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 preceeding 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.

OVERALL GOALS AND POLICIES

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 so as to protect its natural resource values primarily. 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 freshwater 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.

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.

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.

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 appears to be postponed for several years. The cities and county should 1) Investigate an interim solution to the problem, in conjunction with DEQ and State Fish and Wildlife, 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 shall provide for the use of natural drainage systems (streams, 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.

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 processes, the (City) (County) shall provide for set-backs 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 to the 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 as 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 (City) (County) strongly encourages the school district and the community college to continue programs in Marine Ecology and Oceanography in order to promote this goal.

POLICY 7-B: The (City) (County) should participate in a regional organization (such as Crest) that maintains the staff capability of evaluating development proposals and working with resource agencies.

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 process at the local level. The Oregon Department of Fish and Wildlife shall be used as a resource to evaluate the proposals.

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PERMITTED USE TABLE

NECANICUM ESTUARY

USE/ACTIVITY	NATURAL	CONSERVATION
USES		
1. Airport		
2. Aquaculture, reverse and recapture facilities		C
3. Boat Ramp		C
4. Commercial Development		
5. Communication tower, Corridor		C
6. Docks, Piers, Moorages		C
7. Industrial Development		
8. Marina		C
9. Navigation Aids	PS	PS
10. Outdoor Advertising		
11. Port Activities		
12. Residential Development		
13. Road/Railroads/Bridges		C
14. Sanitary Sewer Outfall		C
15. Storm Water Outfall		C
16. Underwater Cables and Pipelines		C
ACTIVITIES		
1. Dikes, Maintenance		
2. Dikes, New		
3. Dredge Material Disposal		
4. Dredging Maintenance		C
5. Filing		C
6. Piling		C
7. Restoration	C	C
8. Sand/Gravel Removal		C
9. Shoreline Access Points		C
10. Shoreline Stabilization		C
11. Dredging, New		
12. Research & Education Observation	PS	PS

LEGEND: C = Permitted as a Conditional Use
PS = Permitted with review of Planning Commission
Blank = Not permitted

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 adapted 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.

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, not withstanding 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, wiers, dry wells, or other means.

The Necanicum Estuary boundary, as discussed, was drawn around all water bodies, salt marshes, tideflats, and freshwater marshes adjacent to the Necanicum 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 100 feet 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 2' contour intervals, was done by CH_2M-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 making areas of the estuary shoreline available to the handicapped or other persons with limited mobility.

3. Protection of Riparian Vegetation

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 use or activity shall be kept away from the shoreline a distance of at least 30 feet. 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 comission. Setbacks from natural areas shall be a minimum of 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 shorelands uses from highest to lowest, are:

A. Uses which maintain the integrity of the estuary;

B. Water-dependent uses;

C. Water-related uses;

D. Non-water-related uses that do not degrade estuarine resources or unalterably commit shorelands to intensive use; or

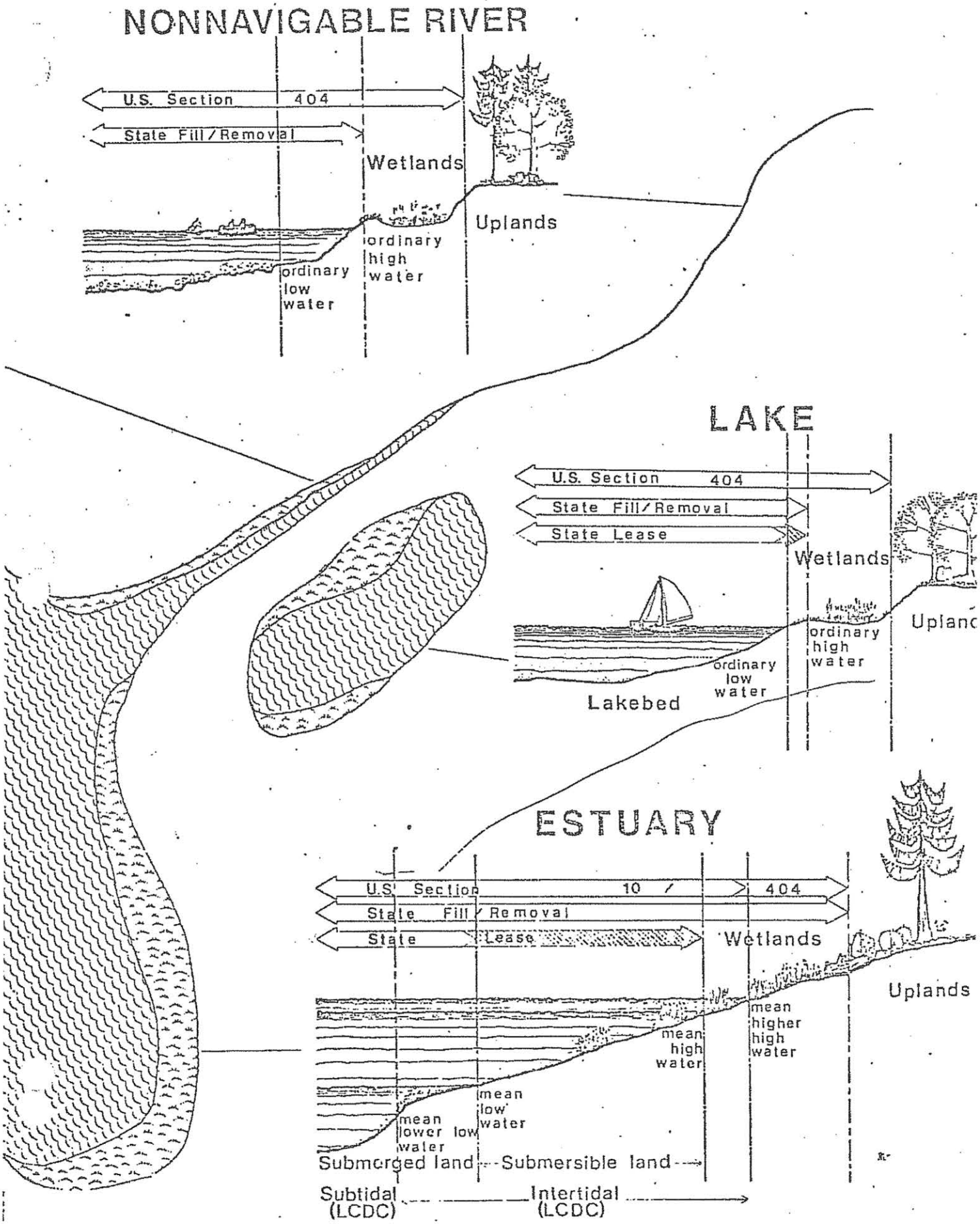
E. Non-water-related uses that permanently alter shorelands, or estuarine resources, upon a showing of public need.

The priority of uses shall be reflected in the (City) (County) zoning 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 utiliized, and good engineering practices shall be employed to protect water quality. Where active erosion is occuring and biological productivity is low, beach nourishment may be considered as a means of disposal. Dredge material must be sufficiently coarse for this purpose. Dredge material disposal shall be carefully evaluated through the permit process.

Restoration of the estuary shall be encouraged through the establishment of aquaculture facilities, and improvement of the physical and biological properties of the estuary. The improvement of flushing capabilities at the mouth of the river shall be given highest priority.


NONNAVIGABLE RIVER
U.S. Section 404
State Fill/Removal
Wetlands
Uplands
ordinary high water
ordinary low water
LAKE
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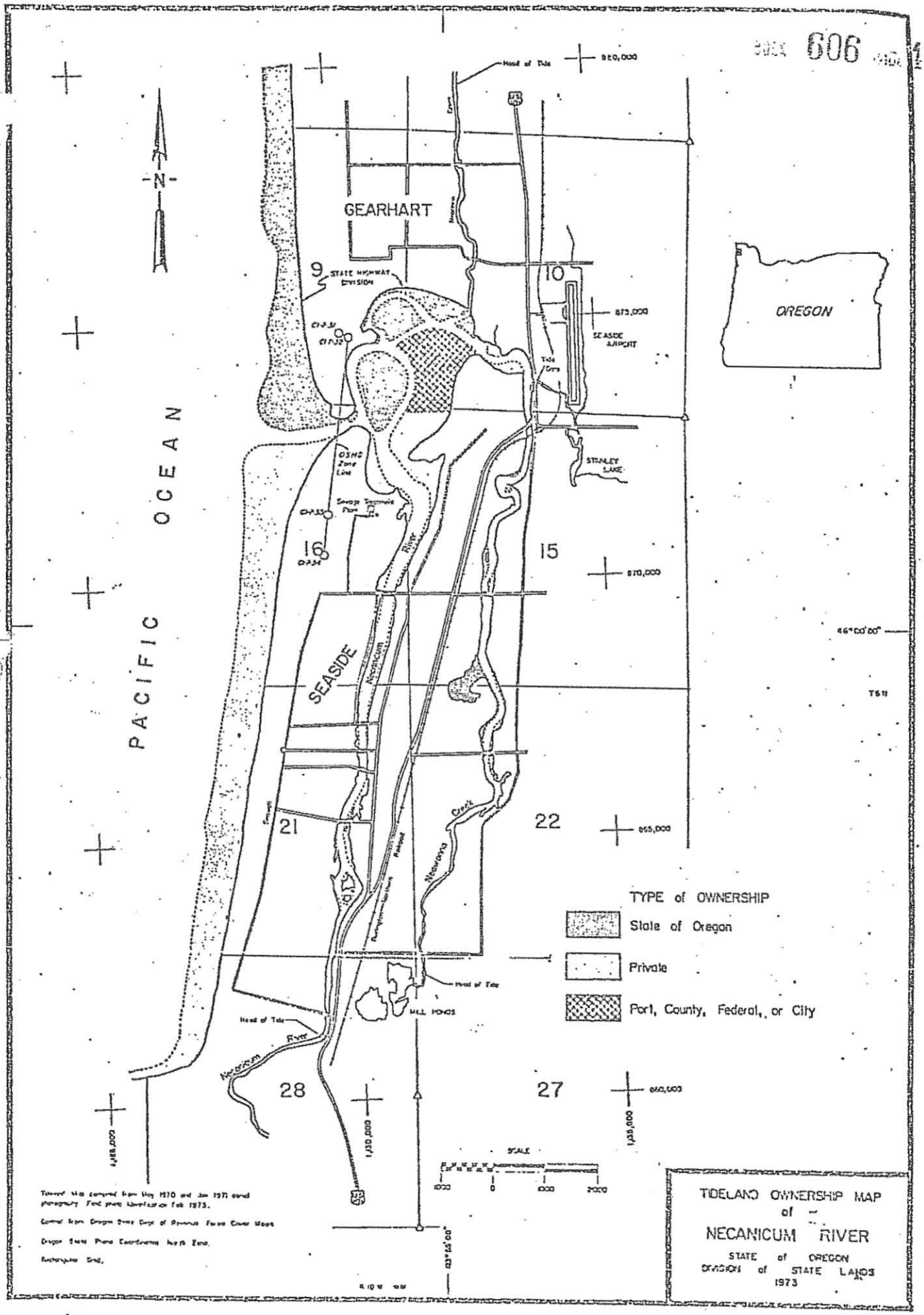
State Fill/Removal
State Lease
Wetlands
Uplanc
ordinary high water
ordinary low water
Lakebed
ESTUARY
U.S. Section 10 / 404
State Fill/Removal
State Lease
Wetlands
Uplands
mean higher high water
mean high water
mean low water
mean lower low water
Submerged land
Submersible land
Subtidal (LCDC)
Intertidal (LCDC)


GEARHART
SEASIDE
PACIFIC OCEAN
OREGON
STATE HIGHWAY DIVISION
SEASIDE AIRPORT
STANLEY LAKE
MILL PONDS
Head of Tide
Neacanicum River
Neawanna Creek
9
10
15
16
21
22
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N
TYPE of OWNERSHIP
State of Oregon
Private
Port, County, Federal, or City
SCALE
TIDELAND OWNERSHIP MAP
of
NECANICUM RIVER
STATE of OREGON
DIVISION of STATE LANDS
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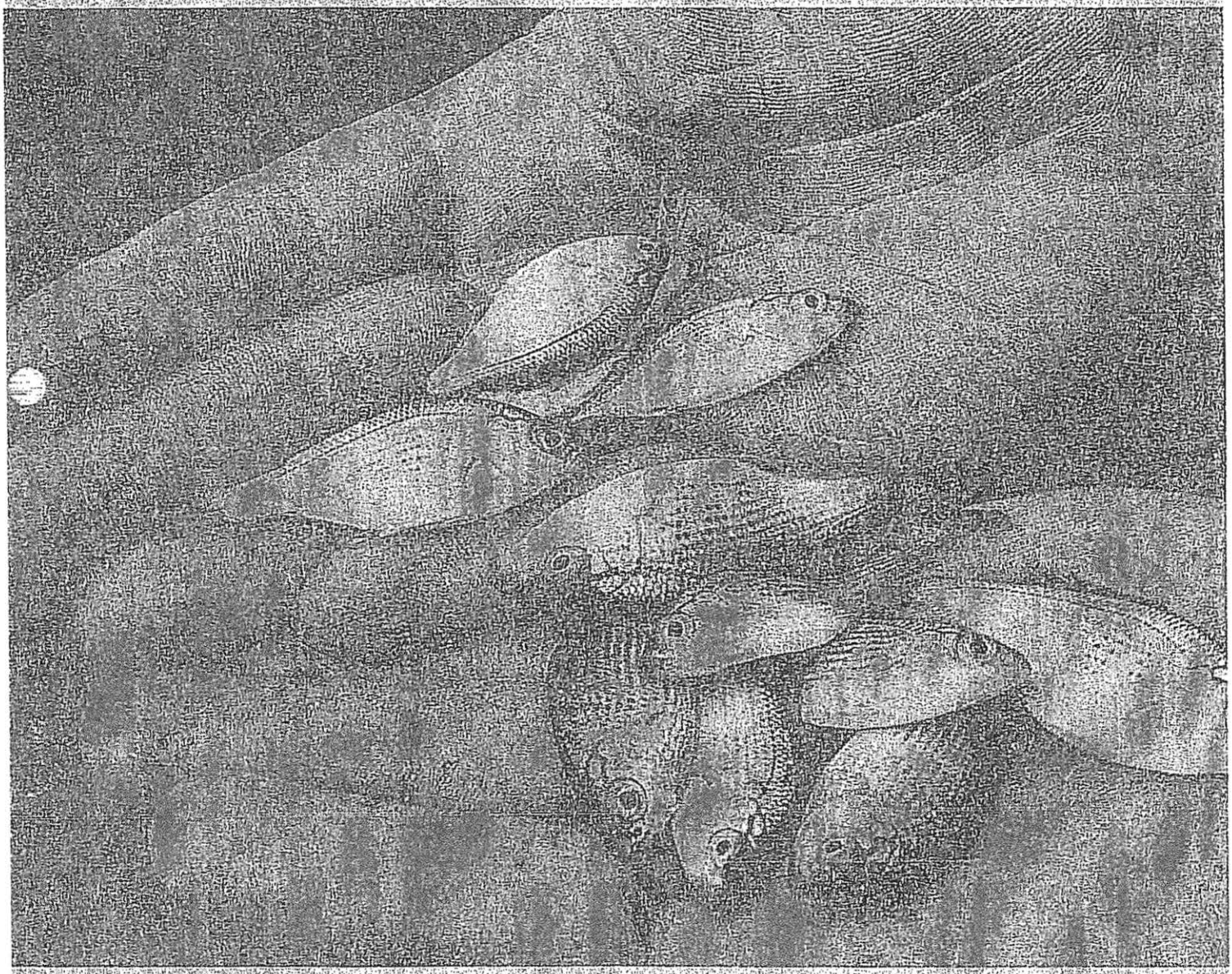
NECANICUM ESTUARY



INVENTORY

BOOK 606 PAGE 40E

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

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Special thanks to the following people for their help;
- Ed Johnson-field work and write-up on sediments section
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- 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)

No. 23

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

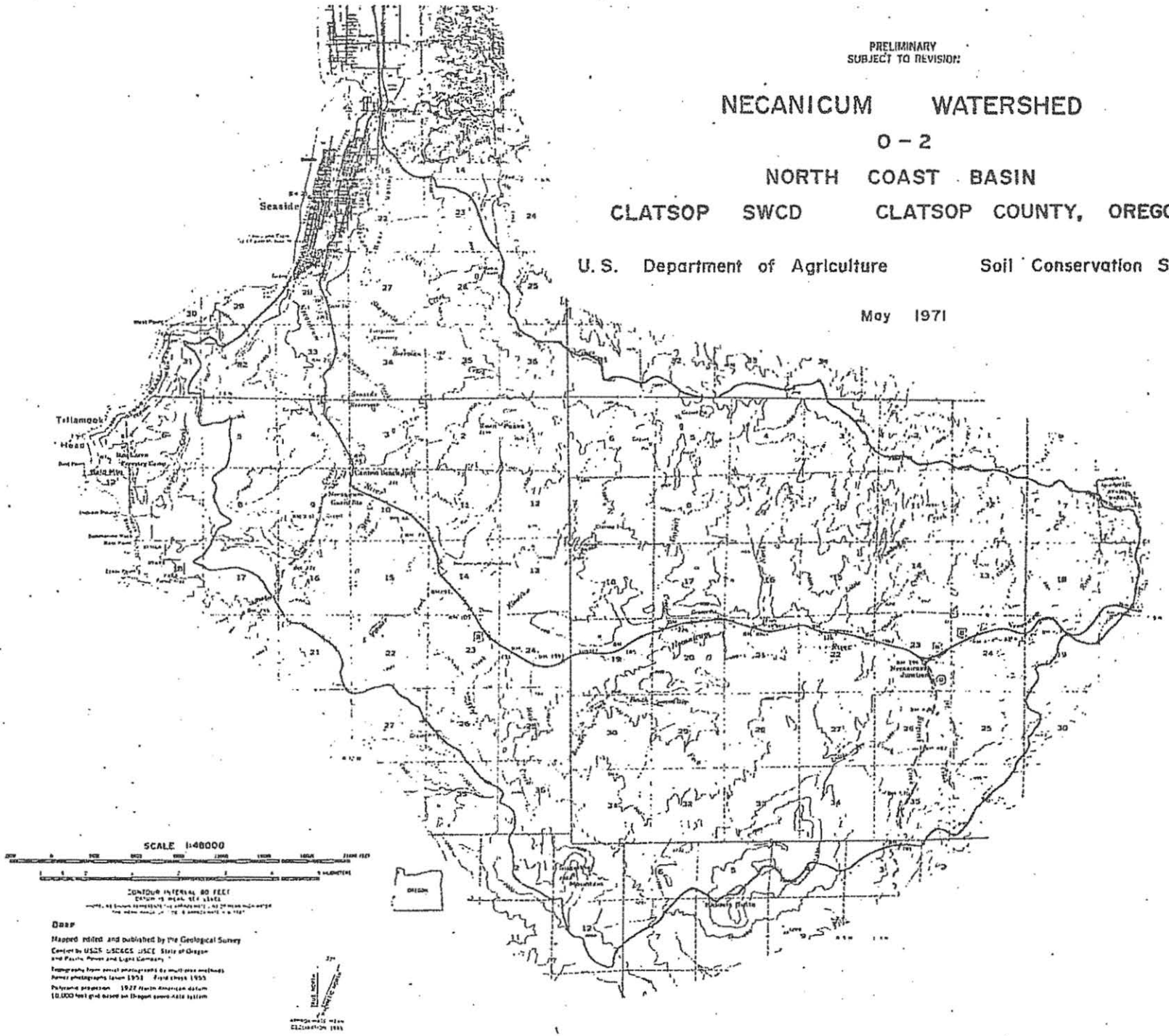
O - 2

NORTH COAST BASIN

CLATSOP SWCD CLATSOP COUNTY, OREGON

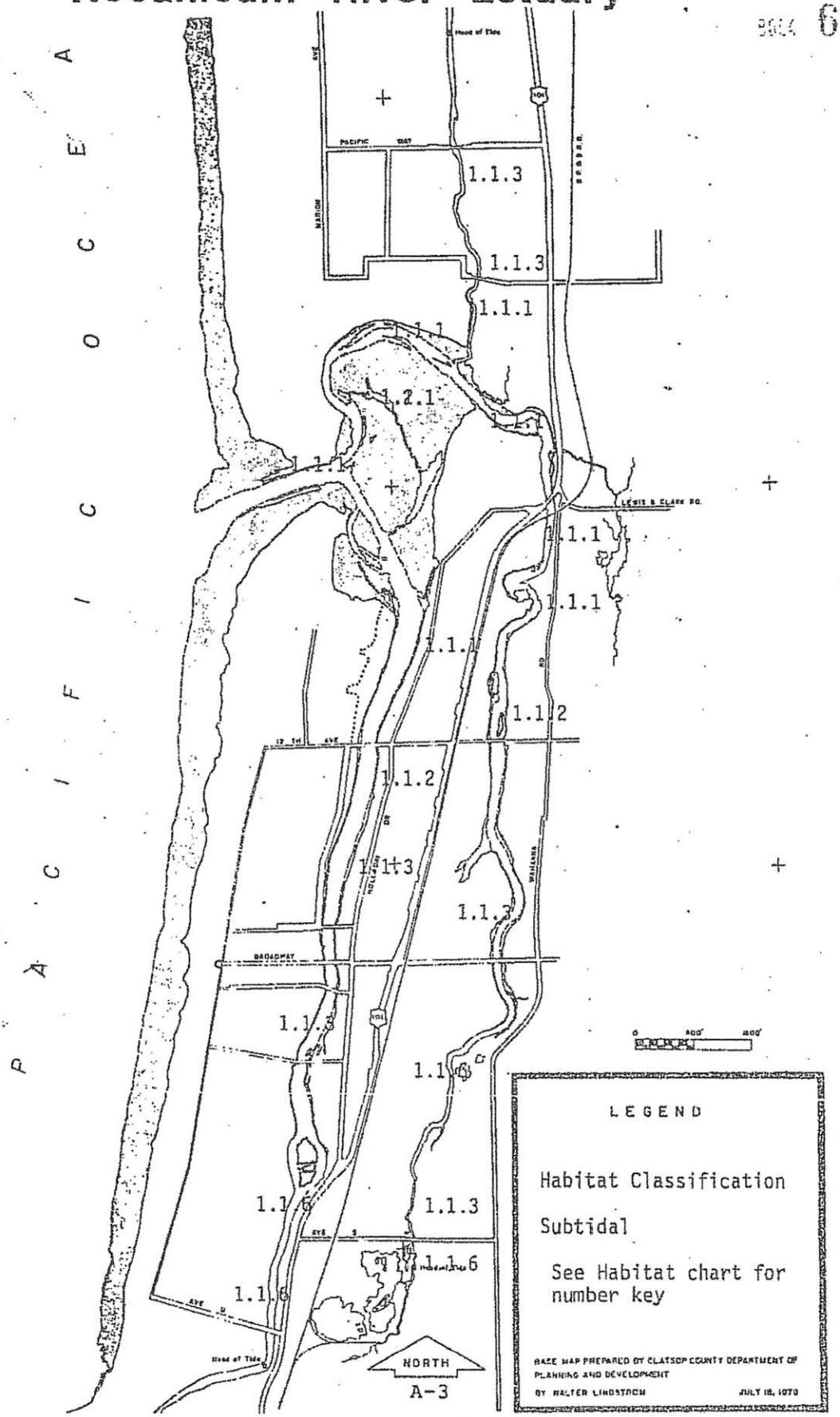
U. S. Department of Agriculture Soil Conservation Service

May 1971

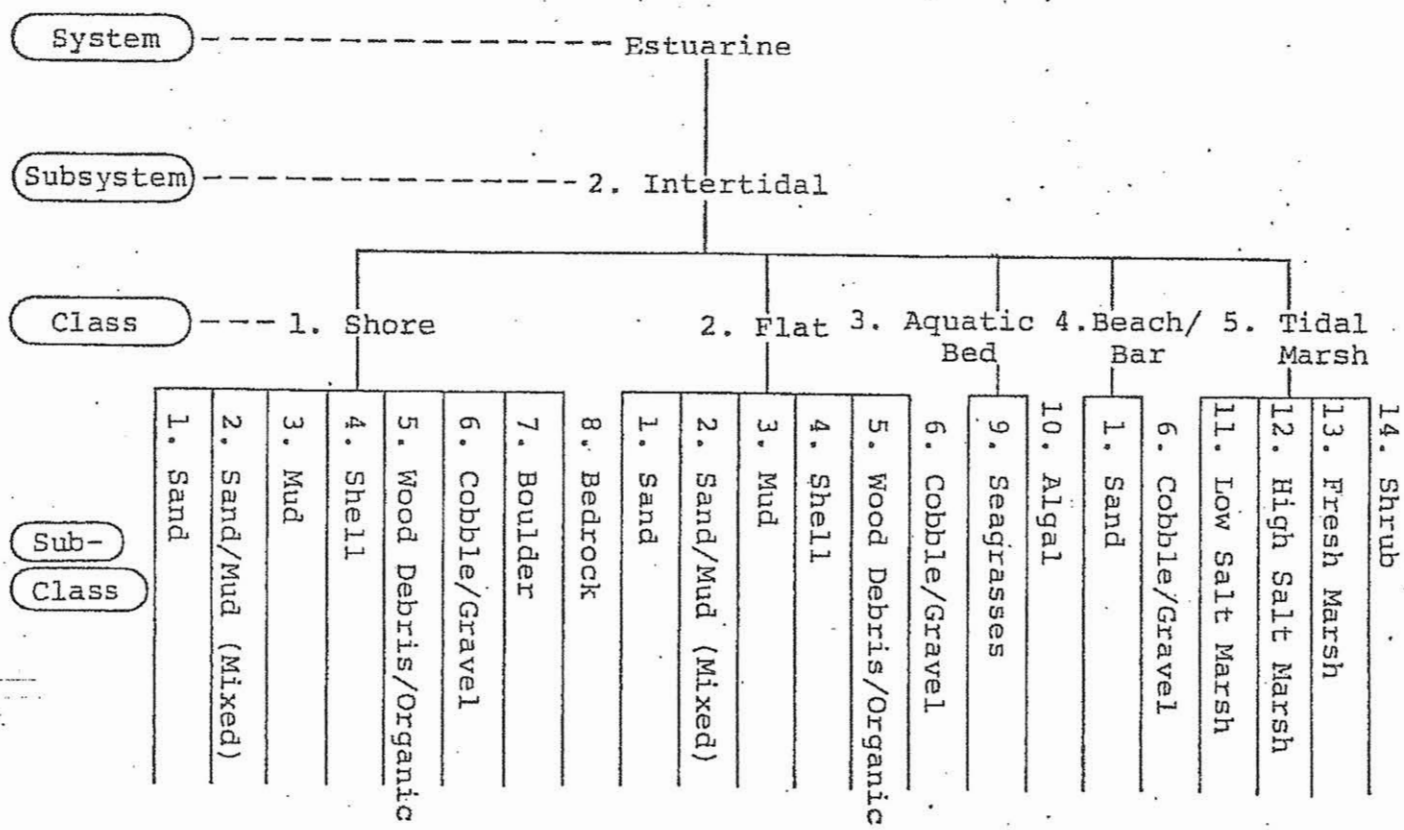


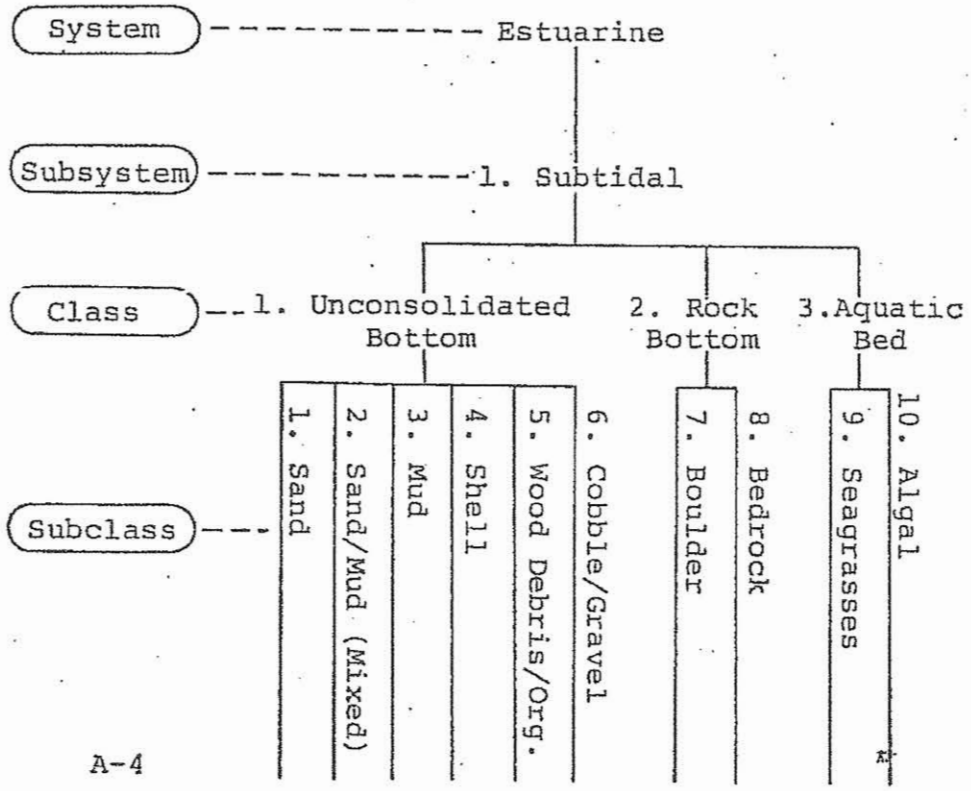
A-2

Necanicum River Estuary



ESTUARINE HABITAT CLASSIFICATION SYSTEM





Modified from "Classification of Wetlands and Deep-Water Habitats 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[1]. 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[2] (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

[1]Muhlberg, Gary, Instructor of Oceanography, Clatsop Community College. Personal conversation, August 14, 1978.

[2]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[3] 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[4] (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[5].

[3]Kulm, L.D. & John V. Byrne, Estuaries (Sediments) of Yaquina Bay, Oregon, Washington D.C., American Association for the Advancement of Science, Publication #83.

[4]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.

[5]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[6] 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[7].

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.

[6] Barnes, R.S.K., Estuarine Biology, London, Edward Arnold Limited, 1974.

[7] 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 fluviatile 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.

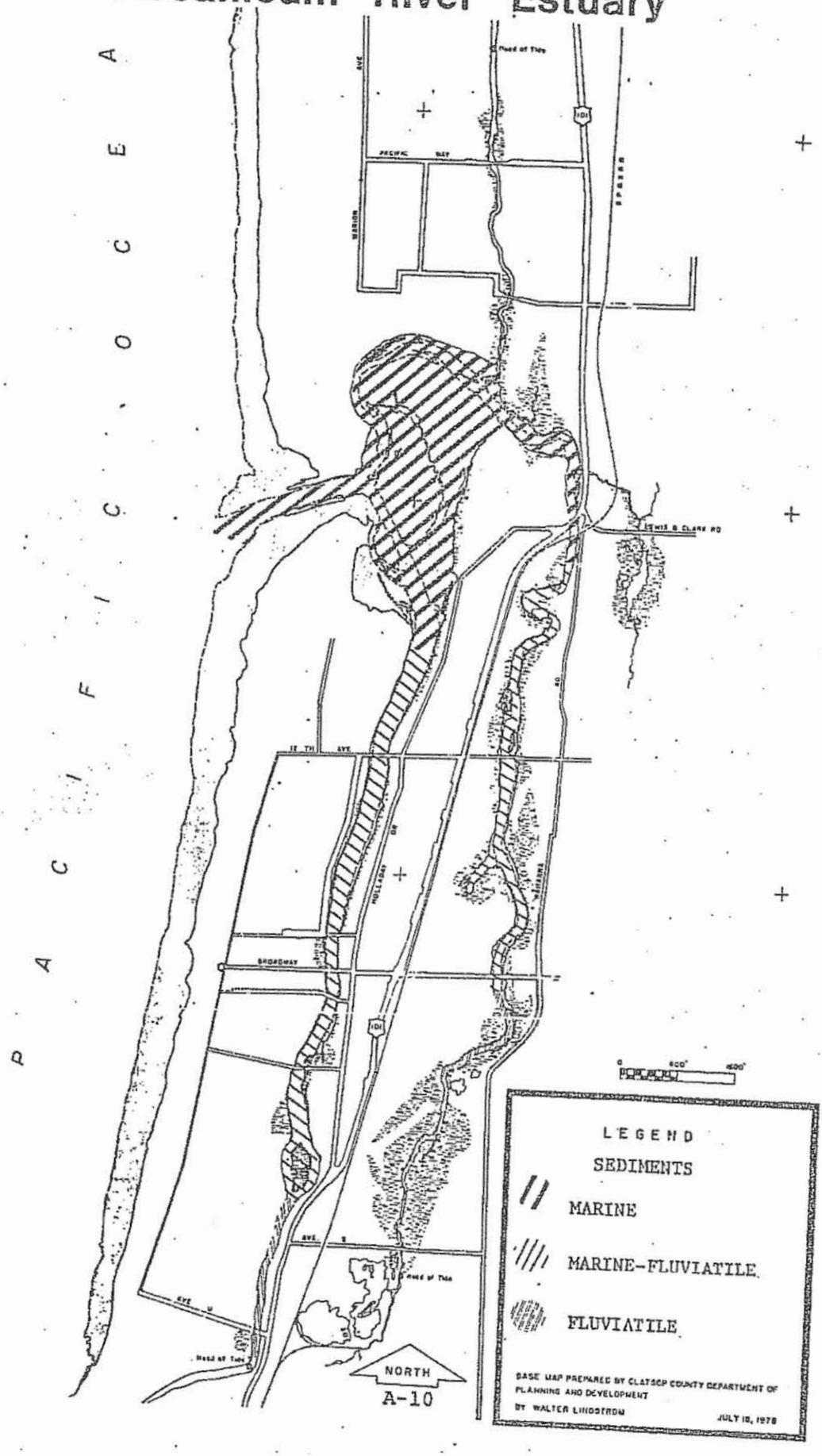
Based on the angle of entry it appears that the Neawanna system at its mouth would receive its water at a slightly higher initial velocity than the Necanicum. Proceeding upstream on the Neawanna, this water is further funnelled, allowing the velocity to be maintained. Near the 101 Bridge a large boulder 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 fluviatile from the fluviatile 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.

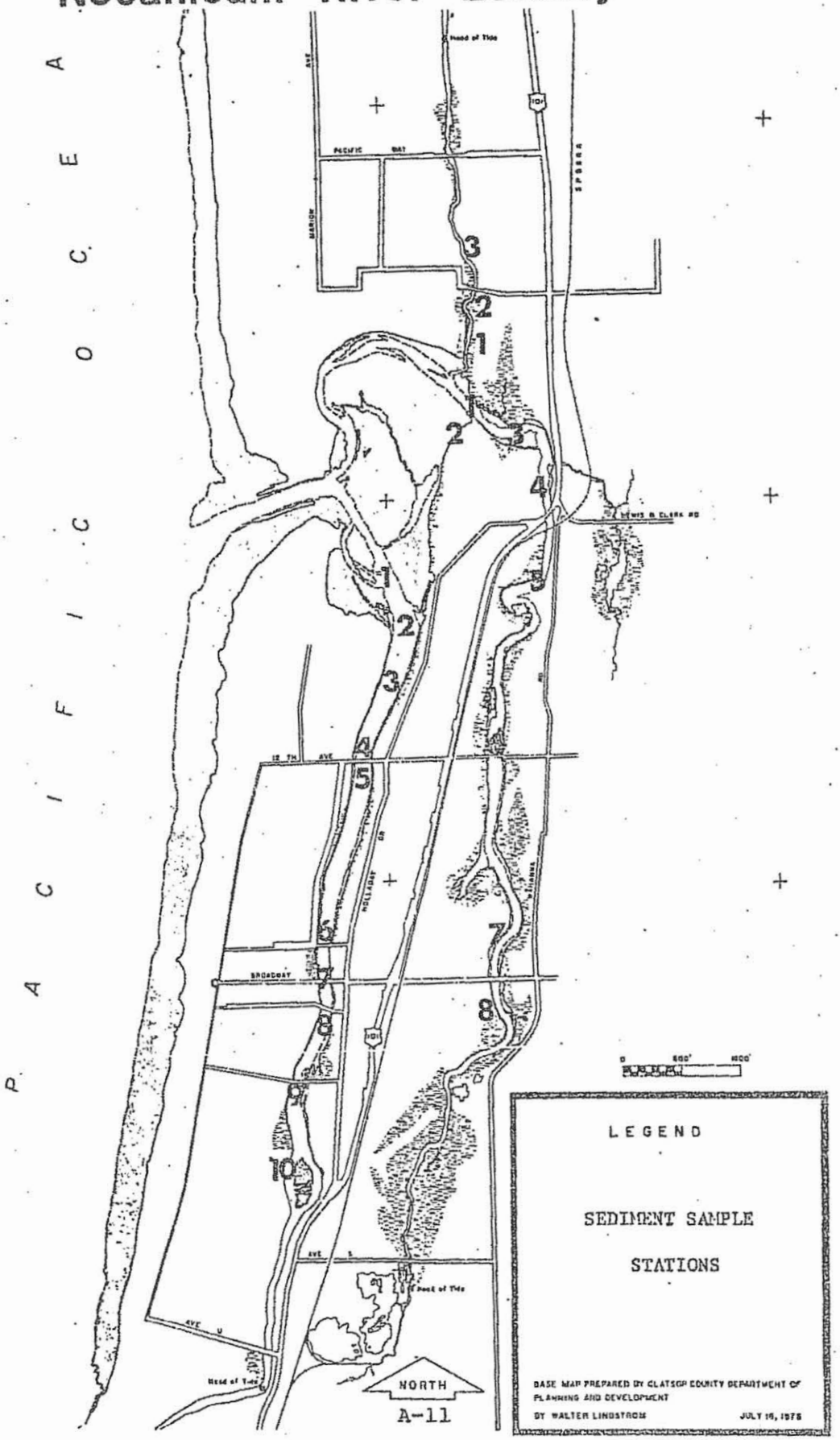
The third and final tributary, Neacoxie Creek, is an excellent example of what happens in a system when man-made constrictions are imposed. Initially, this creek must be considered a marine fluviatile which makes it the only water source in the estuary that lacks a marine zone. This projection is based 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



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° 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.

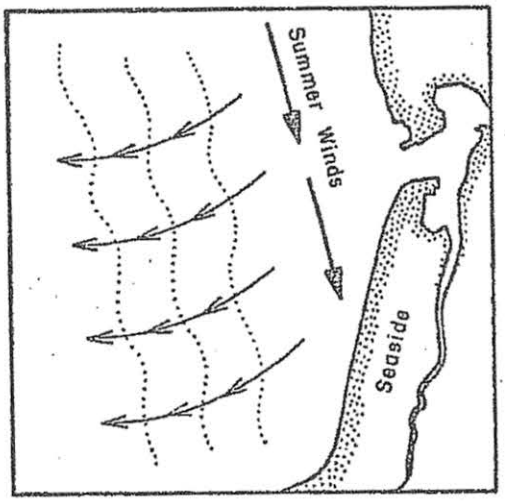


Chart 1. Upswelling–Surface View

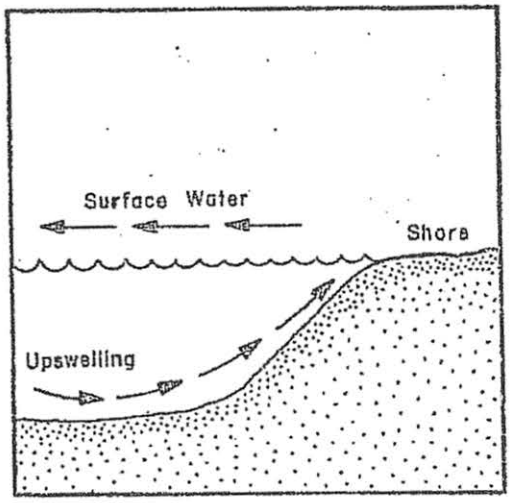


Chart 2. Upswelling in Crossection

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

Month	Mean Precipitation Inches	Mean Temperature	Wind Speed mph	Wind Direction
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	

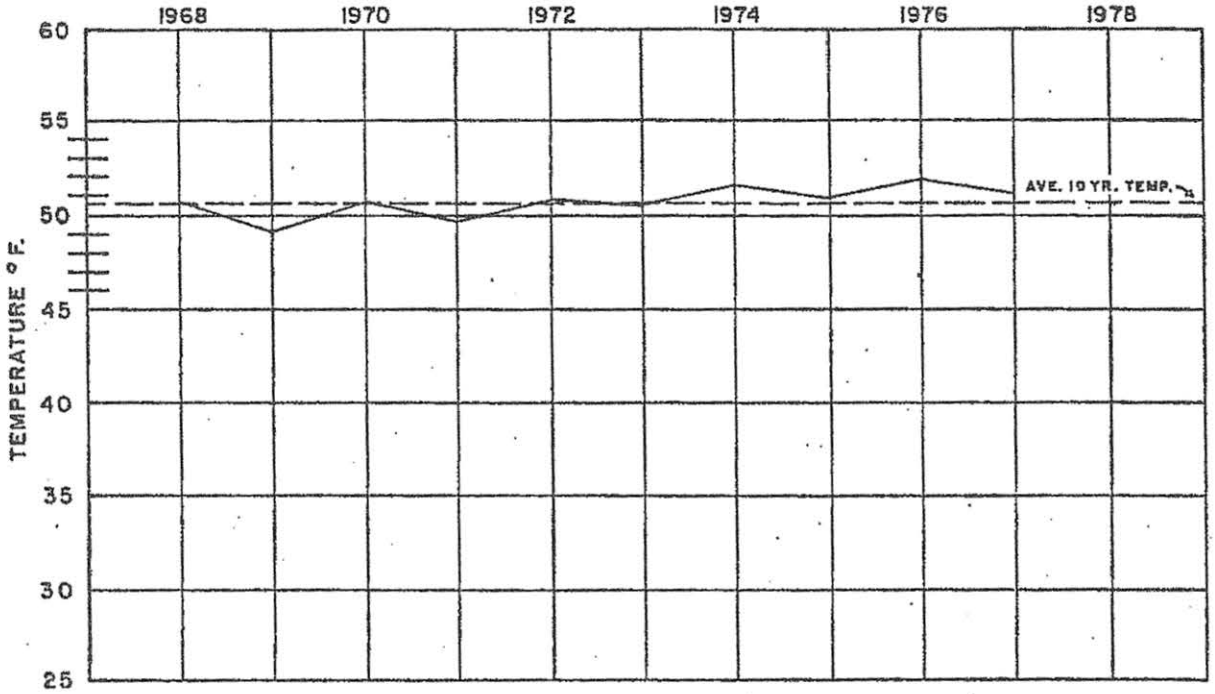
Extremes

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

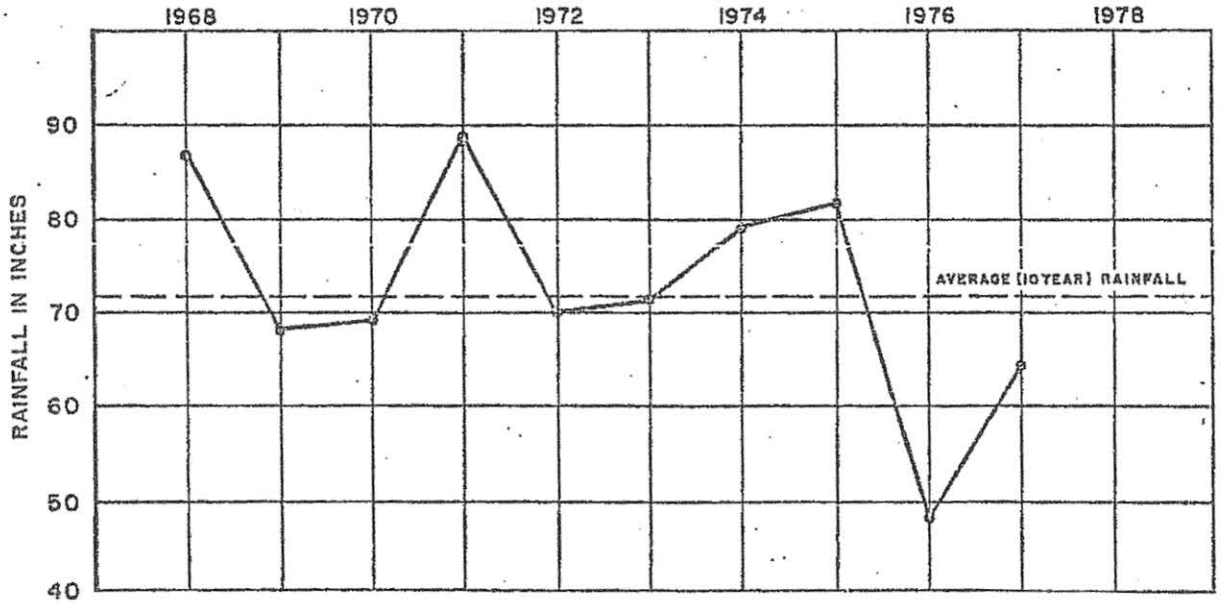
From: U.S. Department of Commerce, Local Climatological Data 1977.

