaver	Roosevelt elk
Muskrat	
Raccoon	

#### PLANT COMMUNITIES IN THE CLATSOP PLAINS

1A Open water with few floating or submerged aquatic vascular plants.

1B Water which usually becomes more or less filled with floating or submerged aquatic vascular plants during the summer and fall. Plant species include:

- Callitriche species (water starwort)
- Lemna minor (duckweed)
- Ceratophyllum demersum (water hornwort)
- Elodea densa (South American waterweed)
- Elodea nuttallii (Nuttall's waterweed)
- Myriophyllum brasiliense (South American water-milfoil)
- Nymphaea odorata (fragrant waterlily)

2 Shallow but more or less permanent water which becomes covered by a dense growth of non-persistent emergent and floating-leaved plants. The main dominants are the yellow flowered Indian Pondlily and the

marsh cinquefoil. A species list of plants common or dominant in this community includes:

- Potamogeton species (pondweed)
- Nuphar polysepalum (indian pondlily)
- Hippuris vulgaris (common mare's tail)
- Potentilla palustris (marsh cinquefoil)
- Utricularia vulgaris (common bladderwort)

- 3 In shallow water where lakes are filling in with aquatic vegetation, a community dominated by sedge tussocks floating in liquid mud. Between the usually compact tussocks, non-persistent emergent and floating leaved plants typical of #2 are often found. Common or dominant species include:

- Carex cusickii (Cusick's sedge)
- Carex vesicaria (inflated sedge)
- Carex interior (inland sedge)
- Menyanthes trifoliata (bogbean)
- Nuphar polysepalum (indian pondlily)
- Potentilla palustris (marsh cinquefoil)

- 4 Sedge meadows dominated by tussocks of Sitka sedge. This vegetation is flooded by two or three feet of water during wet periods though the sedge tussocks are usually persistently emergent. During dry periods, the surface between the tussocks may be exposed or shallowly flooded. This community is typical of wet emergent marshes on Brallier peat, and it usually contains floristic elements of either wetter (2, 3) and/or drier (5, 11A) communities. Common plant species include:

- Carex sitchensis (Sitka sedge)
- Carex cusickii (Cusick's sedge)
- Carex obnupta (slough sedge)
- Nuphar polysepalum (indian pondlily)
- Spiraea douglasii (spiraea or hackberry)
- Oenanthe sarmentosa (water parsley)



- 5 Sedge meadows dominated slough sedge, saturated or flooded at all times. This vegetation is flooded by a foot or more of water during wet periods, and the saturated soil surface is exposed during dry conditions. It occurs on Brallier muck and also on Warrenton loamy fine sand. Common species include:

Carex obnupta (slough sedge)  
Lysichiton americanum (skunk cabbage)  
Oenanthe sarmentosa (water parsley)  
Athyrium filix-femina (lady fern)  
Spiraea douglasii (spiraea, or hackberry)  
Lonicera involucrata (twinberry)  
Carex sitchensis (Sitka sedge)

- 6 Slough sedge wetland on young deflation plains. These wetlands, on sandy soil close to the ocean, have a fluctuating water table and are flooded during wet periods but dry out so that the soil is moist, not saturated, during dry conditions. Common or dominant species include:

Carex obnupta (slough sedge)  
Potentilla pacifica (pacific silverweed)  
Deschampsia cespitosa (tufted hair-grass)

A number of unusual or interesting plant species occur in this community:

Botrychium multifidum (leathery grape-fern)  
Habenaria greenii (Green's bog-orchid)

- 7 Shrub-dominated wetland on young deflation plans. As with vegetation type #6, this type is saturated or flooded during wet periods and may be merely moist at other times. The usual dominant species is Salix hookeriana (Hooker willow), with an herb layer of Carex obnupta (slough sedge).

- 8 Shrub-dominated swamps. This vegetation type resembles #7, but occurs on more mature soils, particularly Brallier muck and also Warrenton loamy fine sand. Soils are less well draining than #7,

and are saturated or flooded at all times. Species typical of this community are:

Salix hookeriana (Hooker willow)

Salix lasiandra (Pacific willow)

Pyrus fusca (crabapple)

Lysichiton americanum (skunk cabbage)

Carex obnupta (slough sedge)

In addition, scattered trees of Picea sitchensis (Sitka spruce) and Alnus rubra (red alder) may be present.

- 9 Sitka spruce swamp. Forested swamp dominated by Sitka spruce trees, which may become large (they are generally stunted in type 8). Soil conditions are saturated with occasional flooding. The understory is dominated by skunk cabbage and slough sedge, with Rubus spectabilis (salmonberry), and Sambucus racemosa (elderberry) in areas which are transitional between wetland and upland.
- 10 Alder swamp. Forested swamp dominated by red alder with an understory of slough sedge and skunk cabbage. Soil conditions are saturated. Red alder is mainly an upland species and appears to be intolerant of very wet conditions. Well developed alder swamps are not common.
- 11 Low shrub vegetation, in which spiraea or hackberry (Spiraea douglasii) is the main dominant. A wet and a drier variant of this type have been identified. The wet variant often occurs on Brallier muck and is flooded for most of the year. Typical associates of the spiraea are slough sedge and Sitka sedge (Carex sitchensis). The drier variant is also found on Brallier peat, often on abandoned cranberry bogs, where it grows with other shrubs such as sweet gale (Myrica gale) and labrador tea (Ledum glandulosum).
- 12 Sphagnum bog. The bog surface is covered by a mat of bryophytes, principally of the genus Sphagnum. Soil conditions are saturated, on account of the water-retaining properties of the moss, and the

community develops on Brallier peat. Common vascular plants include species of herb and shrub such as:

Carex obnupta (slough sedge)  
Carex sitchensis (Sitka sedge)  
Carex cusickii (Cusick's sedge)  
Lysichiton americanum (skunk cabbage)  
Trientalis arctica (northern starflower)  
Drosera rotundifolia (sundew)  
Eriophorum chamissonis (cotton-grass)  
Ledum glandulosum (Labrador tea)  
Kalmia occidentalis (swamp laurel)  
Gaultheria shallon (salal)

- 13 Disturbed marsh flora (wet variant). The usual reason for such disturbance is the logging of adjacent forested areas. Following the destruction of marsh vegetation types such as #4 and #5, these areas become dominated by species such as:

Sparganium emersum (bur-reed)  
Juncus nevadensis (Sierra rush)  
Juncus species (rush)  
Glyceria species (manna grass)

- 14 Disturbed marsh flora (dry variant). This vegetation develops on the site of former forested swamp after it has been logged. Common species are:

Juncus effusus (common rush)  
Carex obnupta (slough sedge)  
Oenanthe sarmentosa (water parsley)  
Juncus ensifolius (dagger-leaved rush)  
Carex canescens (gray sedge)

In addition to the wetland plant communities described above, marsh and swamp areas, particularly those characteristic of drier hydrological regimes such as 6, 7, 8, 9, and 10, are sometimes mixed with patches of upland vegetation. These upland communities are described in sections 15 - 17 below.

- 15 The forest communities which develop on well-drained sandy soils, particularly the old sand-dunes which surround the Clatsop Plains wetlands, are typically dominated by the following species:

Trees: Alnus rubra (red alder)

Picea sitchensis (Sitka spruce)

Tsuga heterophylla (hemlock)

Rhamnus purshiana (cascara)

Shrubs: Sambucus racemosa (red elderberry)

Rubus spectabilis (salmonberry)

Vaccinium ovatum (evergreen huckleberry)

Vaccinium parvifolium (red huckleberry)

Gaultheria shallon (salal)

Herbs: Maianthemum californicum (false lily-of-the-valley)

Polystichum munitum (sword fern)

- 16 Younger sand-dunes often support planted coastal pine forest, and this may occasionally be mixed with wetland types 6 and 7.

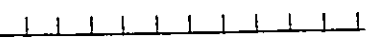
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- 4) Sanderson, R. B., Shulters, M. V., Curtiss, D. A., 1973: Lakes of  
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## THE MAPS

The 1" to 400' base map was aerial photos from the Corps of Engineers (black and white - 1973), prepared for a sewer feasibility study by CH2M Hill. For the field work, these were supplemented by more recent (1981) Corps of Engineers infra-red aeriels. In areas not covered by these aeriels, USGS quad sheets and CREST base maps (scale 1" to 2,000') were used.

Overlays were produced at a scale of 1" to 400' in transparent acetate for the aerial photographs, or on other base maps when aeriels were not available. The following symbols were used:

Blue hatching - - - Significant wetland, Goal 17  
Brown or brown/blue hatching - - - Significant wetland, Goal 5  
Green hatching - - - Significant wildlife and shoreland habitat.  
 - - - Major riparian vegetation.

## A LIST OF THE SIGNIFICANT SITES

### Warrenton Sites

W 1	1st Deflation Plain
W 2	State Park Wetlands
W 3	Coffenbury Lake
W 4	Leinenweber Lake
W 5	Abbot Lake Wetlands
W 6	Crabapple/Creep and Crawl Lakes
W 7	Long Lake
W 8	Pond Lily Lake
W 9	Wild Ace Lake
W 10	Shag Lake/Warrenton Bog
W 11	Clear Lake
W 12	Cemetery Lake
W 13	Warrenton Sloughs
W 14	Middle Skipanon
W 15	Upper Skipanon
W 16	Old Skipanon Creek

#### Hammond Sites

H 1 West of Russell Drive  
H 2 Hammond Bog  
H 3 West of Lake Drive  
H 4 West of Mooring Basin

#### Gearhart Sites

G 1 Neacoxie Creek  
G 2 Deflation Plain  
G 3 Gearhart Bog, part of CP 16  
G 4 Mill Creek, part of CP 19

#### Seaside Sites

S 1 Circle Creek Wetlands  
S 2 Neawanna Swamp, part of CP 20  
S 3 Stanley Lake  
S 4 Necanicum River

#### Clatsop Plains Sites

CP 1 Clatsop Spit  
CP 2 Swash Lake Area  
CP 3 Foredunes  
CP 4 1st Deflations Plain  
CP 5 Slusher Lake, etc.  
CP 6 ? Lake  
CP 7 Smith Lake  
CP 8 Skipanon Swamps  
CP 9 Skipanon Bog  
CP 10 Golf Course Lake  
CP 11 Sunset Lake  
CP 12 West Lake  
CP 13 Taylor Lake  
CP 14 Cullaby Lake  
CP 15 Cullaby Bog  
CP 16 Gearhart Bog  
CP 17 Upper Neacoxie  
CP 18 Triangle Lake  
CP 19 Mill Creek  
CP 20 Neawanna Swamp

#### Other Clatsop County Sites

LY 22 Sloughs  
LY 23 Wetlands/Wildlife  
EC 26 Islands  
EC 27 Tongue Point  
EC 28 John Day

EC 29 John Day - Knappa Dock, Riparian Vegetation  
 EC 30 Brownsmead  
 EC 31 Aldrich Point - Eastwards, Riparian Vegetation  
 EC 34 Tenasilliahe Island  
 EC 35 Driscoll Slough Marshes

W - Warrenton CP - Clatsop Plains  
 H - Hammond LY - Lewis & Clark & Youngs River  
 G - Gearhart EC - Eastern Clatsop  
 S - Seaside

Appendix - Shoreline Changes, Goal 16 areas.

W 18 Middle Skipanon Shoreline Change  
 LY 24 Tidal Marshes on the Lewis & Clark River  
 EC 32 Tidal Marshes at Aldrich Point  
 EC 33 Hunts Creek Tidal Swamps at Bradwood

SITE DESCRIPTIONS - WARRENTON

Warrenton - Site #1 - Goal 17

(Overlay - 1" to 400', #'s 3, 5, and 8)

Location - Coastal, with 3,000 feet of shoreline in FSSP.

Size - c. 500 acres.

Vegetation Types - 6 and 7, together with some upland vegetation (Types 16 and 17).

Riparian Vegetation - None.

Soil - 8A (dune land).

Site Description - A very large area of deflation plain. Wetlands, the dune ecosystem adjacent to the coast in Warrenton (and throughout Clatsop Plains) is of recent origin, having been formed in intertidal and shallow subtidal areas following alterations to the pattern of sand movement along the coast after the construction of the Columbia River South Jetty. The area was stabilized by the U.S. Soil Conservation Service, who planted introduced European beach grass and native trees and shrubs on the unvegetated young dunes. The deflation plain

vegetation is largely natural, and is probably still in a successful stage; that is, it is evolving toward different kinds of wetland vegetation in the course of natural ecosystem development. These deflation plains (elevation c. 18-20 feet) are wet or flooded in winter and spring and dry out during the summer. The topsoil (sand) may be dry during the late summer.

Values - Fisheries - none. Wildlife - low to medium. Wildlife usage: birds, breeding, feeding numerous small birds use the shrub vegetation, birds of prey hunt over the dunes and deflation plains, especially marsh hawks. Includes Nature Conservancy Site for Clatsop County #6 and 60 (in part). The main value of this area is as part of a large coastal ecosystem. Preservation of these values are consistent with use of the area for recreation, provided the vegetation cover is not destroyed.

Management - The site should be managed to preserve its natural values as part of a young sand dune ecosystem.

WARRENTON - Site #2 - Goal 17

(Overlay - 1" to 400', #3)

Location - FSSP, south and east of Battery Russell.

Size - 65 acres.

Vegetation Types - 4 and 8

Riparian Vegetation - none

Soils - 15A (freshwater marsh)

Site Description - Part of a system of deflation plain wetlands, dominated by willows, and by sedges, and which extends into Clatsop County and Hammond. The southern part of the site has some disturbance, since it was formerly used as a sewage disposal area for the State Park Campsite. The site is seasonally flooded and the soils remain saturated during the summer, with small areas of semi-permanent standing water.

Values - Fisheries - none. Wildlife - some use of wetland habitat by birds and mammals. Included in Nature Conservancy Site 60. This wetland is part of the large complex of dunes, deflation plains and other marshes which occupy the western half of the City of Warrenton.

Management - The site should be managed to preserve its natural values.



WARRENTON - Site #3 - Goal 17

(Overlay - 1" to 400', #5)

Location - Coffenbury Lake, FSSP

Size - 70 acres

Vegetation Types - 1A, 1B and 2

Riparian Vegetation - Well developed, c. 10,000 feet x 50 feet wide.

Soils - Lake sediments.

Site Description - A long, narrow coastal lake between high forested sand dunes. Small drainage basin, inflow and outflow, probably as seepage through the sand dunes.