TEMPERATURE AND RAINFALL—SEASIDE AREA

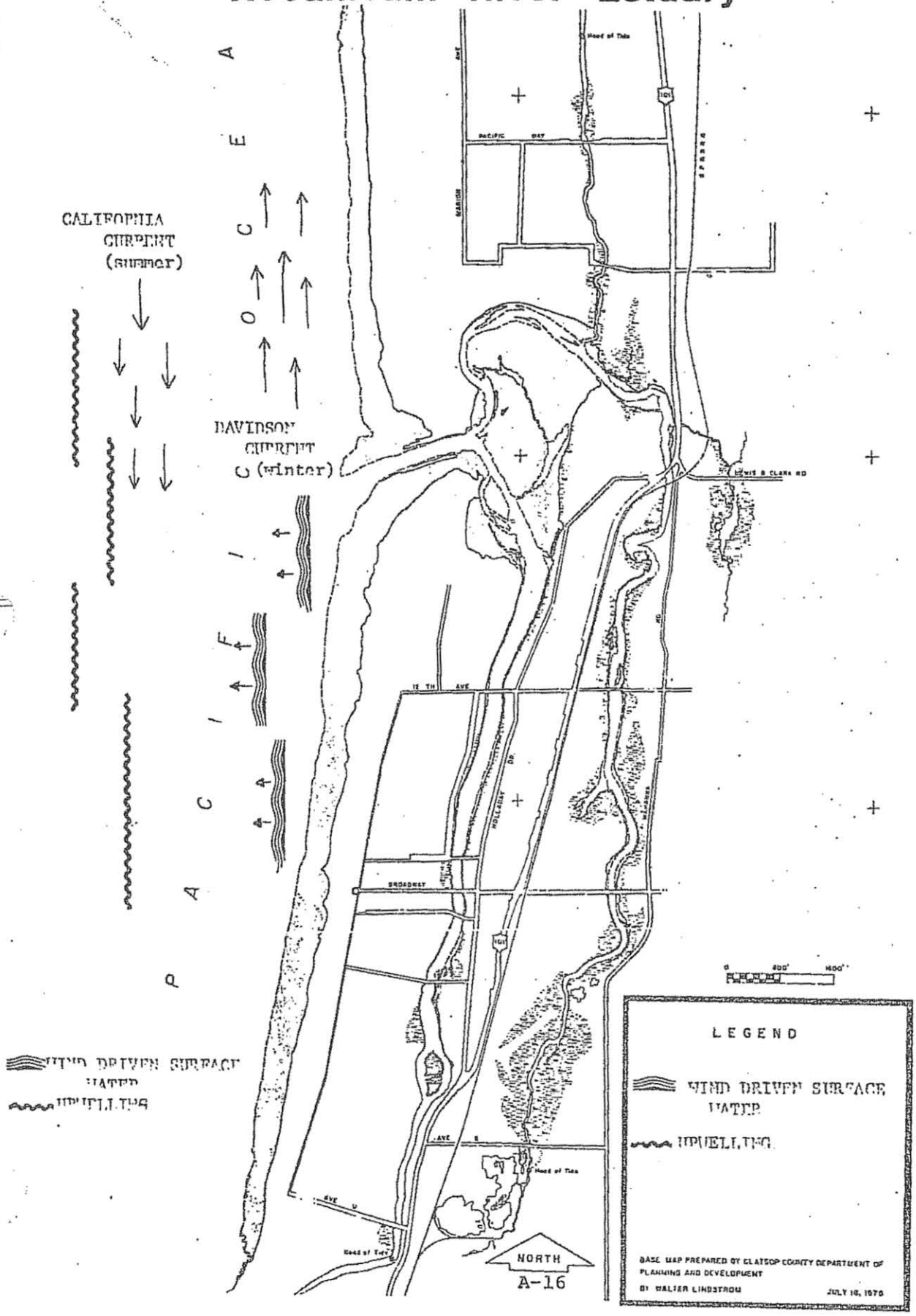
TEMPERATURE



RAINFALL



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:

FLOOD	PEAK DISCHARGE
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.

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

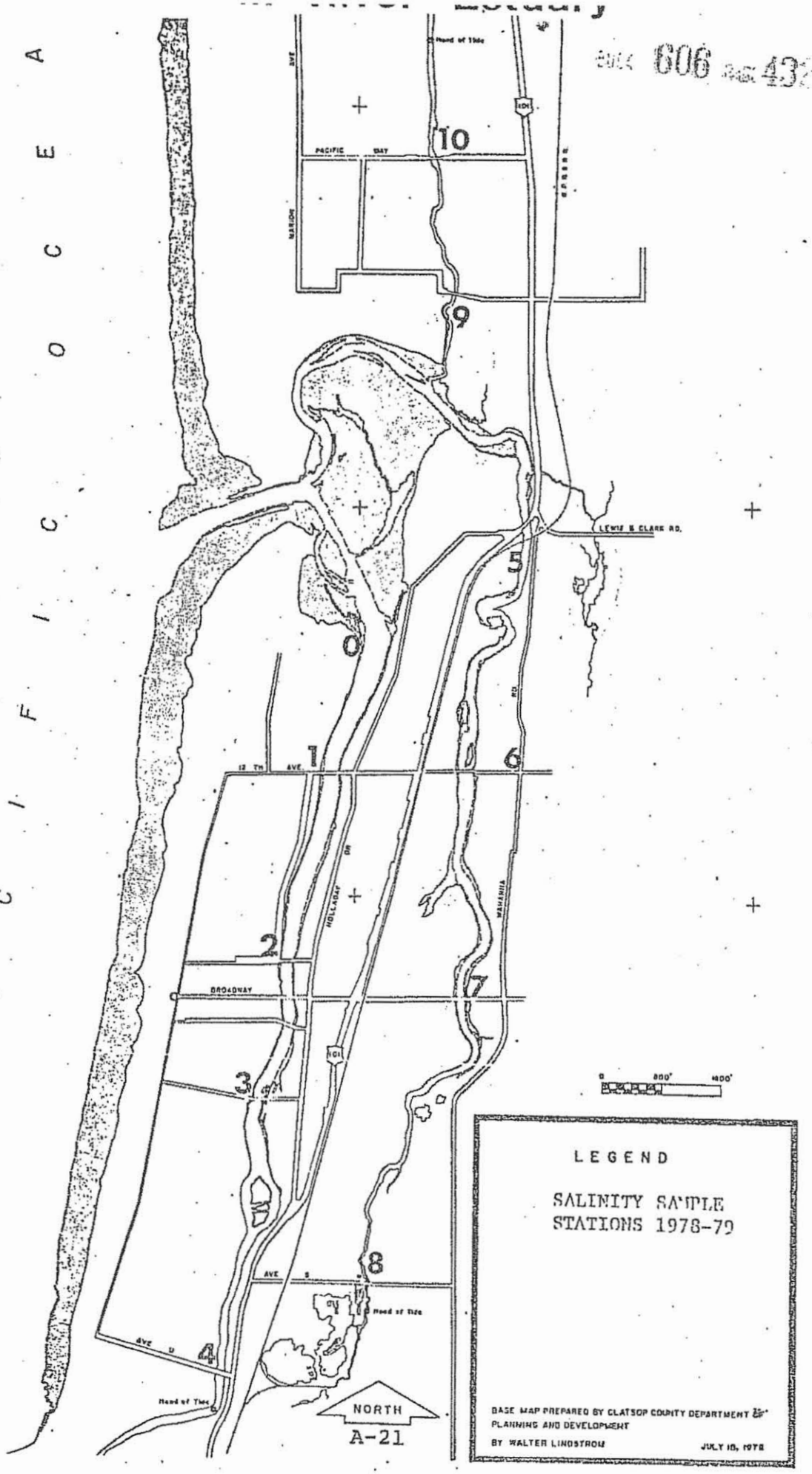
Necanicum--Because of the degree of freshwater contributed by the Necanicum, the overall salinity is somewhat reduced with most of the estuarine organisms being found only in the very lowest part of the river.

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 BOT.	17.1 29.5	15.6 15.3
Aug 21	Low	#2 Necanicum	9:45 a.m.	9:31 a.m. -0.6 (LW)	TOP BOT.	25.5 30.2	15.5 14.8
Aug 21	Low	#3 Necanicum	9:55 a.m.	9:31 a.m. -0.6 (LW)	TOP BOT.	4.3 30.2	15.4 14.8
Aug 21	Low	#4 Necanicum	10:05 a.m.	9:31 a.m. -0.6 (LW)	TOP BOT.	0.4 24.5	15.3 15.6
Aug 21	Low	#1 Necanicum	4:45 p.m.	3:41 p.m. 8.4 (HW)	TOP BOT.	9.7 30.6	17.3 15.5
Aug 21	Low	#2 Necanicum	4:30 p.m.	3.41 p.m. 8.4 (HW)	TOP BOT.	5.0 30.0	16.9 15.5
Aug 21	Low	#3 Necanicum	4:15 p.m.	3:41 p.m. 8.4 (HW)	TOP BOT.	3.2 29.4	16.5 15.5
Aug 21	Low	#4 Necanicum	4:11 p.m.	3:41 p.m. 8.4 (HW)	TOP BOT.	0.7 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 BOT.	1.4 1.7	7.0 6.9
Nov 19	High	#1	3:15 p.m.	2:46 p.m. 7.8 (HW)	TOP BOT.	0.4 0.4	6.6 7.0
Nov 19	High	#3	3:00 p.m.	2:46 p.m. 7.8 (HW)	TOP BOT.	0.3 0.3	-- 6.5
Jan 14	Low	#0 Necanicum Sewage Plant	2:45 p.m.	1:24 p.m. 7.5 (HW)	TOP BOT.	21.2 30.0	6.6 7.0
Jan 14	Low	#3 Necanicum	3:15 p.m.	1:24 p.m. 7.5 (HW)	TOP BOT.	2.2 26.9	6.6 6.8
Aug 25	Low	#10	3:10 p.m.	(LW)		6.1	18.6


PACIFIC OCEAN
Head of Tide
PACIFIC BAY
MARION
101
10
9
LEWIS & CLARK RD.
5
0
12 TH AVE.
1
6
HOLLADAY DR
WAHKIAKUM
2
BROADWAY
7
3
0 800' 1600'
8
AVE S
Head of Tide
AVE U
4
Head of Tide
NORTH
LEGEND
SALINITY SAMPLE
STATIONS 1978-79
BASE MAP PREPARED BY CLATSOP COUNTY DEPARTMENT OF
PLANNING AND DEVELOPMENT
BY WALTER LINDSTROM
JULY 18, 1978

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	
Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom
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), dinoplagellates, 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:

Bacillaria sp.
Rhizosolenia sp.
Coscinodiscus centralis
Chaetoceros sp.
Thalassionema nitzchiodes
Asterionella japonica
Chaetoceros debilis
Thalassiosira decipiens
Ditylum sp.
Skeletonema sp.
Biddulphia longicruris
Nitzschia closterium
Melosira moniliformis

DINOPLAGELLATES

Noctiluca sp.
Peridinium sp.

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

	July	August	January	March
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
Thalassisira decipiens	D	M	I	I
Ditylum sp.	I	-	-	I
Skeletonema sp.	I	I	-	-
Biddulphia sp.	M	I	I	M
Nitzschia closterium	I	-	-	I
Melosira moniliformis	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.

Zostra 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 polycheate worms and crustaceans are found among its rhizomes. It also provides substrate and habitat for diatoms, algae, and crustaceans.

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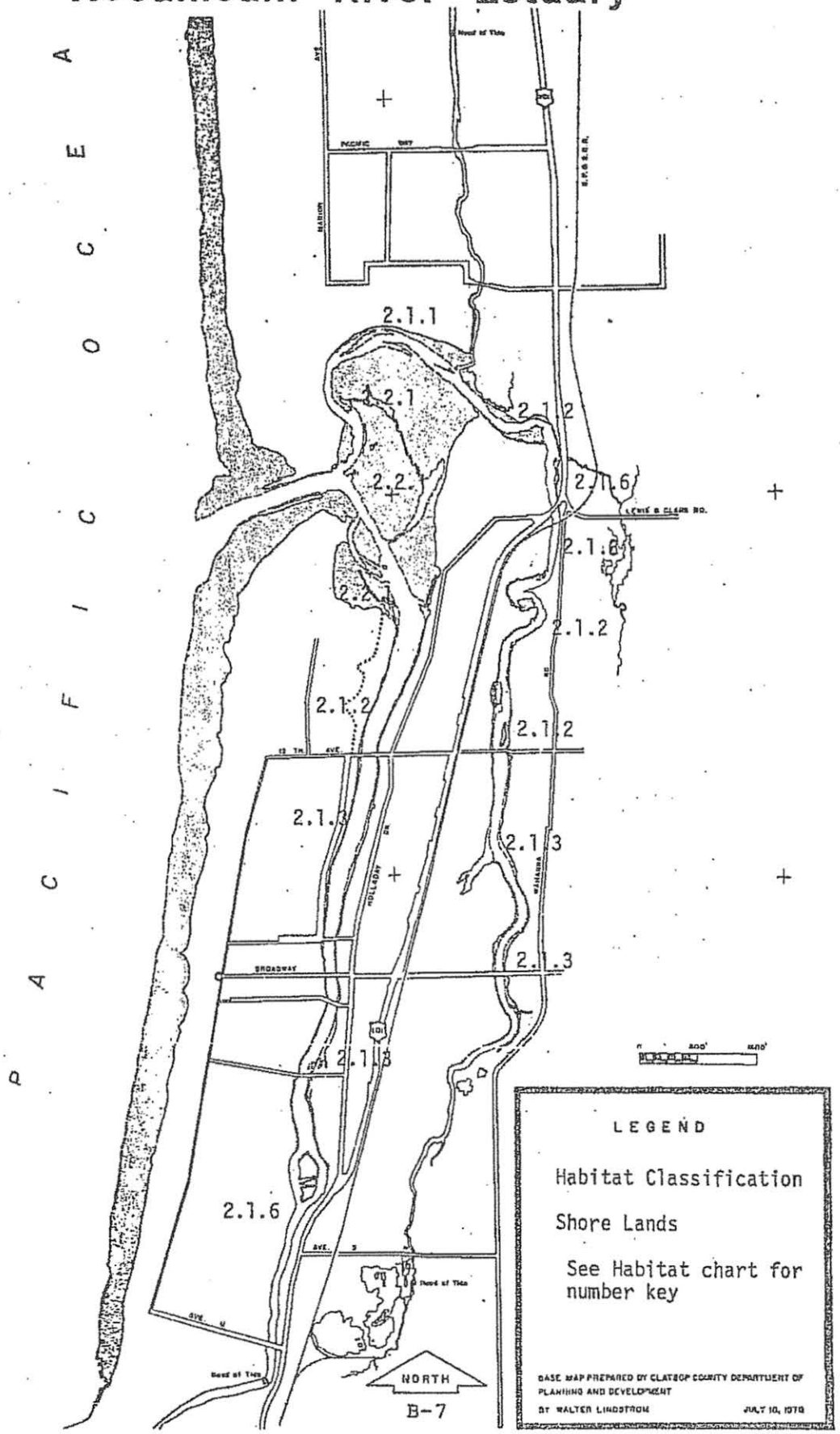
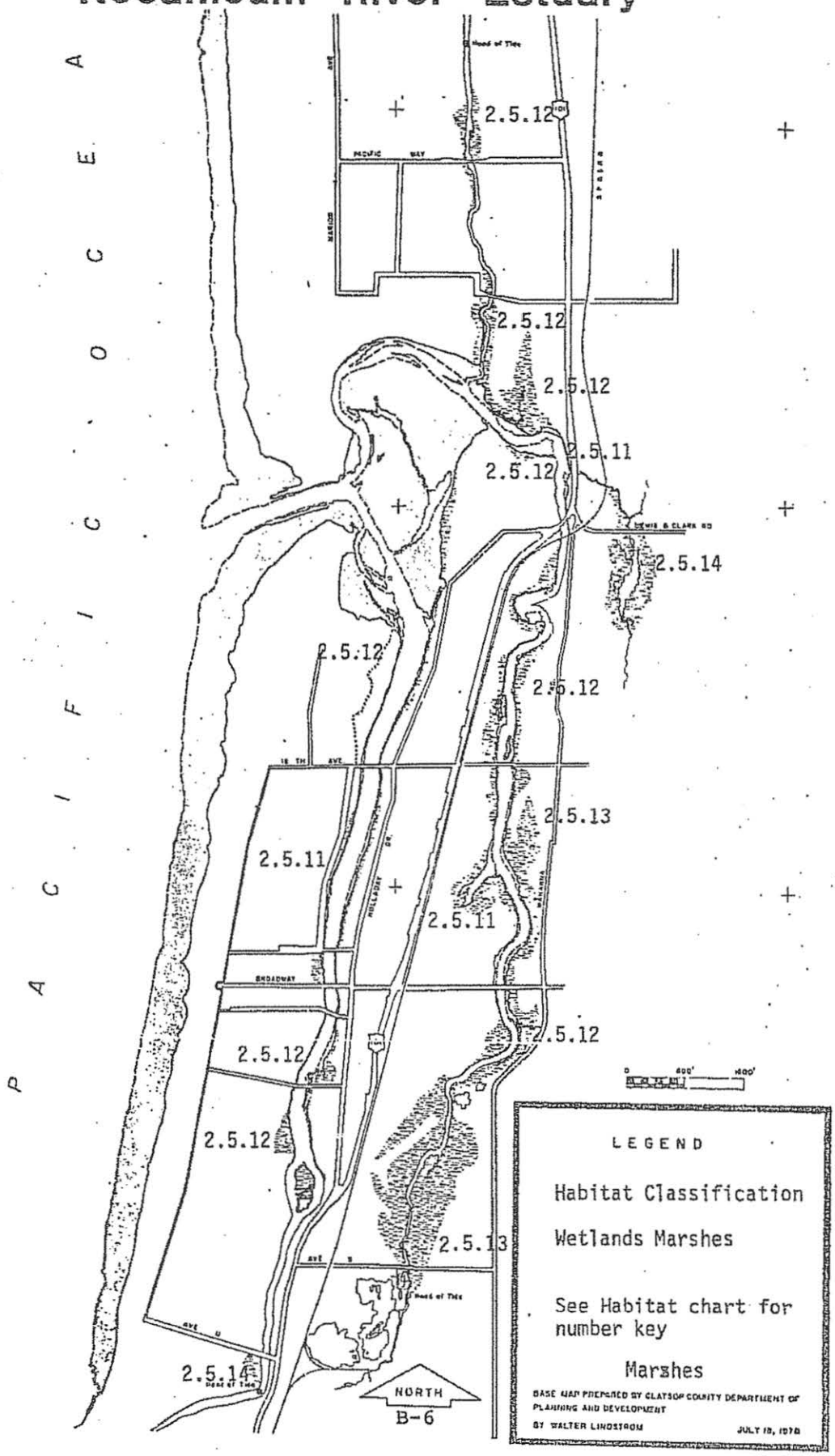
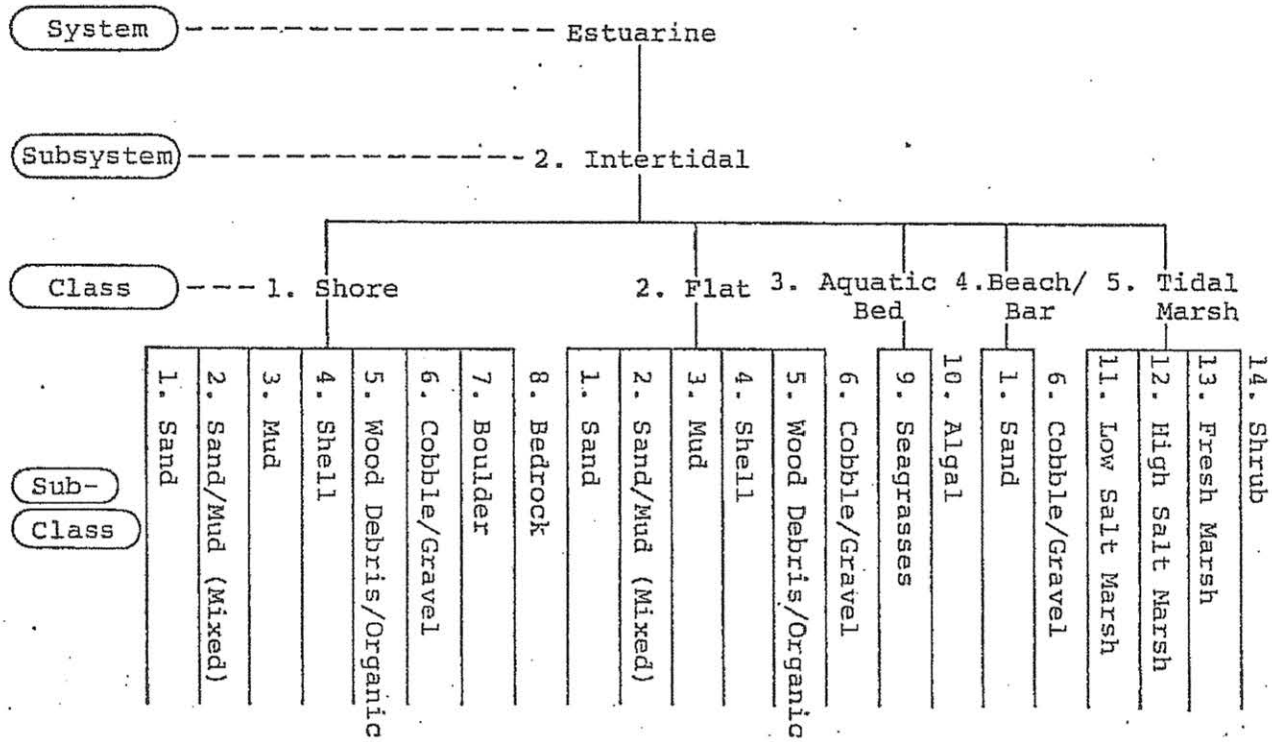
Necanicum River Estuary

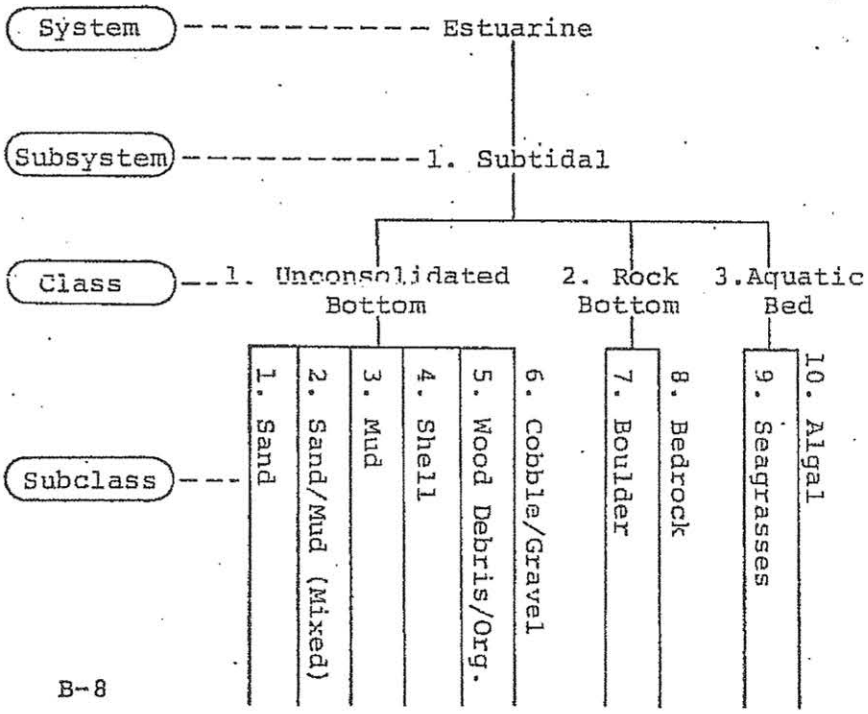


Necanicum River Estuary



ESTUARINE HABITAT CLASSIFICATION SYSTEM





Modified from "Classification of Wetlands and Deep-Water Habitats 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

Ecosystem	$gms/M^2/year$ (grams/square meters/year)	lbs/acre/year
Land deserts, deep oceans	Tens	Hundreds
Grasslands, forests, eutrophic lakes, ordinary agriculture	Hundreds	Thousands
Estuaries, deltas, coral reefs, intensive 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.

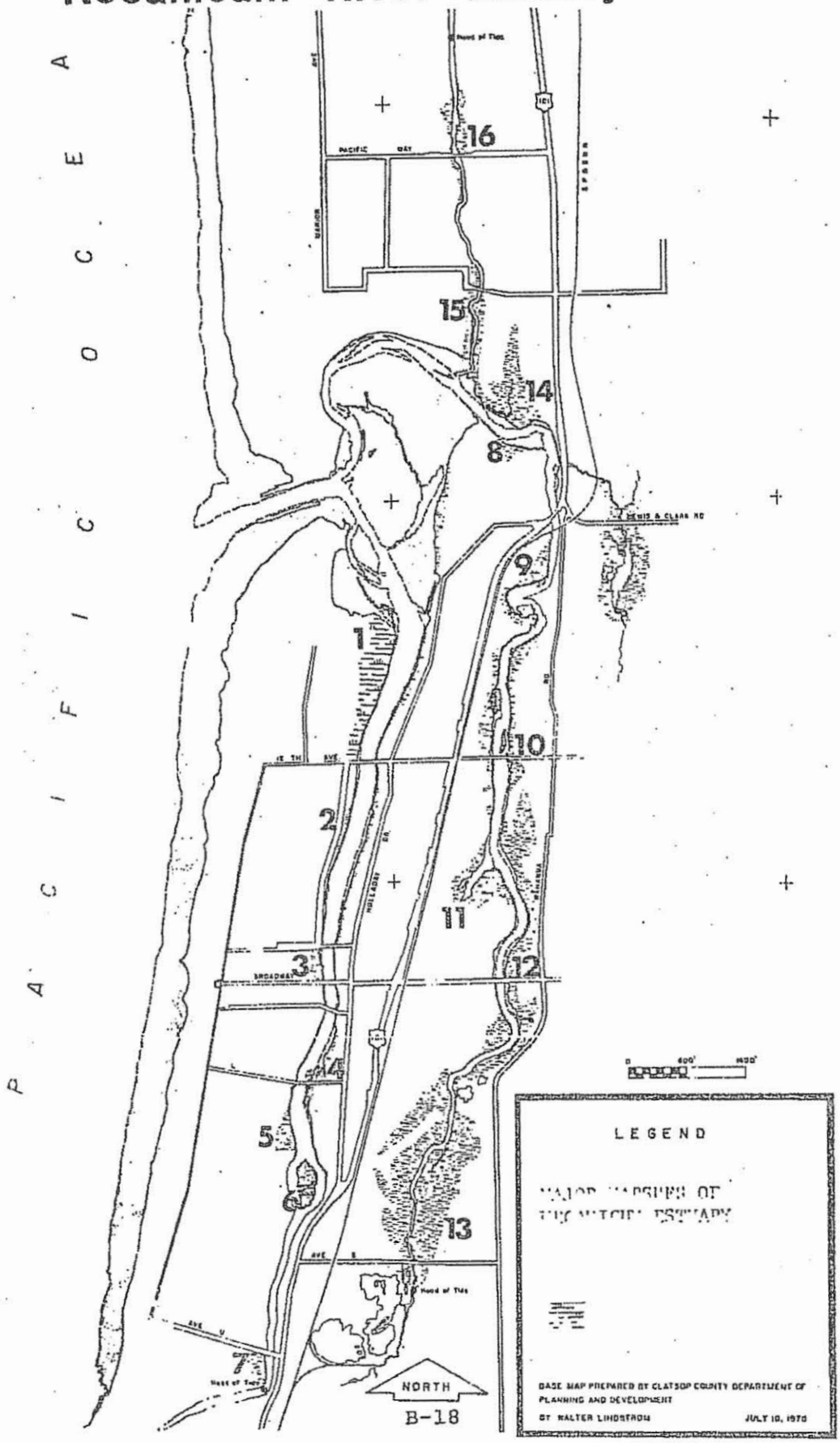
Neacoxie System

(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.

Necanicum River Estuary



MARSH PLANT DISTRIBUTION—NECANICUM ESTUARY

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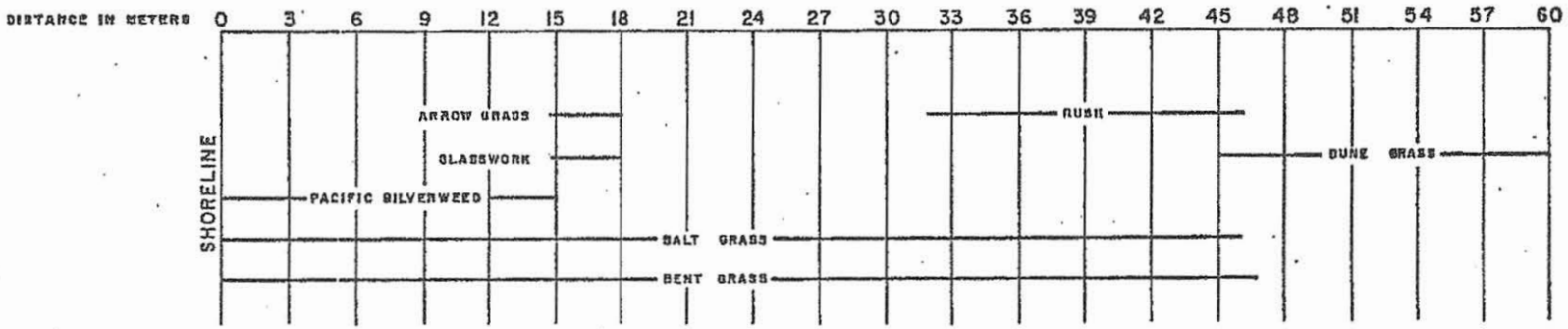

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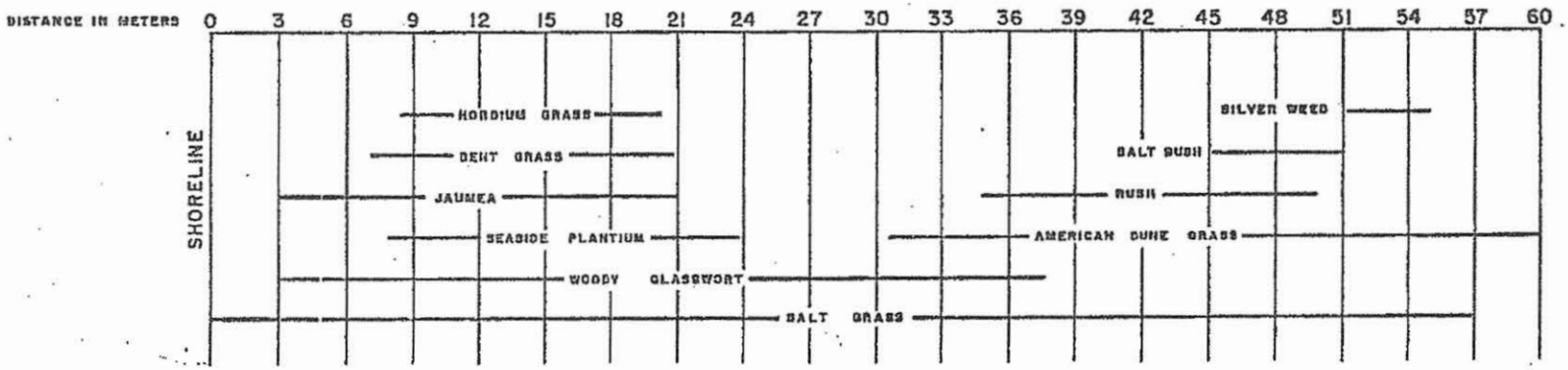

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Marsh Plants

LYNGBYE'S SEDGE

WOODY GLASSWORT

PACIFIC SILVER WEED

SALT GRASS

TUFTED HAIRGRASS

Checklist of Necanicum Estuary Marsh Plants

Common Name	Scientific Name
European Beach Grass	*Ammophila arenaria*
Thrift	*Armeria maritima*
Bent Grass	*Arostis alba*
Salt Bush	*Atriplex patula*
Slough Sedge	*Carex obunupta*
Large-Headed Sedge	*Carex macrocephala*
Lyngbyes' Sedge	*Carex lyngbyei*
Salt Marsh Dodder	*Cuscuta salina*
Tufted Hairgrass	*Dischampaia caepitosa*
Salt Grass	*Distichlis spicata*
Spike Rush	*Eleocharis sp.*
American Dune Grass	*Elymus mollis*
Tall Fescue	*Festuca sp.*
Sea Milkwort	*Glaux sp.*
Fox Tail	*Hordeum sp.*
None	*Jaumea carnosa*
Baltic Rush	*Juncus balticus*
Beach Pea	*Lathyrus japonicus*
Seaside Plantain	*Plantago maritima*
Pacific Silverweed	*Potentilla pacifica*
Seaside Dock	*Rumex sp.*
Ditch-grass	*Puppia sp.*
Woody Glasswort	*Salicornia virginica*
None	*Scirpus macrocarpus* (freshwater)
Three Square Grass	*Scirpus maritimus*
Seaside Arrow Grass	*Triglochin maritima*

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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 cladocerns. 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.

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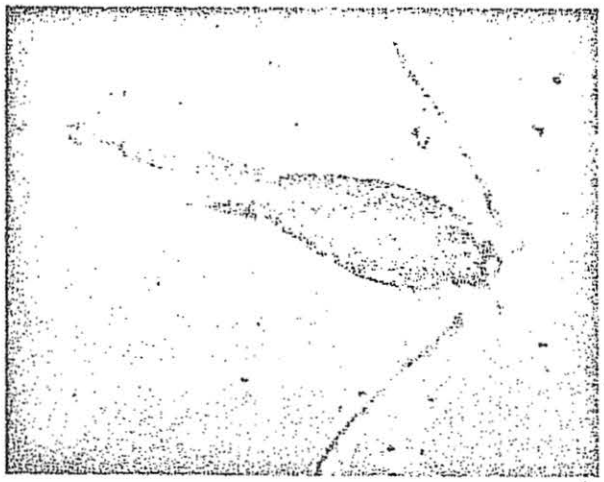
Plankton

BARNACLE LARVA



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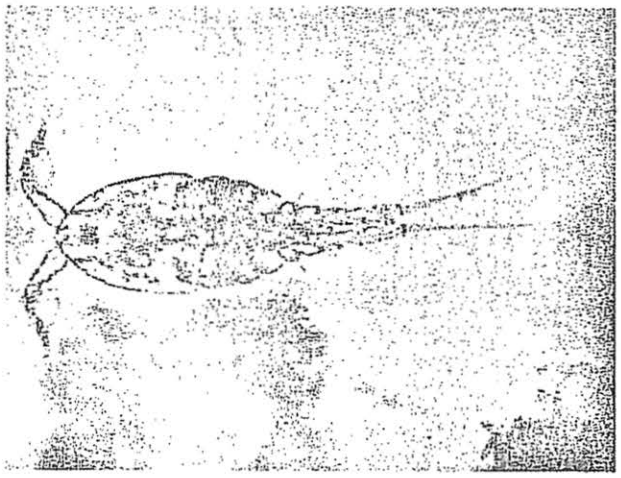
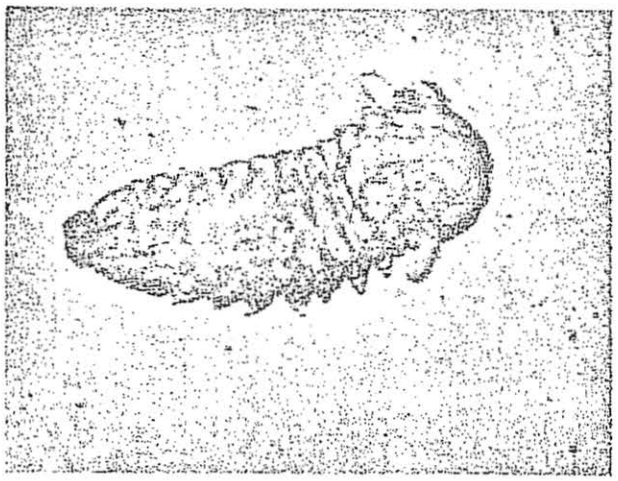
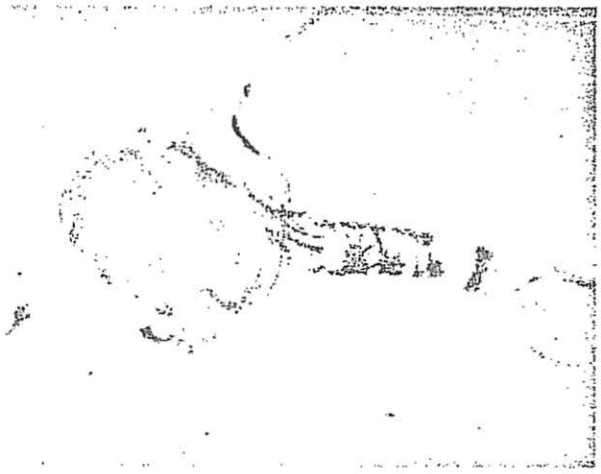


CYCLOPS-COPEPOD



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 mercidis

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

	July	August	January	March
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.

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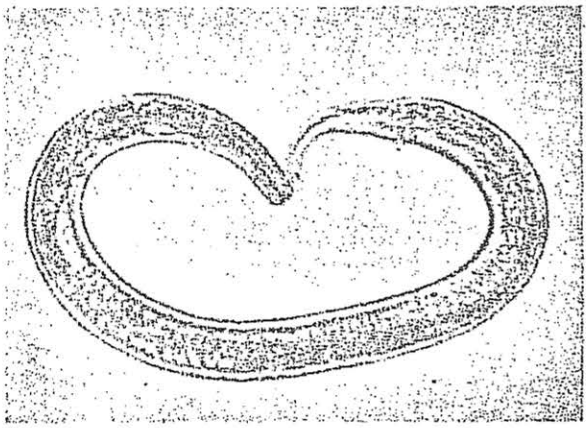
Benthic Organisms

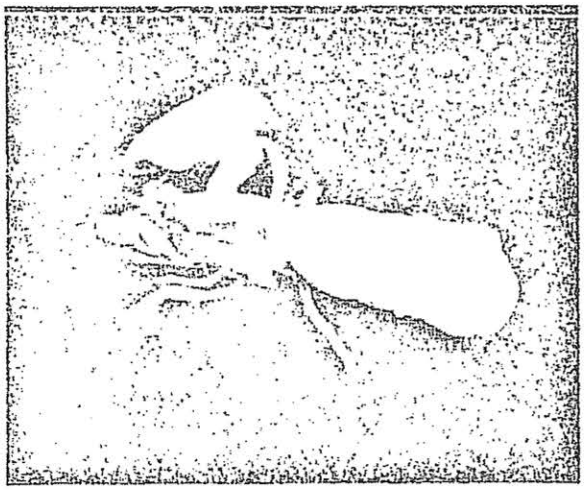
CLAM LARVA

HARPACTICOID-COPEPOD

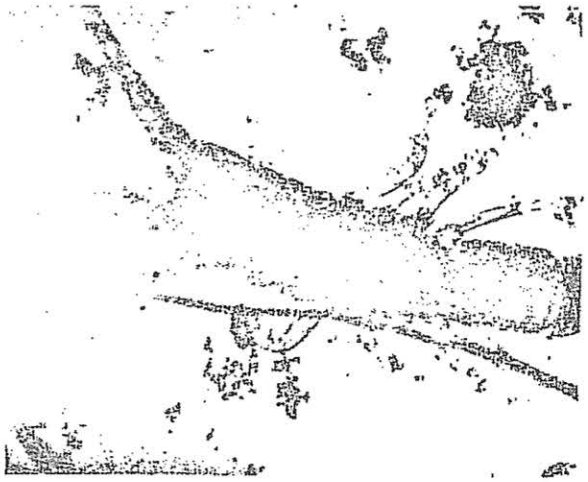


NEMATODE WORM

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 (<u>Salmo gairdneri gairdneri</u>):

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 spawing 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.

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NECANICUM RIVER ESTUARY
FISH SPECIES LIST

Common Name	Scientific Name
Coho salmon	Oncorhynchus kisutch
Chum salmon	Oncorhynchus keta
Chinook salmon	Onchorhynchos tschawytscha
Steelhead	Salmo gairdneri gairdneri
Cutthroat trout	Salmo clarki clarki
Shinner perch	Cymatogaster aggregata
Striped perch	Embiotoca lateralis
Pile perch	Rhacochilus vacca
Walleye perch	Hyperprosopon argenteum
Redtail perch	Amphistichus rhodoterus
Starry flounder	Platichthys stellatus
Pacific staghorn sculpin	Leptocottus armatus
Surf smelt	Hypomesus pretiosus
Northern anchovy	Engraulis mordax
Pacific herring	Clupea herengus pallasi
Bay pipe fish	Syngnathus griseolineatus
Carp	Cyprinus carpio
Three spine stickleback	Gasterosteus aculeatus
Pacific lamprey	Entosphenus tridentatus
Sturgeon (green)	Acipenser medirostris

REFERENCES

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WATERBIRDS OBSERVED IN NECANICUM ESTUARY

Species	Habitat
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)

Species	Habitat
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."

Species	Habitat
Long-legged Wading Birds	
Great Blue Heron	shoreline
Green Heron	shoreline
American Bittern	marsh, grassland
Snowy Egret (single sighting)	

Species	Habitat
Raptors	
Red Tailed Hawk	woodlands
Bald Eagle (rare visitor)	water edge
Marsh Hawk	marsh, grassland
Rough-legged Hawk	Open marshes
American Kestrel	open country
Shorebirds and Gulls	
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

Species	Habitat
Other Birds of the Estuary Shoreline and Forest	
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

Species	Habitat
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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Miklos, D.F., The Audubon Society Field Guide to North American Birds. Alfred A. Knopf, Inc., New York, New York, 1977.

Nehls, H., Shorebirds of Oregon.

Robbins, C.S., B. Bruun, and H.S. Zim, Birds of North America. Western Publishing Co., Racine, Wisconsin, 1966.

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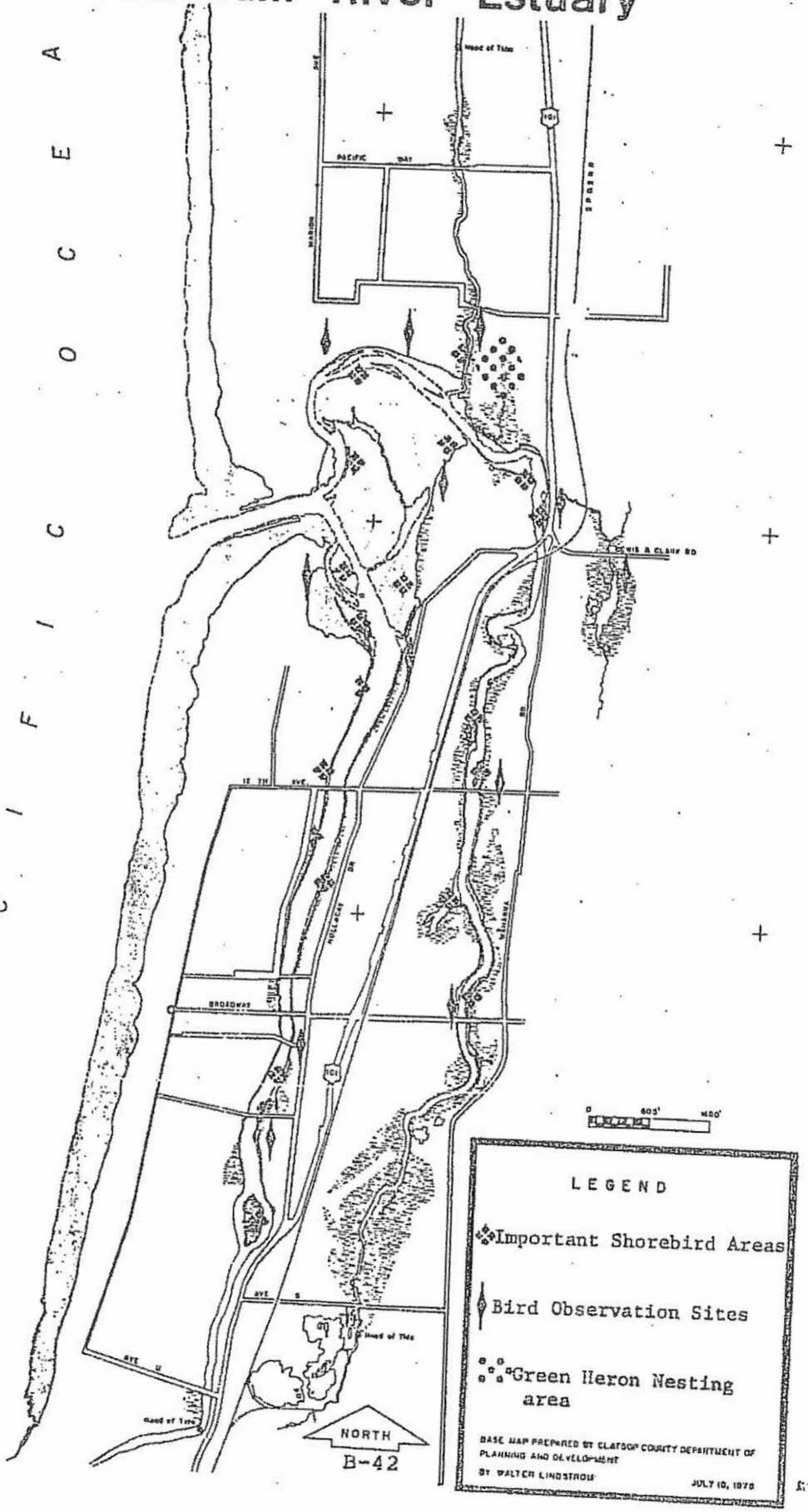
Necanicum River Estuary



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 (*Tamiascurus douglasii*)
Townsend Chipmunk (*Eutamias townsendi*)
Western Gray Squirrel (*Sciurus grieseus*)
Vagrant Shrew (*Sorux bendirei*)
Townsend Mole (*Scapanus townsendi*)
Opossum

Marine Mammals

Harbor Seal (*Phoca vitulina*)

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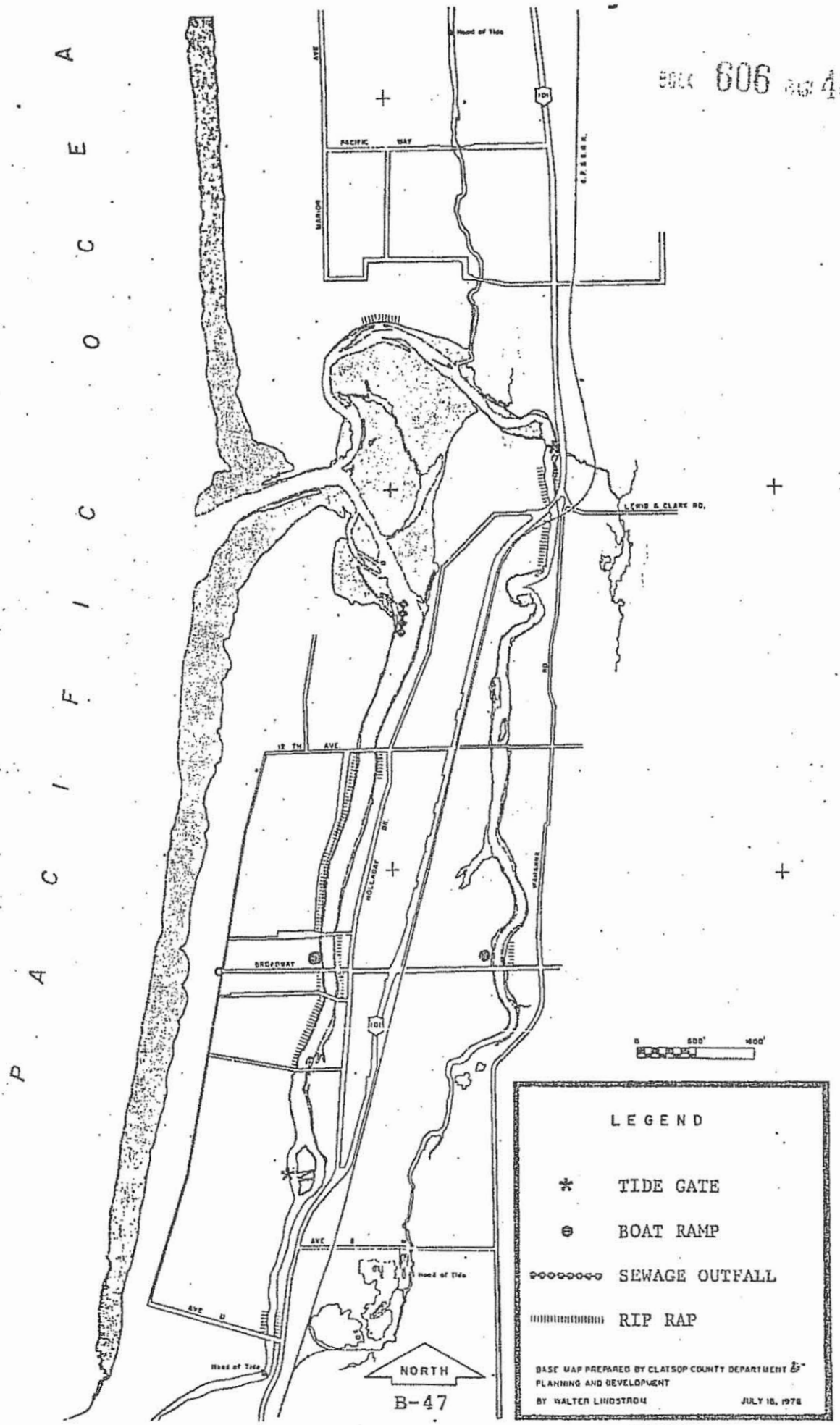
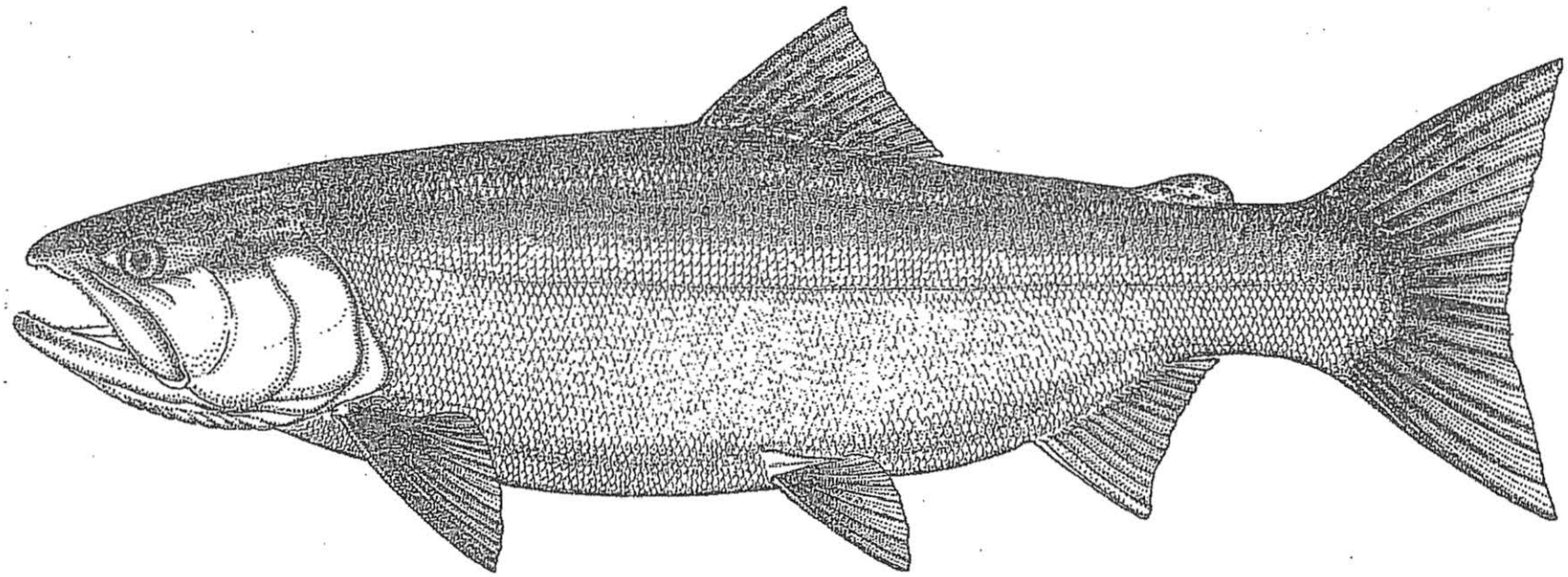
Yocom, C. and R. Dasmann, The Pacific Coastal Wildlife Region. Naturegraph Co., Healdsburg, California, 1965.

SECTION C

(Urban Impacts)

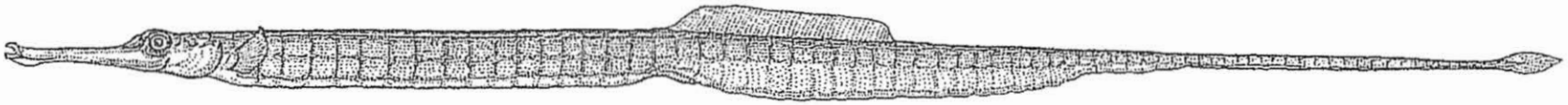
Existing Uses
(to be included later)


PACIFIC OCEAN
Head of Tide
PACIFIC WAY
MARION AVE
101
LEWIS & CLARK RD.
12 TH AVE
HOLLADAY DR.
BROADWAY
AVE B
AVE D
Head of Tide
Head of Tide
NORTH
0 500' 1000'
LEGEND
TIDE GATE
BOAT RAMP
SEWAGE OUTFALL
RIP RAP
BASE MAP PREPARED BY CLATSOP COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT
BY WALTER LINDSTROM
JULY 16, 1978



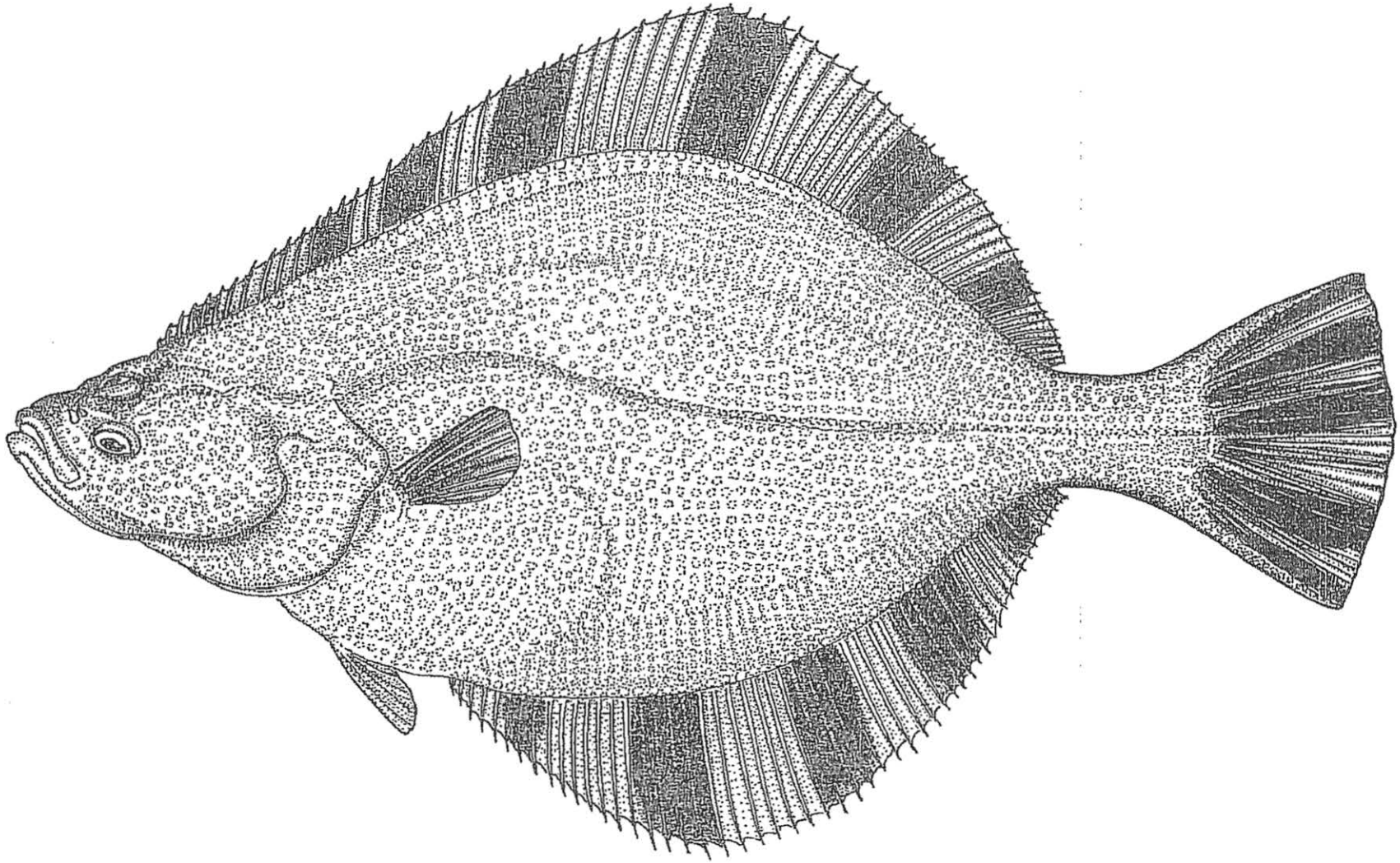
Oncorhynchus kisutch Coho Salmon

BOX 606 PAGE 1



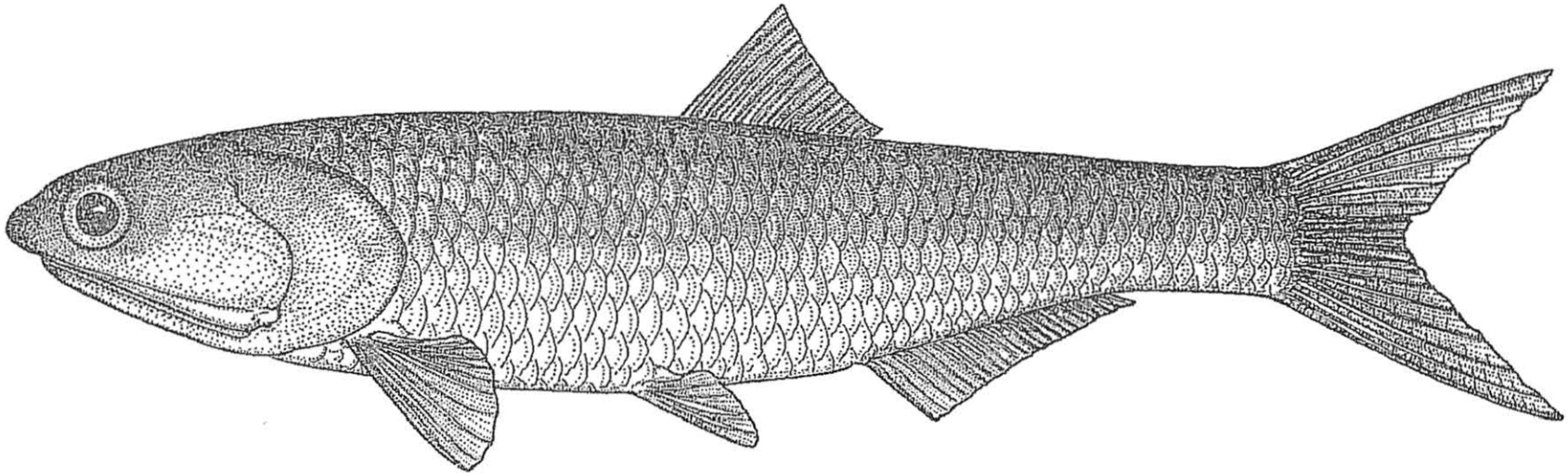
Syngnathus griseolineatus Bay Pipefish

606 35 481



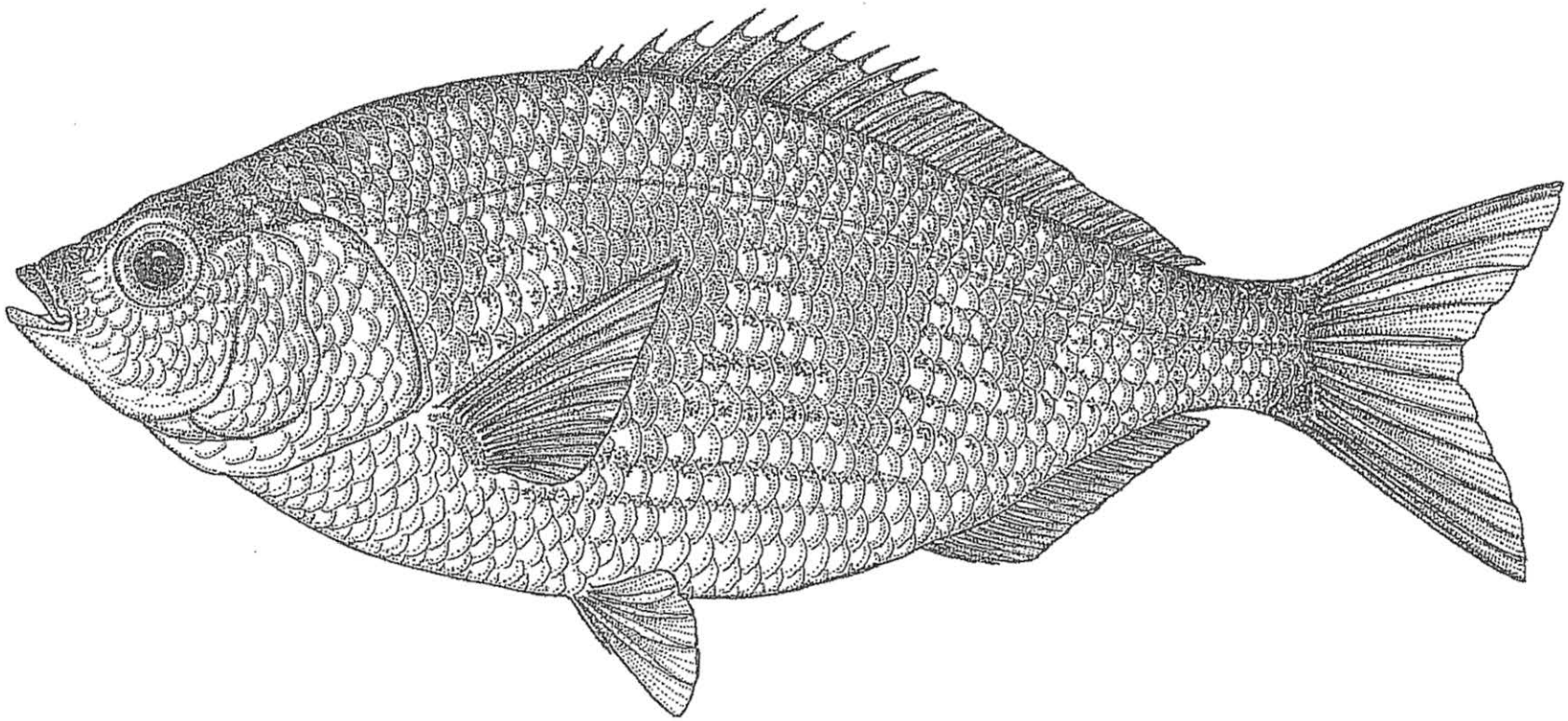
Paltichthys Stellalus Starry Flounder

POLK 606 PAGE 481



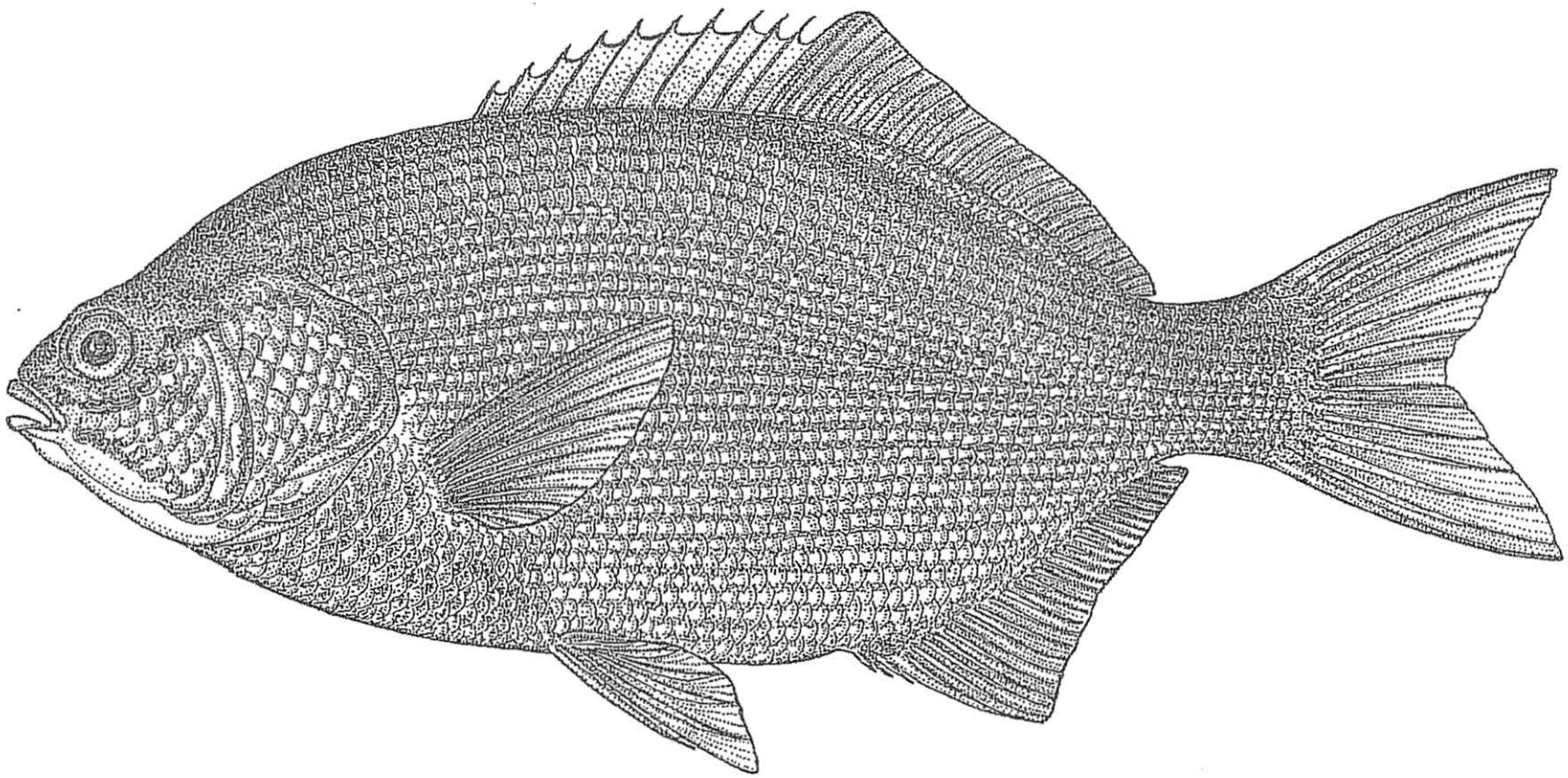
Engraulis Mordax Northern Anchovy

606 ABI 1991



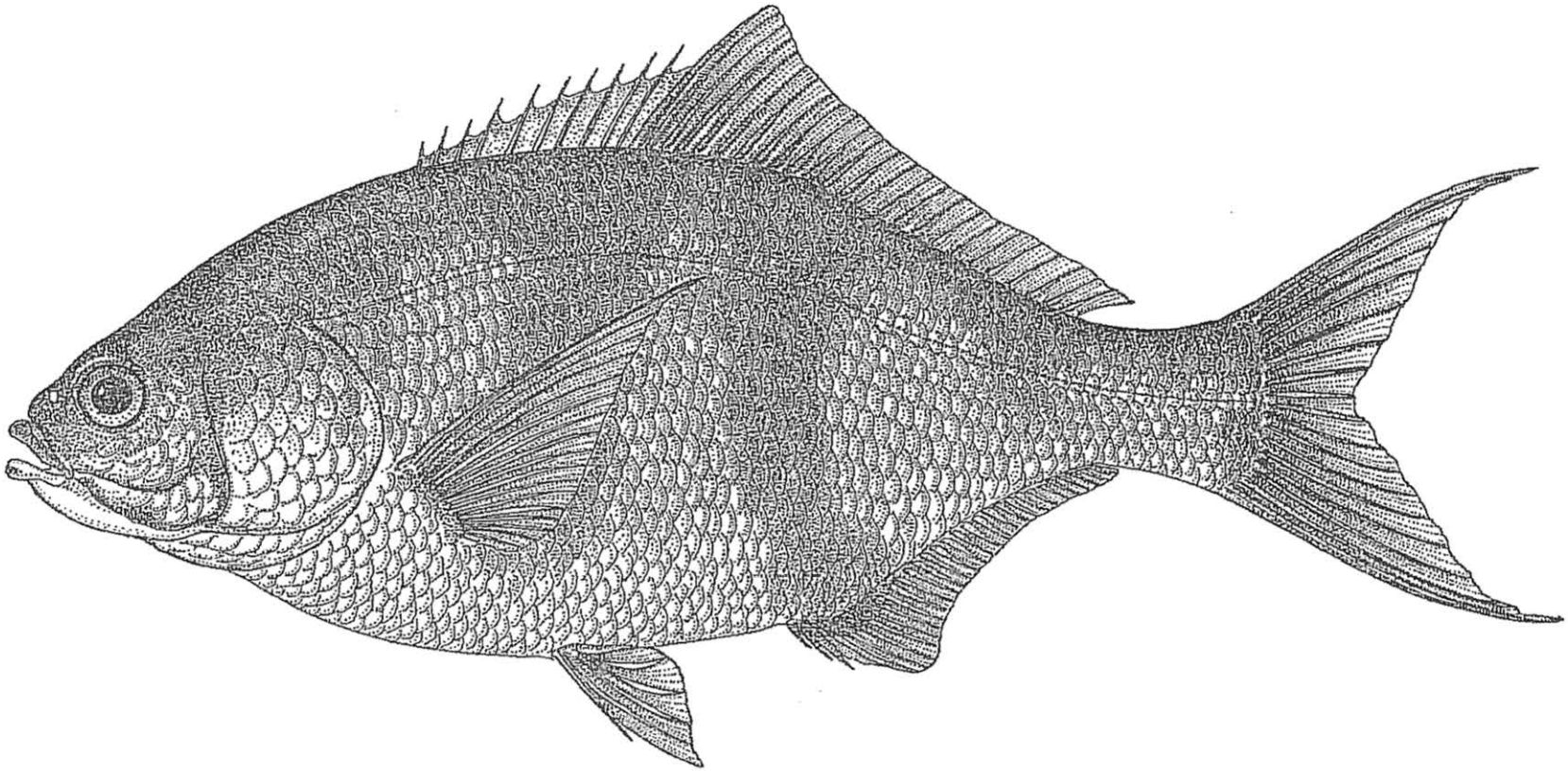
Cymatogaster aggregata Shiner Perch

FISH 606



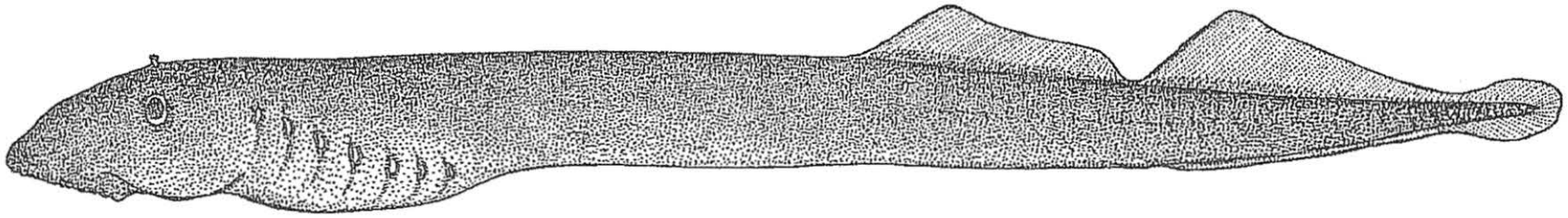
Embiotoca lateralis Striped Seaperch

606 492



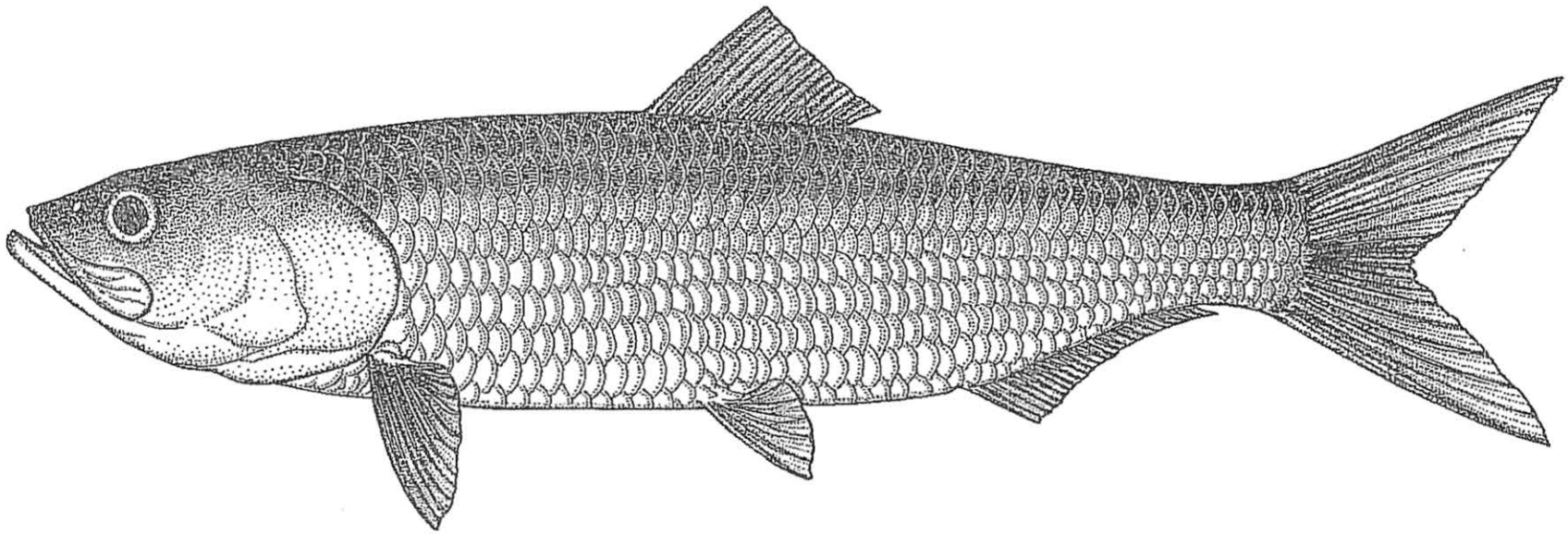
Rhacochilus vacca Pile Perch

DOE 25 401



Entosphenus tridentatus Pacific Lamprey

606 261 494



Clupea harengus pallasi Pacific Herring

BOX 606 MS 496

Clatsop County Comprehensive Plan, Proposed Changes for the Necanicum Estuary

to

1. Add the following policy, Necanicum Estuary Goals and Policies, Goal 1, page III-15 and renumber all subsequent policies (i.e. present Policy C becomes Policy D)

   Policy C. The general priority (from highest to lowest) for use of estuarine resources shall be:
   a) Uses which maintain the integrity of the estuarine ecosystem;
   b) Water-dependent uses requiring estuarine location, consistent with the Oregon Estuarine Classification;
   c) Water-related uses which do not degrade the natural estuarine resources, values; and
   d) Non-dependent, non-related uses which do not alter, reduce, or deegrade the estuarine resources and values.

2. Add the following policy to Necanicum Estuary Goals and Policies, Goal 4, page III-16.

   Policy 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 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.

3. Amend Policy C, under Goal 3, Necanicum Estuary Goals and Policies, page III-156 by adding the following:

   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) Riprap to allow protection of an existing bank line with clean, durable erosion resistent material provided that the need for riprap 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 or activities where, upon determination of the Oregon Division of State Lands, the proposed alteration would have negligible physical, biological and water quality impacts.

4. Add a new Goal and Policy statements to Necanicum Estuary Goals and Policies, page III-17.

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 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 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 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 City will apply the above standard to all dredge or fill activities during review of these projects, through the conditional use procedure. The City 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 jurisdicition 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 part to supply information that insignificant degradation or reduction of natural values would occur in a specific project. The City 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.

5. Amend Policy C, under Goal 2, Necanicum Estuary Goals and Policies, page III-5b to read as follows:

> 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 and piers shall be limited to that required for the intended use. Alternatives to docks and piers, such as mooring barge, dryland storage, and launching ramps shall be investigated and considered.

6. Amend Policy D, under Goal 1, Necanicum Estuary Goals and Policies, page III-15a, to read as follows:

> 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 that 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 mitigation, 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 Engineer requirements shall be utilized. Where there is erosion occuring 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.

7. Add a new policy to Goal 3, Necanicum Estuary Goals and Policies, page III-15b.

> Restoration of the estuary shall be encouraged through the establishment of aquaculture facility, and the improvement of the physical and biological properties of the estuary. The improvement of the flushing capabilities at the mouth of the river shall be given highest priority.

8. Add the following after Goal 9, Necanicum Estuary Goals and Policies

THE ESTUARY SHORELANDS BOUNDARY

The Necanicum Estuary boundary, as discussed, was drawn around all water bodies, salt marshes, tideflats, and freshwater marshes adjacent to the Necanicum 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 trains, 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

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 City Zoning 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 lease 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 productiyity is low, beach nourishment may be sufficiently coarse for this purpose. Dredge material disposal shall be carefully evaluated through the permit process.

Restoration of the Estuary shall be encouraged through the establishment of aquaculture facilities and improvement of the physical and biological properties of the Estuary. The improvement of flushing capabilities at the mouth of the River shall be given highest priority.

6. Shoreline Stabilization

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 riprap;
d) Non-vegetated riprap
e) Grains, bulkheads, or other structural methods.

Structural shoreline stabilization methods shall be permitted only if:

a) Flooding or erosion is threatening a structure or an established use; or
b) There is a demonstrated public need in conjunction with a water-dependent use; and

BOOK 606 PAGE 501

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.

CLATSOP COUNTY ZONING ORDINANCE, PROPOSAL CHANGES FOR THE NECANICUM ESTUARY

Section 3.830. Necanicum Estuary Aquatic Natural Zone (NAN-1).

Section 3.832. Purpose. To provide for aquatic areas which should be managed for resource protection, preservation and restoration. These areas may include significant or extensive salt marshes or tideflats which because of a combination of factors such as biological productivity and habitat value play a vital role in the functioning of the estuarine ecosystem. Natural aquatic areas may also include ecologically important water areas which lack significant alteration.

Section 3.833. Development and Use Permitted. The following developments are permitted under a Type I procedure subject to Development and Use Standards, Section 837.

1. Vegetative shoreline stabilization.
2. Passive restoration.
3. Navigational aides.
4. Marine research and education

Section 3.834. Development and Use Permitted with Review. The following developments are permitted under a Type II procedure subject to Development and Use Standards, Section 3.837 and site plan review.

1. Low water bridges.
2. Repair/maintenance of existing dikes.

Section 3.835. Development and Uses Permitted with Review Based on the Resource Capability Test. The following developments are permitted under a Type II procedure subject to Additional Development Standards Section and site plan review. It must also be determined if these uses and activities meet the resource capability of the Aquatic Natural area in which the uses and activities occur and if the uses and activities are consistent with the purpose of the Aquatic Natural Zone, as stated above. The procedures of Section Resource Capability Determination, will be used to make this determination.

3. Active restoration and resource enhancement.
4. Riprap where necessary for erosion control to protect:
   a. Structures or uses existing as of October 7, 1977;
   b. Significant natural resources, histoic or archaelogical sites;
   c. Public facilities.
5. Minor dredging necessary to open drainage channels from tideboxes to deeper water.

Section 3.836. Conditional Development and Use. The following development may be permitted under a Type II procedure and Sections 5.010 to 5.025 subject to Development and Use Standards, Section 3.837 and site plan review. It must also be determined if there uses and activities meet the resource capability of the Aquatic Natural Area in which the uses and activities occur and if the uses and activities are consistent with the purpose of the Aquatic Natural Zone, as stated above. The procedure of Section Resource Capability Determination, will be used to make this determination.

1. Communication facilities.
2. Aquaculture.
3. Submerged cable, sewer line, water line, or other pipelines.
4. Dredging or fill necessary for the installation of Conditional Uses 1-3 above.

Section 3.837. Development and Use Standards. The following standards are applicable to developments in this zone.

1. All uses shall satisfy applicable standards in Chapter 1, 2, 5, and 6 and Sections of Chapter 3 of the Development and Use Standards Document. All uses shall also satisfy applicable standards in Section 54.900, Shoreland and Aquatic Development of Chapter 4 of the Development and Use Standards Document. Where a proposal involves several uses, the standards applicable to each use shall be satisfied (e.g., dredge, fill, shoreline stabilization, piling installation or other activities in conjunction with an aquaculture facility shall be subject to the respective standards for these uses).
2. When a proposal includes several uses, the uses shall be reviewed in aggregate under the more stringent procedure. In addition, a proposal with several uses shall be reviewed in aggregate for consistency with the resource capability and purposes of the Aquatic Natural Zone, when a resource capability determination is required.
3. All policies of the County Comprehensive Plan shall be adhered to.
4. All other applicable ordinance requirements shall also be satisfied.
5. Uses and activities that would potentially alter the integrity of the estuarine ecosystem shall be preceded by a clear presentation of the impacts of the proposed alteration, subject to the requirements of Section , Impact Assessment.
6. A development project which is determined to require an Environmental Impact Study through the Corps of Engineers permit process shall 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;
   c) If no alternative upland locations exist; and
   d) If adverse impacts are minimized as much as feasible;

Section 3.838. State and Federal Permits. Applicants for developments which require a state or federal permit shall submit to the Planning Director a copy of: the completed permit application, other supporting material provided to the permit granting agency and a set of findings which demonstrate that the development would be consistent with the Comprehensive Plan and this Ordinance. This information shall be subject to the Consistency Review procedure set forth in Section 5.120.

Section 3.820. Necanicum Estuary Aquatic Conservation Zone (NAC-2).

Section 3.822. Purpose. To provide for aquatic areas which shall be managed for low to moderate intensities of use. These aquatic areas can withstand limiting amounts of adjacent development or alteration and are consistent with the intent of the overall goals and policies of the estuary section of the Comprehensive Plan. Uses and activities within this zone must be managed for maintenance of resource and recreational benefits. Aquatic conservation areas may include water areas of the estuary and valuable salt marshes and tideflats of lesser biological significance than those in the NAN-1 zone.

Section 3.824. Development and Use Permitted. The following development and use and their accessory uses are permitted under a Type I procedure subject to the Development and Uses Standards, Section 3.82.

1. Navigation aides.
2. Research and education observation
3. Passive restoration
4. Vegetative shoreline stabilization
5. Temporary dike for emergency flood protection, limited to 60 days, subject to state and federal requirements.

Section 3.826. Conditional Development and Use. The following developments may be permitted under a Type II procedure and Sections 5.010 to 5.025, and site plan review and the Development and Use Standards of Section 3.82 .
It must also be determined if these uses and activities meet the resource capability of the Aquatic Conservation area in which the uses and activities occur and if the uses and activities are consistent with the purpose of the Aquatic Natural Zone, as stated above. The procedure of Section , Resource Capability Determination, will be used to make this determination.

1. Water-dependent portions of aquaculture facilities
2. Boat ramp
3. Docks, piers, moorages
4. Maintenance and repairing structures or facilities existing as of October 7, 1977 which no longer meet the purposes of the Aquatic Conservation Zone.
5. Storm water and treated waste water out falls
6. Submerged cable, sewer line, water line, and other pipelines
7. Communication facility
8. Bridge crossings.
9. Mining and mineral extraction
10. Active restoration
11. Dredging, fill or piling necessary for the installation of a Conditional Use (1-10).
12. Maintenance dredging of existing facilities.
13. Piling in conjunction with a navigational aid or single dock or pier
14. Structural shoreline stabilization limited to riprap

Section 3.828. Development and Use Standards. The following standards are applicable to developments in this zone.

1. All uses shall satisfy applicable standards in Chapter 1, 2, 5, and 6 and Sections of Chapter 3 of the Development and Use Standards Document. All uses shall also satisfy applicable standards in Section S 4.200, Shoreline and Aquatic Development, of Chapter 4 of the Development and Use Standards Document. Where a proposal involves several uses, the standards applicable to each use shall be satisfied (e.g., dredge, fill, shoreline stabilization, piling installation or other activities in conjunction with an aquaculture facility shall be subject to the respective standards for these uses).
2. When a proposal includes several uses, the uses shall be reviewed in aggregate under the more stringent procedure. In addition, a proposal with several uses shall be reviewed in aggregate for consistency with the resource capability and purposes of the Aquatic Conservation Zone, when a resource capability determination is required.
3. All policies in the Comprehensive Plan shall be adhered to.
4. All other applicable ordinance requirements shall also be satisfied.
5. Uses and activities that would potentially alter the integrity of the estuarine ecosystem shall be preceded by a clear presentation of the impacts of the proposed alteration, subject to the requirements of Section 3. , Impact Assessment.

6. No use shall be allowed in an Aquatic Conservation Zone which would cause a major alteration of the estuary.
7. The maximum height of structures shall be 20 feet, except where the Planning Commission determines, after a public hearing, that a greater height is necessary and appropriate.
8. A development project which is determined to require an Environmental Impact Study through the Corps of Engineers permit process shall 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.

Section 3.829. State and Federal Permits. Applicants for developments which require a state or federal permit shall submit to the Planning Director a copy of: the completed permit application, other supporting material provided to the permit granting agency and a set of findings which demonstrate that the development would be consistent with the Comprehensive Plan and this ordinance. This information shall be subject to the Consistency Review Procedure set forth in Section 5.120.

Add the following new Section:

Section 5.124. Impact Assessment Procedure. The purpose of this section is to provide an assessment process for development alterations which could potentially alter the integrity of the estuarine ecosystem. Further, certain uses and activities proposed for particular management areas and zones will require an assessment of resource capability before the use or activity is permitted as consistent with the purpose and resource capability of the zone. The impact assessment procedure is intended as a cogent presentation of the impacts expected from a particular development proposal. This procedure will provide the information necessary to judge the capability of the resource to accommodate the identified impacts without altering the integrity of the resource as it relates to the stated purpose of the particular management area or zone.

1. Impact Assessment Requirement. An Impact Assessment in accordance with the provisions of this section shall be required for the following uses and activities when proposed for estuarine aquatic and shoreline areas:
   a) Filling or dredging in intertidal areas;
   b) Proposals for active restoration;
   c) Placement of navigational structures;
   d) Industrial or commercial uses in development aquatic zones;
   e) Dredging for new navigational projects.

   Further, an Impact Assessment shall be required:
   f) When a use or activity requires a determination of consistency with resource capability .

   Note that Federal Environmental Impact Statements or Impact assessments may substitute for this requirement if available at the time of permit review. The Planning Director may require an impact assessment for uses not listed above when the Director believes the use may involve significant impacts.

2. Use of Impact Assessment.
   a) Information contained in impact assessments shall be used in the evaluation of a use or activity during a Conditional Use permit review procedure. The Impact Assessment shall be used to:

(1) identify potential development alterations of significant estuarine fish and wildlife habitats and disturbances of essential properties of the estuarine resource, (2) determine whether potential impacts can be avoided and minimized, and (3) to provide a factual base of information that will ensure that applicable standards in Section 3.950 are met.

b) Where a use requires a resource capability determination, information in the Impact Assessment will be sued to determine consistency of proposed uses and activities with the resource capability and purpose of the affected management area or zone. Resource capability analysis shall be based on the requirements of the Information to be Provided in the Impact Assessment Section.

3. Information to be Provided in the Impact Assessment. Information compiled in the Impact Assessment may be drawn from available data and analysis contained in: Necanicum Estuary Inventory; environmental impact statements or environmental assessments prepared for previous projects in the vicinity of the present development proposal; or other published environmental and estuarine studies pertaining to the Necanicum River estuary. The Impact Assessment should apply available information to the following general areas of analysis. The City may waive inapplicable items for any particular use or project.

a) Aquatic life forms and habitat, including information on: habitat type and use (e.g., rearing, spawning, feeding/resting area, migration route), species present, seasonal abundance, sediment type and characteristics, vegetation present. Type of alteration, including information detailing the extent of alteration (e.g., area measurement, depths to which alteration will extend, volumes of materials removed and/or placed as fill), impacted species (including threatened or endangered species), life stages and life cycles affected with regard to timing of the proposed alteration, percent of total available habitat type subjected to alteration.

b) Shoreland life forms and habitat, including information on: habitat type and use (e.g., feeding, resting, or watering areas, flyways), species present, seasonal abundance, soil types and characteristics, vegetation present. Type of alteration, including information detailing the extent of alteration (e.g., area measurement, extent of grading and excavation, removal of riprarian vegetation), impacted species (including threatened or endangered species), life stages and life cycles affected with regard to timing of the proposed alteration, percent of total available habitat type subjected to alteration.

c) Water quality, including information on: increases in sedimentation and turbidity, decreases in dissolved oxygen concentration, changes in biological and chemical oxygen demand, contaminated sediments, alteration of salinity regime, disruption of naturally occurring water temperatures, changes due to reduction, diversion or impoundment of water.

d) Hydraulic characteristics, including information on: changes in water circulation patterns, shoaling patterns, potential of erosion or accretion in adjacent areas, changes in the flood plain, decreases in flushing capacity or decreases in rate of water flow from reduction or diversion or impoundment of water sources.

e) Air quality, including information on: quantities of emissions of particulates, expected inorganic and organic airborne pollutants.

f) The impact of the proposed project on navigation and public access to shoreline and aquatic areas.