Values - Fisheries - recreational, stocked with cut-throat and rainbow trout. Wildlife - some waterfowl value, breeding and overwintering of ducks and geese. Part of Nature Conservancy Site 60.

Management - Should be consistent with maintaining its high recreational value and should preserve open water for swimming, fishing and boating. Riparian vegetation should be protected except to provide access for water-dependent activities and the small areas of marsh and swamp, mostly at the southern end, should be preserved.

WARRENTON - Site #4 - Goal 17

(Overlay - 1" to 400', #8)

Location - This wetland site is a southerly extension of Coffenbury Lake from which it is separated by an unsurfaced road built on fill. Southwards the site extends to the City limits at DeLaura Beach Road and includes the shallow Leinenweber Lake and also Kyle Lake.

Size - About 50 acres.

Vegetation Types - 1B, 7, 9.

Riparian Vegetation - About 1,000 feet x 50 feet, situated on the west side of Leinenweber Lake.

Soils - Lake sediments, 8A (dune soils), 15A (freshwater marsh), 24E (Westport fine sand).

Site Description - A southward continuation of the Coffenbury Lake deflation plain in which the water becomes much shallower with extensive patches of hooker willow dominated swamp, and also forested swamp at the southern end. The area is probably permanently flooded.

Values - Fisheries - some sport fishing of warm water fish in the shallow lakes. Wildlife - high waterfowl and non-game bird value, suitable habitat for the breeding of ducks and green herons.

Management - The site should be managed to maintain the natural wetland values for fish and birds described above. The riparian vegetation should be preserved.

WARRENTON - Site #5 - Goal 17

(Overlay - 1" to 400', #5)

Location - Mostly in Fort Steven's State Park, west of Ridge Road, between camping area entrance and Camp Kiwanilong entrance.

Size - About 100 acres.

Vegetation Types - 1B, 2, 3, 4, 8, 9, 10

Riparian Vegetation - None

Soils - 15A (freshwater marsh) and lake sediments.

Site Description - A large inaccessible wetland site surrounded by forested dunes. A number of small lakes are present, of which Abbott Lake is the largest (the adjacent Creep and Crawl Lake is described under Site #6). These are in the process of filling in with vegetation and are variously dominated by floating and floating-leaved aquatic plants, and by very wet sedge vegetation. These small lakes make up only a small portion of the 100-acre site; the remainder is occupied by extensive forested swamps surrounding these lakes, and dominated by mainly Sitka Spruce and by alder and willows. The small lakes are permanently flooded, while the surrounding swamps have mostly saturated soils, and may flood occasionally.

Values - Fisheries - little sports fishing occurs at present because of inaccessibility, though populations of warm water game fish are present. Wildlife - lakes are important undisturbed wetland ecosystems, supporting a range of natural wetland values including fishes, water birds and mammals. In addition, the forested swamps have many of the values of coastal spruce forest ecosystems. Included in Nature Conservancy Site #60.

Management - Site #5 should be managed to preserve the numerous natural values described above.

WARRENTON - Site #6 - Goal 17

(Overlay - 1" to 400', #5 and #8)

Location - In the SE part of Fort Stevens State Park, and extending southwards beyond the Park boundary. This site includes Crabapple and Creep and Crawl Lakes (Note: these lakes are incorrectly named on the 7½' quad sheet).

Size - About 80 acres.

Vegetation Types - 1A, 1B, 2, 4, 8

Riparian Vegetation - c. 16,000 feet x 50 feet wide along Crabapple and Creep and Crawl Lakes.

Soils - Lake sediments.

Site Description - Two shallow lakes, formed in old deflation plains and separated by a narrow low dune ridge. Crabapple Lake is broad, with marshy swampy islands, and supports a lush growth of water plants in the summer. Creep and Crawl Lake is narrow, deeper, has less marsh, and many snags. Both are hydrologically dependent on the water table in the sand dune system, and have no obvious inflow or outflow channels.

Values - These coastal lakes have value for recreational fishing. Access is by small boat ramps in the State Park. Part of Nature Conservancy Site #60. They are also important waterfowl breeding habitat.

Management - This site should be managed for low intensity recreation and to maintain the wetland values described above. Riparian vegetation should be preserved.

WARRENTON - Site #7 - Goal 17

(Overlay - 1" to 400', #8)

Location - Long Lake in Camp Kiwanilong, west of Ridge Road between the Camp entrance and DeLaura Beach Road.

Size - 17 acres (Lake - 12 acres).

Vegetation Types - 1A

Riparian Vegetation - 7,000 x 50 feet wide on both sides of the lake.

Soils - Lake sediment.

Site Description - A long narrow, relatively deep lake between high dune ridges. No wetlands apart from the lake area; riparian vegetation is forest or scrub. Hydrologically dependent on the water table in the sand dune system with no inflow or outflow channels.

Values - Fish, waterfowl, recreational.

Management - The lake should be managed for water-dependent recreation and educational usage, including swimming, boating, fishing and wildlife observation. Riparian vegetation should be maintained except where access is needed for water-dependent recreation or other water-dependent use.

WARRENTON - Site #8 - Goal 17

(Overlay - 1" to 400', #8)

Location - Pond Lily Lake, west of Long Lake (see W. Site #8) and north of DeLaura Beach Road, in Camp Kiwanilong.

Size - About 30 acres.

Vegetation Types - 1B, 2, 3, 4, 12.

Riparian Vegetation - About 7,000 feet x 50 feet on east and west shores, mostly Sitka Spruce forest.

Soils - Lake sediments.

Site Description - A fine example of a shallow coastal lake in a former deflation plain, filling in with wetland vegetation. All the wettest vegetation types are well represented, together with a young Sphagnum bog. The forested dune shore to the west of Pond Lily Lake is a fine example of an old dune stabilized by coastal spruce forest and could be managed as significant shoreland habitat.

Values - Fisheries - some warm water game fish, but the lake is mostly too shallow for fishing. Habitat for waterfowl and non-game bird species and aquatic furbearing mammals. High educational values.

Management - This site should be managed to maintain the high natural values described above. The wetland ecosystem and the associated riparian vegetation should be preserved.

WARRENTON - Site #9 - Goal 17

(Overlay - 1" to 400', #18)

Location - Wild Ace Lake, west of Ridge Road and north of DeLaura Beach Road.

Size - Approximately 34 acres.

Vegetation Types - 1A, 2, 9, 11

Riparian Vegetation - c. 3,600 x 50 feet, mostly along the lake shore.

Soils - Lake sediments.

Site Description - A compact wetland site, connected to Cemetery Lake by a culvert under the road fill. The shallow lake is surrounded by extensive marshes which are more or less permanently inundated. The area is very marshy and inaccessible, except by canoe.

Values - Some fish, probably underexploited through lack of access and shallow water. Wildlife values high - waterfowl and aquatic fur-bearers. High value as a natural wetland ecosystem. Nature Conservancy Site #14.

Management - This site should be managed to preserve its natural values, protecting the wetlands and riparian vegetation.

#### WARRENTON - Site #10 - Goal 17

(Overlay - 1" to 400', #2, 4, 5, 8)

Location - East of Ridge Road between Hammond and the County Road which passes the Sanitary Landfill.

Size - Approximately 400 acres.

Vegetation Types - 1A, 1B, 2, 3, 4, 5, 8, 9, 10, 11, 13, 14.

Riparian Vegetation - c. 4,500 x 50 feet around Shag Lake and associated emergent wetlands.

Soils - Lake sediment and Brallier muck.

Site Description - A large and very diverse wetland system. These broad deflation plain wetlands are bounded to the east by the easternmost sand dunes and where the dunes are discontinuous, merge with the Columbia River Foodplain. To the north, this wetland system continues into Hammond (see H 2). The southern half of the site is the wettest, with extensive tracts of flooded sedge marsh and low Spiraea shrub, and including a small coastal lake, Shag Lake. The northern half of the site is covered with willow and forested wetlands. This area was formerly agricultural land, reportedly used for growing peas on the drained Brallier muck. It was later abandoned and the failure of the drainage system (due in part to beaver activity), has caused a reversion to wetland vegetation indistinguishable from the region's natural plant communities. In recent times, there has been some disturbance

through logging of the surrounding dune ridges and the forested swamps, but the area maintains a high overall natural wetland value. Values - Some fishing in Shag Lake, which is reportedly stocked with cut-throat trout. Wetlands have high value as habitat for birds and mammals, and as natural and diverse wetland habitats. Nature Conservancy lists part of this site as Clatsop County #13 (the Shag Lake area).

Management - This area should be managed to protect its considerable natural values as wetland habitat. Suitable uses include hunting, fishing and wildlife observation.

WARRENTON - Site #11 - Goal 17

(Overlay - 1" to 400', #5)

Location - West of S. W. Juniper Avenue: Clear Lake

Size - About 25 acres.

Vegetation Types - 1A, 2, 4, 9, 11.

Riparian Vegetation - c. 5,000 x 50 feet around the lake and emergent wetlands.

Soils - Lake sediments.

Site Description - A small, relatively deep coastal lake, situated in a depression surrounded by high sand dunes which isolate it from site #10 to the west and from the Skipanon Creek/Columbia River Floodplain to the east. The lake has steep shores with forested riparian vegetation everywhere except at the south end, where there is a tract of emergent marsh and forested swamp.

Values - The lake has some value as warm-water fish habitat, while the marshes are significant fish and wildlife habitat.

Management - The area has high recreational and scenic value for people living in the immediate vicinity. The marshes should be managed for their natural values. Riparian vegetation should be preserved.

WARRENTON - Site #12 - Goal 17

(Overlay - 1" to 400', #5)

Location - Cemetery Lake, west of Ocean View Cemetery.

Size - Approximately 40 acres.

Vegetation Types - 1B, 2, 3, 8, 11

Riparian Vegetation - Very little. The riparian functions on the west side of the lake are fulfilled by a fringe of forested swamp.

Soils - Lake Sediment, Brallier muck.

Site Description - A shallow coastal lake with associated wetlands, formerly continuous with Smith Lake to the south, before construction of the DeLaura Road Causeway. The east bank of the lake has been altered: the cemetery extends to the edge of the water and most of the riparian vegetation has been removed. Moorages have been constructed. The rest of the lake shore is marshy and inaccessible and is in a natural condition.

Values - The lake supports some fishing by local people on the east side. Wetland values are high to the north, south and west. This site has some educational value, since it is one of the few coastal lakes with a good viewpoint (in the cemetery), and is also an aesthetic resource.

Management - The area should be managed to retain these natural low-intensity recreational and aesthetic values.

WARRENTON - Site #13 - Goal 17

(Overlay - 1" to 400', #4, 6, 7)

Location - Several, see map. Alder/Tansy Creeks, Skipanon Slough, Holbrook Slough, Adams and Vera Slough.

Size - Not measured.

Vegetation Types - 1A (1B, 5, 8, 14)

Riparian Vegetation - Extensive, a 30' corridor along the banks of the sloughs.

Soils - Lake sediments.

Site Description - Larger diked sloughs and their associated riparian vegetation in the Goal 17 areas of Warrenton. These are: The Skipanon Slough system, the Alder Slough/Tansy Creek, Holbrook Slough and Adams Slough/Vera Slough (Partly outside Goal 17 area). These sloughs are the original natural drainage channels of the Columbia floodplain. Now diked, they form fresh water lakes which drain the surrounding land and discharge through tidegates into the estuary.

Values - Fish, breeding water birds, recreational values, restoration potential in some cases.

Management - Should be managed for wildlife and low-intensity recreation values described above; restoration to the estuary would be appropriate.

WARRENTON - Site #14 - Goal 17

(Overlay - 1" to 400", #5)

Location - Skipanon River between the 8th Street Dam, south to the former Highway 101 bridge.

Size - About 30 acres.

Vegetation Types - 1A, 9

Riparian Vegetation - Some. C. 500 x 50 feet. The forested wetlands area also serves as riparian vegetation.

Soils - Brallier muck and river sediments.

Site Description - This is a largely non-tidal section of the Skipanon River, above the 8th Street dam. It is composed of the river itself, and some forested swamps, which occupy bends in the river and islands.

Values - The river has fisheries value, and the forested wetlands function as wildlife habitat and also as riparian vegetation. The area has scenic and recreational values.

Management - The scenic and natural values of the site should be maintained. The top of the dike between harbor bridge and former Highway 101 bridge would make a fine footpath/bikepath.

WARRENTON - Site #15 - Goal 17

(Overlay - 1" to 400', #7)

Location - The Skipanon River and associated wetlands, south of the former Highway 101 bridge and west of the Highway 101 realignment.

Size - Approximately 60 acres.

Vegetation Types - 1A, 5, 8, 9

Riparian Vegetation - c. 2,000 x 50 feet on the west bank of the Skipanon River from former Highway 101 bridge south to the city limits. A further 2,500 x 50 feet occur south of the city limits and therefore appear to be mostly or all in the County.

Soils - Brallier muck and river sediment.



Site Description - The Skipanon River (mostly non-tidal, above the 8th Street dam) and associated riparian vegetation and marshes. The marshes (and swamps) are on the former pasture, which has been abandoned and has reverted to wetlands. Part of the area was formerly diked, but the dike is now in disrepair. The vegetation appears to be successional, that is, it is still reacting to the change from pasture back to wetland.

Values - Fisheries and education - Warrenton High School maintains a salmon hatchery at this site. The juvenile salmon presumably feed in the Skipanon and in the small channels, which penetrate the marshes, before their release into the estuary. The marshes also have some use by waterbirds. Elk usage of the area is probably reduced since the construction of the Highway 101 realignment, which separates this site from forests to the east.

Management - This site should be managed to maintain or improve fisheries, water-quality, and wildlife/waterfowl values of the Skipanon River.

WARRENTON - Site #16 - Goal 5

(Overlay - 1" to 400', #7)

Location - Within Warrenton UGB, southern part (undeveloped) of the Alumax site T8N R10W S34 N½.

Size - c. 100 acres.

Vegetation Types - Most important are: 4, 5, 8, 9, 11

Riparian Vegetation - Upland vegetation (spruce/hemlock/alder forest) bordering on vegetation types 4 and 5 and 11 above sedge marshes and low scrub) is riparian. Similar vegetation bordering types 8 and 9 is not, since most riparian functions are fulfilled by the tall, woody marsh vegetation. c. 5,000 x 50 feet in locations indicated on the overlay.

Soils - The soil at this site is mostly Brallier muck of undetermined depth.