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g) Demonstration that any proposed structures or devices are properly engineered.
h) Demonstration that the public need and gain which warrant such modification or loss.
i) Demonstration that non-water dependent uses will not preempt existing or future water-dependent utilization of the area.
j) Determination of the potential cumulative impact of the proposed development, including alteration of adjacent significant estuarine fish and wildlife habitat and disturbance of essential properties of the estuarine resource.
k) Determination of methods for accommodation of the proposed development alteration, based on items a) through j) above, in order to minimize preventable adverse impacts. Determination of need for mitigation.

4. Impact Assessment Findings. Resulting from the analysis of the information presented in the Impact Assessment, one of the following findings shall be concluded.
   a) The proposed uses and activities are in conformance with all comprehensive plan policies and standards and do not represent a potential degredation or reduction of significant fish and wildlife habitats and essential properties of the estuarine resource. Where an Impact Assessment is required for a resource capability determination, the proposed uses are consistent with the resource capability and purpose of the affected management area or zone.
   b) The proposed uses and activities are in conformance with all comprehensive plan policies and standards, but represent a potential degredation or reduction of significant fish and wildlife habitats and essential properties of the estuarine resource. The Impact Assessment identifies reasonable alternatives to proposed actions that will eliminate or minimize to an acceptable level, expected adverse environmental impacts. Where an Impact Assessment is required for a resource capability determination, the adverse environmental impacts have been minimized to be consistent with the resource capability of the management area or zone. The proposed uses and activities may be accommodated and found to be consistent with resource capabilities and meet the purposes of the management.
   c) The proposed uses and activities are not in conformance with all comprehensive plan policies and standards. The Impact Assessment and analysis indicate that unacceptable loss will result from the proposed development alteration. The proposed uses and activities represent irreversible changes and actions and unacceptable degredation or reduction of significant estuarine fish and wildlife habitats and essential properties of the estuarine resource will result; or, that the adverse consequences of the proposed uses and activities, while unpredictable and not precisely known, would result in irreversible trends or changes in estuarine resource properties and functions.

Section 5.126. Resource Capability Determination.

1. Purpose.
Certain uses and activities in estuarine zones are allowed only if determined to meet the resource capability and purpose of the zone in

which the use or activity occurs. The purpose of this section is to establish a procedure for making a resource capability determination.

2. Definition of Resource Capability.
Resource capability is defined as the degree to which the natural resource can be physically, chemically, or biologically altered, or otherwise assimilate an external use and still function to achieve the purpose of the zone in which it is located.

3. Purpose of Different Estuarine Zones.
   a) Aquatic conservation zone: The purpose of the Aquatic Conservation Zone is to manage areas for low to moderate intensity of development that does not require major alteration of the estuary, with emphasis on maintaining aquatic resource and recreational benefits.
   b) Aquatic natural zone: the purpose of the aquatic natural zone is to provide for preservation and protection of estuarine resources, including significant fish and wildlife habitats, essential properties of the estuary, such as dynamic geological processes, continued biological productivity, unique communities of organisms, maintenance of species diversity. Low intensity uses consistent with the protection of natural values are appropriate.

4. Resource Capability Procedure.
In order to determine whether a use or activity is consistent with the resource capability and purpose of the zone for which the use or activity is proposed, the following procedure is required:
   a) Identification of the zone and area in which the activity is proposed and the resources in the area;
   b) Identification of adverse impacts of the proposed use or activity on the resources identified in (a) above.
   c) Determination of whether the resources can continue to achieve the purpose of the zone in which the use or activity is proposed.

5. Identification of Resources and Impacts.
The applicant for a proposed use or activity in which a resource capability determination must be made shall submit the following:
   a) Information on resources present in zone in which the use or activity is proposed;
   b) Impact assessment as specified in Section 5.124, Impact Assessment Procedure. (Federal Environmental Impact Statements or Impact Assessments may be substituted if available at the time of the permit request.)

If in the course of review, additional information is required to satisfy the provisions of this ordinance, notification shall be made to the applicant outlining the additional information needed and the reason. Although the applicant shall be responsible for providing all necessary information, the planning department will assist the applicant in identifying inventory sources and information. Sources which can be used to identify resources included: Necanicum Estuary Inventory, environmental impact statements for project in same area, or other published studies concerning the Necanicum Estuary. Identification of resources shall include both environmental (e.g., aquatic life and habitat present, benthic populations, migration routes) and social and economic factors (navigation channels, public access facilities).

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6. Resource Capability Administrative Provisions.
A resource capability determination for a use or activity identified in this ordinance as a Conditional Use shall be made in accordance with the Conditional Use Procedure set forth in Section 5.000.

Public notice of development proposals which require determination of consistency with resource capabilities shall be sent to all affected parties. State and Federal resource agencies with mandates and authorities for planning, permit issuance and resource decision-making, including the following, will be notified: Oregon Department of Fish and Wildlife, Oregon Division of State Lands, Oregon Department of Land Conservation and Development, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency, U.S. Army Corps of Engineers.

S 4.260 NECANICUM ESTUARINE STANDARDS

S.4.262 Aquaculture:

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.

S 4.264 Boat Ramp.

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. 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.

S 4.266 Dock/Moorage.

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 impracticle 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 equipment, 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.

S4.268 Fill.

1. Fill shall be permitted for active restoration, aquaculture, placement of communications

facilities, water-dependent recreation such a marinas, and flood control and erosion contrc 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 is is es-established through environmental impact assessment 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 intertidal or tidal marsh areas 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 9.c.(1)-(4) are made, and

2) If consisten 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 9.b.-d.;

2) Land use management practices and non-structural 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.

S4.270 Land Transportation Facilities.

1. Land transportaion facilities shall not be located in wetlands or aquatic areas except where bridge crossing 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 or 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.

S4.272 Maintenance Dredging.

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.

S4.274 Marinas.

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.

54.276 <u>Pilings.</u>

1. Piling for a use permitted in the estuary shall be approved only after the applicant has established that adverse impacts on navi-

gation, 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. Piling 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.

54.278 Restoration/Resource Enhancement - Active.

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.

NECANICUM ESTUARY
S 4.280 SHORELINE STABLIZATION

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 birds 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, not withstanding the other regulations in these standards subject to these 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 gravel fill blanket and operation of equipment in the water. State and federal agency regulations 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 protec-

tion shall be permitted for maintenance of man-made structures existing as of October 7, 1977.

S 4.282 Utilities.

1. Overhead electrical or communications transmission lines shall be located so as not to unduly interfere with migratory bird flyways and significant habitat or residential 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 ongoing 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, wiers, dry wells, or other means.

IV. ECOLA CREEK ESTUARY (GOALS 16 AND 17)

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IV. ECOLA CREEK ESTUARY INTRODUCTION

The Ecola Creek (sometimes referred to as Elk Creek), Estuary and Coastal Shorelands is an Element (Goals 16 and 17) of the Clatsop County Comprehensive Plan.

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 in a memo written by Rainmar Bartl and Duncan Thomas for Clatsop County.

An exception has been adopted by the County to allow for Cannon Beach to expand its wastewater treatment plan into Ecola Creek estuary wetlands.

Ecola Creek Estuary

Ecola Creek is a well-mixed tidal creek having very low marine biological and moderate terrestial value. Tidal influence extends between 250-350 feet above the U.S. Highway 101 bridge crossing the creek; a total distance of one-half mile.

Elk Creek has no definable major tracts of salt marth, tideflats, and seagrass and 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 salinities limit Ecola 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. The Division of State Lands has determined that alterations, up along the Highway 101 bridge, below the 5 foot contour could require mitigation and that alterations below the 7 foot contour would require a state fill and removal permit. The removal of log jams further upstream has been identified as a possible restoration. This could improve the fish runs on the creek.

The City of Cannon Beach is proposing to utilize 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 will result in the filling of approximately .03 acres of estuarine area. The County has adopted an Exception to the Estuarine Resources Goal and the Coastal Shorelands Goal to permit this development (See Exceptions, Appendix B).

Ecola Creek Estuary Policies

The Ecola Creek Estuary is classified by the Plan, as a conservation estuary. The Estuarine Resources Goal defines a conservation estuary or management unit as follows:

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 natural estuaries, and oyster and clam beds. Partially altered areas or estuarine areas adjacent to existing development of moderate intensity shall also be included in this classification unless otherwise needed for preservation or development consistent with the overall Oregon Estuary Classification.

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 fishery are supported.

3. Alterations to the shoreline or the Creek which would alter the flow of the stream, are not permitted.

4. As an active restoration activity, the removal of log jams upstream from the U.S. Highway 101 to the bridge would be appropriate if performed under the supervision of the Oregon Department of Fish and Wildlife and other resource agencies. Active restoration activity shall not involve dredging or filling of Ecola Creek.

5. Riparian vegetation along Ecola Creek shall be protected, except where a valid Exception has been taken.

6. All activities in the Ecola Creek Estuary shall be coordinated with Cannon Beach to insure they are compatible with the City Comprehensive Plan.

7. Adverse impacts to estuarine resources resulting from dredge, fill or dredged material disposal activities (public or private) 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.

   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. Riprap to allow protection of an existing bank line with clean, durable erosion resistent material provided that the need for riprap protection is demonstrated and that this need cannot be met with natural vegetation, and no appreciable increase in existing upland occurs;

   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 or activities where, upon determination of the Oregon Division of State Lands, the proposed alteration would have negligible physical, biological and water quality impacts.

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 below the 7 foot contour shall be allowed only with permit approval from the Division of State Lands. Filling below the 5 foot contour may require mitigation as prescribed by the Division of State Lands.

10. Dredging may be permitted only for:

    a. Aquaculture

    b. Active restoration

    c. Bridge crossing support structure

    d. Submerged cable, sewer line, water line, or other pipeline.

    The above mentioned dredging in aquatic areas shall be allowed only if:

    a. A public need is demonstrated

    b. No alternative upland locations exist, and

    c. Adverse impacts are minimized

    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 activities are 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;

    c. Bridge crossing support structure;

    d. Aquaculture

    e. In conjunction with a use for which an Exception has been taken.

    The above mentioned filling in aquatic areas shall be allowed only if:

a. A public need is demonstrated;

b. No alternative upland locations exist;

c. Adverse impacts are minimized.

13. 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 that would warrant such modification or loss.

14. 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.

    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;

    b. Bulkhead installation necessary to protect an aquaculture facility;

    c. Storm water and treated wastewater outfalls;

    d. Active restoration;

    e. Bridge crossings;

    f. Water dependent portions of aquaculture facilities, and

    g. Dredge, fill or piling necessary for the installation of uses listed above.

Proposed Changes to the Land and Water Development Code.

Create a new estuary zone for Ecola Creek

Section 3.700 Ecola Aquatic Conservation Zone (EAC).

Purpose: The purpose of the Ecola Aquatic Conservation Zone (EAC) is to assure the conservation of: (1) fish and wildlife habitats, (2) essential properties of the estuarine resource (e.g. dynamic geological processes, continued biological productivity, unique or endemic communities of organisms, maintenance of species diversity), and, (3) the long-term use and conservation of renewable estuarine resources. The designation provides for development uses of low to moderate intensity that do not require major alterations of the estuary, with an emphasis on maintaining estuarine natural resources and benefits.

Section 3.702 Development and Use Permitted.

In the Ecola Aquatic Conservation Zone, the following developments and their accessory developments are permitted under a Type I procedure subject to applicable development standards in Section 3.708.

a. Passive restoration
b. Vegetative shoreline stabilization
c. Marine research and education
d. Emergency repair to existing dikes, subject to state and federal requirements
e. Temporary dike for emergency flood protection, limited to 60 days, subject to state and federal requirements
f. Maintenance and repair of dikes

Section 3.704 Conditional Development and Use.

The following activities and their accessory developments may be permitted under a Type II procedure and Section 5.010 to 5.025 subject to applicable criteria and development standards of Section 3.708 and site plan review.

a. Submerged cable, sewer line, water line, or other pipeline.
b. Maintenance and repair of structures or facilities existing as of October 7, 1977, which no longer meet the purposes of Ecola Aquatic Conservation Zone.

Section 3.706 Conditional Development and Use and Resource Capability.

The following activities and their accessory developments may be permitted under a Type II procedure and Section 5.010 to 5.025 subject to applicable criteria and development standards of Section 3.708 and site plan review.

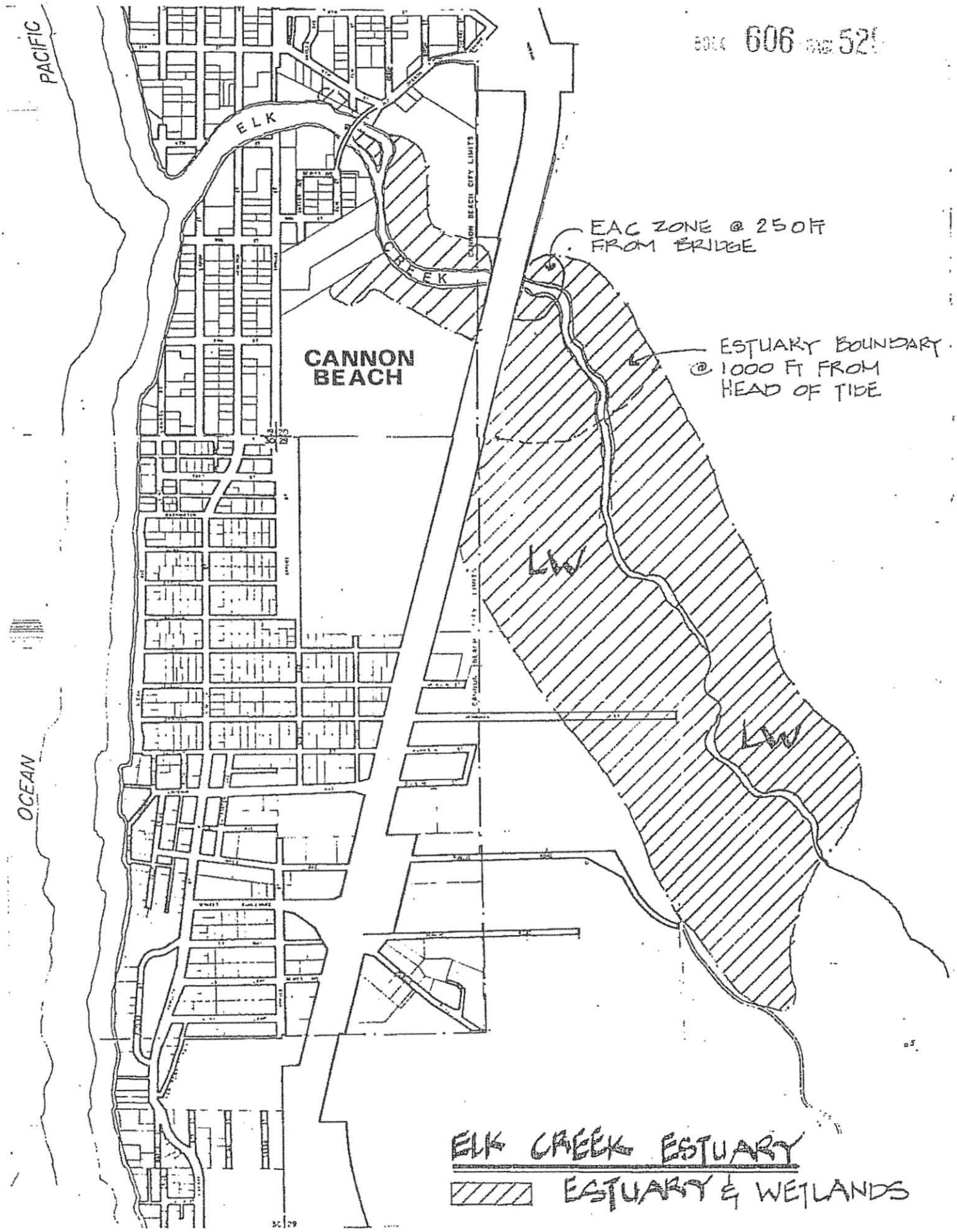
It must also be determined if these uses and activities meet the resource capability of the Ecola Aquatic Conservation Zone area in which the uses and activities occur and if the uses and activities are consistent with the purpose of Ecola Aquatic Conservation Zone, as stated above. The procedures of Section _____ Resource Capability Determination, will be used to make this determination.

a. Riprap shoreline stabilization
b. Bulkhead installation necessary to protect an aquaculture facility
c. Storm water and treated wastewater outfalls
d. Active restoration
e. Bridge crossings
f. Water dependent portions of aquaculture facilities
g. Dredging, fill, or piling installation necessary for the installation of a conditional use listed above.
h. Uses and activity permitted by an approved Goal Exception.

Section 3.708 Additional Development Standards and Procedural Requirements.

a. All uses shall satisfy applicable standards of the Standards Document. Where a proposal involves several uses, the standards applicable to each use shall be satisfied.
b. When a proposal includes several uses, the uses shall be reviewed in aggregate under the more stringent procedure. In addition, a proposal with several uses shall be reviewed in aggregate for consistency with the resource capability and purposes of the Ecola Aquatic Conservation Zone, when a resource capability determination is required.
c. All policies in the County Comprehensive Plan shall be adhered to.
d. Uses and activities that would potentially alter the integrity of the estuarine ecosystem shall be preceded by a clear presentation of the impacts of the proposed alteration, subject to the requirements of Section _____, Impact Assessment.
e. No use shall be allowed in the Ecola Aquatic Conservation Zone which would cause a major alteration of the estuary.
f. A development project which is determined to require an Environmental Impact Assessment through the Corps of Engineers permit process shall be allowed only:

   -- if required for navigation or other water-dependent uses that require an estuarine location, and
   -- if a public need is demonstrated, and
   -- if no alternative upland locations exist, and
   -- if adverse impacts are minimized as much as feasible.


PACIFIC
OCEAN
ELK
CREEK
CANNON BEACH
CANNON BEACH CITY LIMITS
EAC ZONE @ 250 FT FROM BRIDGE
ESTUARY BOUNDARY @ 1000 FT FROM HEAD OF TIDE
LW
LW
ELK CREEK ESTUARY
ESTUARY & WETLANDS

9-16-83

V. OCEAN AND COASTAL

LAKE SHORELANDS (Goal 17)

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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."1

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."2

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;

1A 1977 Input-Output Model for Clatsop County, Oregon State University Extension Service. 1978.

2L.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."[1]

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."[2]

---

[1]Ibid.
[2]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.

1L.C.D.C. Statewide Planning Goals and Guidelines, p. 18.

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 in 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 Compreheneisve 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 ans 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 occurrent 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 vgetation 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 emergency 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 Ace 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 crieria).

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 g) 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 Resevoirs: Master Plan for Angler Access and Associated Recreational Uses. Sites identified werre 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 aquacultre" are shown on maps 6, 7, 13, 14, 20 and 21 pages.

See maps 7, 14, and 21 pages 44, 51 and 58.

6. Areas of exceptional aesthetic or scenic quality, where the quality is primarily derived from, or related to, the association with coastal water bodies.

This includes the following areas that derive their primary quality from their association with coastal water bodies i.e. ocean and coastal lakes:

headlands
beaches
active dunes (first foredune immediately adjacent to the beach)
off shore rocks

a) State Parks Headlands, Active Dune areas and Sandspits. 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.

b) Other active dune areas (first dune east of beach)
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.

c) Beaches in Clatsop County
These are protected by Oregon Beach Law (ORS 390).

d) Off shore rocks

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)

7. Coastal Headlands
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:

a) Tillamook Head. The area included as a Headland is much of the land within Ecola State Park and Elmer Feldenhiemer Preserve. It includes the steep slopes experienced beginning at the north end of the park and extends south parallel to the ocean to the beach north of Chapman Point. Indian Beach is included in this area. ODOT Parks Division owns the property and maintains day use activities for portions of the area (south area at Indian Beach and Bald Point) where roads, parking, picnicking and associated activities are permitted. The Oregon Coast Trail is located in the park.

b) Oswald West State Park. The area included in Clatsop County is that portion within the park encompassing the tunnel and adjacent park land. The land is the northern most portion of the park owned by the ODOT Parks Division. The Oregon Coast Trail skirts the eastern end of the headland on the east side of Highway 101.

The location of headlands is shown on Maps 6, 13, and 20, page 43, 50 and 57.

Coastal Shoreland Inventory

The following sections list hazard areas, 100 year floodplain velocity zone and adjacent areas of geological instability, significant shoreland and wetland biological habitat, areas necessary for water-dependent and water-related uses, areas of exceptional aesthetic or scenic quality, coastal headlands and historical sites which were identified during the inventory of the coastal shoreland planning area. In order to protect and preserve archeological sites, the inventory of the archeological sites is not available for public review, but is on file at the Clatsop County Planning Department. The coastal lake and shoreland inventory list, which is arranged geographically by shoreland subarea, is followed by maps (pp.) showing the location of the listed features by type and site number. Larger scale maps showing these features are located in the Clatsop County Department of Planning and Development.

TILLAMOOK COUNTY TO ARCH CAPE TUNNEL

1. Site: Cove Beach. Maps 16 and 17 pages 53 and 54.
   Location: T4N R10W Section 30 & 31
   Classification: 1. Hazard area, 100 year floodplain velocity zone;
   2. Adjacent areas of geologic instability
   Discussion:
   Base Zone: Coastal Residential (CR).

2. Site: Oswald West State Park (portion east of Cove Beach). Map 20 page 57.
   Location: T4N R10W Section 31
   Classification: Area of recreational importance
   Discussion:
   Base Zone: Recreation Management (RM).

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 & 311
   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 IIslands 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 sourthern 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 thefirst 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 Rilea 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 sourthern 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 coatal 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 48.
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 perenially 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 46.
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 westermost 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: T8N 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 typicl natural river floodplalin 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: T8N 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 facors 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 accomplsh 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,[1] 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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[1]"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:1

> "Vital park attractions, outstanding scenic features, major fish and wldlife 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

1"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 "exceptonal 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."[1]

(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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[1]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.

6. 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.

9-15-83

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-1s for adjacent soils.
3. 5 soils maps of area.

Exhibit "A"

BOOK 606 PAGE 561

PAUL D. SEE

300 SURF PINES ROAD
SEASIDE, OREGON 97138
738-5869

REGISTERED PROFESSIONAL OREGON GEOLOGIST

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.

REGISTERED PROFESSIONAL OREGON PAUL D. SEE 113 GEOLOGIST

OR-SOILS-1 12/72
FILE CODE SOILS 12

SOIL INTERPRETATIONS FOR OREGON

U.S.D.A. SOIL CONSERVATION SERV

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)	SHRI SWEL POTE TIAL
	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	Moder

DEPTH (in.)	CONDUCTIVITY (mmhos/cm)	CORROSIVITY		EROSION FACTORS		WIND EROD. GROUPS	FLOODING			HIGH WATER TABLE			HY LO GR
		STEEL	CONCRETE	K	T		FREQUENCY	DURATION	MONTHS	DEPTH (ft.)	KIND	MONTHS	
0-60	---	High	High	--	--	--	Frequent	Long	Dec-Apr	0.0-2.0	Apparent	Jan-Dec	I

CEMENTED PAN		BEDROCK		FROST ACTION	REMARKS
DEPTH (in.)	HARDNESS	DEPTH (in.)	HARDNESS		
--		>60		--	

SANITARY FACILITIES AND COMMUNITY DEVELOPMENT

USE	SOIL	RATING	RESTRICTIVE FEATURES
SEPTIC TANK ABSORPTION FIELDS	1,2,3	Severe	Floods, wet
SEWAGE LAGOONS	1,2,3	Severe	Floods, wet
SANITARY LANDFILL (TRENCH)	1,2,3	Severe	Floods, wet
SANITARY LANDFILL (AREA)	1,2,3	Severe	Floods, wet
DAILY COVER FOR LANDFILL	1,2,3	Poor	Floods, wet, excess humus
SHALLOW EXCAVATIONS	1,2,3	Severe	Floods, wet, excess humus
DWELLINGS WITHOUT BASEMENTS	1,2,3	Severe	Floods, wet, excess humus
DWELLINGS WITH BASEMENTS	1,2,3	Severe	Floods, wet, excess humus
SMALL COMMERCIAL BUILDINGS	1,2,3	Severe	Floods, wet, excess humus
LOCAL ROADS AND STREETS	1,2,3	Severe	Floods, wet, excess humus

SOURCE MATERIAL AND WATER MANAGEMENT

USE	SOIL	RATING	RESTRICTIVE FEATURE
ROADFILL	1,2,3	Poor	Wet, excess humus
SAND	1,2,3	Unsuited	Excess humus
GRAVEL	1,2,3	Unsuited	Excess humus
TOPSOIL	1,2,3	Unsuited	Wet
POND RESERVOIR AREA	1,2,3	Severe	Excess humus
EMBANKMENTS DIKES AND LEVEES	1,2,3	Severe	Low strength
DRAINAGE	1,2,3	Severe	Floods, wet
IRRIGATION	1,2,3		Not needed
TERRACES AND DIVERSIONS	1,2,3		Not needed
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 SERVI(

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 tida "mud". They occupy nearly level or depressional topography in coastal bays. Where not cultivated the vegetatior 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	PLASTICITY INDEX	PERMEABILITY (in/hr)	AVAIL. WATER CAP. (in/in)	SOIL REACTION (pH)	SHRINK SWELL POTENTIAL
	USDA TEXTURE	UNIFIED	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	Modera
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	Modera

DEPTH (in.)	CONDUCTIVITY (mmhos/cm)	CORROSIVITY STEEL	CORROSIVITY CONCRETE	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUPS	FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (ft.)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	HYDROLOGIC GROUP
6-0	--	High	High	--	--	--	Frequent	Brief	Dec-Mar	0.0-1.5	Apparent	Nov-June	D
0-7	--	High	High	--									
7-40	--	High	High	--									

CEMENTED PAN DEPTH (in.)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (in.)	BEDROCK HARDNESS	FROST ACTION	REMARKS
--		> 60		--	

SANITARY FACILITIES AND COMMUNITY DEVELOPMENT

USE	SOIL	RATING	RESTRICTIVE FEATURES
SEPTIC TANK ABSORPTION FIELDS	1	Severe	Floods, percolates slowly, wet
SEWAGE LAGOONS	1	Severe	Floods, wet
SANITARY LANDFILL (TRENCH)	1	Severe	Floods, wet
SANITARY LANDFILL (AREA)	1	Severe	Floods, wet
DAILY COVER FOR LANDFILL	1	Poor	Wet, excess humus, thin layer
SHALLOW EXCAVATIONS	1	Severe	Floods, wet
DWELLINGS WITHOUT BASEMENTS	1	Severe	Floods, wet
DWELLINGS WITH BASEMENTS	1	Severe	Floods, wet
SMALL COMMERCIAL BUILDINGS	1	Severe	Floods, wet
LOCAL ROADS AND STREETS	1	Severe	Floods, wet, low strength

SOURCE MATERIAL AND WATER MANAGEMENT

USE	SOIL	RATING	RESTRICTIVE FEATURES
ROADFILL	1	Poor	Wet, low strength
SAND	1	Unsuited	Excess fines
GRAVEL	1	Unsuited	Excess fines
TOPSOIL	1	Poor	Wet
POND RESERVOIR AREA	1	Slight	Favorable
EMBANKMENTS DIKES AND LEVEES	1	Moderate	Shrink-swell, excess humus
DRAINAGE	1	Severe	Floods, wet
IRRIGATION	1		Not needed
TERRACES AND DIVERSIONS	1		Not needed
GRASSED WATERWAYS	1		Not needed

OR-SOILS-1 12/72
FILE CODE SOILS 12

SOIL INTERPRETATIONS FOR OREGON

U.S.D.A. SOIL CONSERVATION SERV

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 residium 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.	% 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						
0-6	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	Modera
37-50	Partially weathered siltstone													

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	MONTHS	
0-6	-	High	High	.32	5	5	None			> 6			B
6-37	-			.37									

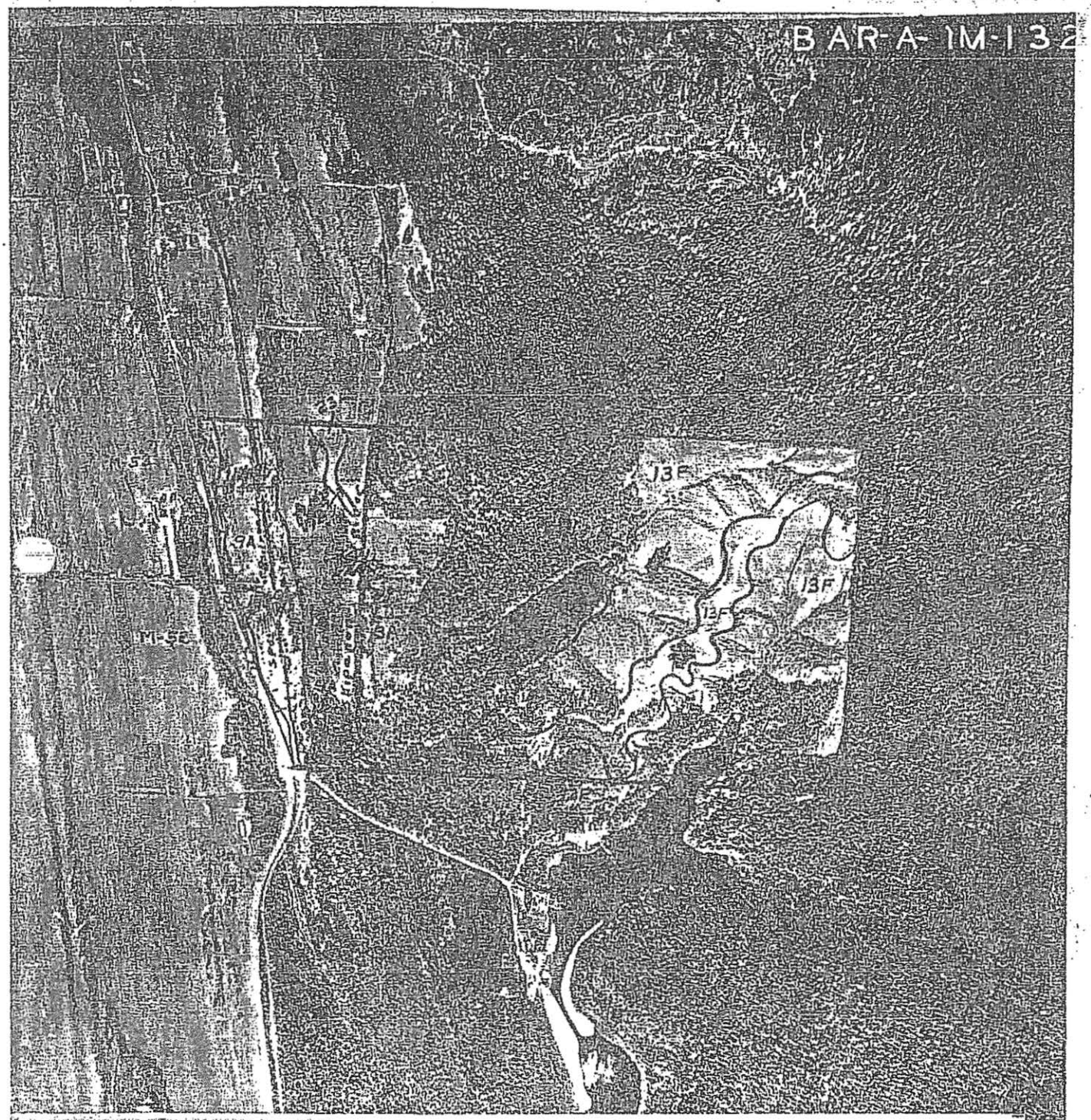
CEMENTED PAN		BEDROCK		FROST ACTION	REMARKS
DEPTH (in.)	HARDNESS	DEPTH (in.)	HARDNESS		
-		20-40	rippable	-	

SANITARY FACILITIES AND COMMUNITY DEVELOPMENT

USE	SOIL	RATING	RESTRICTIVE FEATURES
SEPTIC TANK ABSORPTION FIELDS	1	Severe	Slope
SEWAGE LAGOONS	1	Severe	Slope, depth to rock
SANITARY LANDFILL (TRENCH)	1	Severe	Slope, depth to rock
SANITARY LANDFILL (AREA)	1	Severe	Slope
DAILY COVER FOR LANDFILL	1	Severe	Slope
SHALLOW EXCAVATIONS	1	Severe	Slope, depth to rock
DWELLINGS WITHOUT BASEMENTS	1	Severe	Slope
DWELLINGS WITH BASEMENTS	1	Severe	Slope, depth to rock
SMALL COMMERCIAL BUILDINGS	1	Severe	Slope
LOCAL ROADS AND STREETS	1	Severe	Slope

SOURCE MATERIAL AND WATER MANAGEMENT

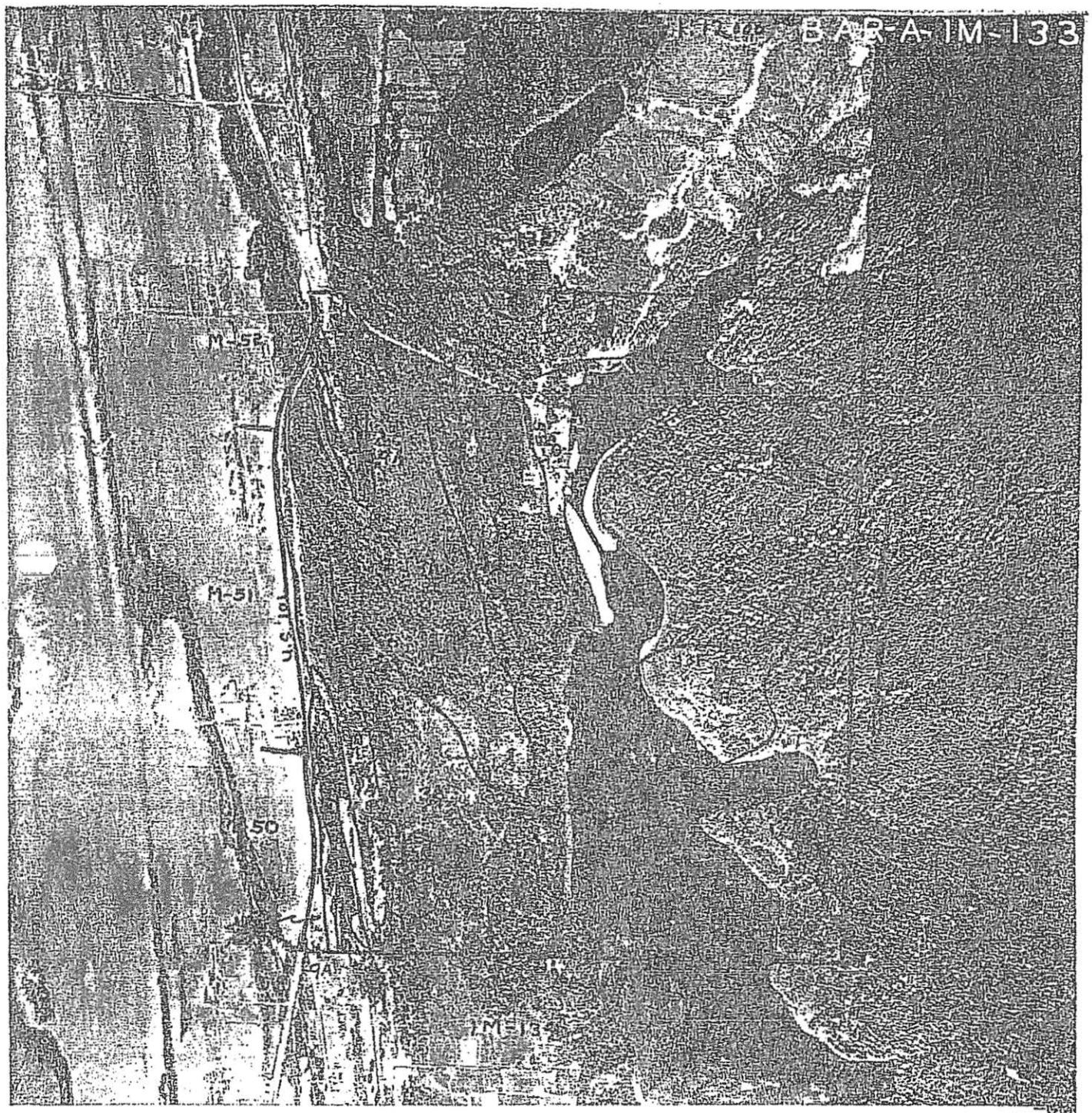
USE	SOIL	RATING	RESTRICTIVE FEATURES
ROADFILL	1	Poor	Slope
SAND	1	Unsuited	Excessive fines
GRAVEL	1	Unsuited	Excessive fines
TOPSOIL	1	Poor	Slope
POND RESERVOIR AREA	1	Severe	Slope
EMBANKMENTS DIKES AND LEVEES	1	Severe	Slope
DRAINAGE	1		Not needed
IRRIGATION	1	Poor	Slope
TERRACES AND DIVERSIONS	1	Severe	Slope
GRASSED WATERWAYS	1	Severe	Slope



USDA - SCS ADVANCE COPY - SUBJECT TO CHANGE

SOP COUNTY SOIL SURVEY, OREGON. 0 ¼ ½ MILE

E OF COPY 4.7 COPY FACTOR 33.3 % NEG. SCALE 1.57 DATE COPIED APR. 19 3



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LINCOLN COUNTY SOIL SURVEY, OREGON. 0 ¼ ½ MILE

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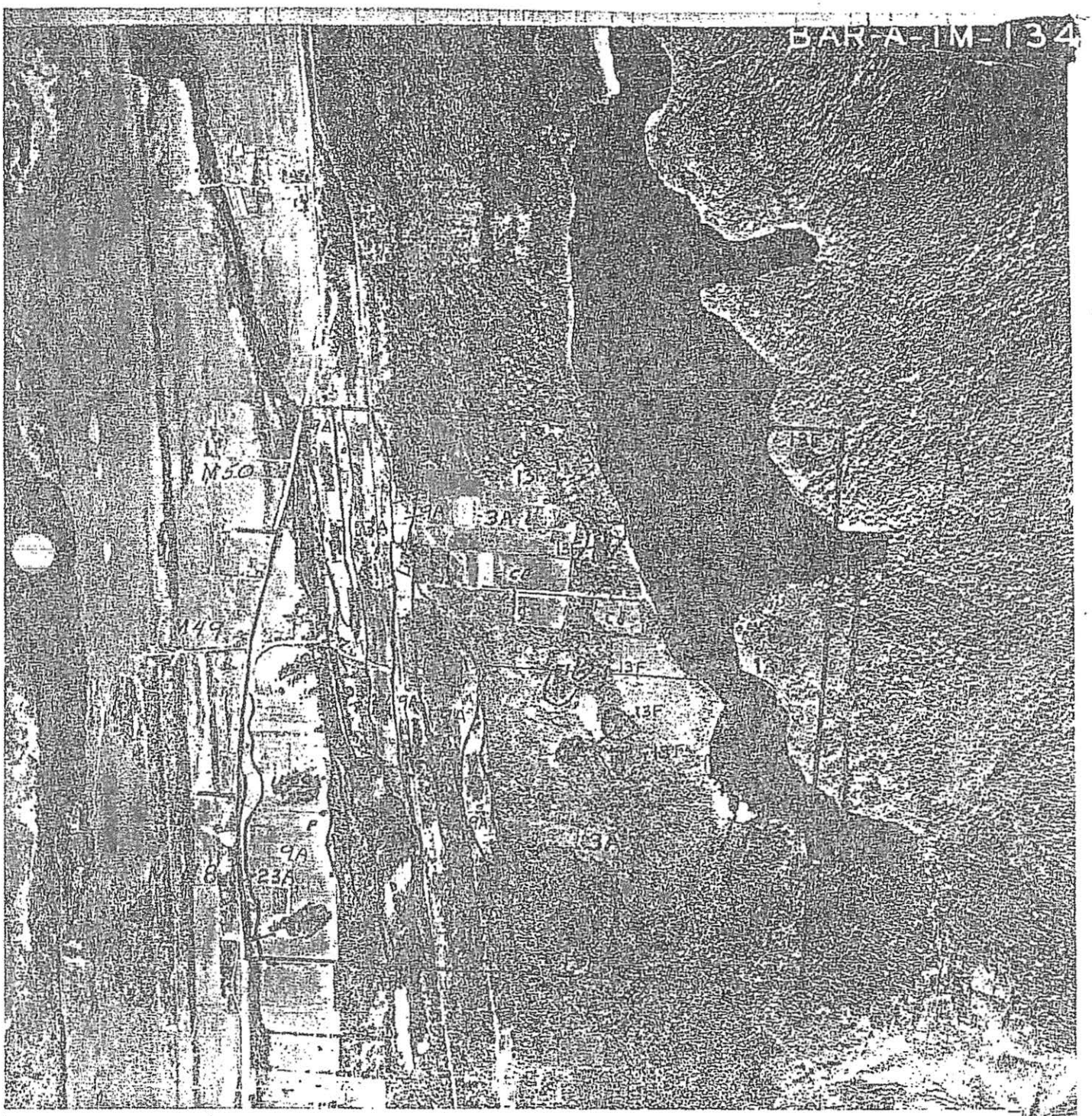

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SUP COUNTY SOIL SURVEY, OREGON. 0 ¼ ½ MILE

E OF COPY 4.7 COPY FACTOR 33.3 % NEG. SCALE 1.57 DATE COPIED APR. 1973

USDA - SCS ADVANCE COPY - SUBJECT TO CHANGE

IT'SOP COUNTY SOIL SURVEY, OREGON. 0 ¼ ½ MILE

SCALE OF COPY 4.7 COPY FACTOR 33.3 % NEG. SCALE 1:57 DATE COPIED APR. 19 3

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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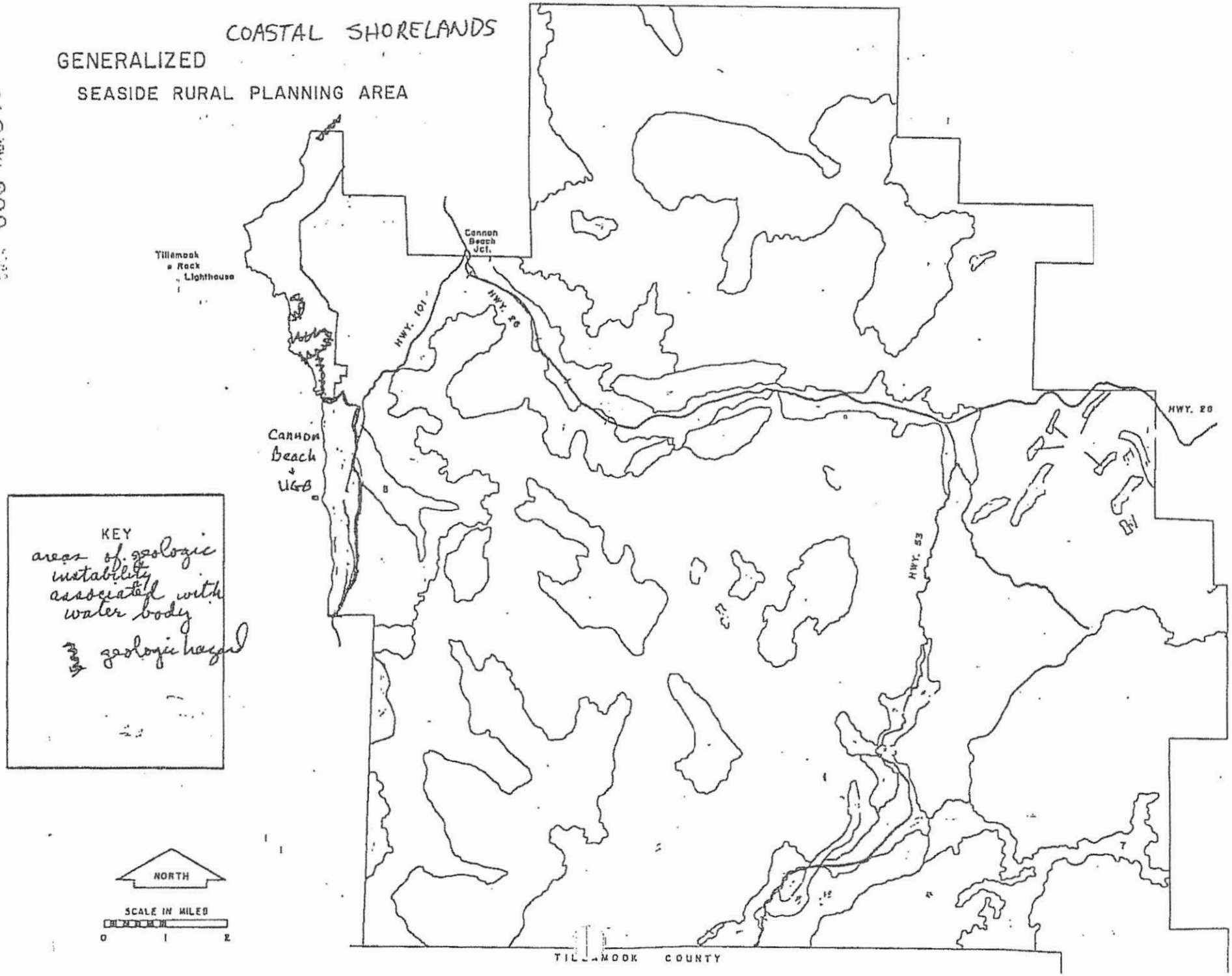
For Detailed Mapping see maps in the Clatsop County Department of Planning and Development.

COASTAL SHORELANDS

GENERALIZED

SEASIDE RURAL PLANNING AREA



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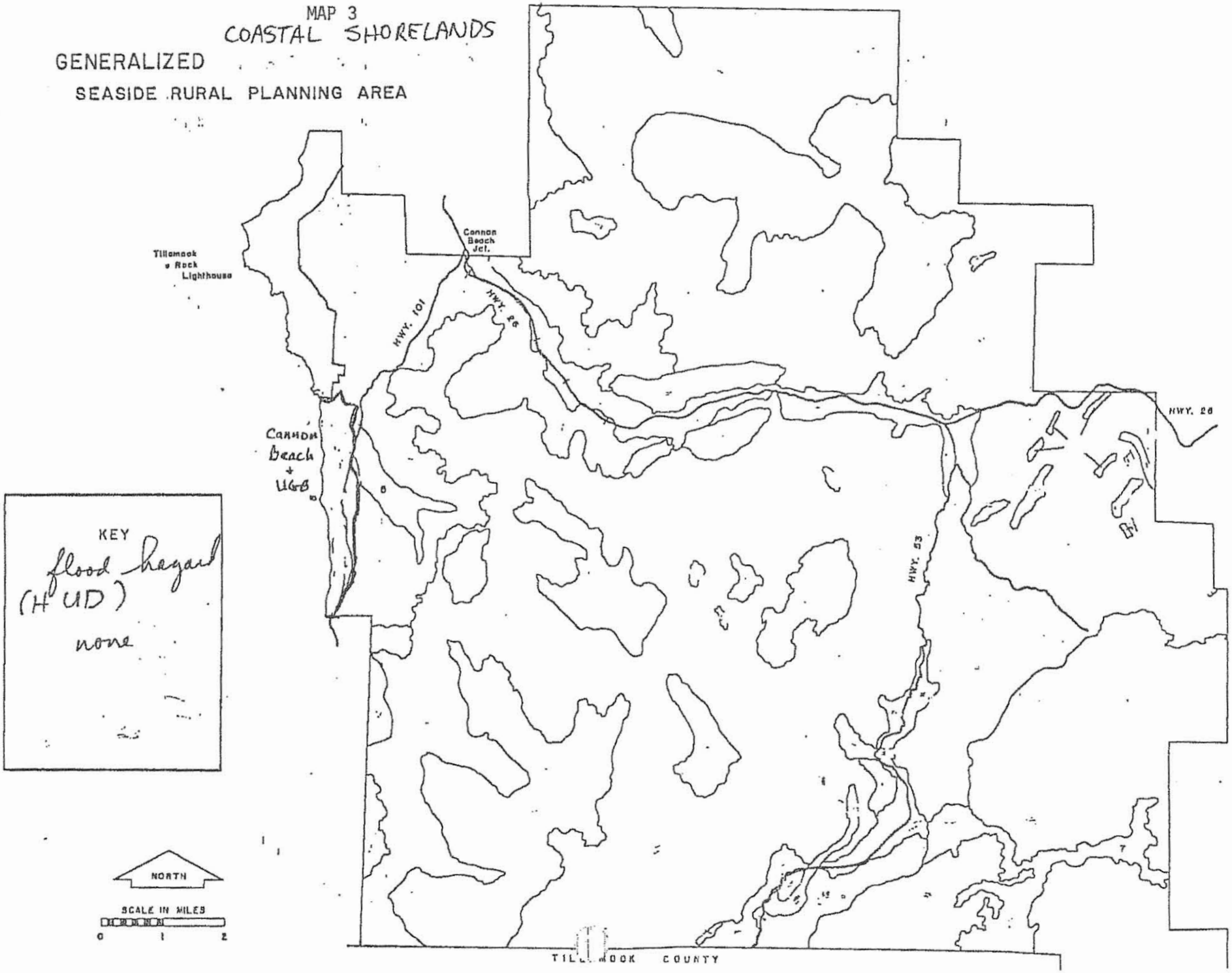
MAP 3

COASTAL SHORELANDS

GENERALIZED

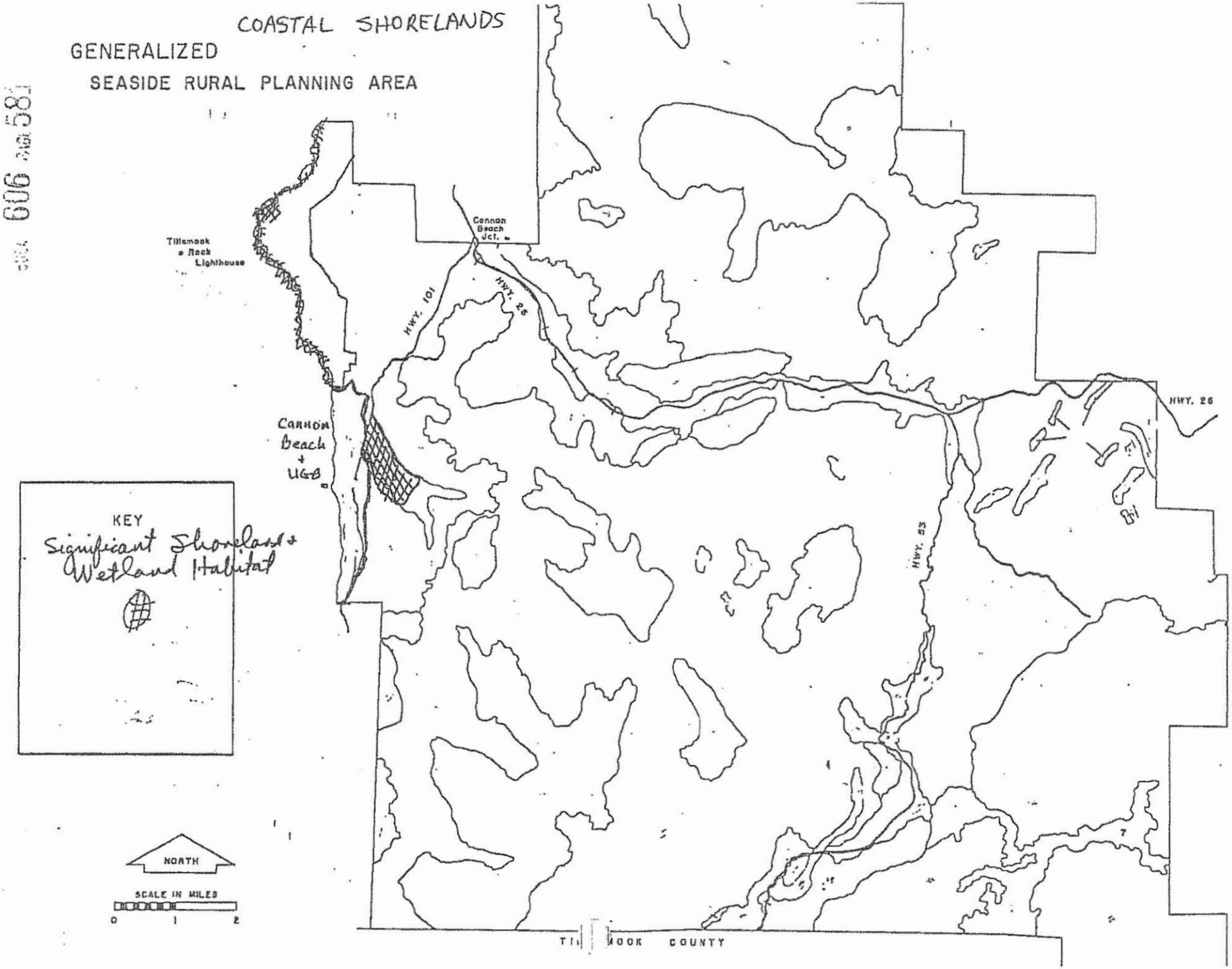
SEASIDE RURAL PLANNING AREA



COASTAL SHORELANDS

GENERALIZED

SEASIDE RURAL PLANNING AREA



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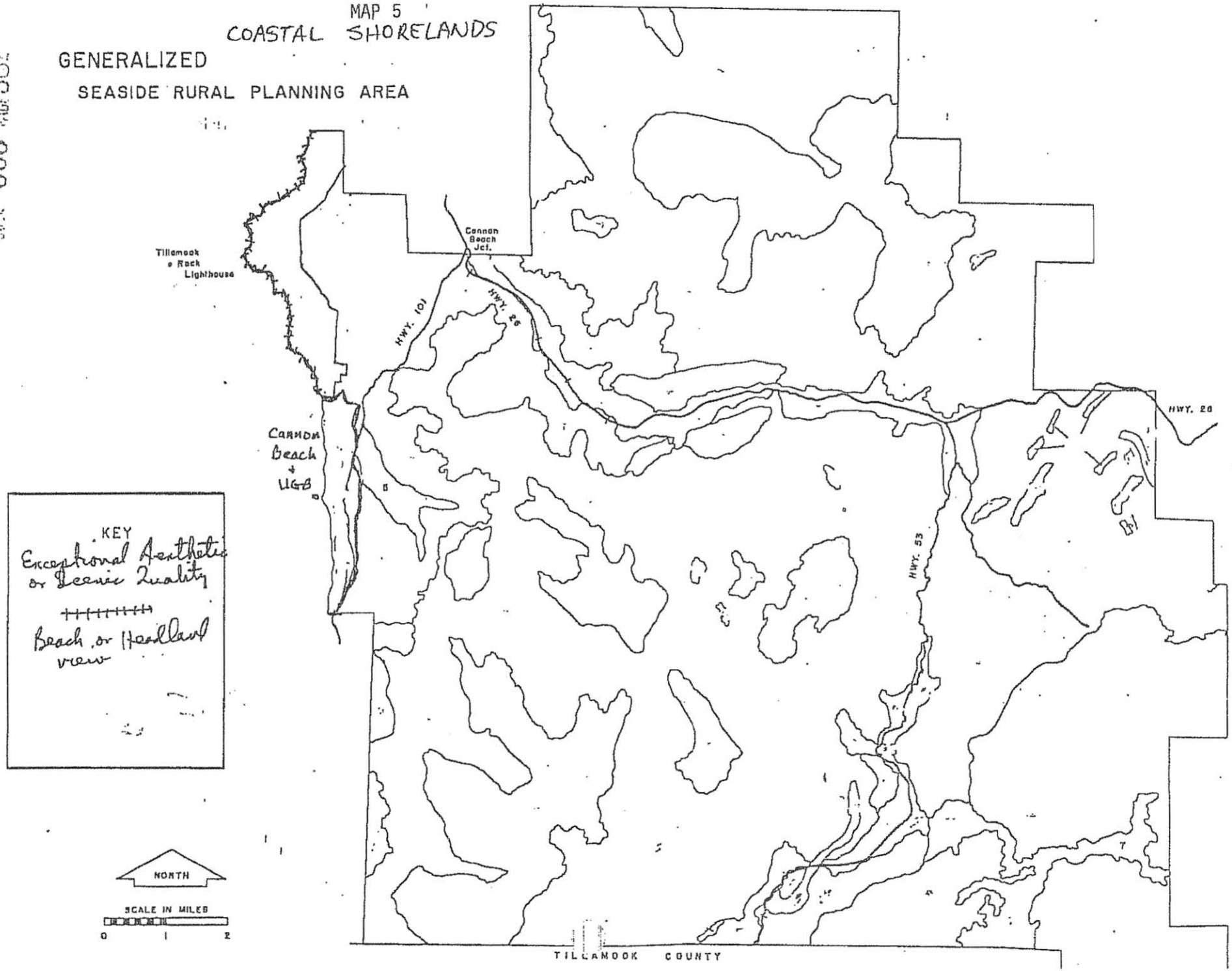
MAP 5

COASTAL SHORELANDS

GENERALIZED

SEASIDE RURAL PLANNING AREA



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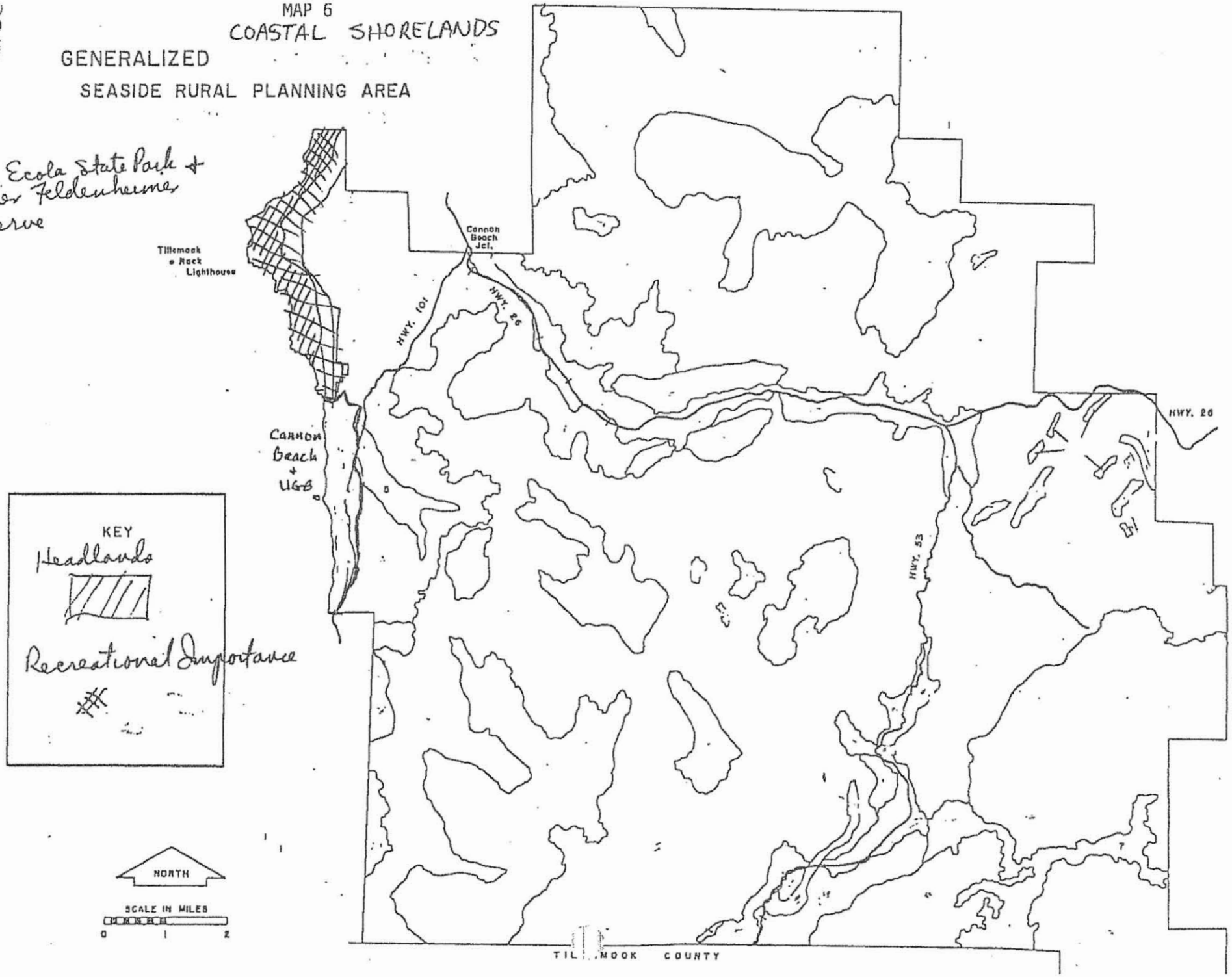
MAP 6
COASTAL SHORELANDS

GENERALIZED
SEASIDE RURAL PLANNING AREA



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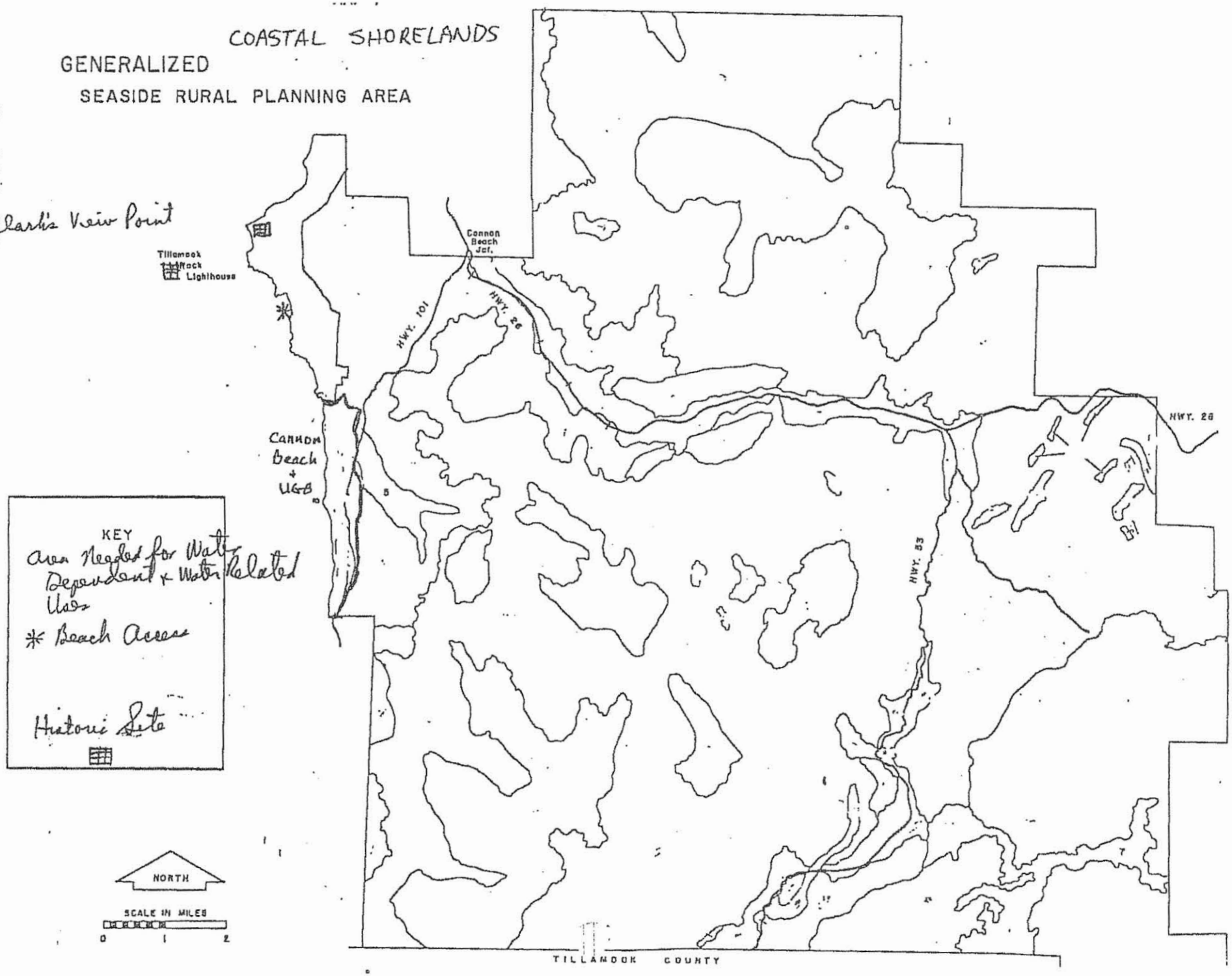
COASTAL SHORELANDS

GENERALIZED

SEASIDE RURAL PLANNING AREA

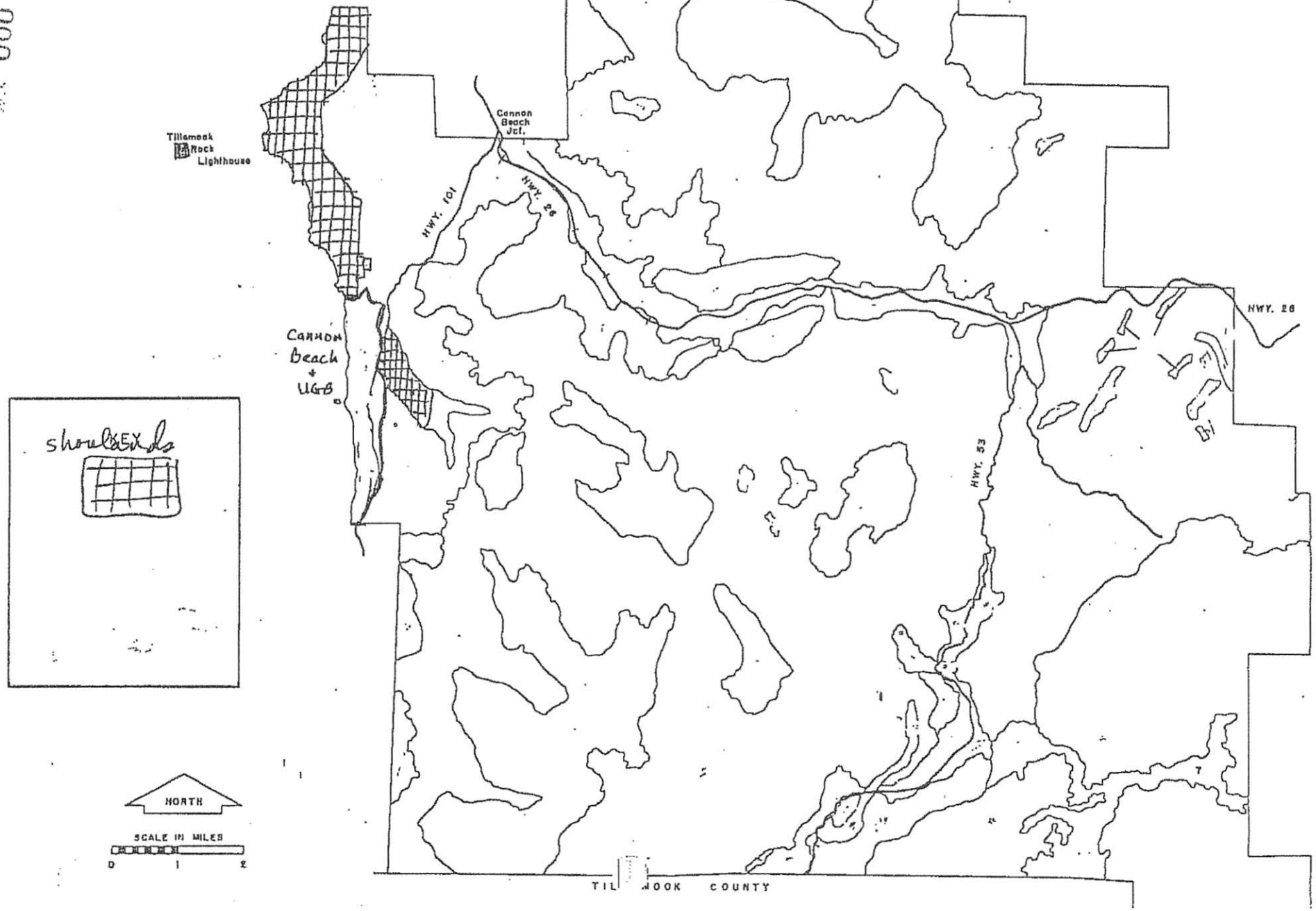


MAP 8

COASTAL SHORELANDS

GENERALIZED

SEASIDE RURAL PLANNING AREA



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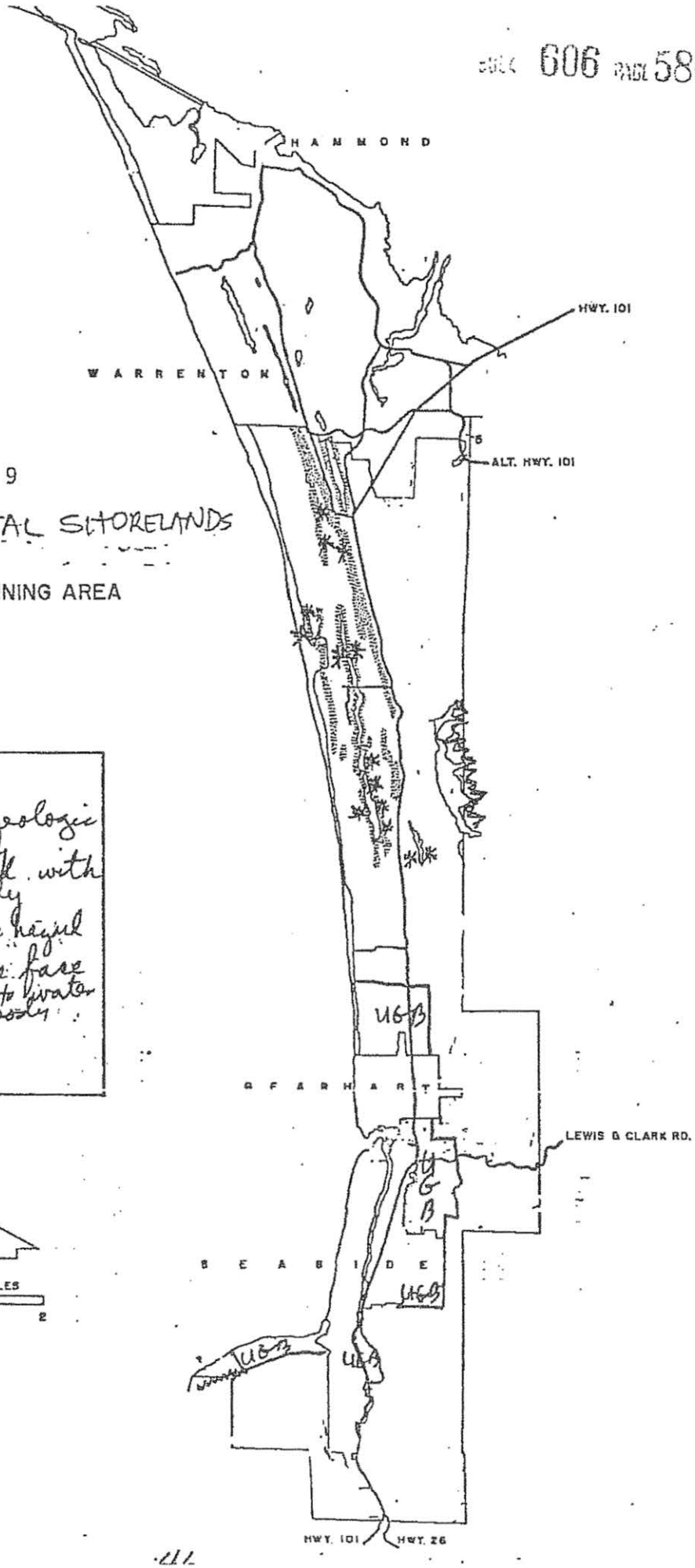


MAP 9

COASTAL SHORELANDS

GENERALIZED

CLATSOP PLAINS PLANNING AREA

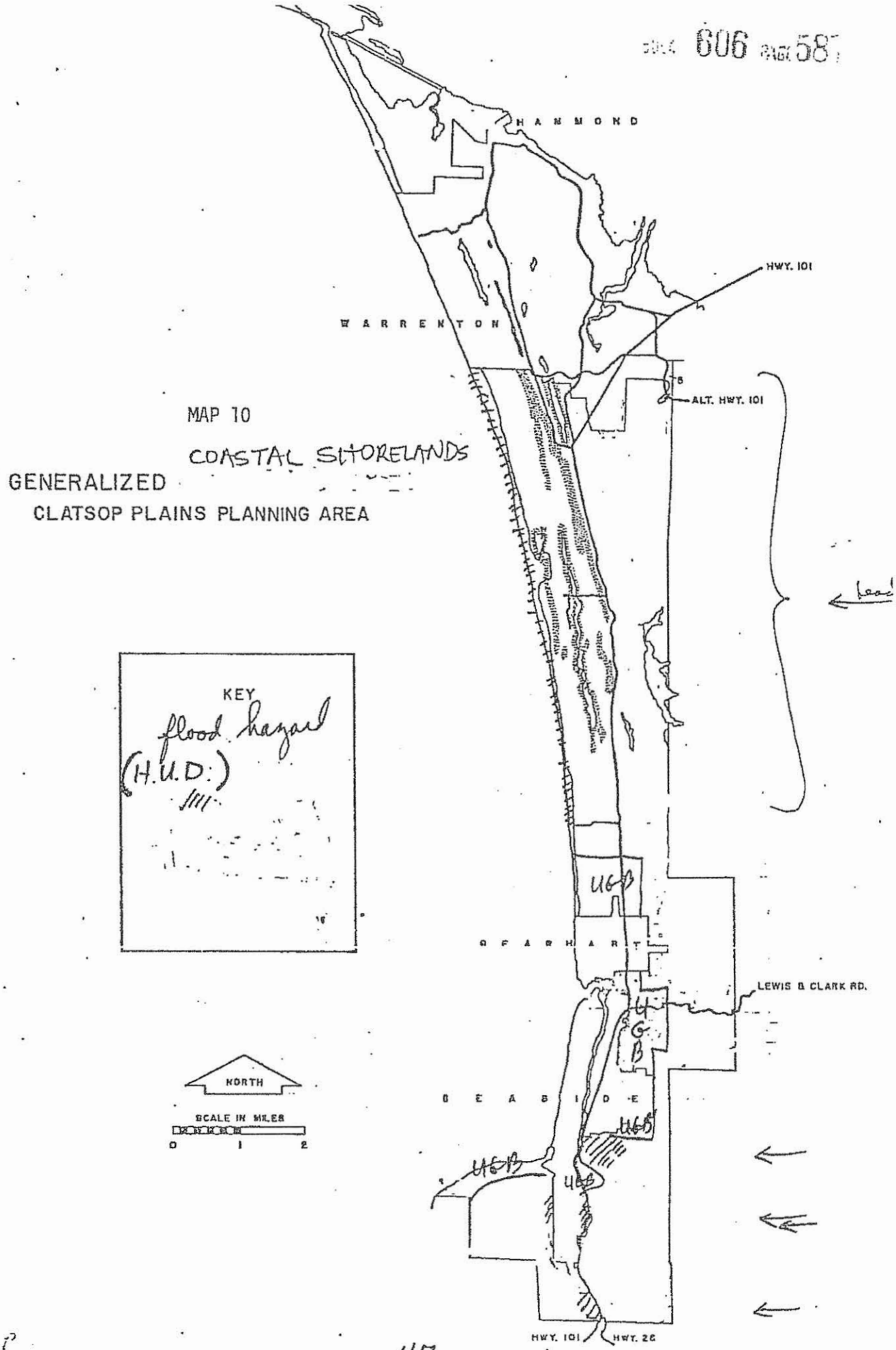
KEY

areas of geologic instability associated with water body

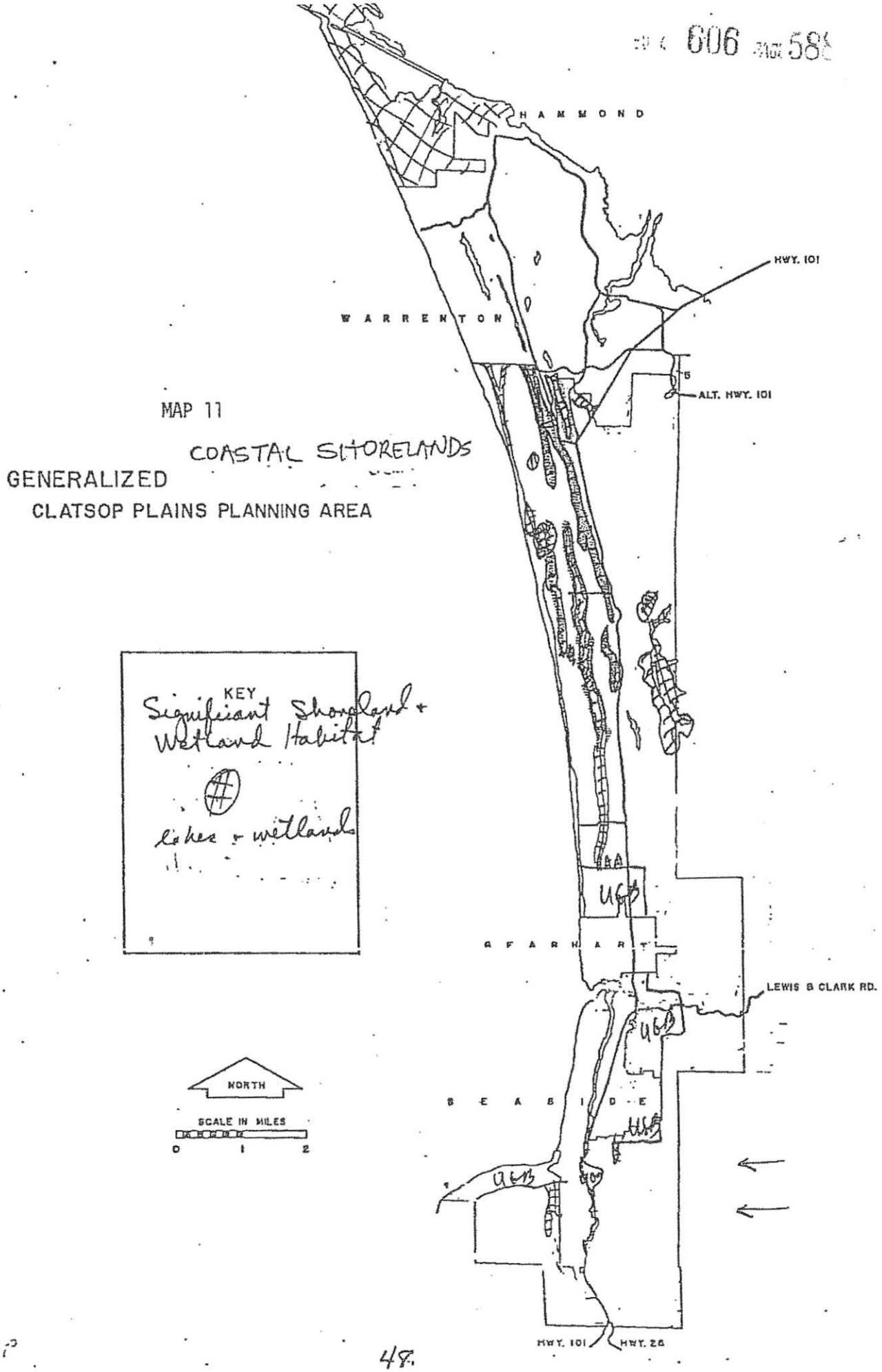
geologic hazard

* steep dune face adjacent to water body

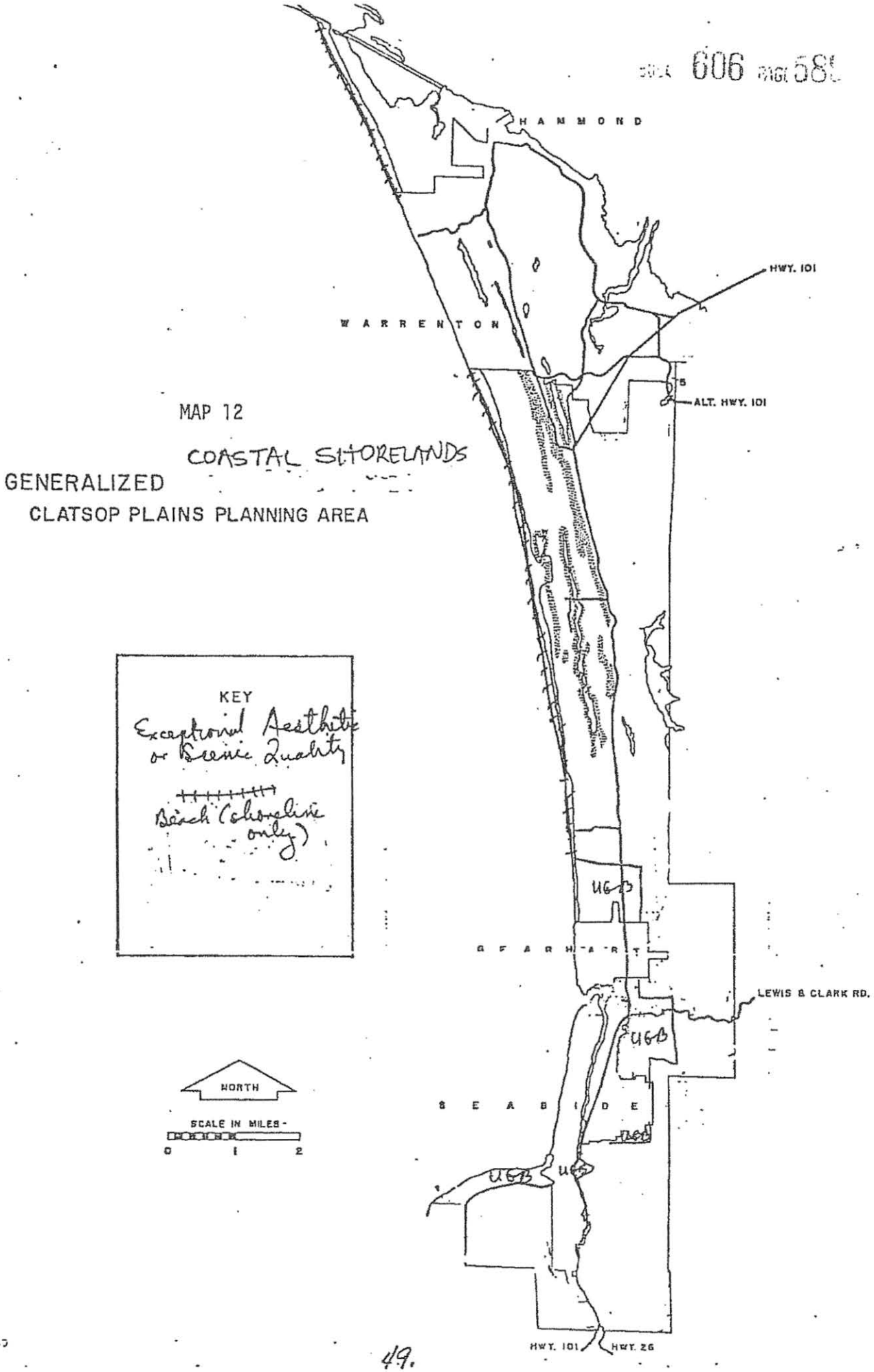
Page Map


HAMMOND
WARRENTON
HWY. 101
ALT. HWY. 101
MAP 10
COASTAL SHORELANDS
GENERALIZED
CLATSOP PLAINS PLANNING AREA
KEY
flood hazard
(H.U.D.)
UGB
GEARHART
LEWIS & CLARK RD.
UGB
NORTH
SCALE IN MILES
0 1 2
SEASIDE
UGB
UGB
UGB
HWY. 101
HWY. 26

Base Map


HAMMOND
WARRENTON
HWY. 101
ALT. HWY. 101
GEARHART
LEWIS & CLARK RD.
SEASIDE
HWY. 101
HWY. 26
UGB
UGB
UGB
UGB
UGB
MAP 11
COASTAL SHORELANDS
GENERALIZED
CLATSOP PLAINS PLANNING AREA
KEY
Significant Shoreland + Wetland Habitat
lakes + wetlands
NORTH
SCALE IN MILES
0 1 2