Site Description - A long, narrow swamp which occupies the valley of the Old Skipanon Creek. Drainage is through an old tidegate into the Skipanon River, at the western end of the site. The Skipanon River at this point has a partly tidal, partly non-tidal regime, depending

upon management of the 8th Street dam by Warrenton High School. Drainage of the site is poor, and impounded water accumulates in drainage channels, and in wet sedge marshes and willow swamps. The western part of the site was formerly in agricultural usage, but has been abandoned and has reverted to natural wetland vegetation. The vegetation types resemble those found in the deflation plain wetlands of the Clatsop Plains. This site, however, although on the edge of a sand-dune system, is not a deflation plain wetland: historically, it is probably part of a former tidal lagoon which became filled in with peat as the tidal circulation was reduced and the alluvial plain built up to the west, at the beginning of the post-glacial period. Until recently, it had some tidal influence from the Skipanon River. Similar areas in Warrenton include parts of Site #10.

Values - Fisheries: none. Wildlife: high. Unlike the deflation plain wetlands further west, this site is heavily used by elk, which inhabit the surrounding forests. These appear to use the site for feeding and resting. The lack of human disturbance at this site makes it important for the breeding and feeding of marsh birds. During a site visit, a bittern and herons were noted as well as a large number of yellowthroat and long-billed marsh wrens. There are probably many other species present. Also, at the east end of the site is the only known active osprey nest in the area, which, according to ODFW policy, should receive the same protection as a bald eagle nest site (a primary zone of 300 m radius and a secondary zone of an additional 100 m radius).

Scientific and Educational Value - The site is a good example of a valley bog, although inaccessible at present, and may have a fossil record of the development of the area's vegetation preserved in its peat and sediment deposits.

Management - This site is a significant wetland with high natural and scientific interest. It should be managed to preserve these values.

## SITE DESCRIPTIONS - HAMMOND

### HAMMOND - Site #1 - Goal 17

(Overlay - 1" to 400', #2)

Location - The western edge of the town, south of 3rd Avenue, west of Russell Drive.

Size - About 45 acres.

Vegetation Types - 4, 8, 10.

Riparian Vegetation - None.

Soils - Warrenton loamy fine sand.

Site Description - A deflation plain wetland with very wet sedge marsh and patches of open water, willow swamp and alder swamp. This site drains through an artificially constructed channel through the sand dune to the west, or directly through the sandy soil whenever the water level falls below the outlet.

Values - A good example of deflation plain wetland with mature marsh and swamp vegetation. Natural habitat for wetland bird and animal species.

Management - This site should be managed to protect the natural values described above, and for low-intensity recreation.

### HAMMOND - Site #2 - Goal 17

(Overlay - 1" to 400', #2)

Location - Hammond Bog.

Size - About 225 acres.

Vegetation Types - 4, 5, 8, 9, 10, 13, 14

Soils - Mostly Brallier muck. Also Warrenton loamy fine sand and Clatsop silty clay loam.

Site Description - A large area of swamps and marshes continuous with Warrenton Site #10. Together, these two sites (Hammond #2 and Warrenton #10) form a large and significant tract of wetland habitat, with good examples of all of the deflation plain vegetation types except Sphagnum bog. The Hammond site supports extensive willow and alder swamps, and sedge marshes. The site was formerly in agricultural use and peas were raised on the drained Brallier peat: the outline of the old fields can still be seen on aerial photographs. The fields were abandoned and

rapidly converted to natural wetland habitat when the drainage system failed, mainly due to the activities of the large indigenous population of beavers. The site now drains to the north and to the east.

Values - A large tract of natural and semi-natural wetland habitat. The site supports large populations of water birds, particularly mallard, and also mammals such as deer and beaver.

Management - The site should be managed as natural wetland habitat, and for low intensity recreation.

HAMMOND - Site #3 - Goal 17

(Overlay - 1" to 400', #2)

Location - West of Lake Drive.

Size - About 40 acres.

Vegetation Types - 5, 8, 10.

Soils - Warrenton loamy fine sand.

Site Description - A deflation plain wetland system, wettest at the southern end, where there is willow swamp and semi-permanently flooded emergent marsh. The northern end is swamp with saturated soil and seasonal flooding.

Values - This deflation plain is a part of the extensive Clatsop Plains/Warrenton sand dune system, and has high value as habitat for waterfowl, other marsh birds, deer and aquatic furbearing mammals.

Management - The natural values of this site should be protected.

HAMMOND - Site #4 - Goal 17

(Overlay - 1" to 400', #2)

Location - West of the Mooring Basin.

Size - About 13 acres.

Vegetation Types - 8.

Riparian Vegetation - None.

Soils - Warrenton loamy fine sand.

Site Description - A willow dominated deflation plain wetland with soils saturated or inundated at all times. There are some other wetlands adjacent to the site, forest and shrub dominated, which were found not to be significant because of disturbance and drier hydrological regime.

Values - Part of a large sand dune system, important to waterfowl and other marsh birds.

Management - Natural wetland values of this site should be protected.

#### SITE DESCRIPTIONS - GEARHART

##### GEARHART - Site #1 - Goal 17

(Overlay - 1" to 400', #12)

Location - Neacoxie Creek, runs north through the City of Gearhart and its Urban Growth Area. North of 6th Street, the Creek is non-tidal and is described here as a significant wetland. The tidal portion south of 6th Street has already been described by Neal Maine (1979) in the "Necanicum Estuary Inventory." This Goal 16 area has some Goal 17 riparian vegetation which has been mapped for this survey.

Size - About 23 acres.

Vegetation Types - 1B, 8.

Riparian Vegetation - The Goal 17 area is lined by riparian vegetation in places. The total riparian tract measures about 8,800 feet x up to 50 feet. The Goal 16 area has about 5,000 feet x up to 50 feet (see map).

Soil - Marsh.

Site Description - This long, narrow deflation plain once extended from the Necanicum Estuary to Coffenbury Lake in Fort Stevens State Park, but several sections are now drained or filled. The Gearhart Section is a long, narrow ribbon of more or less open or water-weed covered water, lined with willow swamp and by the escarpments of sand-dune ridges.

Values - Waterfowl and warm-water fish.

Management - Neacoxie Creek should be managed to protect its wetland and riparian values.

GEARHART - Site #2 - Goal 17

(Overlay - 1" to 400', #12)

Location - Immediately west of Highway 101, from the drive-in theater to the northern edge of the urban growth boundary, interrupted in the middle by a filled area which divides the site into a northern and a southern section.

Size - Northern Section, c. 16 acres; Southern Section, c. 21 acres.

Vegetation Types - 1B, 2, 4, 5, 8.

Riparian Vegetation - None

Site Description - A diverse wetland system, some of the area is semi-permanent standing water while the remainder is seasonally flooded and saturated at other times. There is no visible outlet and the system must drain through the sand dunes. The northern section is two narrow, semi-permanent parallel lakes lined with willow swamp. The southern portion is broader and includes open water and sedge marshes partly lined with willow swamp.

Values - Waterfowl and possibly some warm-water fish.

Management - The site should be managed to protect its natural wetland values.

GEARHART - Site #3 - Goal 5

(Overlay - 1" to 400', #12)

Location - East of the old railroad and north of Palmberg Sand & Gravel yard.

Size - About 15 acres.

Vegetation Types - 5, 8, with patches of reed canary grass.

Riparian Vegetation - None.

Soils - Brallier Muck.

Site Description - This is the southern end of a 400 acre wetland site, most of which lies in Clatsop County (CP 16). This site is the best example of native peat-bog habitats in the area, with good examples of Sphagnum bog, Spiraea bog, sedge marsh and willow swamp, of which the latter two vegetation types are represented in the Gearhart portion. The site shows evidence of former cultivation, but has now reverted to natural wetland with saturated, seasonally inundated and

intermittently exposed soils. The site is heavily used by marsh birds and raptors, and also by elk which enter freely from the forest lands to the east.

Values - This 400 acre site has high scientific interest as the County's best example of a coastal peat bog. It has some value for water fowl and is heavily used by elk. The Gearhart portion is swamp/marsh, is wetter than the rest of the site and has heavier waterfowl and lower elk usage.

Management - The site should be managed to protect its natural wetland and scientific values.

GEARHART - Site #4 - Goal 5

(Overlay - 1" to 400', #12)

Location - East of McCormick Gardens Road, down past the airport, where it joins the Goal 17 Stanley Lake Wetlands. Two portions of this site are in the Gearhart Urban Growth Boundary.

Size - The two Gearhart portions measure: North, 2 acres and South, 7 acres out of a total site area of 130 acres.

Vegetation Types - 5, 8, also cat-tail and reed canary grass marshes.

Riparian Vegetation - None.

Soils - Brallier Muck.

Site Description - An area of emergent marshes and low shrub/sedge marshes with a variety of marsh plants in an area which is seasonally inundated to semi-permanently flooded. There is also some willow swamp. These wetlands line the creek which flows east of the airport to join the Stanley Lake outlet and discharges through a tidegate into Neawanna Creek.

Values - Waterfowl and marsh bird usage, probably warm-water fish in the creek.

Management - The site should be managed to protect its values as a natural wetland ecosystem.

SITE DESCRIPTIONS - SEASIDE

SEASIDE - Site #1 - Goal 17

(Overlay - 1" to 400', #14 and 16)

Location - Circle Creek wetlands, west of the Necanicum River and south and west of the golf course. This Goal 17 wetland has c. 140 acres in the City of Seaside, 18 acres in the Seaside UGB, and 20 acres in Clatsop County.

Size - Total area of 178 acres (see above for breakdown by jurisdiction).

Vegetation Types - 2, 8, 9.

Riparian Vegetation - None.

Soils - Brenner silt loam, Nestucca silt loam.

Site Description - This site is a poorly drained, low-lying part of the Necanicum floodplain. It is separated from the ocean by the bar which supports Ocean View Way, and from the Necanicum River, into which it drains. It is mostly separated by the more elevated land adjacent to the river. Site is a typical natural river floodplain wetland for this region. The vegetation is mostly willow and spruce swamp, and the site has some fine old-growth spruce trees. It is enhanced by areas of emergent marsh and shallow water-lily covered lakes along Circle Creek, which meanders through the site.

Values - Fisheries - none. Wetland use by birds, deer, elk and other animals, high. Scientific: a good example of a natural riverine flood plain wetland.

Management - This site should be managed for its natural wetland values: the old growth spruce trees should be protected.

SEASIDE - Site #2 - Goals 17 and 5

(Overlay - 1" to 400', #14)

Location - Upper Neawanna, south of Sundquist Road and east of the Mill Ponds, in the Seaside UGB.

Size - Seaside UGB portion is 27 acres.

Vegetation Types - 8. Also emergent marshes which resemble the tidal marshes of the Neawanna described by Maine (1979), on page B-16, marsh type #13.



Riparian Vegetation - None.

Soils - Brenner silt loam.

Site Description - This site is adjacent to the Goal 16 area of the Neawanna River described by Maine. As mapped, a small and undetermined area at the North end of the site is estuarine. This site is part of a large headwater swamp on the Neawanna River in the Seaside UGB and in Clatsop County. Two existing industrial uses make this a difficult area to map: in the Seaside UGB, the mill ponds have been excluded from the wetland site, while in Clatsop County, gravel is being extracted. The area of active and proposed gravel extraction is also excluded. Overall, the site resembles S 1, with extensive willow and spruce swamps enhanced by patches of emergent marsh and small lily ponds. The site is dissected by several small creeks.

Values - Fisheries - a natural coho run of undetermined size is reported for the Neawanna by Maine. These probably breed in this headwater swamp. The area has high value as wetland habitat for birds and mammals.

Management - The natural wetland values of this site should be protected, except for the excluded areas where existing industrial uses are occurring.

SEASIDE - Site #3 - Goal 17 and 5

(Overlay - 1" to 400', #13 & #14)

Location - Mill Creek and Stanley Lake marshes, from Seaside Airport south to the new entrance road to Trails End. City of Seaside and Seaside UGB.

Size - 67 acres.

Vegetation Types - 1B, 2, 4, 5, 8, 14

Riparian Vegetation - None.

Soils - Brallier muck, Bergsvik muck, Brenner silt loam.

Site Description - This site comprises a shallow coastal lake (Stanley Lake) and associated wetlands. Since Stanley Lake expands and floods much of this site during wet seasons, most of the area falls under Goal 17. The site consists of the permanently flooded lake area, surrounded by very wet Sitka sedge marshes and extensive areas of willow

swamp and slough sedge marshes. Some of the marsh areas were formerly farmed, but have now reverted to natural wetland, though in some areas a disturbed marsh flora is still present. The area has heavy use as wetland habitat by birds, particularly waterfowl, and is also reported to have a salmon run by Maine. He included Stanley Lake under Goal 16 because of some salinity intrusion through the tidegate under Highway 101. It is probably more correct to regard the area as a Goal 17 wetland, since the tidal influence appears to be negligible.

Values - Waterfowl: some value as a salmon spawning area (coho) and probably some warm-water fish.

Management - The area should be managed to protect its natural wetland values.

#### SEASIDE - Site #4 - Goal 17

(Overlay - 1" to 400', #14 & #16)

Location - Necanicum River, from head of tide, south to City limits.

Vegetation Types - None.

Riparian Vegetation - A zone of riparian vegetation, comprising shrubs and trees is present along both banks of the Necanicum River. The width of this zone varies from zero, where pasture runs right down to the water line, to a maximum of 50' wide where sufficient woody vegetation is present. In most places, the riparian zone is a narrow (10-20') band on the river bank.

Site Description - The Necanicum River has important natural values, particularly for salmonoids and some species are stocked. Water quality is enhanced by the riparian vegetation described above. The portion of the river in Clatsop County has similar values.

Management - The site should be managed to protect its fisheries values and to protect the riparian vegetation.

## SITE DESCRIPTIONS - CLATSOP COUNTY (PLAINS)

### CLATSOP COUNTY - Site #CP 1 - Goal 17

(Overlay - 1" to 400', #1 & #3)

Location - Clatsop Spit, west of Battery Russell and the old military road west of Swash Lake, south to Warrenton City Limits.

Size - 1,330 acres.

Vegetation Types - 6 and 7.

Riparian Vegetation - None.

Soils - Sand dune soils.

Site Description - This enormous site is a mosaic of young deflation plain wetlands and sand dunes mostly of rather low elevation. The deflation plains are mostly dominated by slough sedge and hooker willow; they are flooded in winter and spring by high water tables, and also by very high tides. In summer, the sandy soil may be saturated or moist. A well developed young dune/deflation plain flora is present. The uplands are dominated by grass, principally introduced beach grass, and also some scrub. Black-tailed deer are present together with many smaller aquatic and terrestrial mammals. The area is important to avifauna, particularly migrating and overwintering populations. Many rare species have been recorded. It is important habitat for raptors, and has a resident population of marsh hawks and occasional use by many other species.

Values - The area is important to pelagic birds during stormy weather. Endangered snowy plovers have nested here, particularly west of parking lot C. The area has been identified as important habitat by the Nature Conservancy, and as one of the State's most important bird-watching areas.

Management - The natural values of this site should be preserved. This protection is compatible with low-intensity recreation. Use of off-road vehicles should be discouraged in the sand dunes, deflation plains and estuarine intertidal areas. Suitable designations are natural aquatic and shoreland, and conservation aquatic and shoreland. Also, the salt marsh adjacent to parking lot C (Goal 16), which is very important to water birds, should be protected.

CLATSOP COUNTY - Site #CP 2 - Goal 17

(Overlay - 1" to 400', #3 and #2)

Location - Areas surrounding Swash Lake to the east and south.

Size - About 175 acres.

Vegetation Types - 9, 10, 7

Riparian Vegetation - A zone of scrub and trees up to 50' wide around the eastern end of Trestle Bay: about 5,600 feet.

Soils - Sand dune soils.

Site Description - This area supports relatively mature sand-dune vegetation, with a mosaic of wetland and upland areas. The deflation plain wetlands are forested and large areas are inundated by the highest tides. Because the major hydrological influence is the sand-dune water table, these wetlands were judged to be Goal 17, not Goal 16. Isolated dunes and dune ridges in this site support spruce/hemlock forest and are significant as riparian and upland habitats for birds and mammals. This site is in a complex area of great habitat diversity, closely associated with the Swash Lake estuarine area. It is important to deer, aquatic furbearers and to wetland bird species. The site also includes three areas of forested swamp on the south side of Jetty Road.

Values - Part of natural mature sand-dune ecosystem, in close proximity to the estuary.

Management - The natural values of this site should be preserved.

CLATSOP COUNTY - Site #CP 3 - Goal 17

(Overlay - 1" to 400', #8, 9, 10, 11, 12)

Location - The fore-dunes between the Warrenton City Limits and Gearhart UGB.

Size - About 650 acres.

Vegetation Types - None, significant shoreland (dune grassland)

Riparian Vegetation - None.

Soils - Sand-dune soils.

Site Description - The values of the Clatsop Plains foredunes as significant wildlife habitat are given in the introduction to this project. This coastal habitat is of recent origin, and was stabilized by the

USDA, forming a semi-natural coastal grassland. There are also some areas of scrub and low trees, which provide additional habitat diversity.

Values - Part of a coastal sand-dune ecosystem, significant grassland.

Management - This area should be preserved as semi-natural grassland habitat. Apart from a limited number of access road to the beach, this area is suitable for low-intensity recreation. Further development of housing on these dunes is likely to be incompatible with protecting their natural values. Off-road vehicle use of the area should be controlled to prevent the loss of vegetation cover.

CLATSOP COUNTY - Site #CP 4 - Goal 17

(Overlay - 1" to 400', #8 & #9)

Location - The first deflation plain, east of the westernmost dune ridges. Extends from the City of Warrenton limits to the north, southwards to Camp Rilea.

Size - 120 acres.

Vegetation Types - 6 and 7.

Riparian Vegetation - None.

Soils - Sand dune soils.

Site Description - A large deflation plain of relatively recent origin.

At c. 18-22 feet above MSL, these wetlands are flooded at wet times of the year, particularly winter and spring, and dry out during the summer. The sandy soil has poor moisture retaining capacity. The vegetation is mostly dominated by slough sedge and hooker willow, while numerous small isolated dunes support upland vegetation. The main value of these wetlands is that they are part of a large, more or less natural coastal ecosystem: they are less valuable per acre than wetlands further inland. Wildlife use is by amphibians, small mammals, deer and many bird species, particularly birds of prey.

Values - Breeding and feeding of wetland birds, scientific/educational value as part of a coastal ecosystem.

Management - Preservation of these natural values is compatible with some recreational use: use of the beach areas requires a limited number of access routes to traverse these wetlands.

CLATSOP COUNTY - Site #CP 5 - Goal 17

(Overlay - 1" to 400', #9 & #10)

Location - Deflation plain wetlands (including Slusher Lake) west of Sunset Lake.

Size - About 104 acres.

Vegetation Types - 1B, 6, 7.

Riparian Vegetation - A zone up to 50' wide and about 4,000 feet long surrounds perennially and seasonally inundated areas (see maps).

Soils - Sand dune soils.

Site Description - West and south of Camp Rilea, the first and second deflation plains, behind the foredune area, are discontinuous. Instead of the large slough-sedge areas found further north, these are hollows in the dunes filled with slough sedge and hooker willow wetlands, and often containing coastal lakes. The largest of these is Slusher Lake, but there are several others which are perennially flooded. These lakes have some warm water fish and waterfowl values, while the associated swamps and marshes are used by waterfowl and other wetland birds. South of this site, the first deflation plain peters out gradually in a series of small, seasonally inundated puddles. These were not found to be significant.

Values - This site has waterfowl and some fisheries value and is part of a large coastal ecosystem.

Management - The natural values of this site should be preserved.

CLATSOP COUNTY - Site #CP 6 - Goal 17

(Overlay - 1" to 400', #8)

Location - West of Ridge Road, south of Columbia Beach Road to Camp Rilea.

Size - 96 acres.

Vegetation Types - 1B, 2, 4, 5, 8, 9.

Riparian Vegetation - These shallow lakes are lined with a 50' wide fringe of riparian vegetation, extending for about 35,000 feet.

Soils - Marsh soils and lake sediments.

Site Description - A large shallow lake occupying two parallel deflation plains with a discontinuous dune ridge between them. This is a diverse wetland system, with large expanses of shallow water, sedge marshes,

willow and spruce swamp and riparian vegetation. Since this area is permanently flooded, it supports populations of warm-water fish. The shallow marshy nature of this lake makes it unsuitable for fishing, but it is used extensively by waterfowl, particularly American widgeon. It probably supports breeding populations of waterfowl, such as mallard and wood duck, as well as other wetland bird species. The southward extension of this lake is narrow and long and is lined with trees. It should also contain warm-water fish, and is important to breeding water birds. An isolated four acre "puddle" (c. 400 feet west of the main site) with standing water, sedge and willow swamp, is also included in this site. It also has some importance to wetland birds.

Values - Important to waterfowl and aquatic mammals.

Management - This is a fine example of a shallow coastal lake and should be managed to maintain its natural values. Care should be taken to ensure that excessive eutrophication of this lake from septic tank leachate does not occur. The very extensive and well-developed riparian vegetation should be preserved.

CLATSOP COUNTY - Site #CP 7 - Goal 17

(Overlay, 1" to 400', #8 & #9)

Location - Smith Lake

Size - c. 98 acres.

Vegetation Types - 1B, 2, 4, 8.

Riparian Vegetation - The lake is lined with riparian vegetation (mostly trees) in a belt up to 50' wide and about 11,000 feet long.

Soils - Lake sediments and marsh soils.

Site Description - This site consists of two parallel deflation plains.

The smaller one to the west is shallow, weed-filled water surrounded by swamps and marshes. The larger one to the east is connected to the first in several places by swamps, and contains the large but rather shallow Smith Lake. This lake is mostly open water which becomes weed filled in summer; fringing marshes and swamps are narrow except at the southern end. It has heavy recreation usage from the surrounding property owners, and is reported to support several species of warm-water game fish. It is also an important overwintering area for waterfowl, principally coot and American widgeon, which may number many hundreds.

Values - Fisheries, recreational warm-water game fish, overwintering waterfowl.

Management - The important fisheries and waterfowl values should be protected, while allowing for continued recreational use and other uses (such as water rights). Efforts should be made to preserve the remaining riparian vegetation which has been heavily impacted by lake shore developments. Further eutrophication of the lake should be prevented and management such as water-weed removal could be considered if it becomes excessively choked with vegetation.

CLATSOP COUNTY - Site #CP 8 - Goal 17

(Overlay - 1" to 400', #9)

Location - South of Warrenton High School, East and West of the railroad.

Size - About 67 acres.

Vegetation Types - 4, 5, 8, 9, 10.

Riparian Vegetation - 1,000 feet x 50 feet along the Skipanon to the south of the wetland area.

Soils - Brallier muck.

Site Description - An area of mostly forested wetlands with some emergent marsh, adjacent to the Skipanon River.. Besides fulfilling riparian functions, these wetlands are extensively used by wetland and upland avifauna, by aquatic furbearers and by deer.

Values - Some wildlife value; a riparian zone along the Skipanon River.

Management - The natural values of this site should be protected.

CLATSOP COUNTY - Site #CP 12 - Goal 17

(Overlay - 1" to 400', #10 & #11)

Location - West Lake. This lake is crossed by Highway 101 and the associated wetlands extend southwards beyond the southern end of the Delmoor Loop.

Size - About 126 acres.

Vegetation Types - 1B, 2, 4, 8, 13

Riparian Vegetation - A zone up to 50' wide is present in places around the lake, length c. 11,000 feet.

Soils - Lake sediments and Brallier muck.



Site Description - A coastal lake of medium depth, with its associated marshes and swamps. At high water periods, these wetlands are inundated with lake water. This lake is reported to support recreational fishing for warm-water game fish. Waterfowl, particularly coot, overwinter on this lake; probable breeding species are coot, hooded merganser, wood duck, pied-billed grebe and mallard. Purple herons are sometimes seen here.

Values - Warm-water game fish and waterfowl.

Management - The natural values of this site should be preserved.

CLATSOP COUNTY - Site #CP 11 - Goal 17

(Overlay - 1" to 400', #9, #10 & #11)

Location - Sunset Lake.

Size - About 130 acres.

Vegetation Types - 1A, 1B, small areas of marsh swamp.

Riparian Vegetation - Scrub and trees, a zone up to 50' wide is present but has been heavily impacted by agricultural and suburban developments.

Soils - Lake sediments.

Site Description - One of the largest and deepest coastal lakes. Sunset Lake is about 16,500 feet long, up to 640 feet wide and up to 19 feet deep. This lake supports populations of warm-water fish and there is a large recreational fishery. Waterfowl are often abundant, besides the large domestic flocks, and in bad weather, the lake is used for shelter by pelagic ocean species.

Values - Recreational fishing and overwintering and breeding of waterfowl; boating and swimming. Fish are stocked.

Management - The natural values of this lake need to be protected to ensure its continued recreational value. Eutrophication may be a problem in the future if the number of septic tanks increases, but does not appear to be a problem at present. The continuing loss of riparian vegetation is a serious problem: further loss should be prevented and extensive restoration of riparian vegetation would be appropriate. The proliferation of single-purpose docks may become a problem here.

CLATSOP COUNTY - Site #CP 10 - Goal 17

(Overlay - 1" to 400', #8, #9 & #10)

Location - A long narrow coastal lake (c. 15,600 ft.) interrupted by at least 6 road fills. Extends from Columbia Beach Road to Smith Lake southward through Camp Rilea, between the golf course and Highway 101, and beyond Sunset Beach Road.

Size - About 73 acres.

Vegetation Types - 1B, 2, 3, 4, 8, 11 (wet var.).

Riparian Vegetation - This system of shallow lakes is lined by a zone of riparian vegetation up to 50' wide and 20,000 feet long.

Soils - Marsh soils and lake sediments.

Site Description - At their widest places these lakes have extensive sedge and water-lily marshes with weed-filled water and swampy patches. Where they are narrow, they become weed-filled water overhung by willows and riparian vegetation. The shallow water presumably supports populations of warm-water fish. Aquatic fur-bearing mammals such as beaver and nutria are present. The site supports a great diversity of water birds. Breeding waterfowl include mallard, wood duck and hooded merganser, with these and many other species overwintering here. Other residents include bittern and kingfishers. These lakes apparently received little disturbance, but are becoming choked with water weed in places, probably from septic tanks and fertilizer leachates.

Values - The lakes are important to breeding, migrating and overwintering waterfowl and marsh birds, and to aquatic furbearers.

Management - This is a fine example of shallow coastal lakes with associated marshed, swamps and riparian vegetation. These natural values should be protected.

CLATSOP COUNTY - Site #CP 9 - Goal 5

(Overlay - 1" to 400', #7 & #9)

Location - Along the Skipanon River: south of Warrenton and SE of Highway 101 realignment.

Size - About 98 acres.

Vegetation Types - 5, 8, 11 (dry var.), 9.

Riparian Vegetation - About 2,000 feet x 50 feet along the Skipanon, north of the wetlands.

Soils - Brallier muck.

Site Description - This peat bog site was apparently farmed in the past, but has since reverted to native wetland vegetation. The Skipanon River which passes through this site, supports populations of warm-water fish. The swamps to the east of the Skipanon are extensively used by elk. The bog area is important habitat for wetland avifauna and probably supports populations of aquatic furbearers.

Values - This is a good example of a coastal peat bog, though it is probably of lower value than CP 16.

Management - The Goal 5 process should be applied to this site to assess the possibility of protecting its riparian and natural wetland values.

CLATSOP COUNTY - Site #CP 13 - Goal 17

(Overlay - 1" to 400', #10 and Gearhart Quad.)

Location - Taylor Lake, north of Cullaby Lake.

Size - About 17 acres.

Vegetation Types - 1A, 1B, C, 10, 3

Riparian Vegetation - 2,500 feet x 50 feet wide around the lake (see quad sheet).

Soils - Brallier muck, lake sediments.

Site Description - This fairly deep, clear lake supports populations of warm-water game fish and has some use for sport fishing. A forested swamp to the SW within 500 feet of the lake was judged to be significant wetland, and the lake is lined with a forested riparian zone. The forested wetland area is used by deer and elk, aquatic furbearing mammals, and is likely to be important habitat for breeding and feeding of wetland birds. There is also a small marshy area to the east of the lake. The lake was described as Nature Conservancy Site #15 for Clatsop County and the NC also described the surrounding hillside as part of the site. Except for the 50' riparian zone, this hillside was not included in this study, since an evaluation of the natural resources of Clatsop Ridge was beyond its scope.

Values - Warm-water game fish; some value to wetland birds.

Management - This site is little disturbed, more or less pristine wetland area despite its relatively small size. The marshes, swamps and riparian vegetation around the lake should be preserved.