Base Map



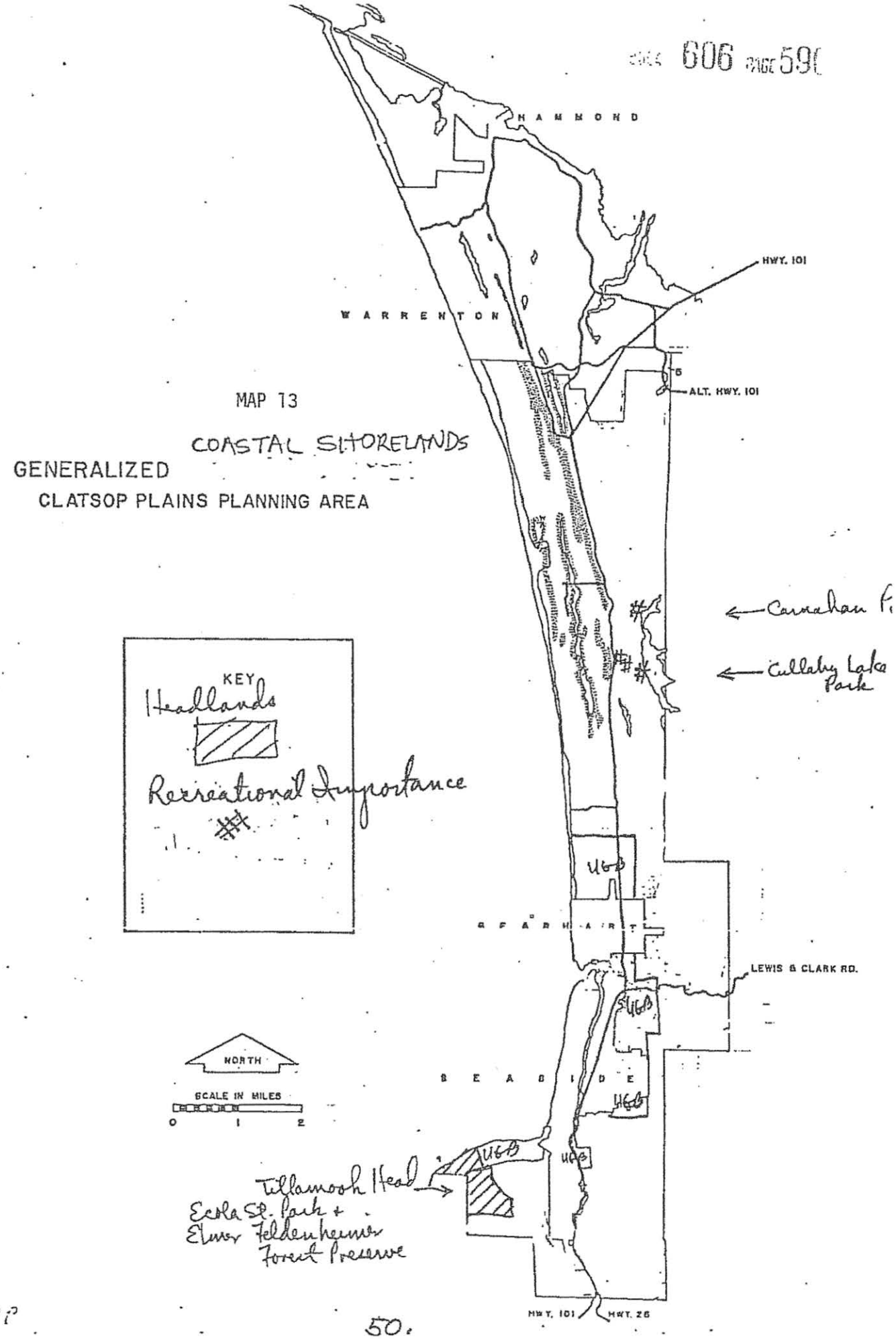
MAP 12

COASTAL SHORELANDS

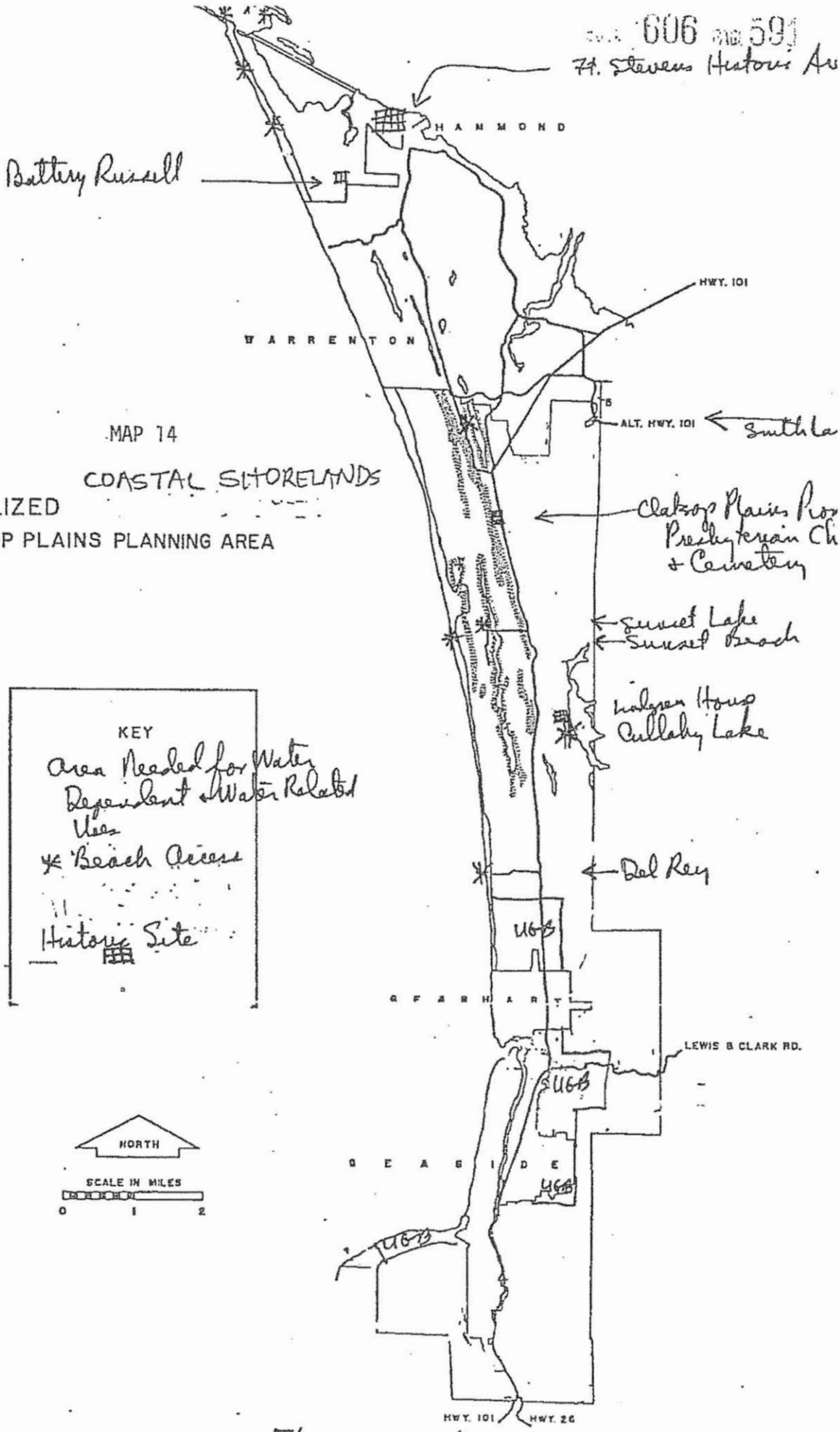
GENERALIZED

CLATSOP PLAINS PLANNING AREA

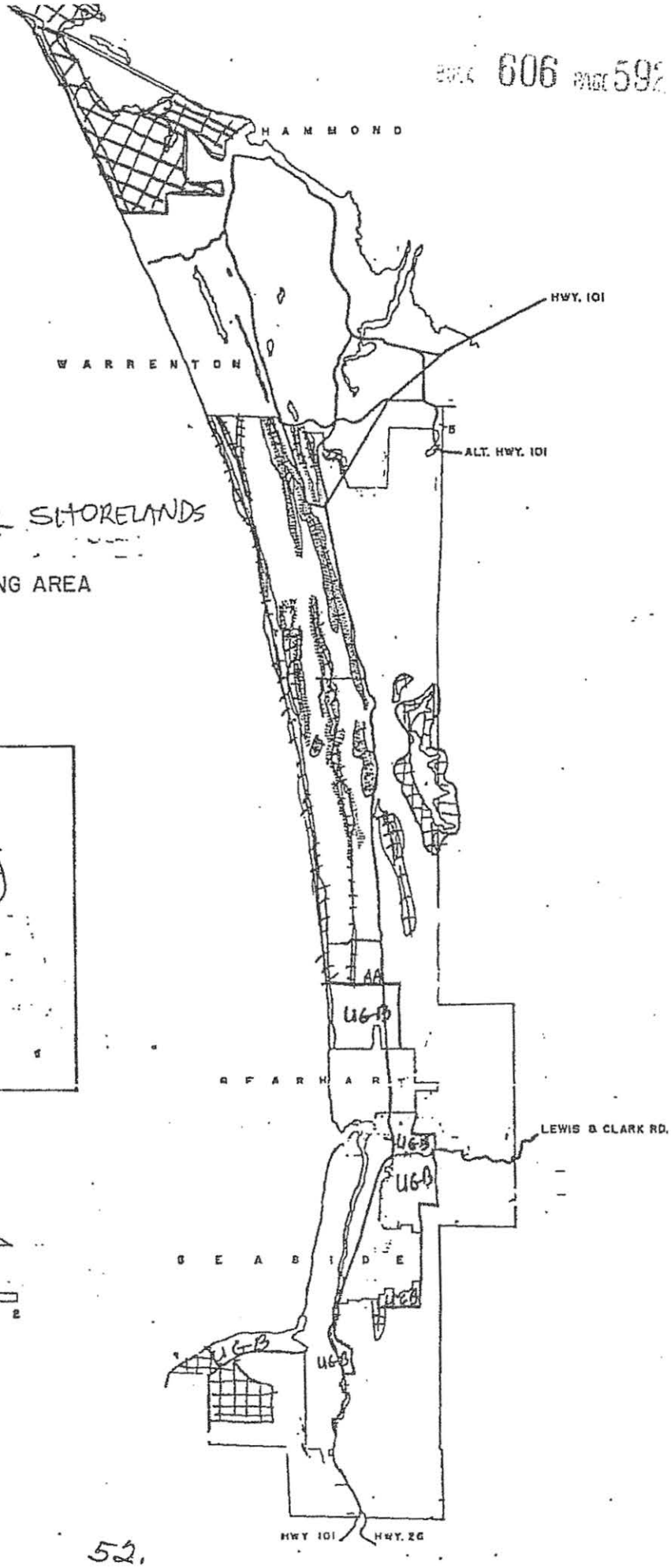
See Map


HAMMOND
HWY. 101
WARRENTON
ALT. HWY. 101
MAP 13
COASTAL SHORELANDS
GENERALIZED
CLATSOP PLAINS PLANNING AREA
Carnahan Pi
Cullaby Lake Park
KEY
Headlands
Recreational Importance
UGB
GEARHART
LEWIS & CLARK RD.
NORTH
SCALE IN MILES
0 1 2
SEASIDE
Tillamook Head
Ecola St. Park +
Elmer Feldenheimer
Forest Preserve
HWY. 101
HWY. 26

See Map


74. Stevens Historic Ar
HAMMOND
Battery Russell
HWY. 101
WARRENTON
ALT. HWY. 101
Smith La
MAP 14
COASTAL SHORELANDS
GENERALIZED
CLATSOP PLAINS PLANNING AREA
Clatsop Plains Pres
Presbyterian Ch
& Cemetery
Sunset Lake
Sunset Beach
Wolgren House
Cullaby Lake
KEY
Area Needed for Water
Dependent & Water Related
Uses
Beach Access
History Site
Del Rey
UGB
GEARHART
LEWIS & CLARK RD.
NORTH
SCALE IN MILES
0 1 2
SEASIDE
HWY. 101
HWY. 26

Base Map



MAP 15

COASTAL SHORELANDS

GENERALIZED

CLATSOP PLAINS PLANNING AREA

KEY

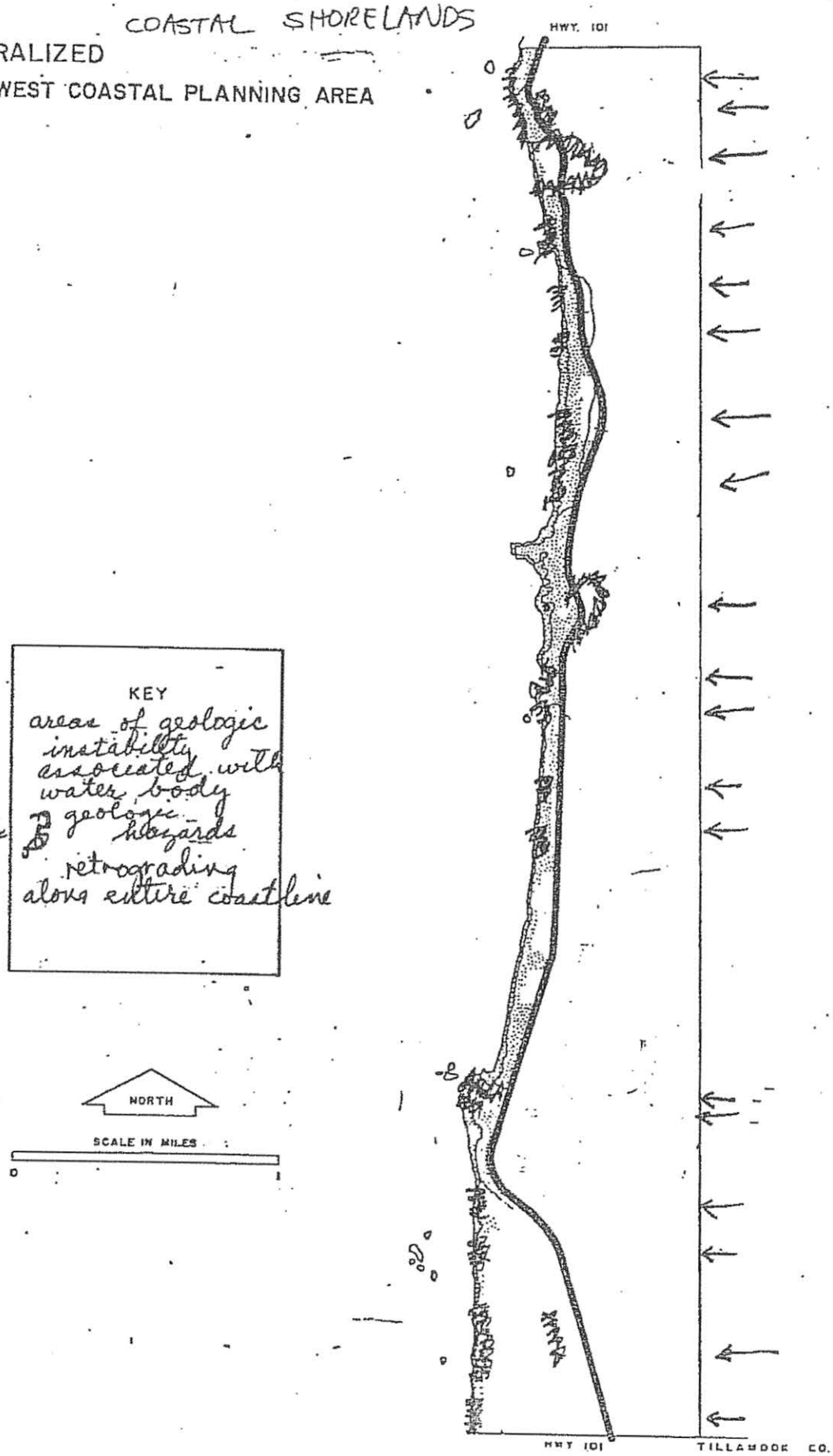
Shorelands

See Map

MAP 16

COASTAL SHORELANDS

GENERALIZED
SOUTHWEST COASTAL PLANNING AREA



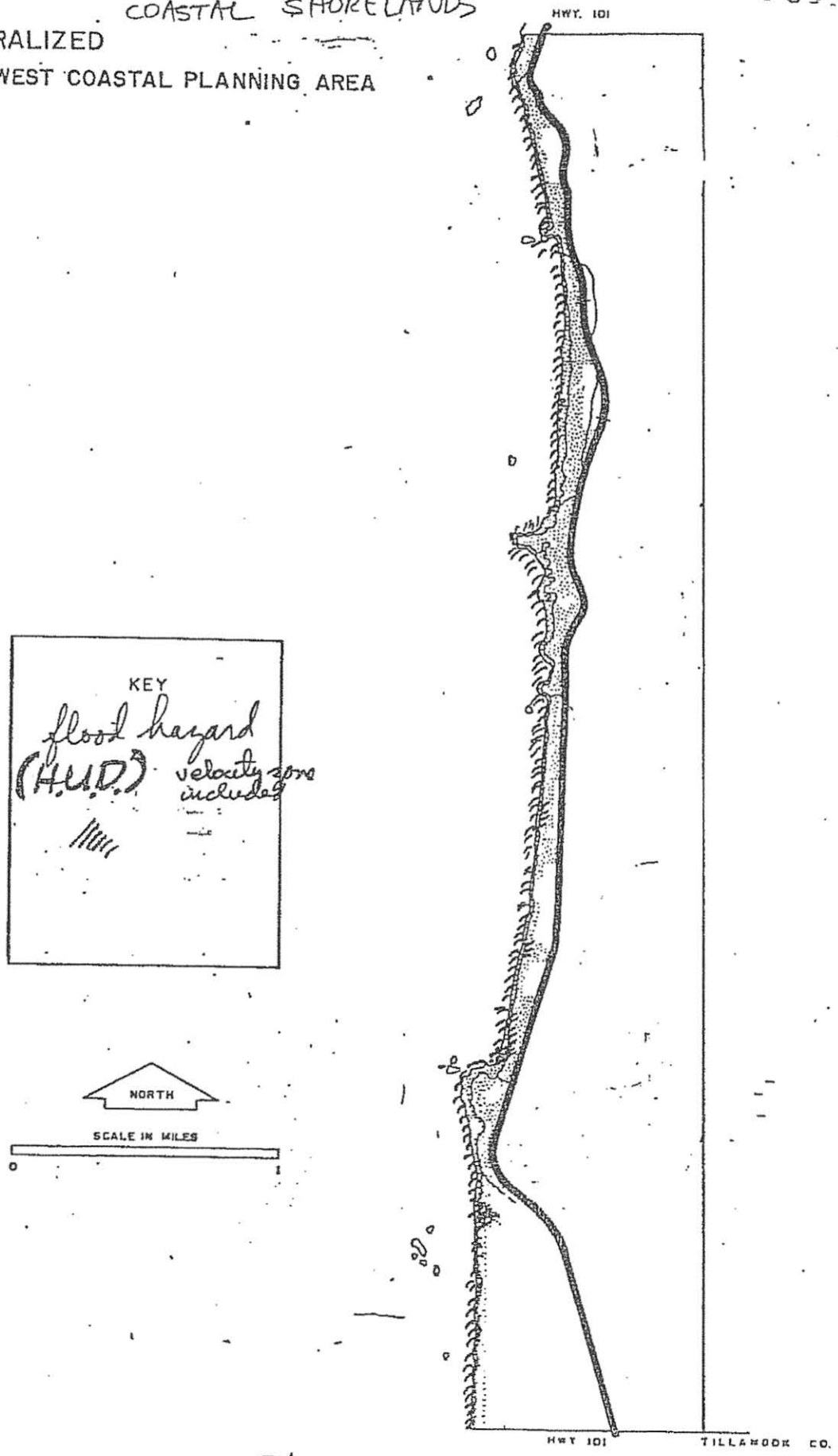
Identified in the Larry Ross geologic study of the S.W. coastal

MAP 17

606 PG 594

COASTAL SHORELANDS

GENERALIZED
SOUTHWEST COASTAL PLANNING AREA

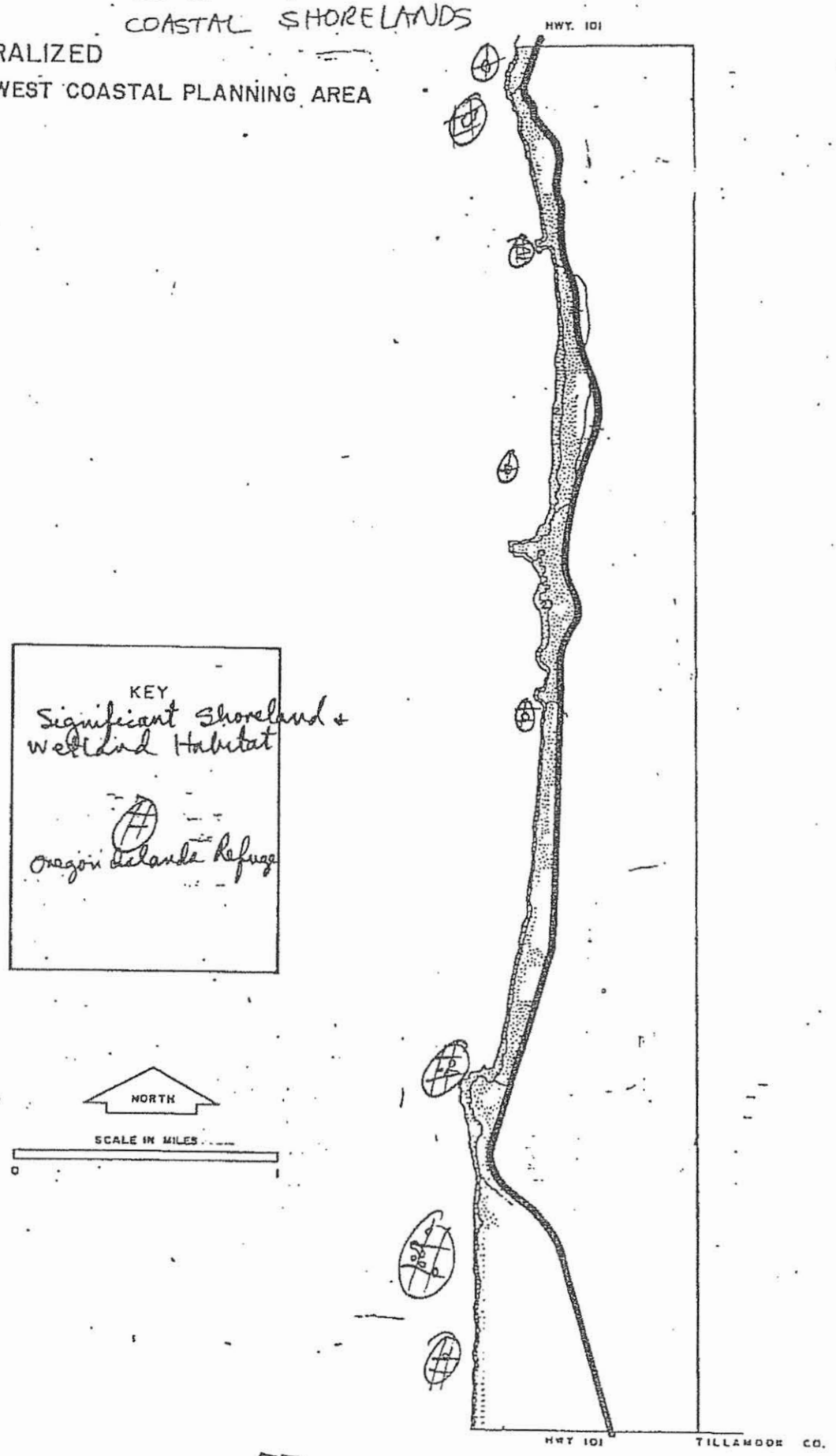


MAP 18

COASTAL SHORELANDS

GENERALIZED

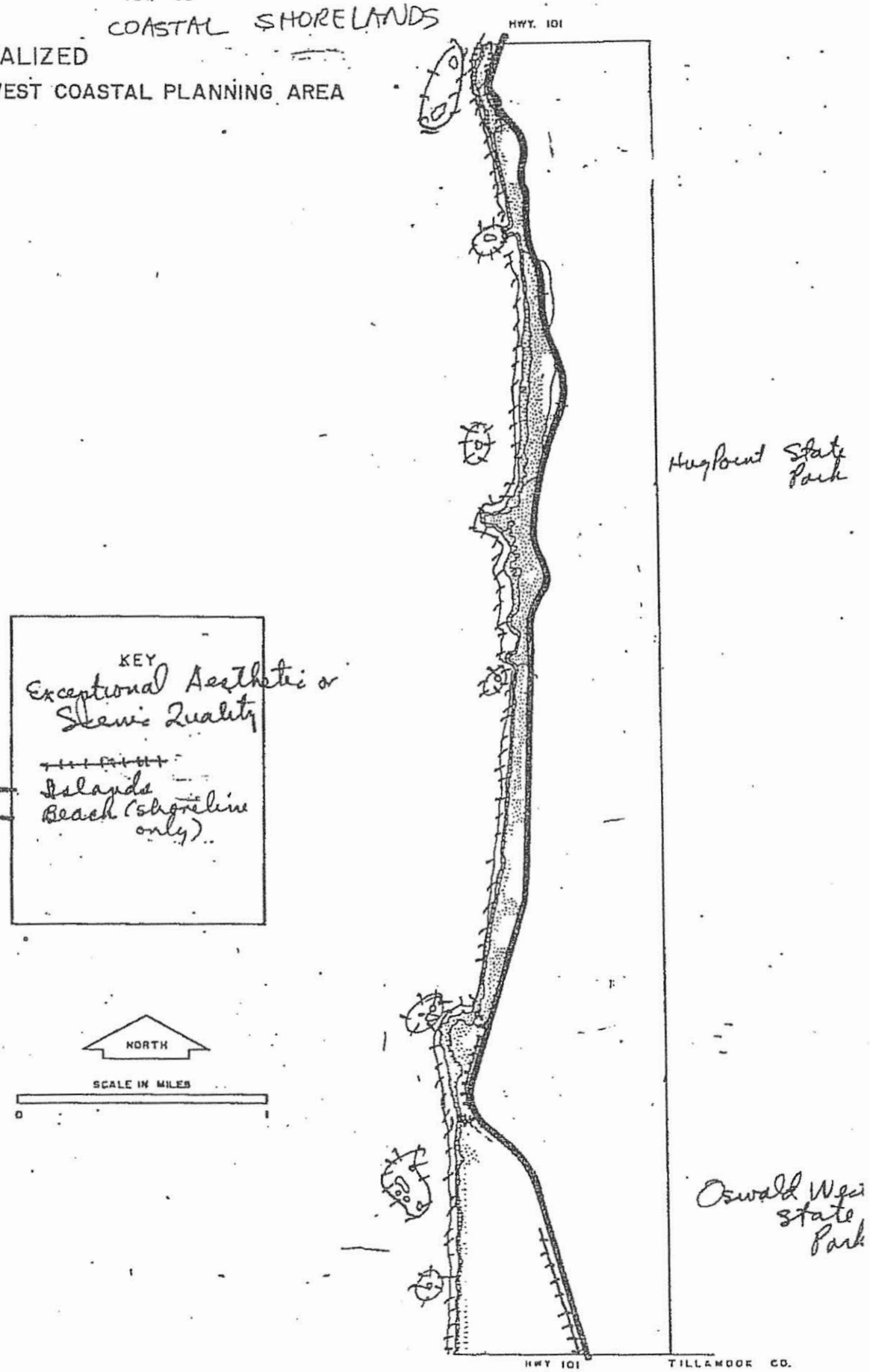
SOUTHWEST COASTAL PLANNING AREA



MAP 19

COASTAL SHORELANDS

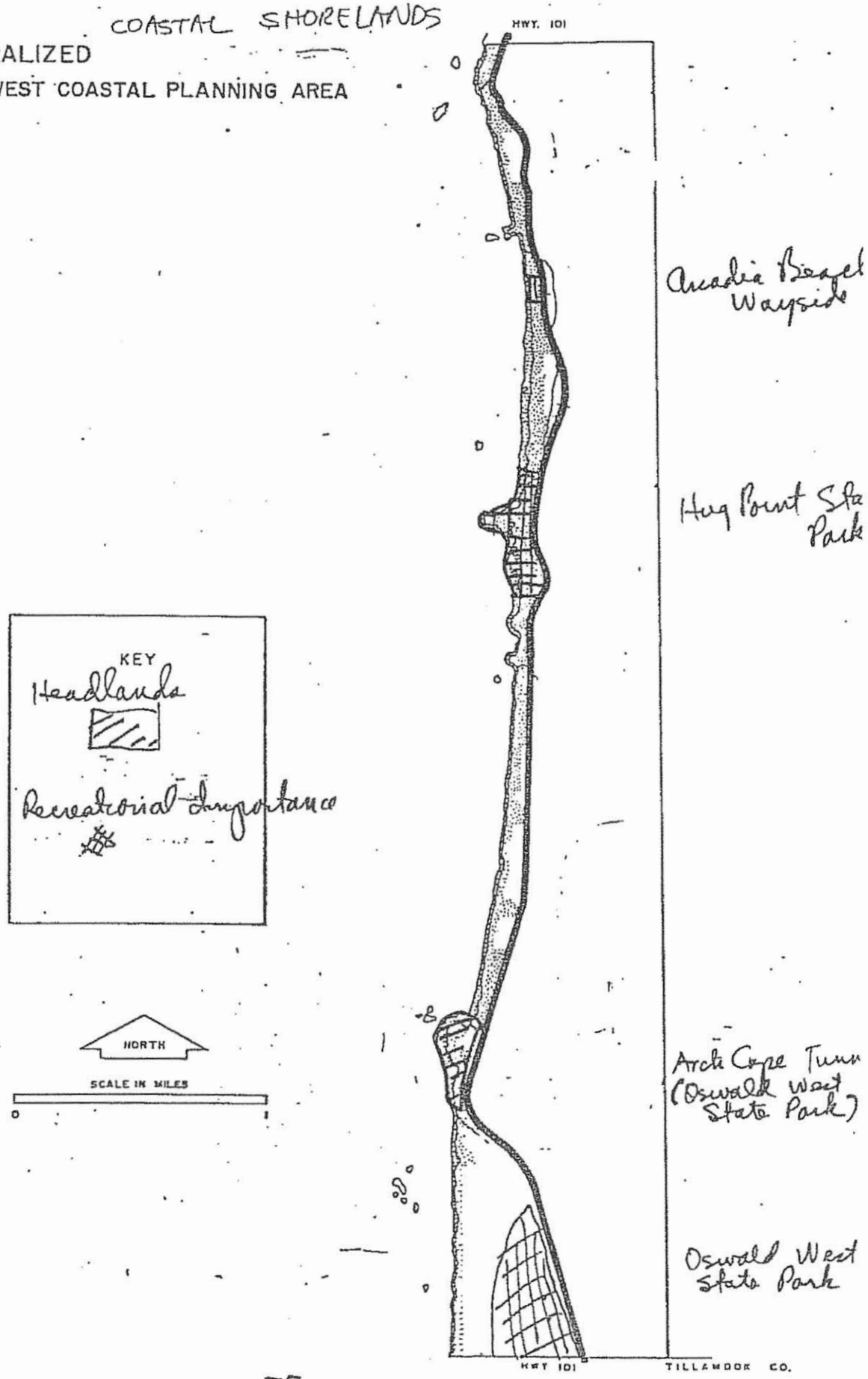
GENERALIZED
SOUTHWEST COASTAL PLANNING AREA



MAP 20

COASTAL SHORELANDS

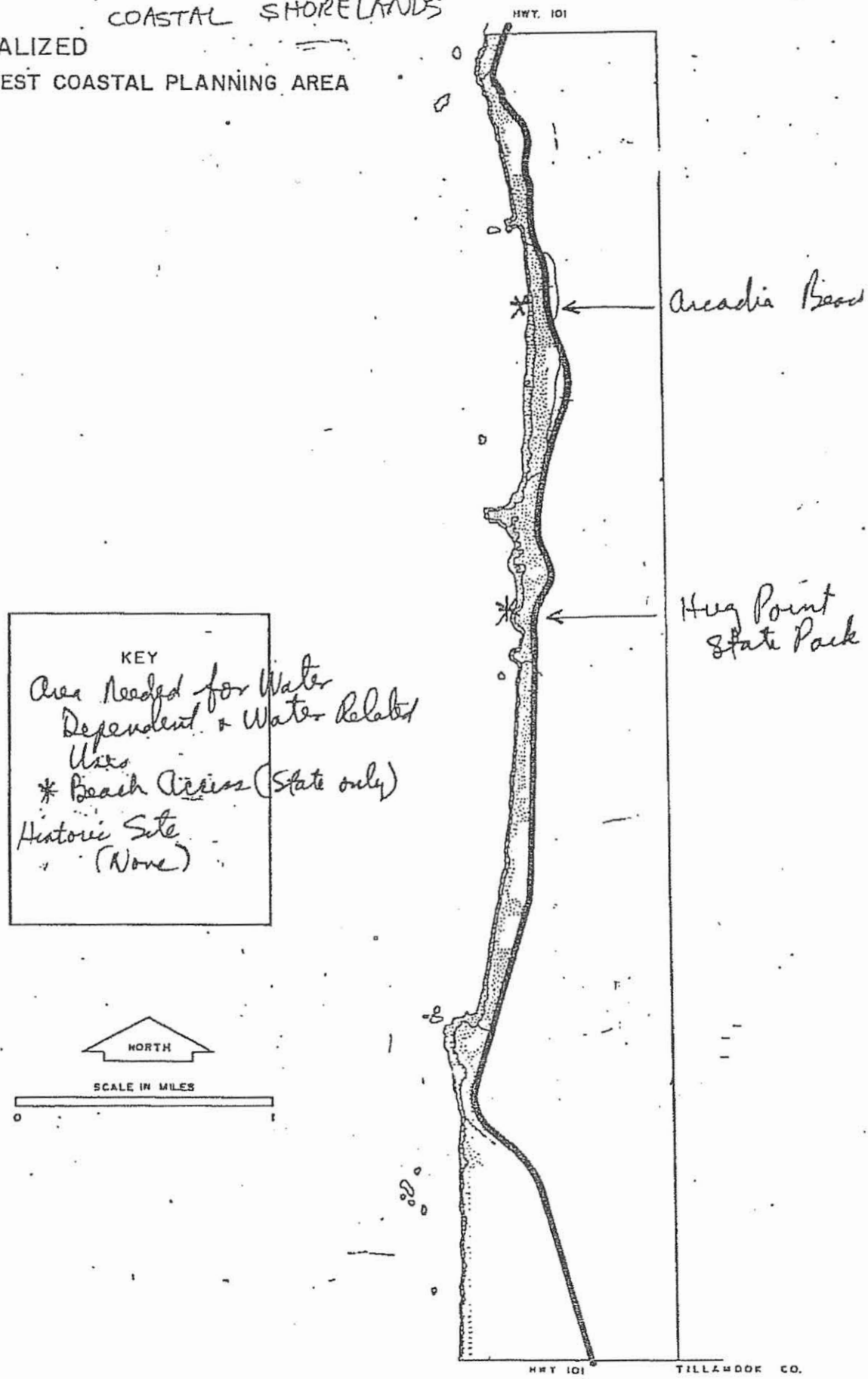
GENERALIZED
SOUTHWEST COASTAL PLANNING AREA



MAP 21

COASTAL SHORELANDS

GENERALIZED
SOUTHWEST COASTAL PLANNING AREA



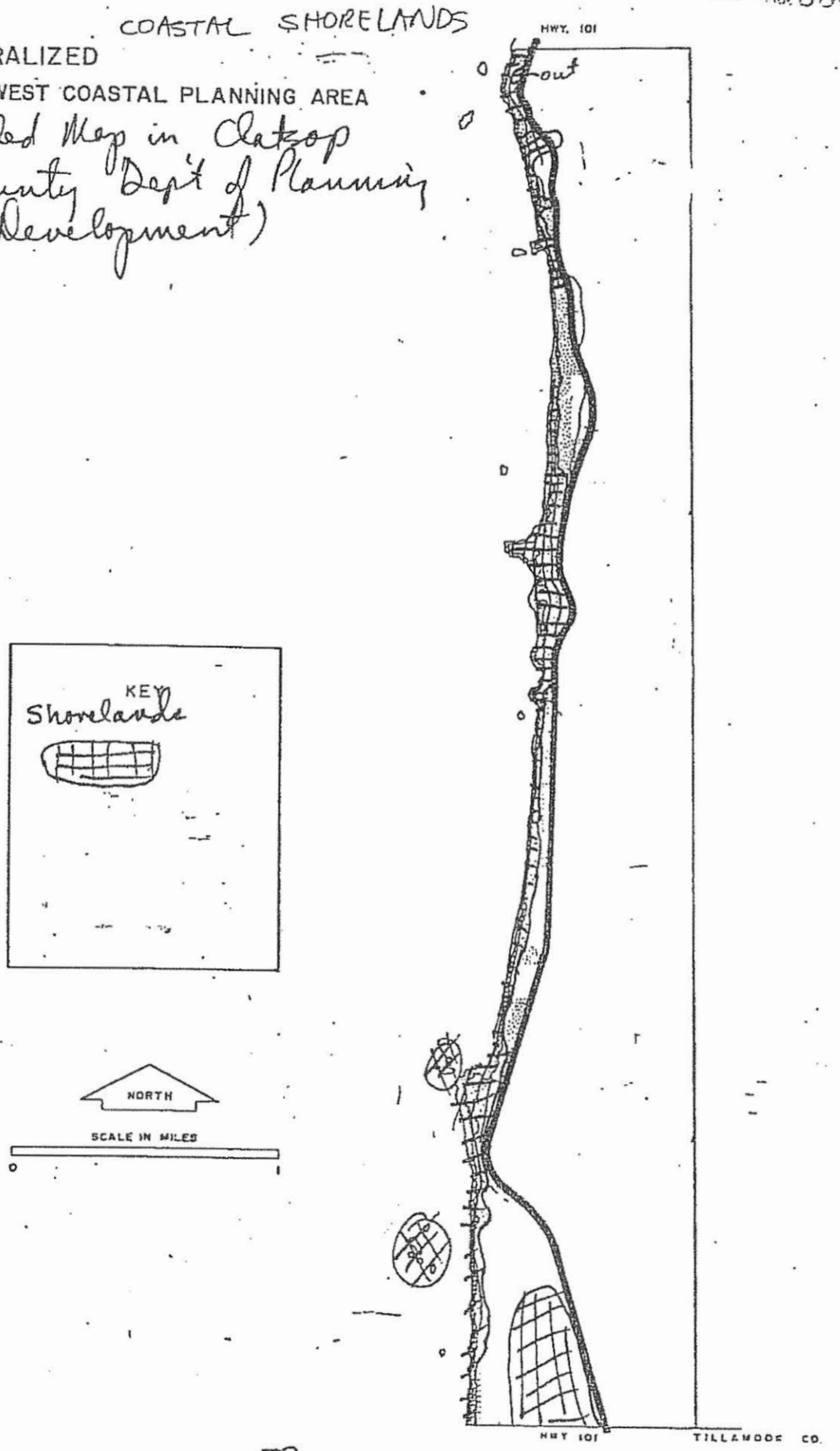
MAP 22

COASTAL SHORELANDS

GENERALIZED

SOUTHWEST COASTAL PLANNING AREA

(Detailed Map in Clatsop County Dept of Planning + Development)



606 606

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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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 kestrals, 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).

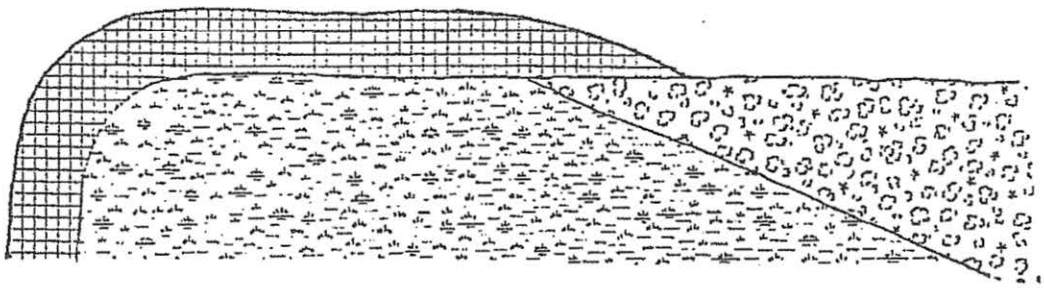
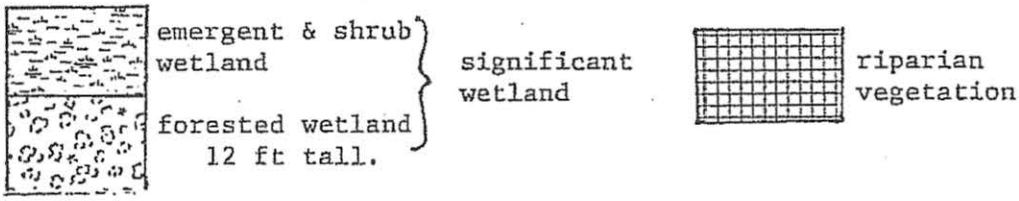


Figure 1. The location of a 50 ft wide riparian zone around a significant wetland area dominated partly by emergent vegetation and partly by woody vegetatation exceeding 12 ft in height.



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 course 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 course sandscent 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 Clatop 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 (Nuttaill'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-persistant 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:

Potomogeton species (pondweed)
Nuphar polysepalum (indian pondlily)
Hippuris vulgaris (common mare's tail)
Potentilly 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-persistant emergent and floating leaved plants typical of #2 are often found. Common or dominant species include:

Carex cusickii (Sucick's sedge)
Carex vesicaria (inflated sedge)
Carex interior (inland sedge)
Menyanthes trifoliata (bogbean)
Nuphar polysepalum (indian pondlily)
Potentilly 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 persistantly 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 greenei (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)
Eriphorum 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.

REFERENCES

1) CREST, 1979: Columbia River Estuary Regional Management Plan; Columbia River Estuary Study Taskforce, Astoria, OR.
2) Maine, N., 1979: Necanicum Estuary Inventory; Report to Clatsop County.
3) Nature Conservancy, 1977: Oregon Natural Areas - Data Summary.
4) Sanderson, R. B., Shulters, M. V., Curtiss, D. A., 1973: Lakes of Oregon, Volume 1, a report by U.S.G.S.
5) Taylor, D., Knispel, W., 1976: Fish and Wildlife Habitat Protection Plan for Clatsop County. ODFW report to Clatsop County.

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 aerials. In areas not covered by these aerials, 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 aerials 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
H - Hammond
G - Gearhart
S - Seaside

CP - Clatsop Plains
LY - Lewis & Clark & Youngs River
EC - Eastern Clatsop

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 consistant 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 furbearers. 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 outisde G 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 innundated 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 marshed 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 sund-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 excessivly 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 greve 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, 9, 10, 8

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, immediatly 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 Plain, 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 tidegated 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."

606 665

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 creekl. These wetlands technically fall under Goal 16, on account of periodic flooding by tidal water. They are, however, heavily distrubed, 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

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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:	Picea sitchensis/Sambucus racemosa
Water Regime:	Saturated

Alder/Spruce

System:	Palustrine
Class:	Forest wetland
Subclass:	Broad-leaved deciduous/needle-leaved evergreen
Dominance Type:	Alnus rubra/Picea sitchensis
Water Regime:	Seasonally flooded

Sedge/Alder

System:	Palustrine
Class:	Emergent/forested wetlands
Subclass:	Persistent/broad-leaved deciduous
Dominance Type:	Carex obnupta/Alnus rubra
Water Regime:	Semipermanently exposed

Sedge/Twinberry

System:	Palustrine
Class:	Emergent/scrub-shrub wetlands
Subclass:	Persistent/broad-leaved deciduous
Dominance Type:	Carex obrupta/Lonicera involucrata
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 I
VEGETATION COMMUNITIES
OF CANNON BEACH WETLAND

Blackberry/Alder

Himalayan blackberry	(*Rubus discolor*)
evergreen blackberry	(*Rubus laciniatus*)
red alder	(*Alnus rubra*)
twinberry	(*Lonicera involucrata*)
Sitka spruce	(*Picea sitchensis*)
crab apple	(*Pyrus fusca*)
Scotch broom	(*Cytisus scoparius*)
cow parsnip	(*Heracleum lanatum*)
horsetail	(*Equisetum arvense*)
coltsfoot	(*Petasites frigidus*)
buttercup	(*Ranunculus sp.*)
clover	(*Trifolium sp.*)
slough sedge	(*Carex obnupta*)
soft rush	(*Juncus effusus*)
grass	(Gramineae)
wild mustard	(Cruciferae)
vetch	(*Vicia sp.*)

Spruce/Elderberry

Sitka spruce	(*Picea sitchensis*)
red elderberry	(*Sambucus racemosa*)
buttercup	(*Ranunculus sp.*)
red huckleberry	(*Vaccinium parvifolium*)
vine maple	(*Acer circinatum*)
Douglas maple	(*Acer douglasii*)
hemlock	(*Tsuga heterophylla*)
curled dock	(*Rumex crispus*)
wood rush	(*Luzula sp.*)
sword fern	(*Polystichum munitum*)
cow parsnip	(*Heracleum lanatum*)
oxalis	(*Oxalis oregana*)
wild cucumber	(*Marah oreganus*)
montia	(*Montia parvifolia*)
Siberian miner's lettuce	(*Montia siberica*)
bracken	(*Pteriduim aquilinum*)
slough sedge	(*Carex obnupta*)
grass	(Gramineae)
violet	(*Viola spp.*)
crab apple	(*Pyrus fusca*)
foxglove	(*Digitalis purpurea*)
lily of the valley	(*Maianthemum dilatatum*)
tansey ragwort	(*Tanacetum vulgare*)
large-leaf aven	(*Geum macrophyllum*)
common thistle	(*Circium vulgare*)

Spruce/Elderberry (Cont.)

Scouler's corydalis	(*Corydalis scouleri*)
tooth-leaved monkey flower	(*Mimulus dentatus*)
yerba buena	(*Satureja douglesii*)
Oregon fairybells	(*Disporum oregonum*)
woodrush	(*Luzula sp.*)
cascara	(*Rhamnus purshiana*)
evergreen huckleberry	(*Vaccinium ovatum*)

Alder/Spruce

red alder	(*Alnus rubra*)
Sitka spruce	(*Picea sitchensis*)
crab apple	(*Pyrus fusca*)
salmonberry	(*Rubus spectalilis*)
red huckleberry	(*Vaccinium parvifolium*)
lily of the valley	(*Maianthemum dilatatum*)
montia	(*Montia parvifolia*)
Siberian miner's lettuce	(*Montia siberica*)
oxalis	(*Oxalis oregana*)
cow parsnip	(*Heracleum lanatum*)
salal	(*Gaultheria shallon*)
slough sedge	(*Carex obnupta*)
bedstraw	(*Galium boreale*)
wild cucumber	(*Marah oreganus*)
squashberry	(*Viburnum pauciflorum*)
gooseberry	(*Ribes sp.*)
tooth-leaved monkey flower	(*Mimulus dentatus*)
hedge nettle	(*Stachys mexicana*)
Fendler's waterleaf	(*Hydrophyllum fendleri*)
green-tinted heuchera	(*Heuchera chlorantha*)
violet	(*Viola spp.*)
woodrush	(*Luzula sp.*)
wild mustard	(Cruciferae)

Sedge/Alder

slough sedge	(*Carex obnupta*)
red alder	(*Alnus rubra*)
skunk cabbage	(*Lysichitum americanum*)
lady fern	(*Athyrium filix-femina*)
water parsley	(*Oenanthe sarmentosa*)
spleenwort	(*Asplenium sp.*)
Pacific cinquefoil	(*Potentilla pacifica*)
narrow-leaf skullcap	(*Scutellaria angustifolia*)
woodrush	(*Luzula*)
Brewer's bittercress	(*Cardamine breweri*)
angled bittercress	(*Cardamine angula*)

TABLE 1 (continued)

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Sedge/Twinberry

slough sedge	(*Carex obnupta*)
twinberry	(*Lonicera involucrata*)
skunk cabbage	(*Lysichitum americanum*)
water parsley	(*Oenanthe sarmentosa*)
wild mustard	(Cruciferae)
red alder	(*Alnus rubra*)
Sitka spruce	(*Picea sitchensis*)
deadly nightshade	(*Solanum dulcamara*)
maidenhair fern	(*Adiantum pedatum*)
water fern	(*Azollamexicana*)
coast boykinia	(*Boykinia elata*)
American wintercress	(*Barberea orthoceras*)

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.