CLATSOP COUNTY SITE #CP 14 - Goal 17

(Overlay - 1" to 400', #10 and #11 and USGS Gearhart Quad Sheet.)

Location - Cullaby Lake.

Size - 280 acres.

Vegetation Types - 1A, 5, 8, 9, 11 (dry var.)

Riparian Vegetation - 20,000 feet x 50' wide, particularly on the eastern side of Cullaby Lake.

Soils - Brallier muck, lake sediments.

Site Description - Cullaby Lake has the largest area of any coastal lake in the Clatsop Plains: it appears to be the remnant of a much larger lake or lagoon which has been filling in with peat since its separation from the ocean. It currently has a high level of recreational usage, and supports a recreational warm-water game fishery. It has some value to overwintering and breeding waterfowl. The south end of the lake was described as having a great variety of avifauna by the Nature Conservancy (Clatsop County Site #16). In addition, peat bogs on the western side of the lake within the Goal 17 area were found to be significant. Some of these previously supported agriculture, probably cranberry growing, but have since reverted to scrub or emergent wetlands and are used extensively by wetland avifauna and by raptors.

Values - Warm-water game fishery; waterfowl and wetland birds.

Management - The natural values of the lake should be protected in order to maintain its high recreational value. The riparian vegetation, fringing marshes and significant bog areas should all be protected.

CLATSOP COUNTY - Site #CP 15 - Goal 5

(Overlay - 1" to 400', #10 & #11)

Location - Between Cullaby Lake and Highway 101.

Size - About 230 acres.

Vegetation Types - 5, 8, 9, 11 (dry var.)

Riparian Vegetation - None.

Soils - Brallier muck.

Site Description - This large peat bog site is a westerly extension of the significant Goal 17 peat bog areas which line the west side of Cullaby Lake. The peat, which has filled in a former lake basin, has powerful water-retaining properties, and the surface is saturated for much of the year. It can, however, be used for agriculture, particularly cranberry growing and some of the site appears to have been so used in the past. It has now reverted to native wetland vegetation. These peat bogs are important to wetland animals, particularly avifauna, and the southern end of this site is extensively used by elk.

Values - Wetland animals; natural and semi-natural peat bog wetlands.

Management - This site is a good example of a coastal peat bog. Examples of this wetland type should be preserved.

CLATSOP COUNTY - Site #CP 16 - Goal 5

(Overlay - 1" to 400', #11 & #12)

Location - East of Highway 101 from the south end of the Dellmoor Loop Road, south to Palmberg Gravel works.

Size - About 380 acres (including 15 acres in Gearhart G 3).

Vegetation Types - 4, 5, 8, 9, 11 (dry var.) 12, 13.

Riparian Vegetation - None

Soils - Brallier muck.

Site Description - This site is the best example of a coastal peat bog on Brallier muck in the County. The northern end approaches the raised bog condition dominated in places by the moss Spagnum, a rare community in this area, and also by various shrubs and stunted trees. To the south, the site becomes much wetter and considerable areas are at least seasonally inundated. The southern half in particular, is used by breeding waterfowl, while the central and northern portions have heavy elk use. There is a great diversity of avifauna, throughout, including many wetland species despite the scarcity of open water. The site shows evidence of former cultivation, but has since reverted to native wetland vegetation.

Values - Wetland animals, particularly avifauna and elk. The site has high scientific and educational value as a fine example of a peat bog:

the post-glacial vegetation history of the area is probably contained in fossils in the deep peat.

Management - The high natural values of this site should be protected.

Preservation of this site as the best example of a coastal peat bog in the area would be appropriate.

CLATSOP COUNTY - Site #CP 17 - Goal 17

(Overlay - 1" to 400', #11 & #12)

Location - West of Highway 101, North of Gearhart UGB, North and South of DelRey Beach Road and north and south end of Surf Pines Road. A northwards extension of Gearhart Sites #1 and 2.

Size - 30 acres.

Vegetation Types - 1B, 4, 5, 8, 14.

Riparian Vegetation - None

Site Description - This site is a continuation of the long, narrow deflation plain described under "Gearhart Site #1" in this report. Together, these two sites link Sunset (Neacoxie) Lake to the Neacoxie estuary. Also included are the small northwards extensions of Gearhart Site #2, immediately west of Highway 101, and which, although part of a separate deflation plain system, have very similar characteristics to this one. These areas have shallow lakes, presumably with some warm-water fish, marshes, and willow swamps, with wetland birds. The northern end has been impacted in the past through attempts to drain the site and the destruction of riparian vegetation.

Values - Part of an extensive deflation plain/coastal lake system which extends from the Necanicum estuary northwards to Sunset Lake. Before extensive filling in Camp Rilea, it extended to Coffenbury Lake. The system has fisheries, waterfowl and other wetland values.

Management - The natural wetlands values of this site should be preserved.

CLATSOP COUNTY - Site #CP 18 - Goals 17 and 5

(Overlay - 1" to 400', #11 and USGS Gearhart Quad.)

Location - 2 small lakes and adjacent wetlands on Cullaby Creek, 4,000 feet south of Cullaby Lake.

Size - 120 acres (Goal 17), 40 acres (Goal 5).

Vegetation Types - 1B, 4, 5, 8, 9, 2.

Riparian Vegetation - About 4,000 feet x 50 feet along Cullaby Creek.

Soils - Brallier muck.

Site Description - This area has great habitat diversity, with open water, marsh and swamp habitats, all well represented. The swamp/upland boundary to the NE of this site was not accurately determined. The lakes are connected to Cullaby Lake via Cullaby Creek and support populations of warm-water game fish. The surrounding marshes and swamps are important to breeding waterfowl and other wetland birds, and have some importance to overwintering waterfowl. The swamp areas are extensively used by elk. The upper part of Cullaby Creek, south of the Goal 17 area, has about 40 acres of scrub and forested swamps. Since this area is adjacent to the Goal 17 area and shares similar natural values, it is logical to manage the two areas as a single unit.

Values - Warm-water fish, breeding wetland birds, habitat diversity.

Management - The natural values and habitat diversity of this site should be protected.

CLATSOP COUNTY - Site #CP 19 - Goal 5

(Overlay - 1" to 400', #12 & #13)

Location - North of the road to the Crown Site, up to the Palmberg Gravel Company, east of Highway 101 and Seaside Airport.

Size - About 130 acres (5 acres in Seaside UGB, 9 acres in Gearhart UGB-G4).

Vegetation Types - 5, 8, 9, also marshes dominated by cat-tails and reed canary grass.

Riparian Vegetation - None.

Soils - Brallier muck.

Site Description - A system of very wet marshes lining Mill Creek with adjacent swampy areas to the east. These marshes were apparently farmed in the past, but the water table has subsequently risen so that the area now supports native marsh vegetation and swamp. The site has a large area of emergent wetland, and is therefore suitable habitat for the breeding of wetland birds, including waterfowl, such as mallard. Woodduck probably nest in the swamps. Populations of elk and aquatic furbearing mammals are present.

Values - A large area of emergent and forested wetland, probably an important site for wetland birds and for elk.

Management - The natural habitat values of this site should be protected.

CLATSOP COUNTY - Site #CP 20 - Goal 5

(Overlay - 1" to 400', #14)

Location - Southeast of Seaside, south of the Mill ponds, east of Highway 101.

Size - About 132 acres (27 in Seaside UGB - Site #S 2).

Vegetation Types - 1B, 2, 5, 8, 9.

Riparian Vegetation - None.

Site Description - This headwater swamp on the Neawanna is dissected by several small creeks, which support a small natural run of coho salmon (Maine). The swamps which also act as riparian zones around these creeks and the mill ponds are important elk habitat and are important habitat for nesting and feeding wetland birds species, probably including some waterfowl breeding.

Values - Natural wetland values: wetland avifauna, fish, including salmon spawning.

Management - The preservation of part of this site is pre-empted by an existing permit for gravel extraction: the exact area to which this permit applies was not determined. The natural values of this site should be protected as far as possible.

SITE DESCRIPTIONS - CLATSOP COUNTY (LEWIS & CLARK & YOUNGS RIVER)

CLATSOP COUNTY - Site #LY 22 - Goals 17 and 5

(Overlay - See attached map)

Location - Youngs River, Lewis and Clark River, tidegated sloughs (see map, 1:24,000). About 22 sloughs, including Johnson, Peterson, Green, Barrett, Jeffers, Knowland, Cook, Binder, Casey, Tucker Sloughs, and others not named on the USGS Quad.

Size - Not determined.



Vegetation Types - 1A, 1B, 5, 8.

Riparian Vegetation - Extensive, but not mapped. A zone up to 30' wide (where present) of trees and shrubs lines the shores of these sloughs.

Soils - Lake sediments.

Site Description - These former tidal sloughs are now tidegated and are effectively lakes. They now serve to drain floodplain pasture, and also have considerable natural values. They are deep enough to support populations of warm-water fish, and also have value to waterfowl, particularly nesting woodduck.

It is debatable how much of this resource is covered by Goal 17. The best solution is to treat the whole site as a Goal 17 resource.

Values - Warm-water fish and waterfowl.

Management - The sloughs should be protected, while provision should be made for their function as drainage channels. The riparian vegetation should be protected.

#### CLATSOP COUNTY - Site #LY 23 - Goal 17

(Overlay - See attached map)

Location - Youngs River/Lewis and Clark River: wetlands, wildlife habitat and riparian vegetation. Wetland sites are Haven Island and near Fort Clatsop.

Size - Not determined.

Riparian Vegetation - A band of riparian vegetation up to 50' wide is present in many places along these two rivers (see map, 1:24,000 feet for major tracts).

Site Description - (1) A forested swamp c.11 acres, probably with some tidal interference, lies to the north of Fort Clatsop adjacent to the Lewis and Clark River. (2) South of Fort Clatsop and west of the road, a 550 acre poorly drained floodplain site has reverted to marsh and may have some tidal influence. (3) Haven Island, a 60 acre site in Youngs River of which about 20 acres are wetland and the remainder is significant wildlife habitat on account of its isolated location in the river, remote from human disturbance, which gives it importance to waterfowl and to aquatic furbearers.

Values - These sites are important habitat for waterfowl and aquatic mammals, particularly so because of proximity to parts of the Columbia River Estuary.

Management - These areas should be protected as significant wetland and wildlife habitat. Restoration to the Estuary would be suitable in sites (1) and (3). Riparian vegetation should be protected.

#### SITE DESCRIPTIONS - CLATSOP COUNTY (EASTERN COUNTY)

##### CLATSOP COUNTY - Site #EC 26 - Goals 17 and 5

(See CREST Plan)

Location - Columbia River dredge-spoil islands; east and west Sand Island, Lois and Mott Islands, Rice Island, Miller Sands, Jim Crow Sands.

Vegetation Types - Mostly uplands; wetland vegetation types 6 and 7 are present on West Sand Island.

Riparian Vegetation - 50' wide zone surrounds Lois and Mott Islands, the older part of Miller Sands and parts of East and West Sand Island.

Soils - Dredge spoils.

Site Description - These sites, mostly upland, have considerable value to estuarine wildlife. In particular, unstabilized sandy areas are used by breeding seagulls on East Sand Island, Rice Island and the sand spit on Miller Sands.

These islands also support populations of aquatic furbearers, and are especially important to these animals at high tide. Trees on these islands are important for the roosting of birds of prey, including bald eagles and herons. Caspian terns probably nest on Miller Sands and possibly elsewhere.

Values - These islands, which are inaccessible and relatively undisturbed uplands, are important to estuarine wildlife because they provide habitat diversity.

Management - These areas are all designated "Conservation Shoreland" in the CREST Plan. This is a suitable designation to protect the values

of these sites. Continued dredge spoil disposal is compatible with wildlife values, particularly if spoiling avoids the nesting period of seabirds in colony areas. Revegetation of these sandy uplands should be avoided where possible, to maintain this valuable nesting habitat.

CLATSOP COUNTY - Site #EC 27 - Goal 17

(See CREST Plan.)

Location - Tongue Point.

Size - Not measured.

Riparian Vegetation - 50' wide zone along the shoreline.

Site Description - Mature forest and riparian vegetation: scenic and historical area; bald eagle nesting site. Already designed "Natural Shoreland" in the CREST Plan: this is suitable to protect natural values.

CLATSOP COUNTY - Site #EC 28 - Goals 17 and 5

Location - John Day River: 5 wetland areas (see attached map).

Size - 16, 30, 49, 25, and 62 = 182 acres.

Vegetation Types - 1A, 4, 5, 9, 11 (wet var.) - See Clatsop Plains Study.

Riparian Vegetation - Extensive riparian zones (50' wide) line the marshes and the John Day River (see map).

Site Description - The five sites are as follows:

- (1) On the north side at c.RM15, a well developed hackberry swamp straddles Highway 101 (16 acres).
- (2) On the south side, post RM2, a 30 acre hackberry, sedge and spruce swamp occupies the valley of a small tributary.
- (3) At c.RM3.5, a small creek runs southwards and the upper reach is tidegated. Of the tidegated portion, the northern part is poorly managed wetland pasture, while the southern end is natural swamp vegetation.
- (4) At the head of the River, beyond RM4, are extensive swampy areas. The SE arm is a long marsh/swamp in pristine condition (c. 25 acres). This is one of the few areas where a natural transition from tidal to non-tidal marsh can be seen; it also shows a good wetland/upland transition, since some of the surrounding forest is mature.

- (5) The upper, tidegated portion of the John Day spreads into 3 creeks across a broad floodplain. Part of this is badly managed wetland pasture, while the remainder is swamp and marshes supporting natural vegetation. This was not included as a restoration site but would be very suitable for this purpose. The CREST Plan did note potential for fisheries enhancement, however. These wetlands have important function as feeding and nesting habitat for birds, and as habitat for aquatic furbearers, deer and elk. They have small populations of warm-water fish in the tidegated sloughs. Those fisheries values would be greatly enhanced by restoration, and this is an area where relatively minor actions, involving the loss of marginal agricultural land, would result in major benefit to the estuary. Potential also exists for an extended riparian zone in the mature upland forests which surround these sites.

Management - Suitable designations would be: (1) Conservation or Natural Aquatic; (2) Conservation or Natural Aquatic; (3) Conservation Aquatic; (4) Natural Aquatic; (5) Conservation Aquatic.

Riparian vegetation should be preserved; the restoration of Sites 1, 2, 3, 5 to the estuary is recommended.

The John Day River is a short, tidal slough into which drain numerous small creeks, each with its own short floodplain. The result of this is a complex area with very high habitat diversity, and important riparian functions. These are the estuarine functions which have been most extensively impacted in the past, and the area therefore has very high restoration potential. This was recognized in the CREST Plan, which included some of these sites in mitigation/restoration areas, namely:

- (1) was included in 31 (M)
- (2) was included in 32 (M)
- (3) was included in 35 (M)

NOTE: Shoreline corrections: Tidal swamps which were not identified in the CREST Plan are marked "T" on the map of this area. These wetlands are in the Goal 16 area.

CLATSOP COUNTY - Site #EC 29 - Goal 17

(See attached map)

Location - John Day Point to Knappa Dock

Riparian Vegetation - Up to 50' wide zone along the CR and around areas of fringing marshes.

Site Description - Significant wetlands were identified in the following locations:

- (1) Two small marsh areas east of John Day Point - probably some tidal influence (c. 10 acres).
- (2) Swamps around Twilight Creek (c. 10 acres).
- (3) Swamps on Mary's Creek (c. 30 acres).
- (4) Lake near Ferris Creek (c. 6 acres).
- (5) Small lake east of Ferris Creek (c. 6 acres).
- (6) Fresh water marshes (non-tidal) on Svensen Island (c. 70 acres).
- (7) Small swamps and marshes at Eddy Point (c. 20 acres).

All of these sites are wetlands closely associated with the Columbia River which provide habitat diversity for waterfowl and mammals, and may have some tidal influence.

Management - Suitable designation for these sites is "Conservation Aquatic." Bald Eagle nests near Callander Island and Mary's Creek should be protected.

CLATSOP COUNTY - Site #EC 30 - Goals 17 and 16

(See attached map)

Location - Brownsmead.

Riparian Vegetation - Up to 30' wide zone, where it occurs.

Site Description - Sloughs in Brownsmead, tidegated. These have been identified in the CREST Plan and designated "Conservation Aquatic," which offers adequate protection. These sloughs have variable amounts of riparian vegetation, from none up to a zone 30' wide.

In addition, there is a 40 acre wetland site on Gnat Creek (see attached map), an extension of the Goal 16 and Gnat Creek Marshes, and some associated riparian vegetation (50' wide zone), and also 30' wide riparian zone along Gnat Creek and its tributaries.

Management - The Gnat Creek swamp site should be protected for its natural values; riparian vegetation should be preserved. No change is necessary in the designation of the tidewater sloughs.

CLATSOP COUNTY - Site #EC 31 - Goal 17

(See attached map)

Location - Between Aldrich Point and the western end of Puget Island, riparian vegetation and significant shoreland (upland) areas.

Size - Not measured.

Riparian Vegetation - In this area riparian vegetation extends 50' from the shoreline of the estuary, and on small tributary creeks up to the head of tide. A 30' band of riparian vegetation extends along tributary creeks above the heads of tide.

Along the Columbia River, the riparian zone is extensively interrupted by the Burlington Northern Railroad which mostly follows the estuary shoreline.

Shoreland (upland) resources in this area are: bald eagle nest sites and their protection zones at Aldrich Point; the Bradwood Cliffs old growth area (described by the Nature Conservancy, Site #1). This 40 acre site is one of the last areas of old growth in the County.

Site Description - Bradwood Cliffs - about 40 acres of old growth forest on bluffs by the Columbia River. This site is one of the few remaining tracts of old growth forest in the county and should be preserved. A suitable designation would be "Natural Shoreland."

Management - The riparian zone should be preserved, except where access is required for water-dependent developments. The bald eagle sites should be protected. The Bradwood Cliffs site should be preserved.

CLATSOP COUNTY - Site #EC 34 - Goals 17 and 5

(See attached map)

Location - Tenasillahe Island

Size - About 1,700 acres.

Riparian Vegetation - Some riparian vegetation (up to 30' wide zone) lines the sloughs.

Site Description - All of the diked portion of Tenasillahe Island is significant under Goal 17 (up to 1,000' from the dike) and Goal 5. Upland areas are critical habitat for the endangered Columbia white-tailed deer, and are actively managed for this species by the USFWS. This area is significant shoreland and biological habitat. The sloughs on the island and some forested swamp areas are significant wetland. These areas, by providing habitat for warm-water fish, for waterfowl, and for other avifauna, enhance the wildlife values of the area. In addition, there are bald eagle nest sites on the eastern side of the island and the protection zones around these are in the significant shorelands area.

Values - Non-tidal freshwater wetlands, warm-water fish, endangered species habitat.

Management - This site should be actively managed to ensure the survival of the white-tailed deer; the wetlands and the bald eagle nest areas should be preserved. Riparian vegetation should be preserved.

CLATSOP COUNTY - Site #EC 35 - Goal 5

(See attached map)

Location - Driscoll Slough marshes, between Wauna Mill and Westport.

Size - About 360 acres.

Vegetation types - Tidal and non-tidal emergent marshes, hackberry swamp, spruce swamp, willow swamp.

Riparian Vegetation - About 3,500 feet along the Columbia River.

Site Description - These tidal swamps, supporting natural climax floodplain vegetation, are one of the last remnants of a vast system of tidal marshes and swamps which once covered many thousands of acres in Columbia County and the eastern end of Clatsop County as far as Bradley Park. The loss of these and similar floodplain areas was a major reason for the decline of the Columbia White-tailed deer. This site has not, however, been identified as critical habitat for the White-tailed deer. In the upper estuary area, in which this site is included, a CREST report notes that 80% of the tidal swamps have been destroyed in the past century. The swamps are laced with tidal sloughs, except for a small area in the NE corner which is cut off from tidal

circulation by fills. These tide channels, fringed by forested swamps, are productive warm-water fish habitat, and are also likely to be important nursery area for juvenile chinook salmon. The area is important to waterfowl and marsh birds, and probably supports breeding populations of mallard and wood duck. This habitat type is of prime importance to aquatic furbearers, such as muskrat, nutria, beaver, river otter, and racoon. Disturbance at this site includes extensive filling for industrial sites and road and railroad causeways.

Management - This site is a good example of an increasingly scarce tidal wetland habitat type. It should be managed to preserve its natural values as forested wetland if possible.

#### APPENDIX (SHORELINE CHANGES)

During this survey, some areas were identified where shoreline changes to the CREST Plan were needed, because an area had been incorrectly included or excluded from the estuary.

##### WARRENTON - Site #18 - Goal 16

Location - Middle Skipanon, CREST Plan Subarea 42-05, west bank, south of Harbor Drive Bridge.

Site Description - An area of river bank was incorrectly described as Goal 16 marshes in the CREST Plan. This area should in fact be shorelands. The corrected shoreline is shown on the attached map.

##### CLATSOP COUNTY - Site #LY 24 - Goal 16

Location - Lewis and Clark River T7N R9W, Section 18.

Youngs River T7N R9W, Section 22.

Vegetation Types - High marsh and swamps.

Site Description - These areas (see map, 1:24,000) occur in the tidal portions of the Lewis and Clark and Youngs Rivers and are effectively undiked. They are therefore covered by Goal 16 and the estuary shoreline should be redrawn to include them.



CLATSOP COUNTY - Site #EC 32 - Goals 16 and 17

(See attached map 1:24,000)

Location - Tidal marshes and swamps east of Aldrich Point on both sides of the road.

Size - About 46 acres.

Vegetation Types - High marsh and willow swamp.

Riparian Vegetation - Approximately 50' x 6,000'.

Soils - Tideland.

Site Description - Columbia River Goal 16 tidal marshes and swamps with a fringe of Goal 17 riparian vegetation. This site was overlooked in the CREST Plan, which calls most of it "shoreland." It probably possesses the usual attributes of high marsh and willow swamp; important habitat for aquatic furbearing mammals and waterfowl. The tide channel probably has some value to fish.

An additional feature of this site is that, despite its being bisected by the railroad, it is one of the few areas in the estuary which show a transition from floodplain marshes and swamps to relatively undisturbed upland forests.

Management - This site should be managed to protect its natural estuarine values: suitable designation would be "Natural Aquatic."

CLATSOP COUNTY - Site #EC 33 - Goal 16

(See attached map 1:24,000)

Location - Hunts Creek Marshes.

Size - About 74 acres.

Vegetation Types - Sitka Willow swamp, spruce swamp.

Riparian Vegetation - None, but riparian vegetation extends above the head of tide on Hunt Creek.

Site Description - The lower reach of Hunt Creek is tidal, and has no tidegate. The tidal section of this creek and its associated swamps are therefore covered by Goal 16. This was apparently overlooked during the CREST Plan since much of this site is not even within the CREST planning area. Likely values of this site are: warm-water fish, may have a small salmon run; waterfowl nesting; important habitat for aquatic furbearers.

Management - This site should be managed as estuarine wetland: a suitable designation would be "Conservation 1, Aquatic."

20 December 1982

MEMORANDUM

Cannon Beach - Elk Creek Wetlands

Visited November 1, 1982 by Duncan Thomas & Rainmar Bartl.

Exact determination of observed wetland boundary is difficult, since no base map was available for the area West of highway 101, and the color 1:4 aerial photo coverage was incomplete.

Photos used in the survey were

COE 77-2341 (B & W)

COE 80-1066 (CIR)

A sketch map of the wetlands on 1" to 400'

Crown Zellerbach maps is attached.

Area 1): Wet of HWY 101, South of elk Creek

These wetlands consist of an area of brackish high marsh adjacent to the sewage lagoon and an area of forested swamp between the sewage lagoon and Elk Creek. These wetlands are linked to Elk Creek by a network of tidal channels. These wetlands all fall under Oregon Statewide Planning Goal 16, as part of the Elk Creek Estuary. The vegetation and drainage system show that these areas would be periodically inundated by tidal water.

Area 2): West of HWY 101, north of Elk Creek

These wetlands are composed of a high marsh area managed as pasture, an area of swamp, separated from the creek by a natural levee and a high marsh island in the creek. These wetlands technically fall under Goal 16, on account of periodic flooding by tidal water. They are, however, heavily disturbed, and are a very poor example of tidal wetlands.

Area 3): East of HWY 101

This is a large expanse of palestine spruce and alder swamp, with patches of short and emergent dominated marshes. The wetland exists largely because of

poor drainage characteristics of the site, though there is some tidal influence in the northwest portion. Technically, this area is a complex mix of Goal 16, 17 and 5 wetlands. For convenience, I propose that the tidal portion of Elk Creek should be Goal 16, and the remainder of the mapped area should be covered by Goal 17 and should be designated as a significant wetland.

There is a large area to the south and east of the mapped wetland, which also has poor drainage characteristics. The field survey showed however, that this area did not support extensive wetland vegetation. The herb layer was mostly dominated by Polystichum munitum, a predominantly upland species. The wetlands in this area were found to be not significant.

Soil types at the proposed site vary mainly with elevation and consequently the amount of saturation. Surface soil is generally dark brown silt-loam to a 12- to 15-inch depth. The upper subsoil consists of a dark grayish brown silty clay-loam with predominant gray and red mottles from a 48-inch depth near the higher ground of the creek bank to near ground surface in the lower depressions. The red mottles normally reflect the degree of iron oxidation caused by permanent or nearly permanent water saturation. Soils in the low elevations of the wetlands consist of Brallier or Coquille muck. The soil in the high elevations, mainly along Ecola Creek, probably result from silt deposited during the periodic flooding of the creek.

Prevailing westerly winds and moist air masses from the Pacific Ocean contribute greatly to the weather pattern in Cannon Beach. An average annual rainfall of 77 inches occurs mainly from October through March. Monthly temperatures average 52°F. The warmest months, July, August, and September, have average daily maximum temperatures of 67.1°F, 67.9°F, and 68.3°F, respectively. The coldest month, January, usually produces ten days with temperatures at 32°F or below. For further climatic information, see Facilities Plan Addendum No. 1.

### 3.2.2 Biological Conditions - Plant and Animal Inventory

The biota and ecology of the Cannon Beach area have been influenced by a variety of factors over time, including soil type, a maritime climate with much rainfall and moderate temperatures, and activities of man.

Mankind has had a profound effect on the establishment of the present plant and wildlife communities in the Cannon Beach area and especially on the study site (as discussed in Section 3.2.1). Initially, much of the present downtown area of Cannon Beach was comprised of wetlands similar to those presently found in the strip of lowland which follows the north bank of Ecola Creek from its mouth to the Highway 101 embankment. Because of their low elevation, these wetlands were flooded by the ocean at high tides, by Ecola Creek during winter runoff and, at times, by both sources at once. In addition, these wetlands received drainage from Ecola Creek as it drained the lower portions of the watershed.

Because long-term changes in water table elevation alter plant communities, it appears the historical flora on the study site, especially in the low areas, was different from those which presently exist. Plants indicative of more xeric (dry) sites in coastal spruce forests such as sword fern, oxalis, and Oregon fairybells (all of which grow on the elevated portions of the sites) were reduced in types and numbers; plants which could grow in more mesic (wet) sites, termed hydrophylic plants, such as skunk cabbage, slough sedge, and lady fern, increased in numbers. Presently, scattered growths of sword fern, salmonberry, hemlock, spruce, mustard and grass occur on tops of hummocks of slough sedge, spruce stumps, and fallen spruce and alder trees.

Ecological succession occurs when one biotic community replaces another. Both plant and animal communities continually change until a more stable climax community is reached. Usually plant succession precedes animal succession as the former is usually the main component of wildlife habitat. With the ascendance of man's activities as a prime component in a particular area's vegetation type, successional patterns frequently do not reach their climax or final state and continually revert to previous stages. The same process occurs in nature as a result of flooding rivers, avalanches, landslides, and forest fires. The yearly flooding of the study site by Ecola Creek probably flushes out much of the organic debris which would otherwise accumulate in the lower portions of the site. This prevents the formation of a humus layer which could support a variety of plants which are less tolerant of saturated soils.

The change of the lowland area from a dry or occasionally wet habitat to a permanently wet habitat has had a profound influence on the vegetative and animal communities which live in the project area.

### 3.2.2.1 Vegetation

Franklin and Dyrness (1973) consider Cannon Beach to be in the Picea sitchensis (Sitka spruce) Zone which extends along the greater portion of the coastline of Washington and Oregon within a two-to three-kilometer strip. Their descriptions of this zone broadly reflect the plant composition of the site with several exceptions. These authors record western red cedar and devil's club as being major constituents of Sitka spruce forests; only a few very scrubby cedars and no devil's club were found on the project site.