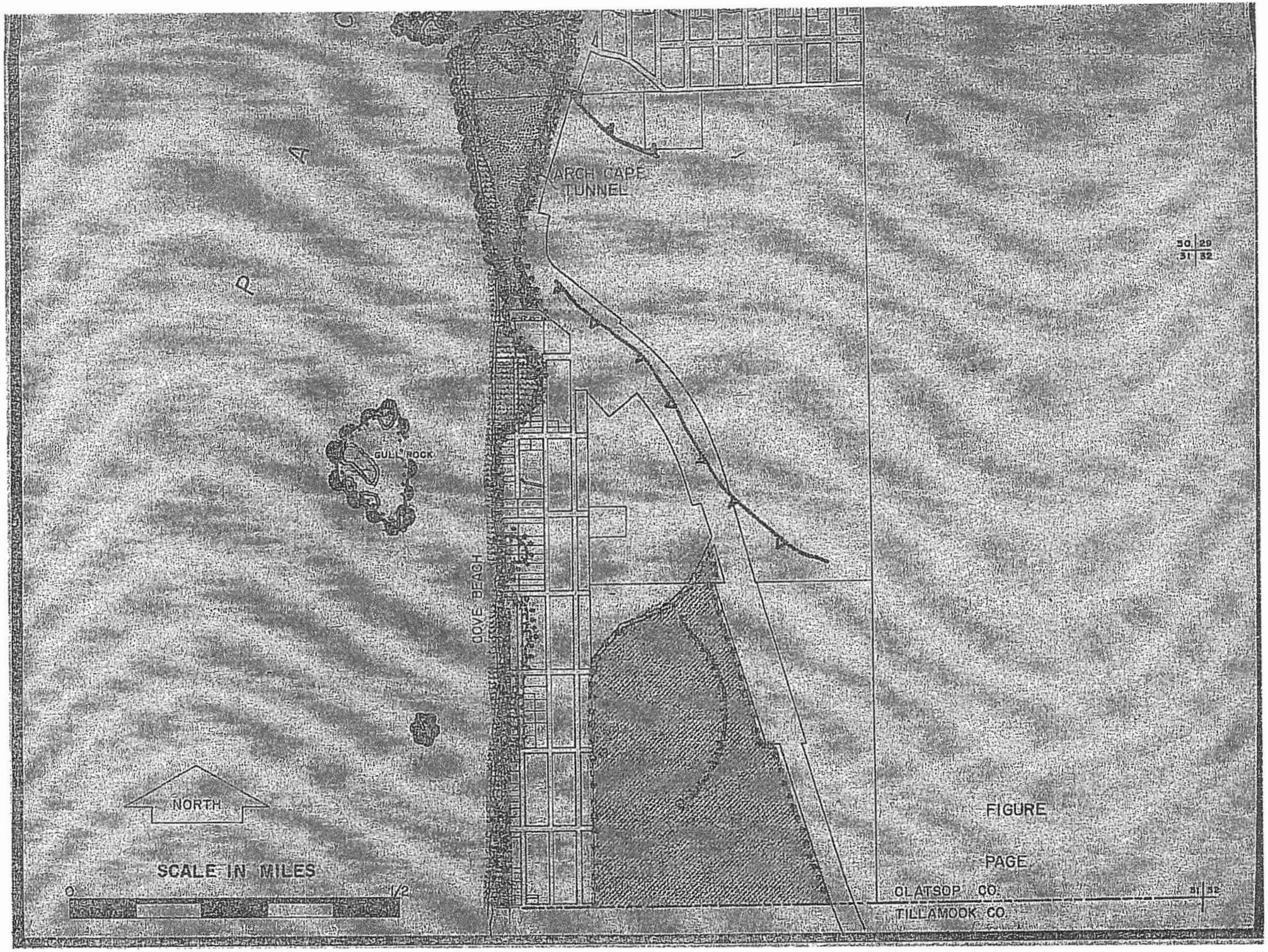
3.2.2.2 Wildlife

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.

SW Coastal Area
MAP
NEXT 3 FRAMES


ARCH CAPE TUNNEL
GULL ROCK
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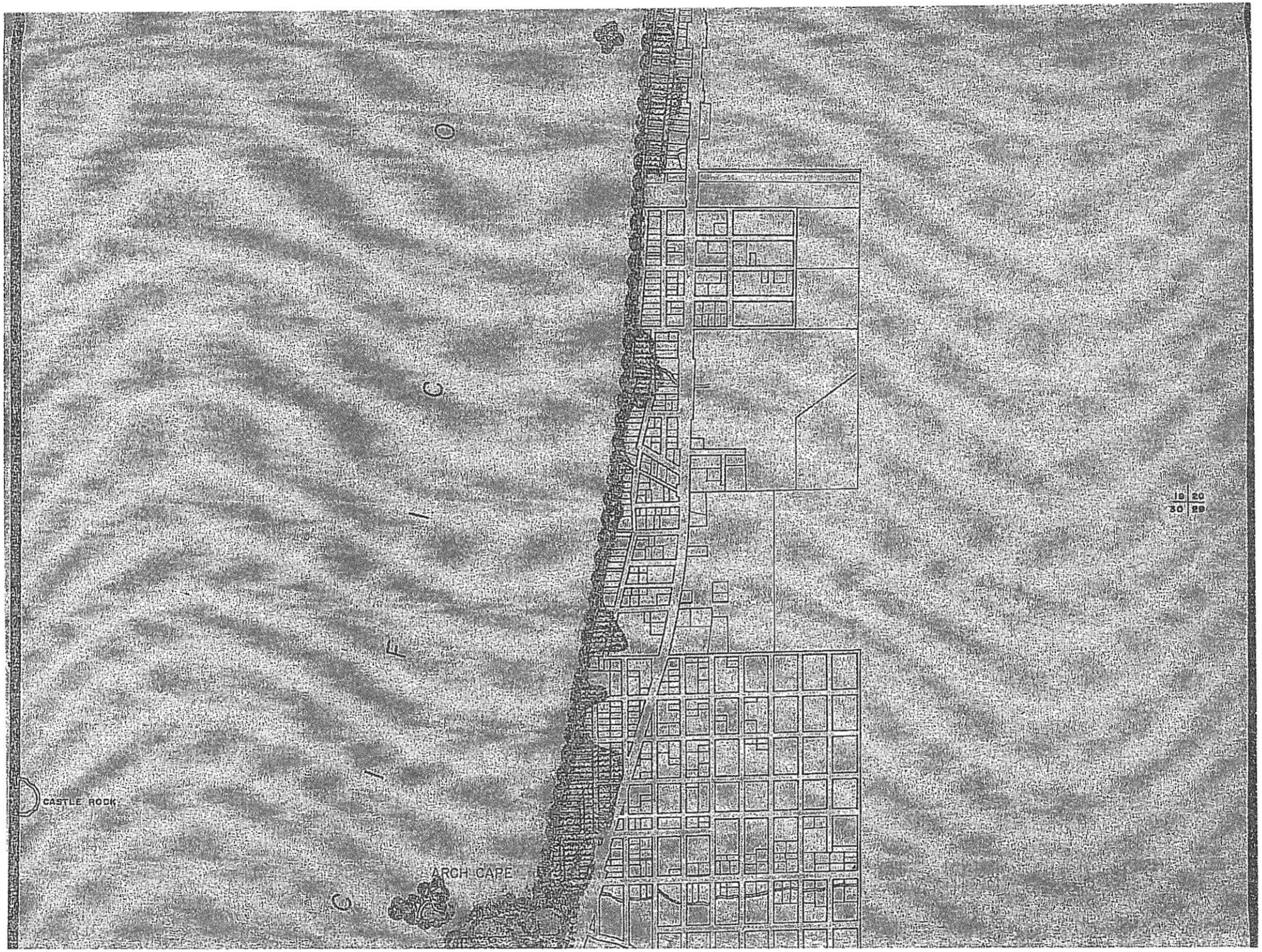
CASTLE ROCK
ARCH CAPE
19 20
30 29

Department of
Planning and Development

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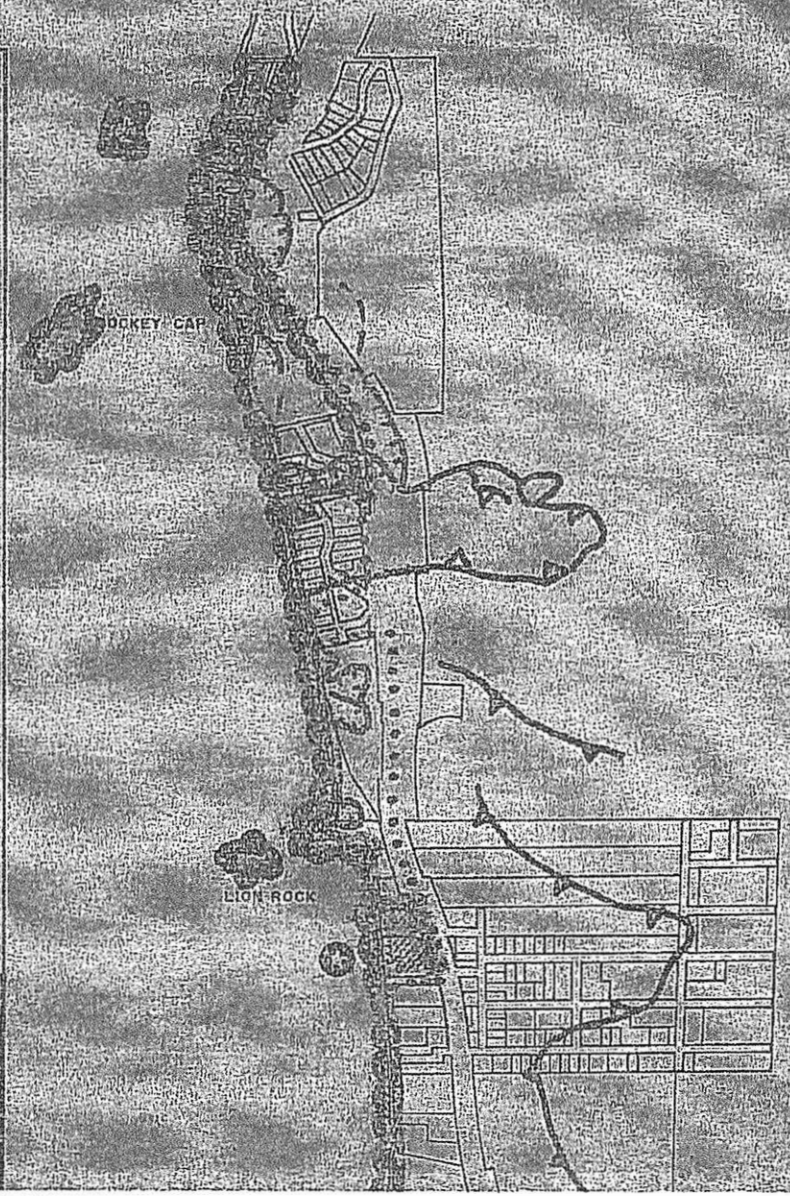
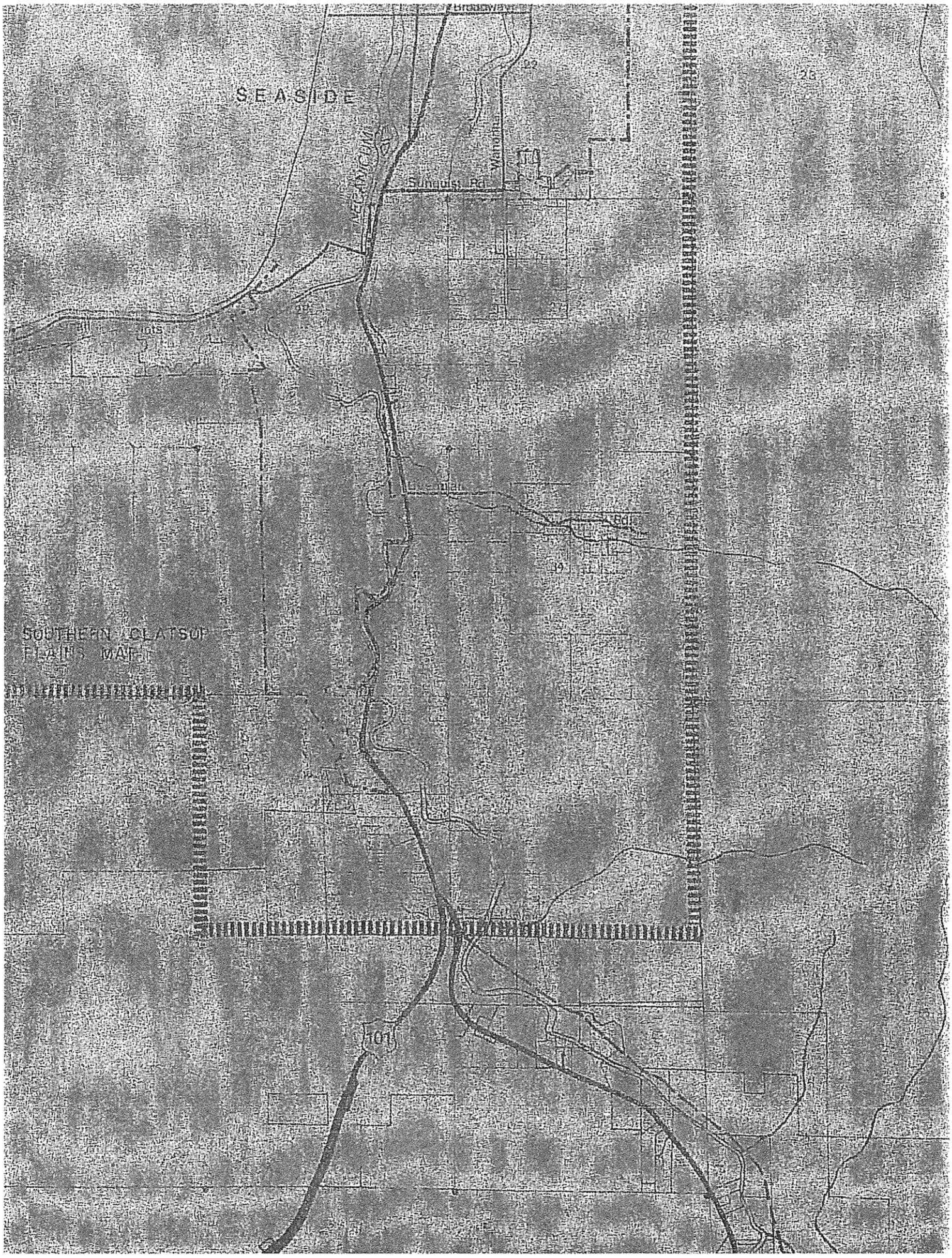
SOUTHWEST CLATSOP COUNTY

GOAL 17: COASTAL SHORELANDS

LEGEND

- Active Slides
- Inactive Slides
- Areas of significant shoreland and wetland biological habitat
- 100 Year Flood Plain
- Exceptional aesthetic or scenic quality
- Area needed for water dependent and water related uses
- Historic Site
- Coastal Headland
- Recreational Importance
- Coastal Shoreland Boundary including area and flood plain west of dotted line




SEASIDE
Broadway
Sunset Rd
Wanotha
Rd
SOUTHERN CLATSOP
PLAINS MAP
101

Tillamook Head Area
Next 4 Frames

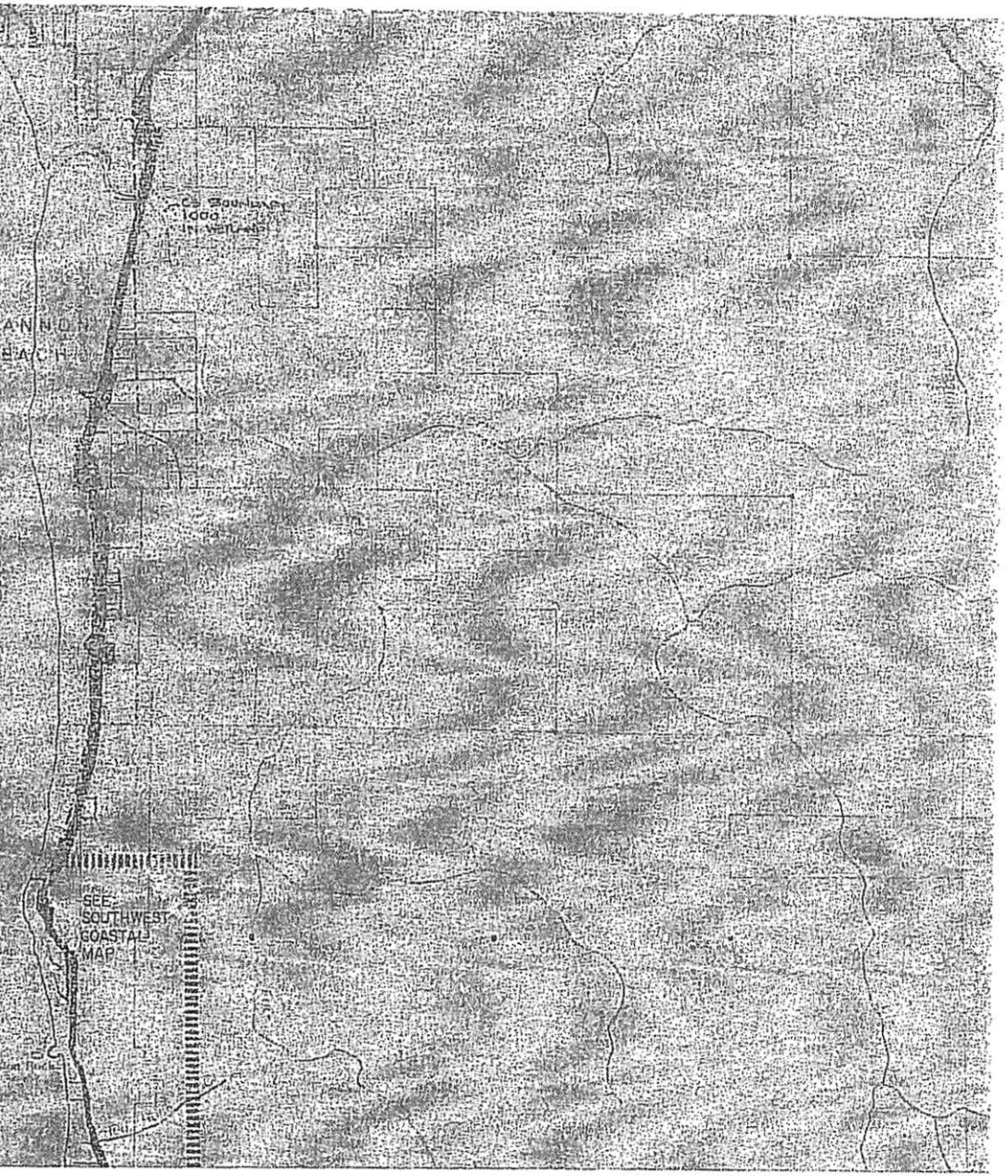
GOAL 17: COASTAL SHORELANDS

LEGEND

- Goal 17: Coastal Wetlands, includes coastal shoreland boundary
- Coastal Shoreland Boundary
- Goal 16: Estuarine Wetlands
- Goal 5: Wetlands
- 100 Year Flood Plain
- Riparian Vegetation
- Area needed for water dependent and water related uses
- Geologic Hazard: foredune erosion or slide area
- Recreational Importance
- Coastal Handicap
- Exceptional aesthetic or scenic quality
- Historic Site: Goal 17
- Areas of significant shoreland and wetland biological habitat

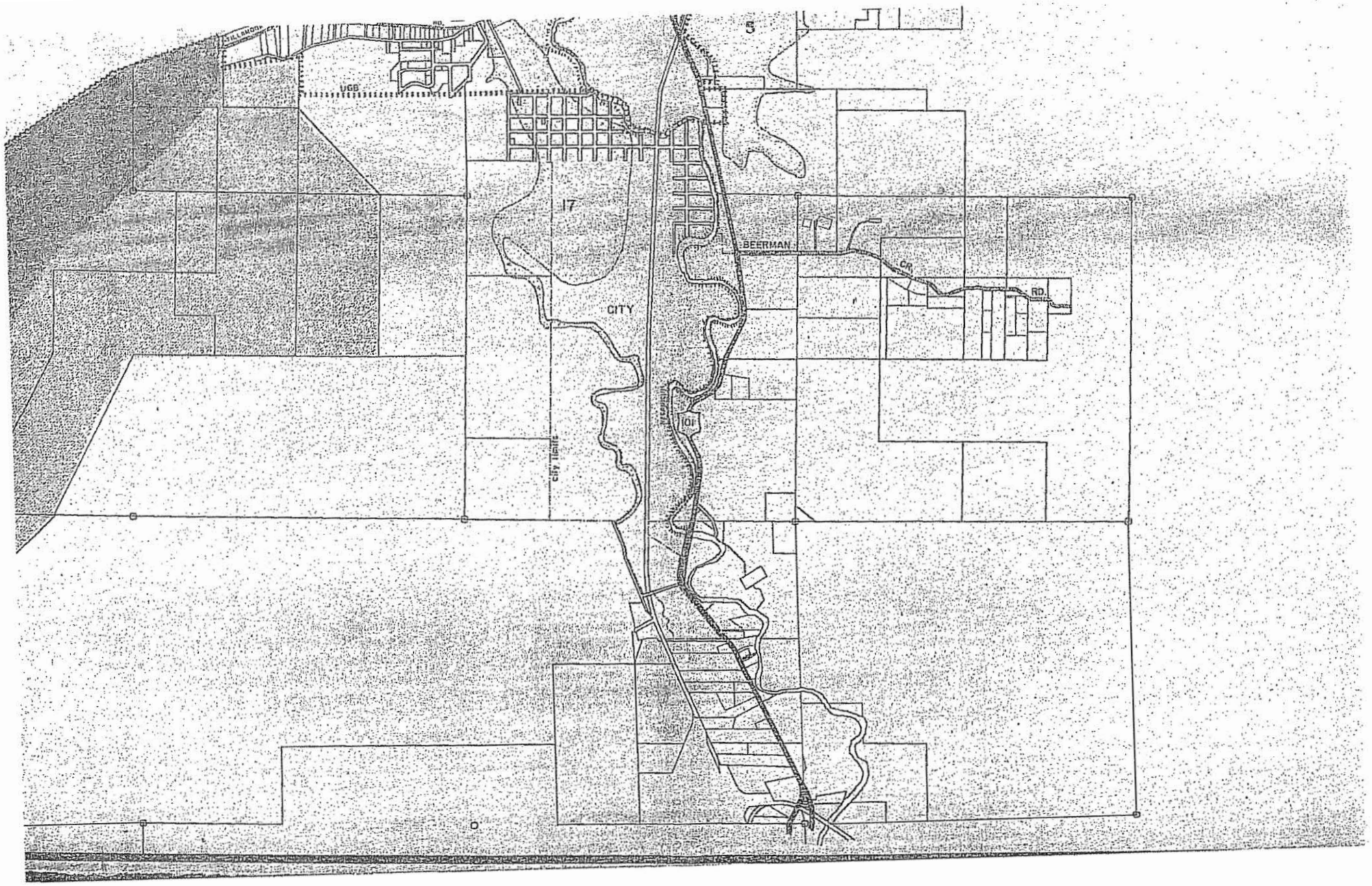
NOTE: Area ecological sites are in the coastal inventory of Goal 5 Resources.

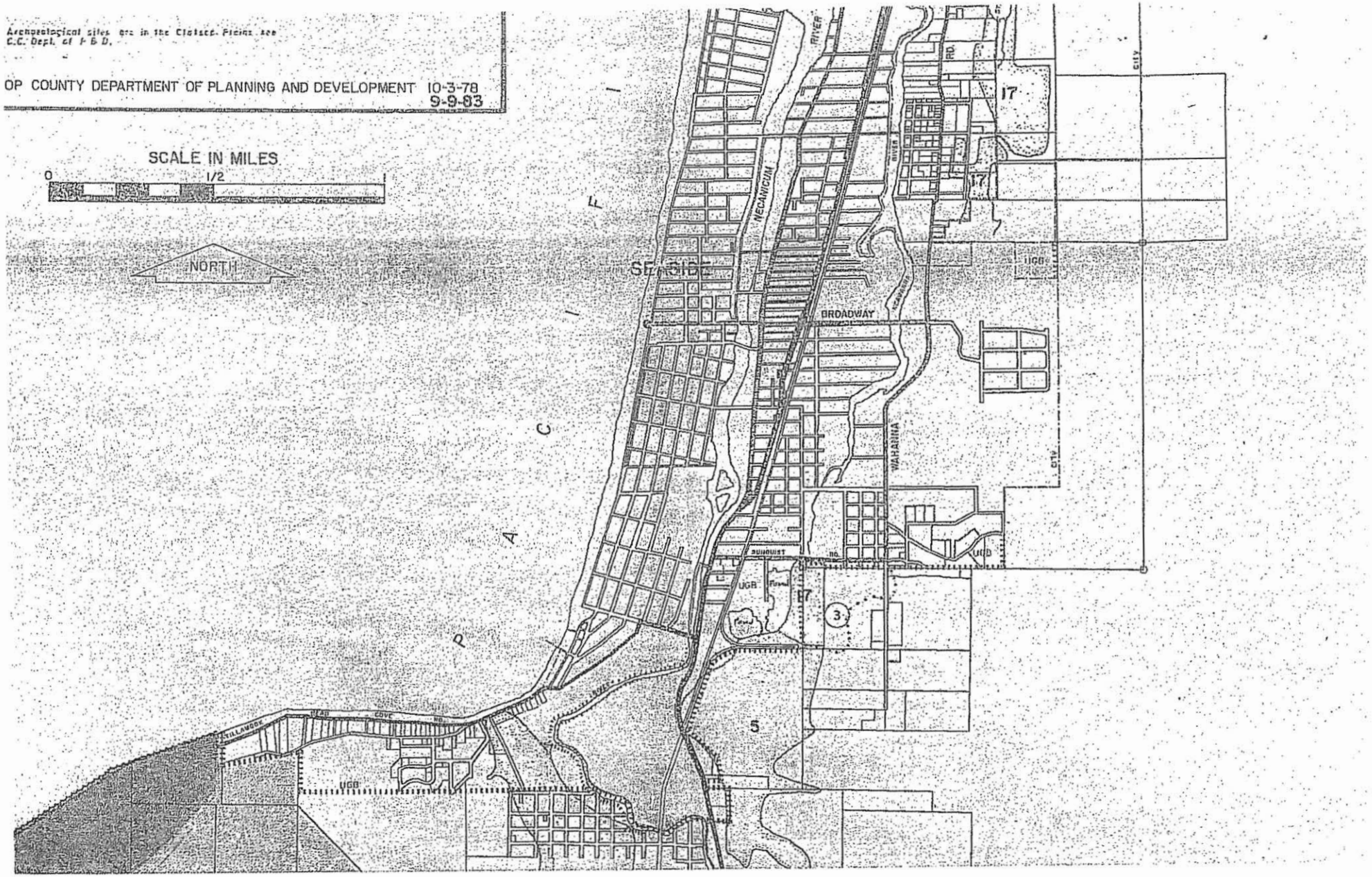
CLATSOP COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT 9-30-83



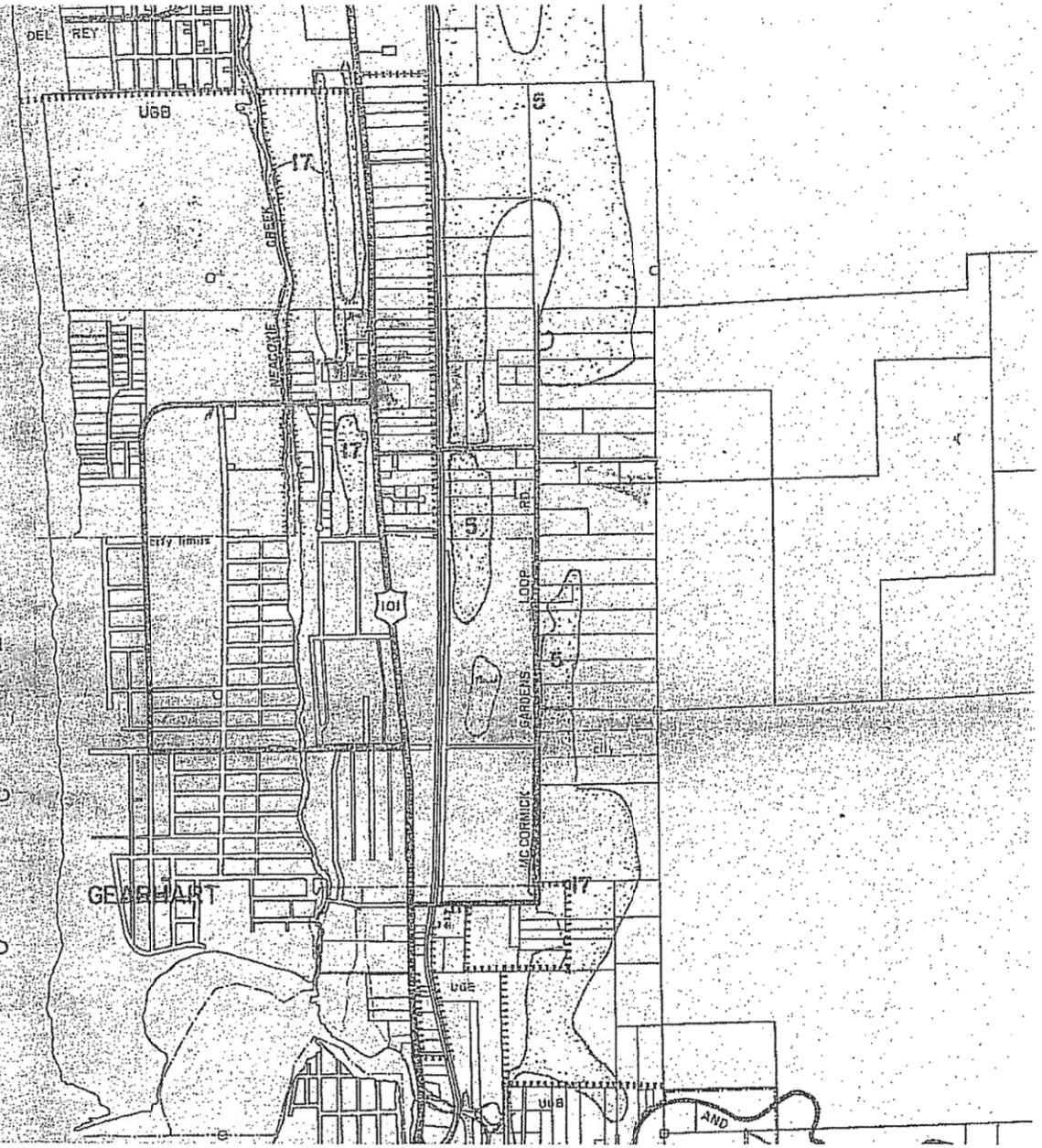
SEASIDE
SEE SOUTHERN CLATSOP PLAINS MAP
ECOLA STATE PARK
Eagles
Clark's Viewpoint
TILLAMOOK HEAD
ELMER FELDENHEIMER PRESERVE
Tillamook Rock Lighthouse
101

Southern Clatsop Plains area
Next 6 Frames


5
UGB
17
CITY
City limits
10r
BEERMAN
CR.
RD.


Archaeological sites are in the Clatsop Plains area
C.C. Dept. of P & D.
OP COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT 10-3-78
9-9-83
SCALE IN MILES
0
1/2
NORTH
P A C I F I
SEASIDE
NECANICUM
RIVER
BROADWAY
WAHANNA
AUGUST
TILLAMOOK
HEAD
COVE
RD.
UGB
CITY
17
3
5

RN CLATSOP PLAINS
ASTAL SHORELANDS



LEGEND

Goal 17: Coastal Wetlands; includes coastal shoreland boundary.

Coastal Shoreland Boundary

Goal 16: Estuarine Wetlands

Goal 5: Wetlands

100 Year Flood Plain

Riparian Vegetation

Area needed for water dependent and water related uses.

Geologic Hazard; foredune erosion or slide area.

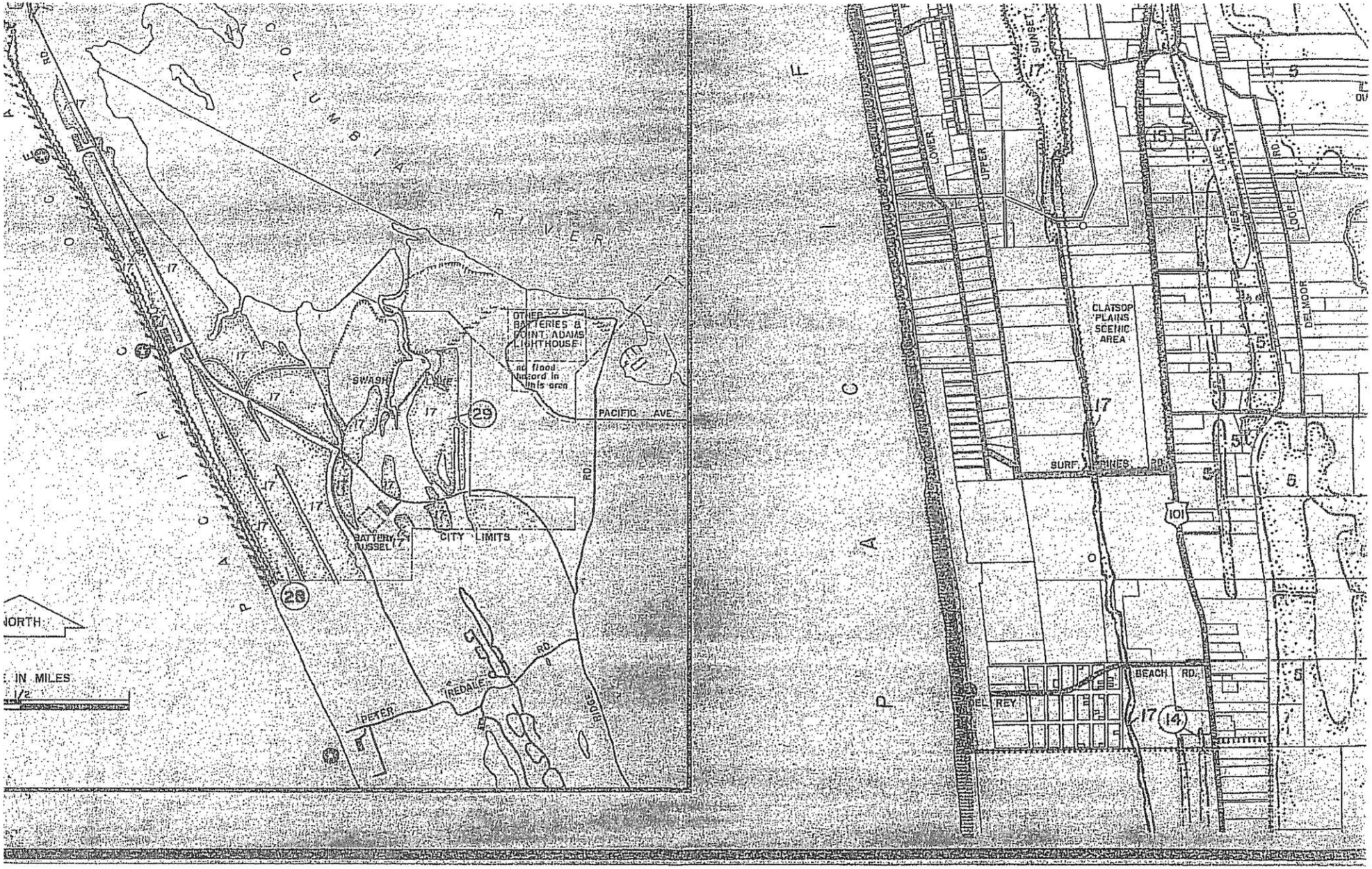
Recreational Importance

Coastal Headland

Exceptional aesthetic or scenic quality

Historic Site; Goal 17

Northern Clatsop Plains area
Next 6 Frames


COLUMBIA RIVER
OTHER BATTERIES & POINT ADAMS LIGHTHOUSE
no flood record in this area
SWASH LAKE
PACIFIC AVE.
CITY LIMITS
BATTERY RUSSEL
IREDALE RD.
PETER RIDGE
NORTH
IN MILES
1/2
LOWER
UPPER
SUNSET
CLATSOP PLAINS SCENIC AREA
SURF PINES RD.
LAKE
WEST
LOOP
RD.
DELMOOR
BEACH RD.
DEL REY
101

COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT 11-6-78

SCALE IN MILES

0 1/2 1

NORTH

CLATSOP SPIT AREA

NOTE: CLATSOR SPIT AREA IS IN 100 YEAR FLOOD HAZARD

COLUMBIA RIVER

SUNSET BEACH RD.

SKIPANON

LOG HOUSE

LOWER RD.

UPPER RD.

SUNSET

LAKE RD.

WEST LOOP

17

15

5

HERN CLATSOP PLAINS

: COASTAL SHORELANDS

LEGEND

- al 17: Coastal Wetlands
- oastal Shoreland Boundary
- al 16: Estuarine Wetlands
- al 5: Wetlands
- 0 Year Flood Plain
- parian Vegetation
- ea needed for water dependent and water lated uses.
- ologic Hazard; foredune erosion or slide area.
- creational Importance
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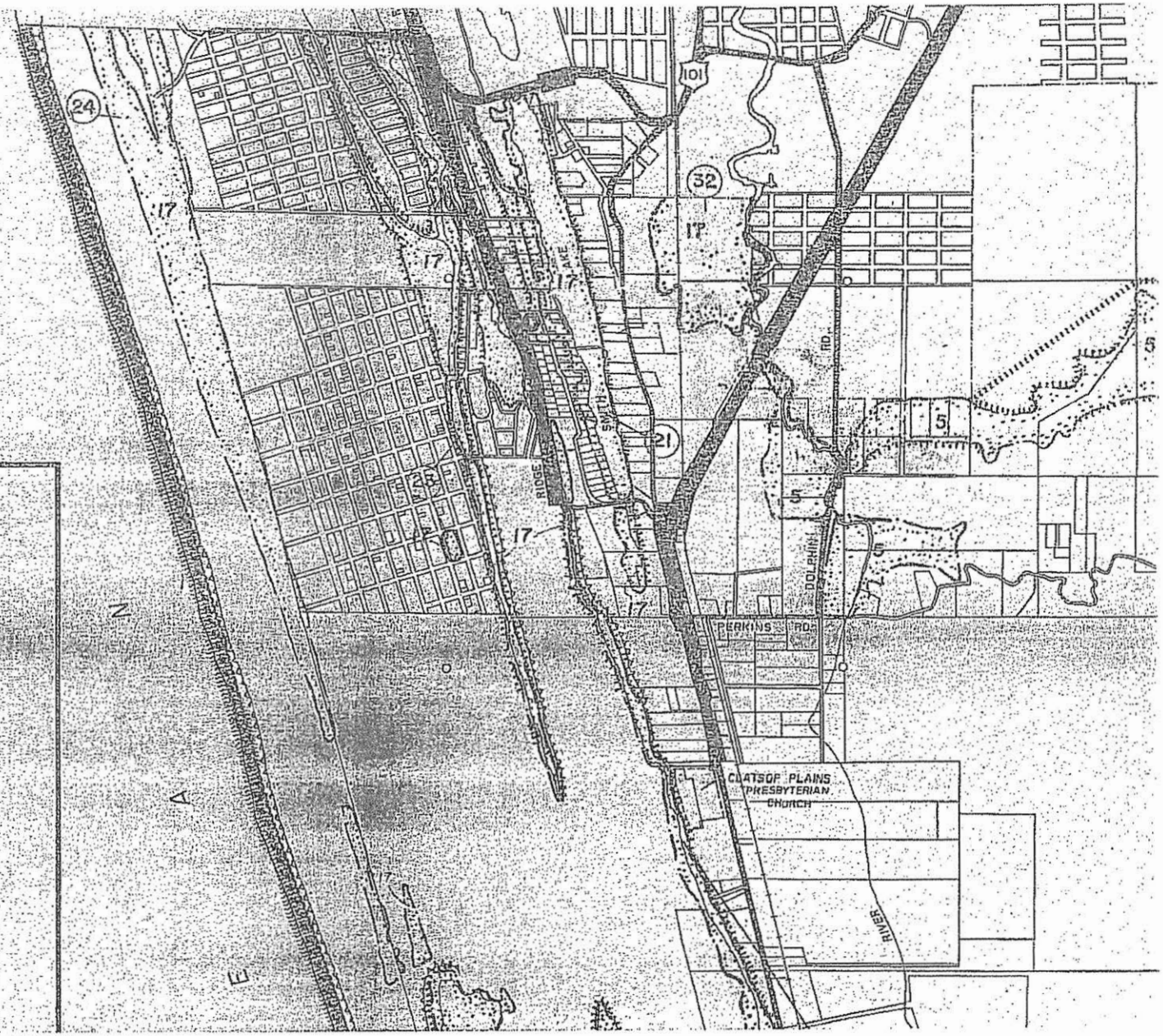
- ceptional aesthetic or scenic quality



09/16/83

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 committment 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 Develpment 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.

Compatability 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 purchasé 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) Compatability 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.

Clasop 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 Hzard 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.

118 BEACHES AND DUNES

1. Amend Countywide Policy 4 to express a preference for nonstructural methods of sand stabilization.
   See revised Beaches and Dunes Policies

2. Amend the plan to specify when a site investigation may be required.
   See revised Beaches and Dunes Policies

3. Adopt an implementing measure for the site investigation report referenced in the County's plan.
   See revised Beaches and Dune Policies pp. 18-22 of Beaches and Dune Report Sections 4.046 and 4.069 pp. 13 and 17.

4. Amend plan policies and the Active Dune Overlay to prohibit subsurface sewage disposal systems for residential development in the Flood Hazard Overlay.
   a. Plan - See revised Beaches and Dune Policies
   b. Zoning - Renumber Sections 4.046 through 4.050 to 4.047 through 4.051. Create a new section 4.046.
      Section 4.046 Development and Use Prohibited. The following developments and their accessory developments are prohibited.
      1. subsurface sewage disposal systems in the Flood Hazard Overlay (/FHO) District.

5. Amend the Active Dune Overlay to allow subsurface sewage disposal systems for low intensity recreation as a Type II use subject to the following criteria:
   a. Is adequately protected from any geologic hazards, wind erosion, undercutting, ocean flooding and storm waves, and
   b. Is designed to minimize environmental effects.

   Revisions will include moving subsurface sewage disposal system from Type II to Type I subject to criteria a and b above. Add criteria to ADO.

6. Adopt implementing measures for all dune forms including conditionally stable dune forms:
   a. To require that erosion be minimized; and
   b. To prohibit drawdown of water supplies.

   See revision - Beaches and Dunes Overlay District (/BDO) Section 4.060 - 4.072 especially 4.067(7).

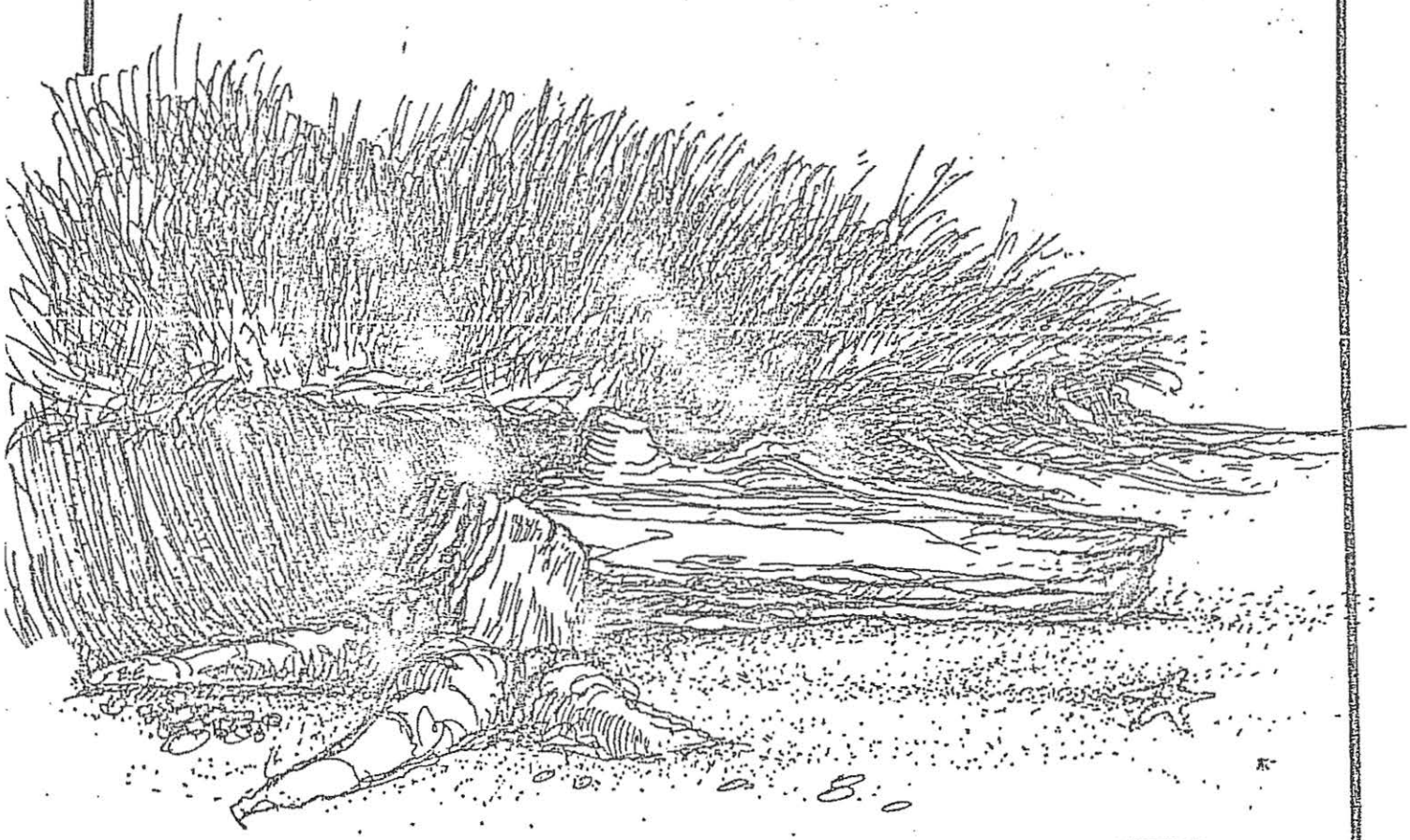
7. Adopt findings in the plan by amending the Structures Allowed, Active Dune Overlay to require specific findings, that proposed uses are designed to minimize environmental effects.
   See proposed amendment to Clatsop Plains Community Plan.