According to the Fish and Wildlife Service wetland classification system (Cowardin, et al., 1979), the entire project area is a palustrine wetland covering four broad classes. The palustrine system includes wetlands dominated by trees, shrubs and/or emergent plants and referred to as swamps, marsh and bog.

#### Spruce/Elderberry

System:	Palustrine
Class:	Forested wetland
Subclass:	Needle-leaved evergreen/broad-leaved deciduous
Dominance Type:	<u>Picea sitchensis/Sambucus racemosa</u>
Water Regime:	Saturated

#### Alder/Spruce

System:	Palustrine
Class:	Forest wetland
Subclass:	Broad-leaved deciduous/needle-leaved evergreen
Dominance Type:	<u>Alnus rubra/Picea sitchensis</u>
Water Regime:	Seasonally flooded

Sedge/Alder

System:	Palustrine
Class:	Emergent/forested wetlands
Subclass:	Persistent/broad-leaved deciduous
Dominance Type:	<u>Carex obnupta/Alnus rubra</u>
Water Regime:	Semipermanently exposed

Sedge/Twinberry

System:	Palustrine
Class:	Emergent/scrub-shrub wetlands
Subclass:	Persistent/broad-leaved deciduous
Dominance Type:	<u>Carex obrupta/Lonicera involucrata</u>
Water Regime:	Intermittently exposed

A number of plants in Oregon are either listed as endangered species, proposed to be listed as such, or are being watched closely for changes in distribution. A great many of these plants occur on the south side of rocky promontories. Sitka spruce and alder/sedge swamps are not well known habitats for these plants, (Hohn, 1981). No endangered or threatened plants are known to exist on the project site.

The field portion of a vegetation analysis undertaken by a KCM ecologist from May 27 through May 29, 1981 revealed the existence of several different plant communities on the project site (see Figure 2). The plant communities and their associated species are listed in Table 1. Budget restrictions dictated that only one field inventory be conducted. Discussions with the concerned resource agencies led to agreement that the best time for this inventory would be late Spring. Because the field work was conducted in late Spring, a few plants which grow on the project site and bloom at other times of the year were not observed.

TABLE 1  
VEGETATION COMMUNITIES  
OF CANNON BEACH WETLAND

Blackberry/Alder

Himalayan blackberry	( <i>Rubus discolor</i> )
evergreen blackberry	( <i>Rubus laciniatus</i> )
red alder	( <i>Alnus rubra</i> )
twinberry	( <i>Lonicera involucrata</i> )
Sitka spruce	( <i>Picea sitchensis</i> )
crab apple	( <i>Pyrus fusca</i> )
Scotch broom	( <i>Cytisus scoparius</i> )
cow parsnip	( <i>Heracleum lanatum</i> )
horsetail	( <i>Equisetum arvense</i> )
coltsfoot	( <i>Petasites frigidus</i> )
buttercup	( <i>Ranunculus sp.</i> )
clover	( <i>Trifolium sp.</i> )
slough sedge	( <i>Carex obnupta</i> )
soft rush	( <i>Juncus effusus</i> )
grass	(Gramineae)
wild mustard	(Cruciferae)
vetch	( <i>Vicia sp.</i> )

Spruce/Elderberry

Sitka spruce	( <i>Picea sitchensis</i> )
red elderberry	( <i>Sambucus racemosa</i> )
buttercup	( <i>Ranunculus sp.</i> )
red huckleberry	( <i>Vaccinium parvifolium</i> )
vine maple	( <i>Acer circinatum</i> )
Douglas maple	( <i>Acer douglasii</i> )
hemlock	( <i>Tsuga heterophylla</i> )
curled dock	( <i>Rumex crispus</i> )
wood rush	( <i>Luzula sp.</i> )
sword fern	( <i>Polystichum munitum</i> )
cow parsnip	( <i>Heracleum lanatum</i> )
oxalis	( <i>Oxalis oregana</i> )
wild cucumber	( <i>Marah oreganus</i> )
montia	( <i>Montia parvifolia</i> )
Siberian miner's lettuce	( <i>Montia siberica</i> )
bracken	( <i>Pteridium aquilinum</i> )
slough sedge	( <i>Carex obnupta</i> )
grass	(Gramineae)
violet	( <i>Viola spp.</i> )
crab apple	( <i>Pyrus fusca</i> )
foxglove	( <i>Digitalis purpurea</i> )
lily of the valley	( <i>Maianthemum dilatatum</i> )
tansey ragwort	( <i>Tanacetum vulgare</i> )
large-leaf aven	( <i>Geum macrophyllum</i> )
common thistle	( <i>Cirsium vulgare</i> )



## Spruce/Elderberry ( cont.)

Scouler's corydalis	( <i>Corydalis scouleri</i> )
tooth-leaved monkey flower	( <i>Mimulus dentatus</i> )
yerba buena	( <i>Satureja douglasii</i> )
Oregon fairybells	( <i>Disporum oregonum</i> )
woodrush	( <i>Luzula</i> sp.)
cascara	( <i>Rhamnus purshiana</i> )
evergreen huckleberry	( <i>Vaccinium ovatum</i> )

## Alder/Spruce

red alder	( <i>Alnus rubra</i> )
Sitka spruce	( <i>Picea sitchensis</i> )
crab apple	( <i>Pyrus fusca</i> )
salmonberry	( <i>Rubus spectabilis</i> )
red huckleberry	( <i>Vaccinium parvifolium</i> )
lily of the valley	( <i>Maianthemum dilatatum</i> )
montia	( <i>Montia parvifolia</i> )
Siberian miner's lettuce	( <i>Montia siberica</i> )
oxalis	( <i>Oxalis oregana</i> )
cow parsnip	( <i>Heracleum lanatum</i> )
salal	( <i>Gaultheria shallon</i> )
slough sedge	( <i>Carex obnupta</i> )
bedstraw	( <i>Galium boreale</i> )
wild cucumber	( <i>Marah oreganus</i> )
squashberry	( <i>Viburnum pauciflorum</i> )
gooseberry	( <i>Ribes</i> sp.)
tooth-leaved monkey flower	( <i>Mimulus dentatus</i> )
hedge nettle	( <i>Stachys mexicana</i> )
Fendler's waterleaf	( <i>Hydrophyllum fendleri</i> )
green-tinted heuchera	( <i>Heuchera chlorantha</i> )
violet	( <i>Viola</i> spp.)
woodrush	( <i>Luzula</i> sp.)
wild mustard	( <i>Cruciferae</i> )

## Sedge/Alder

slough sedge	( <i>Carex obnupta</i> )
red alder	( <i>Alnus rubra</i> )
skunk cabbage	( <i>Lysichitum americanum</i> )
lady fern	( <i>Athyrium filix-femina</i> )
water parsley	( <i>Oenanthe sarmentosa</i> )
spleenwort	( <i>Asplenium</i> sp.)
Pacific cinquefoil	( <i>Potentilla pacifica</i> )
narrow-leaf skullcap	( <i>Scutellaria angustifolia</i> )
woodrush	( <i>Luzula</i> )
Brewer's bittercress	( <i>Cardamine breweri</i> )
angled bittercress	( <i>Cardamine angula</i> )

TABLE 1 (continued)

## Sedge/Twinberry

slough sedge	( <i>Carex obnupta</i> )
twinberry	( <i>Lonicera involucrata</i> )
skunk cabbage	( <i>Lysichitum americanum</i> )
water parsley	( <i>Oenanthe sarmentosa</i> )
wild mustard	( <i>Cruciferae</i> )
red alder	( <i>Alnus rubra</i> )
Sitka spruce	( <i>Picea sitchensis</i> )
deadly nightshade	( <i>Solanum dulcamara</i> )
maidenhair fern	( <i>Adiantum pedatum</i> )
water fern	( <i>Azolla americana</i> )
coast boykinia	( <i>Boykinia elata</i> )
American wintercress	( <i>Barbarea orthoceras</i> )

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It is likely the greatest determinant of which plants will predominate on a particular site in the project area is the amount of soil saturation. Some plants which tolerate a wide range of moisture levels and disturbance occur in more than one community. Frequently these plant communities are not clearly delineated, but gradually grade from one to another.

#### 3.2.2.1.1 Blackberry/Alder

The blackberry/alder plant community occupies approximately 15% of the project area, mostly along the dike which supports Highway 101. Because of the slope and higher elevation, the soil does not tend to be saturated during the growing season except in the small ditch which runs along the Highway. Ground cover includes grasses and clover along the drier roadway, slough sedge, horsetail, cow parsnip, and buttercups in the lower ditch. Trailing and evergreen blackberry and twinberry comprise the shrub layer. Young alders, spruce, and crab apple grow on the higher ground east of the small ditch.

#### 3.2.2.1.2 Spruce/Elderberry

The spruce/elderberry association, covering about 20% of the project area, mainly occurs within the southeastern portion of the site along Ecola Creek and on higher ground. It does not appear that this area is as susceptible to winter flooding as the down-creek portion of the site. The spruce trees, some with diameters of over 6 feet, dominate the upper story. Vine maple, crab apple, large red elderberry shrubs, and small hemlock trees provide a middle layer of vegetation. The ground is covered with buttercup, oxalis, sword fern, wild cucumber, and curled dock.

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#### 3.2.2.1.3 Alder/Spruce

The alder/spruce plant community covers about 19.0% of the project area along the natural levee adjacent to the creek and in the wetter area west of the spruce/elderberry association. The ground is more susceptible to flooding than that of the spruce/elderberry community. Dry sloughs are much in evidence. Alder is the dominant tree, with spruce scattered throughout the area. Usually the alders on the higher ground are larger, with diameters of one & one-half feet or greater. The shrub layer consists of crab apple, salmonberry, and huckleberry. Montia, Siberian miner's lettuce, oxalis, cow parsnip, and slough sedge comprise the herbaceous layer.

#### 3.2.2.1.4 Sedge/Alder

Sedge and small alder trees probably best characterize approximately 11% of the project area between the large slough which contains water throughout the year and runs next to the Highway and Ecola Creek. Because of its elevation and proximity to the large slough, it is relatively well drained, with a matrix of small channels and depressions which usually become dry in the summer.

#### 3.2.2.1.5 Sedge/Twinberry

The sedge/twinberry association occupies the wettest and largest portion of the site on ground, approximately 35% of the project area. The soil in this location probably has one or two feet of water over it most of the year. Numerous large spruce stumps indicate a mature forest once grew throughout this area. In addition, smaller spruce and alder stumps indicate the former presence of a second-growth forest which succumbed not to logging, but to high water tables. Presently a scattering of young alders and spruce grow on hummocks and nurse logs throughout this swamp. Twinberry, growing luxuriantly in this wet habitat, provides a thick shrub layer. Skunk cabbage and

slough sedge dominate the ground cover. Many deep channels and depressions filled with water are evident, along which water parsley grows abundantly.

#### 3.2.2.2 Wildlife

Wildlife, because of its secretive, mobile nature, is harder to observe than plants, and therefore is difficult to analyze in a short ecological survey. Since vegetation and moisture levels are prime components of habitat, the different vegetative communities roughly correspond to habitat types. Because most animals are mobile, they frequently utilize several different habitat types in carrying out life processes. These habitat changes can occur daily and seasonally. Deer remain in thick brush during the day and feed in clearings during the morning and evening hours. Elk usually summer higher up in watersheds and winter at lower elevations where food is more available.

Ecola Creek and its surrounding watershed provide excellent habitat for a very rich and diverse assemblage of wildlife. Many of the animals are listed in Table 2. Large populations of black bear, mink, muskrat, beaver, river otter, raccoon, coyote, and spotted skunks reside along the creek. Although at times quite abundant, the bobcat population has been reduced because of past over-trapping (Teeple, 1981).

Primarily during the winter, a herd of Roosevelt elk, which varies in size, but averages about 18 to 20 animals, wanders over the lower watershed of Ecola Creek, including the project area. During late spring and summer, this herd generally grazes further up the watershed at higher elevations where the cows calve. Elk trails, tracks, and droppings were highly evident on the higher portions of the project site adjacent to the creek. Elk tracks and pellet groups were found in the lower wet areas, but not as frequently nor were they as concentrated. Several elk crossing sites were evident along the creek. Plants which had obviously been grazed included, by order of frequency, sword fern, skunk cabbage, and slough sedge.

## VI FINDINGS AND POLICIES FOR RURAL SHORELANDS

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1. Introduction:

The sets of findings included in this section pertain to all areas (Parts I through IV) defined as estuarine and coastal shorelands. Additional findings for "other" uses will be made at the time of the proposed action. For example if the Department of Planning and Development receives a Conditional Use Permit request for an "other use" in a RA-5 or EFU zone, the request will be reviewed to determine whether this "other use" can be permitted pursuant upon making "a finding by the governing body of the county that such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas and are compatible with the objectives of this goal to protect riparian vegetation and wildlife habitat. The findings in this section pertaining to home occupations, cottage industries in existing structures, utilities necessary for public service and certain Public or Semi-public Uses in Rural Shorelands, certain temporary uses and signs are located here so that these findings need not be made during plan implementation.

2. Goal 17 Use Requirements for Rural Shorelands:

"Shorelands in rural areas...shall be used as appropriate for:

- (a) farm uses as provided in ORS Chapter 215;
- (b) propagation and harvesting of forest products consistent with the Oregon Forest Practices Act;
- (c) private and public water-dependent recreation developments;
- (d) aquaculture;
- (e) water-dependent commercial and industrial uses and water-related uses only upon a finding by the governing body of the county that such uses satisfy a need which cannot be accommodated on shorelands in urban and urbanizable areas;
- (f) subdivisions, major and minor partitions and other uses only upon a finding by the governing body of the county that such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas and are compatible with the objectives of this goal to protect riparian vegetation and wildlife habitat; and
- (g) a single family residence on existing lots, parcels or units of land when compatible with the objectives and implementation standards of this goal."

3. Findings for Private and Public Water-dependent Recreation Developments:

Clatsop County finds that there are shoreland areas other than protected major marshes, significant wildlife habitat coastal headlands, exceptional aesthetic resources, and historic and archaeological sites, that are other than farm or forest in nature and are currently being used or could be used for private and public water-dependent recreation developments.



4. Findings for Exception of "Built and Committed" Rural Shorelands from Goal 17 Rural Shoreland Use Requirements 3e and 3f:

Clatsop County finds that there are shoreland areas which are not urban under the definition of "urban lands" provided on page 24 of the State-wide Planning Goals and Guidelines, yet which are "built and committed" to a type and degree of development which is not rural farm or forest in nature. These include the following areas which are not rural as defined by the Goals, because they are not characterized by sparse settlement, small farms or acreage homesites:

- (a) areas which are not necessary, suitable or intended for urban use (e.g. Falcon Cove-Cove Beach, Arcadia Beach, Fern Hill, John Day, Burnside); and
- (b) communities which are necessary, suitable or intended for urban use (Arch Cape, Shoreline Estates at Cullaby Lake).

Clatsop County also finds that there are individual land parcels outside of the communities listed above which are committed to uses other than the following:

- (a) farm uses;
- (b) propagation and harvesting of forest products;
- (c) private and public water-dependent recreation development;
- (d) aquaculture; and
- (e) water-dependent commercial and industrial uses.

Clatsop County finds that these built and committed communities and individual land parcels are committed to subdivisions and major and minor partitions which are necessary to accommodate the uses which occur within these areas.

The Goal 2 Element of the Clatsop County Comprehensive Plan describes the criteria used to identify "built and committed" areas, provides maps showing the location of these rural shoreland areas, and provides site-by-site commitment findings.

5. Findings for "Other Uses" on Rural Shorelands Within the Exclusive Farm Use-38 (EFU-38), Forest-80 (F-80), Forest-38 (F-38) and Agriculture Forest-20 (AF-20) Zones:

Clatsop County finds that:

- (a) Farm uses as provided for in ORS Chapter 215, and propagation and harvesting of forest products consistent with the Oregon Forest Practices Act are permitted uses in rural shoreland areas (subject to Goal 17 Coastal Shoreland Use finding requirement for shoreland areas identified as major marshes, significant wildlife habitat, coastal headlands, exceptional aesthetic resources and historic and archaeological sites);
- (b) Rural shoreland areas which qualify as agricultural or forest lands, and which are not "built and committed" to, or needed for uses other than agricultural or forestry use, have been included within the EFU-38, F-80, F-38, or AF-20 zones. These zones meet the requirements of Goals 3 and 4 for protecting farm and forest land for farm and forest use;
- (c) Goal 17 Use Requirements for Rural Shoreland Areas (see Section \_\_\_\_\_) define "other uses" as any use other than:
  - 1) farm uses;
  - 2) propagation and harvesting of forest products consistent with the Oregon Forest Practices Act;
  - 3) private and public water-dependent recreation developments;
  - 4) aquaculture; and
  - 5) water-dependent commercial and industrial uses.
- (d) Goal 17 requires that "other uses" in rural shorelands be allowed only upon findings by the governing body that such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas. Other upland locations include non-shoreland locations outside of a given parcel of land and non-shoreland locations within a given parcel of land.
- (e) The following Permitted or Conditional Development and Uses provided for in the Exclusive Farm Use (EFU-38) zone are "other uses" which are necessary in conjunction with commercial farm use and must be located on the land parcel which is used for farm use:
  - 1) one family dwelling, or mobile home on a parcel 38 acres or greater when necessary to carry out a farm use;
  - 2) farm buildings, other than dwellings customarily provided in conjunction with farm use, including roadside stands selling farm products produced or property owners or leased for farm use by the owner of the property on which the roadside stand is located;

- 4) commercial developments that are in conjunction with farm use such as a veterinarian office, feed and seed store, farm machinery sales and repair shop, winery, or farmer's market and that serve a need of farm operation in the area.
- (f) The following Permitted Development and Use Permitted with Review or Conditional Development and Uses provided for in the Forest-80 (F-80) zone are necessary in conjunction with commercial forest use, and must be located on the land parcel which is used for forest use:
- 1) forestry operations;
  - 2) office, maintenance and storage facilities necessary for the management and protection of forest lands;
  - 3) primary processing;
  - 4) forest residence subject to approval and siting criteria; and
  - 5) temporary mobile home for a period not to exceed one year used during the construction of a residence for which a building permit has been issued, and when located at the construction site.
- (g) The following Permitted Development and Use Permitted with Review or Conditional Development and Uses provided for in the Forest-38 (F-38) zone are necessary in conjunction with commercial forest use, and must be located on the land parcel which is used for forest use:
- 1) forestry operations;
  - 2) office, maintenance and storage facilities necessary for the management and protection of forest lands;
  - 3) primary processing;
  - 4) forest residence subject to approval and siting criteria; and
  - 5) temporary mobile home for a period not to exceed one year used during the construction of a residence for which a building permit has been issued, and when located at the construction site.
- (h) The following Permitted or Conditional Development and Uses provided for in the Agriculture Forest-20 (AF-20) zone are necessary in conjunction with commercial farm or forest use, and must be located on the land parcel which is used for resource use:
- 1) forestry operations;
  - 2) office, maintenance and storage facilities necessary for the management and protection of forest lands;
  - 3) primary processing;
  - 4) forest residence subject to approval and siting criteria; and
  - 5) temporary mobile home for a period not to exceed one year used during the construction of a residence for which a building permit has been issued, and when located at the construction site.

- (i) Findings that the uses in e-h above satisfy a need which cannot be accommodated on non-shoreland locations within a given parcel of land and can only be made on a case-by-case basis.
- (j) In cases where agricultural or forest productivity varies within a given parcel of land, location of the uses in e-h above on non-shoreland locations may impact resource productivity to a greater extent than location of these uses within coastal shorelands.
- (k) There are benefits derived from maintaining productivity of resource lands within the EFU-38, F-80, F-38, and AF-20.
- (l) Compatibility of the uses listed in e-h above with the objective of Goal 17 to protect riparian vegetation will be achieved through application of Sections of the Clatsop County Land and Water Development and Use Standards Document.

6. Findings for "Other Uses" on Rural Shorelands Within the Recreation Management (RM) Zone and Open Space, Parks and Recreation (OPR) Zone:

Clatsop County finds that:

- (a) The RM and OPR zones are intended for existing state and private campgrounds and day use facilities. The RM and OPR zones are also appropriate for other areas which have significant natural and open space values;
- (b) Within coastal shorelands, an important function of the RM zone is to provide for low-density coastal recreational developments on large acreage tracts;
- (c) Goal 17 Use Requirements for Rural Shoreland Areas define "other uses" as an use other than:
  - 1) farm uses;
  - 2) propagation and harvesting of forest products consistent with the Oregon Forest Practices Act;
  - 3) aquaculture; and
  - 4) water-dependent commercial and industrial uses.
- (d) Goal 17 requires that "other uses" in rural shorelands be allowed only upon a finding by the governing body that such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas. Other upland locations include non-shoreland locations outside of a given parcel of land, and non-shoreland locations within a given parcel of land.
- (e) The following permitted uses or conditional development and uses provided for in the RM zone are "other uses" which are necessary in conjunction with large acreage, low density coastal recreational developments, and must be located on the land parcel which is used for coastal recreational developments;

- 1) recreational improvements and additions necessary to serve the same visitor capacity served by the existing facilities provided that off-site impacts are not disturbed; and
- 2) general maintenance and operation of existing recreation facilities.

Compatibility of the uses listed in e above with the objectives of Goal 17 to protect riparian vegetation will be achieved through application of the Sections of the Clatsop County Land and Water Development and Use Ordinance Standards Document.

7. Findings for Specific "Other Uses" on Rural Shorelands:

1. Home Occupations on Rural Shorelands.

Clatsop County finds that:

- (a) Allowing the establishment of home occupations on surplus floor area within an existing dwelling increases employment opportunities for the residents of Clatsop County, and reduces the operating costs of small businesses by eliminating the need to rent or purchase additional floor space in order to establish a business;
- (b) There is a need to provide for additional employment opportunities in rural areas within Clatsop County (see Economic Element of the Clatsop County Comprehensive Plan);
- (c) Since home occupations must occur within a dwelling, they must locate on the same land parcel as the dwelling or farm use (i.e., there are no alternative locations for these uses outside of the given land parcel);
- (d) Compatibility of home occupations with the objectives of Goal 17 to protect riparian vegetation will be achieved through application of the Protection of Riparian Vegetation Standards in Section S4.500 of the Clatsop County Land and Water Development and Use Ordinance.
- (e) Home occupations are compatible with Goal 17 requirements for protection of wildlife habitat, since they can be accommodated within existing structures on a given parcel of land, and do not increase density of development within the land parcel.

2. Cottage Industries in Existing Structures on Rural Shorelands.

Clatsop County finds that:

- (a) Allowing the establishment of cottage industries on surplus floor area within an existing dwelling or accessory structure increases employment opportunities for the residents of Clatsop County and reduces the operating costs of small businesses by eliminating the need to rent or purchase additional floor space in order to establish a business.
- (b) There is a need to provide for additional employment opportunities in rural areas within Clatsop County (see Economic Element of the Clatsop County Comprehensive Plan);
- (c) Since cottage industries may occur within a dwelling or in an outbuilding accessory to a dwelling they must locate on the same land parcel as the dwelling, (i.e., there are no alternative locations for these uses outside of the given land parcel);
- (d) Compatibility of cottage industries with the objectives of Goal 17 to protect riparian vegetation will be achieved through application of the Protection of Riparian Vegetation Standards in Section S4.500 of the Clatsop County Land and Water Development and Use Ordinance.

- (e) Cottage industries are compatible with Goal 17 requirements for protection of wildlife habitat, since they can be accommodated within an existing dwelling or in an outbuilding accessory to a dwelling on a given parcel of land and do not increase density of development within the land parcel.

3. Utilities necessary for Public Service and certain Public or Semi-public Uses in Rural Shorelands.

Clatsop County finds that:

- (a) Electrical distribution lines, water, sewer or gas lines and water and sewage treatment plants are necessary to provide normal domestic service to residential dwellings and to other permitted uses within rural shorelands;
- (b) There is a need to provide for normal domestic energy facility and utility service within rural shorelands. This need can not be met on upland locations or in urban or urbanizable areas;
- (c) Compatibility of energy facilities and utilities with the objectives of Goal 17 to protect riparian vegetation will be achieved through application of the Protection of Riparian Vegetation Standards in Section S4.500 of the Clatsop County Land and Water Development and Use Ordinance.
- (d) Compatibility of development on rural shorelands with the Goal 17 requirements for protection of wildlife habitat depends primarily on the density of development provided for, which is determined by the minimum lot size requirements. If development densities within an area are consistent with the protection of wildlife habitat, the incremental disruption of wildlife habitat produced during the installation of energy facilities and utilities which are necessary to serve existing or permitted development should also be consistent with protection of wildlife habitat.

4. Mobile home or Recreational Vehicle Used During the Construction of a Permitted Use for which a Building or Placement Permit Has Been Issued.

Clatsop County finds that:

- (a) Mobile homes and recreational vehicles are sometimes used as interim housing or as temporary office space during the construction of a permitted use;
- (b) Temporary mobile home or recreational vehicle placement does not preclude uses which are allowed as permitted or conditional uses within rural shorelands;
- (c) Mobile home or recreation vehicle placement is subject to the following requirements;
  - 1) Department of Environmental Quality requirements for subsurface sewage disposal;
  - 2) Clatsop County zoning ordinance requirements in:

- a) Section S3.190, Mobile Home Siting Criteria;
- b) Section S4.500, Protection of Riparian Vegetation Standards;
- c) Section S3.700, Geologic Hazard Requirements;
- d) Section 5.500, Temporary Use Permit Section for temporary placement of a mobile home or recreational vehicle.

(d) The requirements listed in (c) above, and the temporary nature of the recreation vehicle placement will serve to prevent adverse impacts to rural shorelands.

## 5. Signs

Clatsop County finds that:

- (a) Areas of exceptional aesthetic and scenic quality have been identified in Section \_\_\_\_\_ of the Ocean and Coastal Lake Shoreland Element of the Clatsop County Comprehensive Plan;
- (b) The placement of signs is subject to the requirements in Section S2.300 of the Clatsop County Land and Water Development and Use Ordinance.
- (c) The placement of signs in rural shoreland areas which have not been identified as areas of exceptional aesthetic and scenic quality does not produce adverse impacts on rural shorelands.

## 8. Findings for Major and Minor Partitions on Rural Shorelands in the Exclusive Farm Use-38 (EFU-38), Forest-80 (F-80), Forest-38 (F-38) and Agriculture Forest-20 (AF-20) Zones.

Clatsop County finds that:

- (a) Farm uses as provided for in ORS Chapter 215, and propagation and harvesting of forest products consistent with the Oregon Forest Practices Act are permitted uses in rural shoreland areas (subject to Goal 17 Coastal Shoreland Use finding requirement for shoreland areas identified as major marshes, significant wildlife habitat, coastal headlands, exceptional aesthetic resources and historic and archaeological sites);
- (b) Rural shoreland areas which qualify as agricultural or forest lands, and which are not "built and committed" to, or needed for uses other than agricultural or forestry use, have been included within the F-80, EFU-38, F-38, and AF-20 zones. These zones meet the requirements of Goals 3 and 4 for protecting farm and forest land for farm and forest use;
- (c) The 80-acre minimum lot size provided for in the Forest-80 (F-80) zone, 38 acre minimum lot size provided for in the Exclusive Farm Use-38 (EFU-38) and Forest-38 (F-38) and the 20 acre minimum lot size provided for in the Agriculture Forest-20 (AF-20) zone is consistent with the continuation of large-acreage farm and forest use;



## 9. Rural Shoreland Policies:

Shorelands in rural areas (other than those designated as major marshes, significant wildlife habitat, coastal headlands, exceptional aesthetic resources and historical and archaeological sites) shall be used, as appropriate, for:

- (a) farm uses (as provided in ORS 215);
- (b) propagation and harvesting of forest products consistent with the Oregon Forest Practices Act;
- (c) private and public water-dependent recreational developments and open space;
- (d) aquaculture;
- (e) single-family dwellings on existing lots, parcels or units of land;
- (f) water-dependent commercial and industrial uses and water-related commercial, industrial and recreational uses, only if such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas.
- (g) subdivisions, major and minor partitions and other uses only upon a finding by the governing body of the county that such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas.

Clatsop County shall review alternative upland locations for "other uses" within a given land parcel within rural shorelands on a case-by-case basis. In determining the suitability of alternative upland locations for "other uses" within a given land parcel in the Exclusive Farm Use (EFU- 38), Forest-80 (F-80), Forest-38 (F-38), or Agriculture Forest-20 (AF-20) zones, consideration shall be given to the productivity of resource land. "Other uses" within these zones shall be located so that productivity of resource land is maintained.