8. Amend the Arch Cape Goal 18 exception to provide compelling reasons and facts regarding need, alternatives and consequences of the proposed exception.
   See Goal 2 where all exceptions have been assembled.

9. Submit findings demonstrating that designations and density proposal for the Clatsop Plains Subarea are consistent with the capabilities and limitations of the dune areas.
   See Beaches and Dunes element, specifically the sections pertaining to Groundwater and Hydrology (pp. 2, 6 and 8-12).

CLATSOP COUNTY
GOAL 18
COUNTY-WIDE ELEMENT

BEACHES & DUNES



PROPOSED AMENDMENTS

BACKGROUND REPORT

&

EXCEPTION

GOAL 18

BEACHES AND DUNES

FOR

CLATSOP COUNTY

by

Curtis J. Schneider
Department of Planning and Development

ADOPTED by Clatsop County Board of Commissioners
January 3, 1979
Ordinance 78-25

1. Geology

Bedrock in the Clatsop Plains area is the Astoria Formation. This unit is Oligocene to late Miocene in age and includes sandstone and silty shale massive to cross-bedded, with gentle westerly dips and extensive faulting, as well as local intrusions (Beaulieu, 1971). The unit is "fine grained, tightly compacted, and relatively impermeable (Frank, 1970). This bedrock underlies the Clatsop Plains sand dune area at a depth of 125 to over 400 feet. This same bedrock unit also underlies the hills to the east of the Clatsop Plains.

2. Beach and Dune Formation, Accretion, Erosion and Migration

The Clatsop Plains sand dunes are a very young (2000 - 3000 years old) geologic landform of active and transient stability. They are comprised of fine and medium grained quartz with lesser feldspar, magnetite, mica, and undetermined rock fragments. The average rate of this beach growth over the last 2000 years has been estimated to be about 3 ft./year (Palmer, 1978). This is perhaps 1 or 2 percent of the annual sand production of the Columbia River (no exact sediment yield data is available), and about 5 to 10% of the possible total longshore beach transport of sand (Palmer, 1978).

The dunes "basic pattern has been towards the development of a smooth arcuate coastline resulting from the large quantities of sand (delivered by the Columbia River) that are distributed in a balanced response to both north-flowing winter currents and the south-flowing summer currents". (Schlicker, 1972). See Figure 1.

During pauses in accretion, submarine sand bars have grown in size to emerge as new beach areas. Beach ridges have developed as sand has piled up immediately inland from the beach proper by storm wave and by entrapment of blown sand by dune grass. Formed in this way, the beach ridges were left behind as parallel rows of stabilized dunes as the beach migrated seaward.

The beaches and dunes have been inventoried and classified according to their stability. Beaches and Dunes of the Oregon Coast developed by the USDA Soil Conservation Service and the Oregon Coastal Conservation and Development Commission (March, 1975) mapped the dunes into three broad associations: active dunes, recently stabilized dunes, and older stabilized dunes. The extent, distribution and mapping of these dune forms are found in Beaches and Dunes of the Oregon Coast. Interdune areas or deflation planes were included in OCCDC mapping but not as a separate association and have been updated in a more recent study Significant Shoreland and Wetland Habitats in the Clatsop Plains by Duncan Thomas.

See Stability of Coastal Dunes, Clatsop County, Oregon for a more detailed description of the formation, accretion, erosion and migration of the active dunes in the Clatsop Plains.

Clatsop County relies upon the following documents for its inventory and classification of beaches and dunes.

606 691

1. Beaches -- Beaches and Dunes of the Oregon Coast by USDA Soil Conservation Service and OCCDC March, 1975;

2. Dunes -- a) Beaches and Dunes of the Oregon Coast by USDA Soil Conservation Service and OCCDC March, 1975 for Older Stabilized Dune and Recently Stabilized Dune forms;

   b) Stability of Coastal Dunes, Clatsop County, Oregon by Leonard Palmer 1978 for Active Dune forms; and

   c) Significant Shoreland and Wetland Habitats in the Clatsop Plains by Duncan Thomas for Interdune (or Deflation Plain) forms.

3. Dune Classification and Limitations[1]

Many subdivisions of physical and biological dune conditions can be differentiated and mapped. The Palmer study attempted not to define the dune variations except as they related to utility of the land for planning of structures. Classifications based upon vegetation growth were as permanent as the duration of the plant cover. The relative activity of a given dune may change in the short time it takes to change its plant cover. Stripping surface vegetation from a conditionally stable dune can make it instantly active, or placing soil mulch and plants on an active dune may make it, temporarily, conditionally stable. However, it is the long term performance of coastal dunes that defines the land use suitability and limitations. The time consideration of relative dune stability should be related to the permanence of structures for which the area is being considered. Planning residential housing on dune areas should consider the dune stability over the life expectancy of the housing being constructed, probably at least one hundred years. A site in which the probability is high of destroying the housing even once in a hundred years is a poor risk for community growth.

Active dune areas mapped in the Palmer study were identified by LCDC criteria. The criteria are further explained below. This mapping is not intended to specify site conditions or stability, nor to replace site specific studies. The dune mapping is here intended to be a preliminary working designation of areas in which further studies may be required. The boundaries mapped should be changed when on site conditions are shown to have changed, or when improved data is obtained. However, any changes should be conservative, since it is better to be on the side of safety and allow developers to provide verification of conditions by qualified experts as required by LCDC, Beach and Dune Guidelines, C-1.

[1]Excerpts taken from Stability of Coastal Dunes, Clatsop County, Oregon, 1978.

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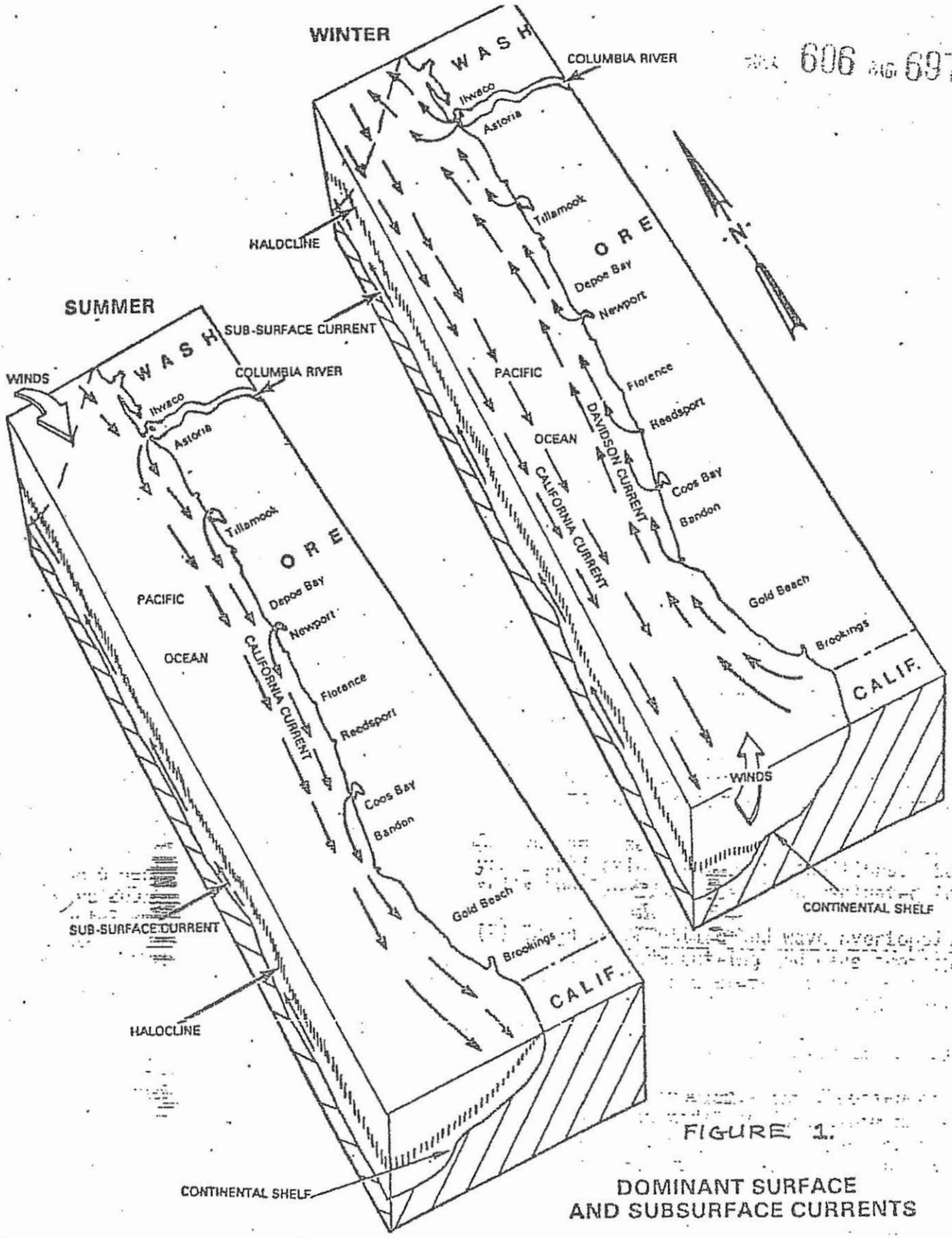


FIGURE 1.

DOMINANT SURFACE AND SUBSURFACE CURRENTS

This Plate was provided through the courtesy of The Portland District, U.S. Army, Corps of Engineers.

This study designates areas of potential (1) Active dunes, (2) Conditionally stable foredunes, and (3) dunes subject to ocean undercutting and wave overtopping. The criteria used are as follows:

(1) Active dunes (examples of active dunes on the Clatsop Plains exist along the shoreline one to three hundred feet inland where active sand deposition occurs.)

(a) "A dune that migrates, grows, and diminishes from the force of wind and supply of sand. Active dunes include all open sand dunes, active hummocks, and active foredunes." (LCDC, 1977).

(b) Open sand dune: "A collective term for active, unvegetative dune landforms." (LCDC, 1977).

(c) Areas of open sand, unvegetated, typically without cohesive soil. For this study, it was not practical to include small isolated areas, distant from beach dunes.

(d) Areas of known accretion or deflation changes, even where vegetation is present, such as dune grass. It has been impractical to define erosion and deposition history at all sites. Indirect evidence, regional trends, and reports by other experts (Leach) were used.

(e) Activity within the time context of development life-expectancy is assumed (arbitrarily about 100 - years). Activity of dunes within "recent" (Holocene) geologic time alone, would include much of what is now "stabilized".

"....there has been little permanent stabilization of the sand dunes along the ocean shore in the past four to seven thousand years," (Wiedemann, 1974, p. 17).

Active dunes have been defined here in the context of about one hundred years projection from past conditions. Sequential photographs, maps, soils and landforms have been evaluated in defining active areas.

(2) Ocean undercutting and wave overtopping. (Examples of areas subject to ocean undercutting and wave overtopping include most areas mapped "active" in this study. See discussion of beach sediment transport in this report. Present erosional undercutting occurs at the northern end of the Clatsop Plains shoreline and is progressively extending southward at this time as recorded by Don Leach.)

(a) "Ocean Flooding: the flooding of lowland areas by salt water owing to tidal action, storm surge, or tsunamis (seismic sea waves). Land Forms subject to ocean flooding include beaches, marshes, coastal lowlands, and lowlying interdune areas, the highest predicted tide is approximately six (6) feet above Mean Sea Level (MSL). The highest probable storm surge is four to seven (4-7) feet above prevailing tidal elevation.

The highest probable tsunami is approximately 14 feet above prevailing tidal elevation in mouths of estuaries and slightly higher on beaches. Because tidal flooding occurs twice daily, the effect of high tide is superposed on that of storm surges or tsunamis in determining the impact of these phenomena," (LCDC, 1977).

(b) The figures (from above) yield six (6) feet tide plus seven (7) feet storm surge, plus fourteen (14) feet tsunami equals twenty-seven (27) feet hazard zone elevation. To include consideration for a tsunami "higher on beaches", a reasonable interpretation totals thirty (30) feet, though coincidence of storm and tsunami occurrence may be of low frequency. Twenty-five (25) feet elevation would be minimum setback for combined tide and tsunami on beaches, where some risk were to be assumed.

(c) Shoreline and sea flood shape can create "fetch" amplifying the wave runup height. By on site tsunami records, or by model analysis, such amplification might be predicted.

(d) Distructive storm waves have been associated with shifting offshore rip current channels at Salishan in Lincoln County. Grass stabilized beaches may show scars of rip channel wave run up, as at Nescowin in Tillamook County. A conservative plan should anticipate recurrent rip current effects on all sandy offshore areas.

(e) Progressive erosion and ocean undercutting occurs on headlands in Clatsop County, but most alluvial beaches have a relatively long history of accretion as discussed above. However, the land use and engineering changes may instigate major equilibrium changes, and thus have the potential to instigate ocean undercutting of an unpredictable amount. An undercutting rate of one (1) foot per year is about the minimum to be expected. Two (2) feet per year would be a more conservative and reasonable rate of ocean undercutting without site specific verification otherwise. Thus, a structure to last 100 years might require 200 feet setback from the crest of eroding alluvial coastal embankments and cliffs, unless rates of erosion are shown to be lower by historical data.

(f) Flood insurance maps indicate the potential elevation of ocean flooding. The flood data provided by Clatsop County for this study is combined with LCDC estimates to define maximum limits.

(g) Recently formed coastal accretion is often recognizable by the contained saw-cut logs. These "fossils" postdate logging operations. Such beach deposits with logs have not existed long enough to be considered permanent. Deposition and accretion can regularly fluctuate in cycles which repeat too slowly to be recognized by most coastal residents.

(3) Conditionally stable foredunes (Recently Stabilized Dunes) (Examples of conditionally stable dunes include most of the dunes in the Clatsop Plains.)

606 70

(a) "A dune presently in a stable condition, but vulnerable to becoming active due to fragile vegetation cover." (LCDC, 1977).

(b) "Recently stabilized dune: A dune with sufficient vegetation to be stabilized from wind erosion, but with little, if any, development of soil or cohesion of the sand under the vegetation. Recently stabilized dunes include conditionally stable foredunes, ----." (LCDC, 1977).

(c) An eolian beach ridge, hummocky, parallel to the beach, with stabilizing vegetation but without significant soil development. (Under the most strict interpretation, most of the Clatsop Plains could be included).

(d) "A comparatively recent phenomenon along the Oregon Coast is the foredune, the high (up to 25 feet) ridge of sand paralleling the shore immediately above high tide line. The foredune appears to have developed mostly since the 1930's. It is strictly a product of vegetation, and of one plant in particular: European beach-grass (Ammophila arenaria).

The ultimate height and breadth of the type of dune is not known, nor has it been investigated in this country as far as is known. Studies have been conducted in England concerning the formation and possible fate of the foredune; and several early German books give detailed instructions for its construction and maintenance," (Wiedemann et al, 1974, p. 12).

Conditionally stable foredunes have been defined in this study by land form, historical and current maps and photographs, and by vegetation and soil conditions.

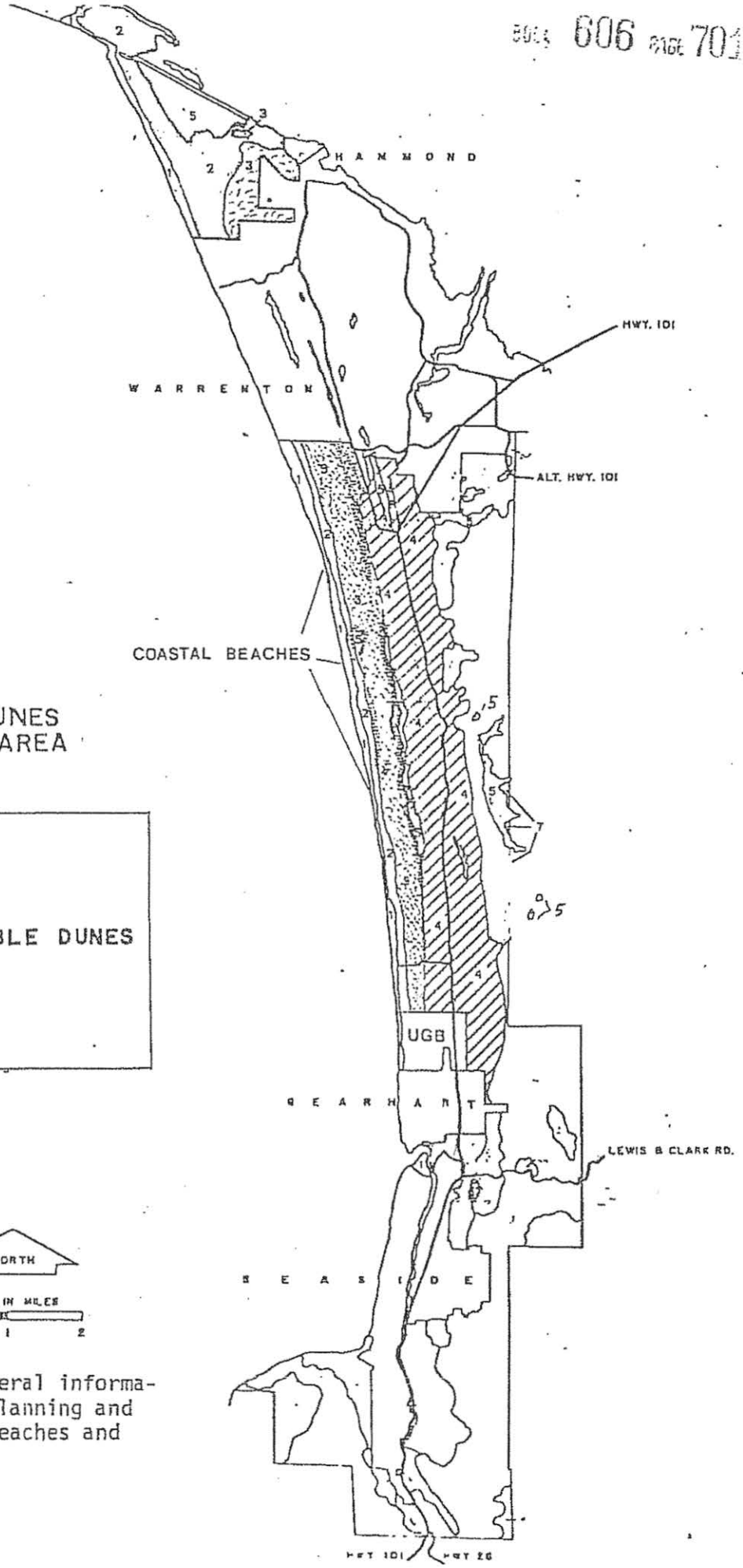
Where construction has occurred on active and conditionally stable foredunes (as at Pacific City) erosion of the dune face has caused severe problems. Attempts to stabilize the foredune by riprap facing is disruptive to the beach process equilibrium and is out of harmony with beach stability processes and the natural aesthetic setting.

(4) Older stabilized dunes (Examples of older stabilized dunes on the Clatsop Plains exist east of Sunset (or Neacoxie) Lake and Creek.

(a) Older stabilized dune: a wind stable dune landform that has soils with weakly cemented nodules and lenses to strongly cemented nodules or strongly cemented Bir horizons (OCCDC 1975).

(b) A dune that is stabilized from wind erosion, and that has significant soil development and that may include diverse forest cover.

(c) Older foredune: a conditionally stable foredune that has become wind stabilized by diverse vegetation and soil development.



GENERALIZED BEACHES & DUNES
CLATSOP PLAINS PLANNING AREA

KEY
1. COASTAL BEACH
2. ACTIVE DUNE
3. CONDITIONALLY STABLE DUNES
4. STABILIZED DUNES
5. WATER BODIES

NORTH

SCALE IN MILES
0 1 2

NOTE: This map is for general information. See Department of Planning and Development for detailed Beaches and Dunes map.

4. Vegetation, Wildlife, Wetlands and Riparian Vegetation[2]

Vegetation:

Vegetation in the Clatsop Plains varies extensively in accordance with numerous ecological changes associated with exposure, groundwater level, elevation, and disturbance by man. On the most generalized level, the entire Clatsop Plains areas can be categorized as being in the Sitka Spruce/Western Hemlock zone. However, due to natural and man-caused major changes and the aforementioned ecological variables a relatively small portion of the Clatsop Plains is in climax conifer forest.

Within the Clatsop Plains two types of successional trends can be identified, namely, plant successions on coastal sand dunes and successions on burned and logged areas. Both of these natural successional trends have been altered considerably by the introduction of nonindigenous species and planting programs. Several specialized habitats with unique successional trends also exist on the Clatsop Plains in limited areas. These include forested swamps, wet meadows, bogs, riparian vegetation, and salt marshes.

Community types on the coastal sand dunes can be identified on the basis of environmental conditions, primarily moisture and soil stability. On the dry active dunes indigenous vegetation consists of seashore lupine, yellow sand verbena, sea lyme-grass, red fescue, dune bluegrass, seashore bluegrass, and beach silver-top. Stabilized dry sand dunes with developed soils are characterized by the presence of kinnikinnick, black twin-berry, salal, evergreen huckleberry, western rhododendron, shore pine, and Sitka Spruce.

Inland from the dry foredunes and sandflats and between the ridges of former foredunes are several types of deflation plain communities. Unlike the active sand dunes, the deflation plain environment is not one of sand deposition, but of an abundance of water. Many of the plants in the deflation plains are adapted to grow in wet places. However, the deflation plains are not uniformly wet, but rather there is a gradation from the higher dry edges to the very wet, marshy bottoms. Also, there are hummocks and small areas of raised ground even in the lowest areas. The plants and plant communities reflect these differences in the elevation of the ground surface in relation to the water table. Frequently as little as six inches vertical height will separate two rather distinct groupings of plants.[3]

[2]For the complete discussion and inventory of vegetation and wildlife (including lists of species found here and rare and endangered species) refer to Biological Inventory of the Clatsop Plains by John Stockham and James R. Pease, 1974, Oregon State University and Significant Shoreland and Wetland Habitats in the Clatsop Plains by Duncan Thomas, 1982.

[3]Description of deflation plain communities modified from Wiedemann, Alfred M., Dennis, La Rae J., Smith, Frank H., Plants of the Oregon Coastal Dunes, O.S.U. Book Stores, Corvallis, 1969.

Wildlife:

The Clatsop Plains is an area well endowed with diverse and plentiful wildlife resources. This abundance of both numbers and species types is largely resultant from the diversity of habitats and the influence of the "edge effect". The zones of transition between habitat types or communities generally provide areas rich in animal life. Examples of this phenomenon on the Clatsop Plains are shorelines, estuarine environments, and open brushy areas within forest zones. Each of these transition zones is characterized by concentrations of wildlife.

Aside from these purely physiographic qualities which promote animal populations, the amount of relatively undeveloped open space is a critical factor in maintaining wildlife resources. The Plains is fortunate in having large blocks of land in both public and private ownership which have not been developed. Fort Stevens State Park, Camp Rilea, and timber holdings east of Highway 101 provide most of the prime Wildlife habitats on the Clatsop Plains. However, as development of the Plains increases and the character of land use changes away from rural uses, conflicts between wildlife utilization and other uses increase. Elk damage complaints along the lower Necanicum and elsewhere are prime examples of conflicting land uses affecting wildlife. Rare, threatened or endangered species that may nest or winter on the Plains include:

Birds

Tule White Footed Goose (Anser albifrons gambelli)	Endangered, may migrate through Oregon.
Trumpeter Swan (Cygnus baccinator)	Endangered, reports that trumpeter swans winter w/ whistling swans in Columbia R. islands.
Northern Bald Eagle (Haliaectus leucocephalus alascanus)	Endangered, possible nesting sites lower Columbia R., coastal bays and lakes.
Southern Fork Tailed Petrel (Oceanodroma furcata plumbea)	Rare, nests on coastal rocks.
Western Snowy Plover (Charadrinus alexandrus nivosis)	Rare, nests along coast on ocean spits with open stretches of sand, spits used include Sand Lake, Yaquina Bay, Columbia River mouth.
California Brown Pelican (Pelecanus occidentalis califonicus)	Endangered, breeds in Calif. and Mex., wanders N. along Oregon coast, esp. noted Netarts-Tillamook Bay area.
Bohemian Waxwing (Bombycilla garrula pallidiceps)	Peripheral, normally occurs in state as a sporadic migrant but are breeding record from Gearhart, Clatsop County.
Aleutian Canada Goose (Branta canadensis leucoparcia)	Endangered, W. Oregon may be immigration or wintering area.

Mammals

Columbia White-tailed Deer (Odocoileus virgineanus leucurus) — Endangered, Lower Columbia River.

The report describes the most significant wildlife resources of the Clatsop Plains in terms of populations, habitats, and management problems which should be reflected in the County's Comprehensive Plan. A complete wildlife inventory prepared with the assistance of Wesley Baterson, Oregon Wildlife Commission game biologist, is included in Appendix C. The Department of Planning and Development has a set of habitat maps showing elk wintering range on private agricultural land and waterfowl feeding and nesting areas, respectively.

Wetlands and Riparian Vegetation:

Clatsop Plains wetlands and riparian vegetation have been mapped.[4] The Clatsop Plains area contains sand dune uplands together with deflation plains and peat bog wetlands. The sand dune uplands still support some natural and semi-natural (an area which has received some human disturbance in the past, but now resembles a natural ecosystem) areas. The wetlands inventoried are significant wildlife habitat under the Coastal Shorelands and Open Spaces, Scenic and Historic Areas and Natural Resources goals.

Areas that are mapped are significant and should be maintained. Other non-significant wetlands are not included on the maps.

5. Ground Water and Hydrology

The major ground water storage area of the County is the sand dune areas of Clatsop Plains.

On the sand dunes of the Clatsop Plains, about 80 inches of precipitation falls annually of which one-half is estimated to recharge the ground water retained by the pervious loose sands. According to recent geological reports on the ground water aquifer at Clatsop Plains, the dune sands are highly permeable and extend to depths of over 150 feet below sea level. The water table of the area follows the shape of the surface topography with the seasonal high generally within 6 feet of the ground surface. The elongate finger lakes of the interdune swales, such as Coffenbury, Crabapple, Smith and Sunset Lakes, represent above-surface areas of the ground water body. Cullaby Lake is the only major lake in the area that is partially fed by surface runoff from the hills to the east. Discharge of the ground water in Clatsop Plains is principally through beach-line seeps and underflow of the Pacific, although several small streams also serve as ground water drains via Skipanon River and Neacoxie Creek. It is estimated as much as 2 million gallons per day per square mile may be available for

[4] Significant Shoreland and Wetland Habitats in the Clatsop Plains by Duncan Thomas, 1982.

withdrawal from a 10 square mile tract in the central part of the dune area.[5] Good management of this ground water aquifer will require engineered design of well field systems and regulatory provisions to prevent future occurrence of potential problems, such as ground water pollution, saltwater intrusion, and lowering of adjacent lake levels.[6]

The report Ground Water Resources of the Clatsop Plains Sand Dune Area, Clatsop County, Oregon details the: hydrology of the area, chemical quality of water, potential ground water supply including specifications on the construction and development of wells, possible problems of sea-water intrusion, possible pollution problems and the possible magnitude of drawdown effects on the area.

The principal conclusions from the study[7] are:

a. The bedrock of the Clatsop Plains dune area consists of shale and sandstone of Tertiary age. These rocks are nearly impermeable and yield only small quantities of water, which may be of poor chemical quality. The bedrock is overlain by deposits of dune and beach sand, locally more than 100 feet thick. These deposits contain the principal aquifers in the area.

b. The dune sand is permeable and absorbs and stores a high percentage of the 78.5 inches of annual precipitation. Most of the ground water in the sand is discharged to the ocean by seeps and underflow. In the area most favorable for development of ground water, about 45 inches of the estimated 60 inches of annual recharge discharges from the sand and may be available for withdrawal. Based on an assumed average specific yield of the ground water reservoir of 20 percent, the estimated maximum volume that could be pumped from the reservoir is 180,000 acre-feet, or nearly 60 billion gallons. In the 10-square-mile area most favorable for ground water development, about 24,000 acre-feet per year, or about 2 mgd per sq. mi., is estimated to be available for withdrawal. However, only a part of the total could feasibly be withdrawn.

c. The most practical method of extracting water from the sand is by means of properly screened and developed vertical wells. Pumping tests on three 6-inch-diameter wells equipped with a short length of screen showed a yield of 100 gpm for each well. The yields of these wells could have been increased substantially by use of longer screens. The average value of aquifer transmissibility calculated from the three pumping tests was 27,000 gpd per ft. This value, because of the effects of partial penetration caused by the inadequate length of well screen in the wells, indicates the minimum range of transmissibility values that may be expected at the well sites.

[5] U.S.G.S. Ground Water Resources of the Clatsop Plains Sand Dune Area, Clatsop County, Oregon. U.S.G.S. Water Supply Paper 1899-A, (Portland: U.S.G.S., 1970).

[6] Excerpts taken from A Plan for Land and Water Use, Clatsop County, Oregon Phase I, 1973. p.76.

[7] U.S.G.S. Ground Water Resources of the Clatsop Plains Sand Dune Area, Clatsop County, Oregon. 1970.

d. The levels of most of the lakes in the area are maintained principally by ground water discharge from the dune sand. Large withdrawals of water immediately adjacent to the lakes could cause a lowering of the lake levels. Provided well fields are located and constructed so that there would be minimum drawdown effects on the water table near the lakes, it should be possible to make large seasonal withdrawals of ground water without desiccating the lakes.

e. The water is soft to slightly hard, has a low chloride concentration, and is of generally good chemical quality. Water from the shallow observation wells is generally weakly acidic, contains objectionable concentrations of iron, and may require iron-removal treatment for certain uses. On the other hand, water from the three test wells, drilled to greater depths, has lower iron concentrations and higher pH values.

f. To avoid desiccation of the ground water lakes and the encroachment of sea water, a water-management program for the Clatsop Plains must be consistent with the water-budget equation. To avoid perennial depletion of fresh ground water in storage, increased consumptive use of ground water must be balanced by increased inflow or reduced natural outflow. The sustained yield of the ground water reservoir will depend on future water-management decisions regarding the quantity of natural discharge salvaged and the quantity of additional ground water recharge induced.

g. Plans for development of ground water in the area should provide for the construction of deep wells near the seaward edge of the dune sand to monitor water levels and chloride concentration of the ground water. The production wells should be located and spaced (1) to minimize interference between wells, (2) to prevent excessive drawdown which might induce sea-water intrusion in any part of the area, (3) to avoid desiccating the sand dune lakes, and (4) to ultimately withdraw the optimum water yield from the ground water reservoir.

Pollution:

The above report identified a large area with substantial amounts of developable ground water in the Clatsop Plains. Due in part to the findings of that study and the prospect of high density development utilizing septic tanks which would contaminate the ground water, a partial moratorium on the installation of septic tanks was placed on the Clatsop Plains in 1970 by the Oregon Environmental Quality Commission. The moratorium did allow some new housing on existing developed subdivisions and tax lots.

Between 1969 and 1970 the Oregon Department of Environmental Quality (DEQ) conducted water quality surveys of the ground water (wells) and selected surface water (lakes and streams) in the Clatsop Plains. The survey data showed few wells were in excess of the U.S. Public Health Service drinking water allowable maximum concentration of 10 mg/l nitrate-nitrogen (NO_3N), but that there is a trend toward increased NO_3N as housing densities, dependent upon septic tank-drainfield disposal systems, increased.

From this data DEQ concluded that the trend of ground water degradation (and potential surface water effects) could only become more acute with increased and/or continued construction of new housing in subdivisions of urban densities with conventional on-site disposal systems. Therefore, on April 1, 1977, the Oregon Environmental Quality Commission passed a resolution which prohibited any development utilizing septic tanks in the Clatsop Plains area. An "Intergovernmental Directive" was also issued which called for "Modification or repeal on an area by area basis". This directive called for petition by the appropriate local agency or agencies with the support of reasonable evidence in order to repeal the moratorium for any particular areas. DEQ has set the "planning goal" for NO_3N concentrations at 5 mg/l.

Clatsop County hired a consultant, Randy Sweet[8], to assist the County in trying to lift the moratorium. On October 28, 1977 the moratorium was lifted for all areas in the County (not cities) except for six (6) areas of high density. New lots created in the area where the moratorium has been lifted must contain one (1) acre per dwelling unit. Septic tanks on lots of this size do not pollute the ground water supply beyond DEQ limits. Areas remaining in the moratorium have densities (dwellings, commercial buildings and RV sites) greater than one per acre.

Following the initial lifting of most areas from the moratorium, Clatsop County, in conjunction with the Town of Hammond and the cities of Gearhart and Warrenton applied to the Environmental Protection Agency for funds to do a Ground Water Protection Plan under Section 208 of the Clean Water Act (PL 92-800). The grant was approved to do the study. It had four objectives[9]:

(1) to identify and establish water quality data;
(2) identify the current pollution sources and levels;
(3) predict future impacts of development on the ground water; and
(4) develop and implement a program that will protect and enhance the water quality of the Clatsop Plains.

Findings, Conclusions and Recommendations of the study are listed in the Clatsop Plains Community Plan. The Environmental Quality Commission adopted the study which also lifted the moratorium on August 27, 1982.

[8]For detailed information on septic tank wastes in the Clatsop Plains refer to the Carrying Capacity of the Clatsop Plains Sand Dune Aquifer, 1977 by Randy Sweet.

[9]R.W. Beck and Associates, Clatsop Plains Ground Water Protection Plan and Environmental Assessment, March, 1982, page I-5.

PROPOSED AMENDMENTS

TO

CLATSOP COUNTY LAND AND WATER

DEVELOPMENT AND USE ORDINANCE

Section 4.040 ADO

Add to 4.043 (6) Subsurface sewage disposal systems except for areas designated as a Flood Hazard Overlay District (/FHO).
(7) Private beach access.

Delete to 4.044 (2) and (3) and renumber.

Add to 4.046 (7) Site specific investigations by a qualified person such as a geologist, soils scientist, or geomorphologist shall be required by the Planning Director prior to the issuance of a development permit in areas that the Planning Director feels may be subject to wind erosion or other hazard potential.

Delete Sections 4.060 SAO:

Add new section:

Section 4.060. Beaches and Dunes Overlay District (/BDO).

Section 4.061. Purpose. The intent of this section is to regulate actions in those areas identified as coastal beaches and dunes including built and committed active dunes for which an Exception to Goal 18 Beaches and Dunes has been taken but not for other active dunes in order to:

(1) Ensure the protection and conservation of coastal beach and dune resources.
(2) Prevent economic loss by encouraging development consistent with the natural capability of beach and dune landforms.
(3) Provide for clear procedures by which the natural capability of dune landforms can be assessed prior to development.
(4) Prevent cumulative damage to coastal dune resources due to the incremental effects of development.
(5) Provide for such protection of beach and dune resources above and beyond that provided by the underlying zoning district.

Section 4.042. Mapping. The /BDO District is applied to all coastal beach and dune landforms, except active dunes but including active dunes for which a built and committed Exception has been taken. The Beach and Dune forms are identified in the Clatsop County Comprehensive Plan.

Section 4.063. Intent. The requirements imposed by the /BDO District shall be in addition to those imposed by the underlying zoning District. Where the requirements of the /BDO District conflict with those of the underlying zoning District, the more restrictive requirements shall apply.

Section 4.064. Development and Use Permitted. Any permitted or conditional development and use allowed in the underlying zone is permitted subject to applicable standards except as may be provided otherwise by Section 4.065.

Section 4.065. Special Uses. The following specified developments and uses, and no others, may be permitted under a Type I procedure subject to applicable development criteria and standards.

(1) (a) Uses.
  (i) Buried fuel tanks.
  (b) Criteria.
  (i) The tanks are entirely free of leaks and have an impermeable coating,
  (ii) The tank is located, to the greatest extent feasible, in a well-drained area,
  (iii) The tank is not on active dunes or other foredunes which as conditionally stable and that are subject to ocean undercutting or wave overtopping.
  (iv) and meets DEQ standards

(2) (a) Uses.
(i) Commercial removal of sand.
(b) Criteria.
(i) The area is not an ocean beach.
(ii) Historic surplus accumulations of sand exist.
(iii) A Site Investigation Report, as specified by Section 4.069 below is conducted.
(iv) Removal of surplus sand can be accomplished without significant impairment of the natural functions of the beach and dune system, and hydraulic processes, according to the Site Investigation Report and a Conditional Development and Use Permit has been granted.

(3) (a) Uses.
(i) Foredune breaching.
(b) Criteria and Conditions.
(i) The breaching is required to replenish sand supply in interdune areas; or
(ii) Emergencies on a temporary basis.
(iii) Such breaching does not endanger existing development.
(iv) The breaching does not adversely impact critical wildlife habitat or Coastal Lake or Freshwater Wetland zone areas.
(v) The areas affected by the breaching are restored according to an approved restoration plan.

(4) (a) Uses.
(i) Commercial drift log removal from beaches.
(b) Criteria.
(i) The removal will result in significant public benefit, improved recreational access, improved scenic values, or protection of wildlife habitat.
(ii) The removal will not result in increased beach or foredune erosion which will endanger existing development.
(iii) Secure approval of a permit from the state (Oregon Department of Transportation).

(5) (a) Uses.
(i) Beachfront protective structures.
(b) Criteria.
(i) The structure is to protect development existing on January 1, 1977.
(ii) Visual impacts are minimized.
(iii) Public access is preserved.
(iv) Negative impacts on adjacent property are minimized.
(v) Long-term or recurring costs to the public are avoided.

(6) (a) Uses.
(i) Hiking, equestrian, and nature trails.
(ii) Private beach access.

(b) Criteria and Conditions.
(i) Prescribing the extent of vegetation removal;
(ii) Prescribing the time, amounts and types of materials and the methods to be used in restoration of dune vegetation;
(iii) Prescribing setbacks greater than required in the underlying zone in order to comply with the intent of the Clatsop County Comprehensive Plan and this Ordinance.
(iv) Prescribing the location, design and number of proposed developments.

Section 4.066. Other Special Uses. The following developments and their accessory developments may be permitted as a Conditional Development and Use under a Type II procedure and Sections 5.010 to 5.025 subject to applicable criteria and development standards and site plan review.

(1) (a) Uses.
(i) Public beach access.
(b) Criteria.
(i) Public need must be shown for the establishment of State public beach access points. If it is found to be needed, the State must satisfactorily prove why this location for the proposed beach access, when compared with other locations, best serves the public need.

Section 4.067. Additional Site and Development Requirements. The following requirements apply to all development except the harvesting of timber as allowed by the District with which the /BDO District is combined. Timber harvesting activities shall conform to Oregon Forest Practices Act rules regulating logging practices in dune areas:

(1) Development shall not result in the clearance of natural vegetation in excess of that which is necessary for the structures, required access, fire safety requirements and the required septic and sewage disposal system.
(2) Vegetation-free areas which are suitable for development shall be used instead of sites which must be artificially cleared.
(3) Areas cleared of vegetation during construction in excess of those indicated in Section 4.064-4.066 above shall be replanted within nine months of the termination of major construction activity.
(4) Sand stabilization shall be required during all phases of construction and post-construction as specified by standards set forth in the Standards Document or by Soil Conservation Service.
(5) Developments shall result in the least topographic modification of the site as is possible.
(6) All conditions shall be found by the Department of Planning and Development to provide for or protect the public health, safety or general welfare, protect the dune, and protect adjacent properties both present and in the future.
(7) Conditions of approval shall be sufficient to protect the property from erosion by wind or water or both, the dune from the loss of stabilizing vegetation, and the permanent drawdown of the groundwater supply.

Section 4.068. Procedures. Application for the construction of all structures and construction of developments permitted subject to conditions in Sections 4.064-4.066 are required and shall be made to the Planning Director or his designate on forms prescribed by Clatsop County. The applicant shall be required to provide at least the following information:

1. a map showing the location of the proposed developments and surrounding developments including structures, vegetation, etc.;

2. description of the extent to which a sand dune will be altered as a result of the proposed development; and

3. other such information as is needed to determine conformance with this Ordinance.

Section 4.069. Site Investigation Report. A site specific investigation report performed by a qualified person such as a geologist, soils scientist or geomorphologist shall be required by the Planning Director prior to the issuance of a development permit in areas that the Planning Director feels may be subject to wind erosion or other hazard potential.

Section 4.070. Guarantee of Performance. The applicant for the development permit shall be required to post a performance bond to insure that safeguards recommended in the detailed site investigation report are in fact provided if the Planning Director determines that such bond is necessary. The method of guarantee, inspection and certification and release of guarantee are specified in Section 10.110 of this Ordinance.

Section 4.071. Time Limits. Prior to approval of the permit the subdivider or developer and the Department of Planning and Development shall agree upon a deadline for the completion of the required improvements, such deadline not to exceed one year from the time of the permit. The County shall have the power to extend the deadline for improvements for one additional year when the subdivider or developer can present substatial reason for doing so.

The subdivider or developer shall restore the vegetation within the first planting season (October to April) using the amounts and types of materials and methods prescribed by the Department of Planning and Development.

The timing of the permits should be made so that restoration may be started as early in the planting season as possible.

Section 4.072. State and Federal Permits. Any use authorized by the provisions of this overlay district shall also require the securing of any necessary State or Federal permit, lease, easement or similar type of authorization.

Beach Policies:

Use regulations and policies for all beaches (defined as waterline to vegetation line) are set forth in the Oregon Beach Law (ORS 390.605 et. seq.). This law affirms the public's right to use of the beach. Policies in the state law include the following:

(a) Improvements on beaches; removal of sand, rock, mineral, marine growth and other natural products; and laying of pipe, cable, or conduit across beaches require permits. Permits are based on the following considerations, among other:

(1) The public need for healthful, safe, aesthetic surroundings and conditions; the natural scenic, recreational and other resources of the area; and the present and prospective need for conservation and development of those resources.

(2) The physical characteristics or the changes in the physical characteristics of the area and the suitability of the area for particular uses and improvements.

(3) The land uses, including public recreational use if any, and the improvements in the area, the trends in land uses and improvements, the density of development and the property values in the area.

(4) The need for recreation and other facilities and enterprises in the future development of the area and the need for access to particular sites in the area.

(b) No deposit of debris, logs, rubbish, or refuse is allowed.

(c) Use of motor vehicles or aircraft on beaches is restricted to varying degrees along the coast.

(d) Public beach access sites are provided by the State Parks System at 1½ - 3 mile intervals. Future State public beach access points may be established upon a showing of public need for proposed beach access. If it is determined that there is a public need, the State must then satisfactorily prove why this location for the proposed beach access, when compared with other locations best serves the public need.

(e) Sand removal shall be prohibited.

(6) Measurement of dune migration and natural dune building process by the Clatsop Soil and Water Conservation District should be continued.

(7) A study is necessary to evaluate the extent to which littoral drift and longshore transport of sediment contribute to the sand supply of beaches, dunes and sand spits in comparison to more local sources (i.e. nearby headlands and shoreline erosion and coastal streams and rivers); projection of future trends in replenishment and identification of the drift sectors (the areas where these local erosion and accretion processes interact).

(8) The Department of Planning and Development should work with state and local law enforcement agencies to obtain greater enforcement of laws designed to protect the vegetation and stability of the dunes.

(9) A study of the impacts of sand removal on sand flow patterns, groundwater supplies, aesthetics, destruction of wildlife habitat and property and associated structures needs to be undertaken. The study should identify those areas suitable for sand removal based on historical sand supply.

Add a policy to read as follows:

1. Structural shoreline stabilization methods shall be permitted only if:

   a. There is a critical need to protect a structure that is threatened by erosion hazard;

   b. Impacts on adjacent property are minimized;

   c. Visual impacts are minimized;

   d. Access to the beach is maintained;

   e. Long-term or recurring costs to the public are avoided; and

   f. Riparian vegetation is preserved as much as possible.

   These criteria shall apply to structural shoreline stabilization both east and west of the State Zone Line.

Add a new policy on coordinating action between the County and State on beachfront protective structures:

2. The County's review of beachfront protective structures, both east and west of the State Zone Line, shall be coordinated with the Department of Transportation and the Division of State Lands.

Add a new policy on the County's priorities for beachfront protection:

1. The 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. Bulkhead or seawall.

   Where rip rap, bulkheads or seawalls are proposed as beachfront protective measures, evidence shall be provided that higher priority methods of erosion control will not work.

Add a new policy requiring engineering of beachfront structures:

1. Beachfront protective structures shall be designed by a registered engineer, if landslide retention is a factor in the placement of the structure, or if the County's design criteria for rip rap are not used. The structure shall be the minimum necessary to provide the level of protection required.

Add a new policy on emergency placement of rip rap.

The emergency placement of rip rap to protect buildings from an imminent threat shall be permitted without a permit. However, the County, Oregon Department of Transportation; Oregon Division of State Lands shall be notified of the placement.

Within 30 days of the emergency placement of rip rap, an application for a beachfront protective structure shall be applied for to either Clatsop County or the appropriate state agency. If the permit is approved and requires alteration or removal of the emergency fill, the applicant shall comply with the permit condition.