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SECTION I.

SENSITIVE PLANT COMMUNITIES

BASELINE INVENTORY OF RARE, THREATENED AND ENDANGERED PLANT SPECIES/COMMUNITIES ALONG WASHINGTON'S PACIFIC COAST

Prepared by the Washington Natural Heritage Program

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SUBJECT: Occurrences of high quality native plant communities and endangered, threatened and sensitive plant species.

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ABSTRACT

This study provides baseline information through field inventories and a review of existing data on high quality native plant communities and endangered, threatened and sensitive plant species within 2,000 feet of shoreline in Pacific and Grays Harbor Counties in Washington State. Map overlays were prepared, corresponding with U.S.G.S. 7.5' topographic quadrangle maps, mapping plant communities for high quality sites and endangered and threatened plant species location. Sites of significant botanical importance are keyed to written descriptions by unique Roman numerals and site names. Written descriptions for plant community sites provide pertinent information on sites, their locations, physical characteristics, land use history and vegetation as well as inventories for mapped plant communities. Written descriptions for endangered, threatened and sensitive plant species provide descriptions of the species, their habitat, geographic distribution and state and federal status. Plant community abstracts and a bibliography of reviewed literature are also provided.

ACKNOWLEDGEMENTS

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PURPOSE

The purpose of this Coastal Energy Impact Program study is to enhance Washington States coastal planning capability in response to the 5 Year Federal Outer Continental Shelf (OCS) Oil and Gas Lease Program. It is intended to facilitate planning for siting of onshore support bases, pipeline landfalls, fabrication yards etc. which may be initiated by the OCS Program.

The Washington Natural Heritage Program was contracted in 1982 to identify, inventory and map occurrences of endangered, threatened and sensitive plant species/native plant communities. The area covered by this study is a 2,000 foot strip of land along the outer coast of Washington in Pacific and Grays Harbor Counties including portions of the outer most coastline, Grays Harbor, Willapa Bay and the mouth of the Columbia River within the boundary of Pacific County (figure 1).

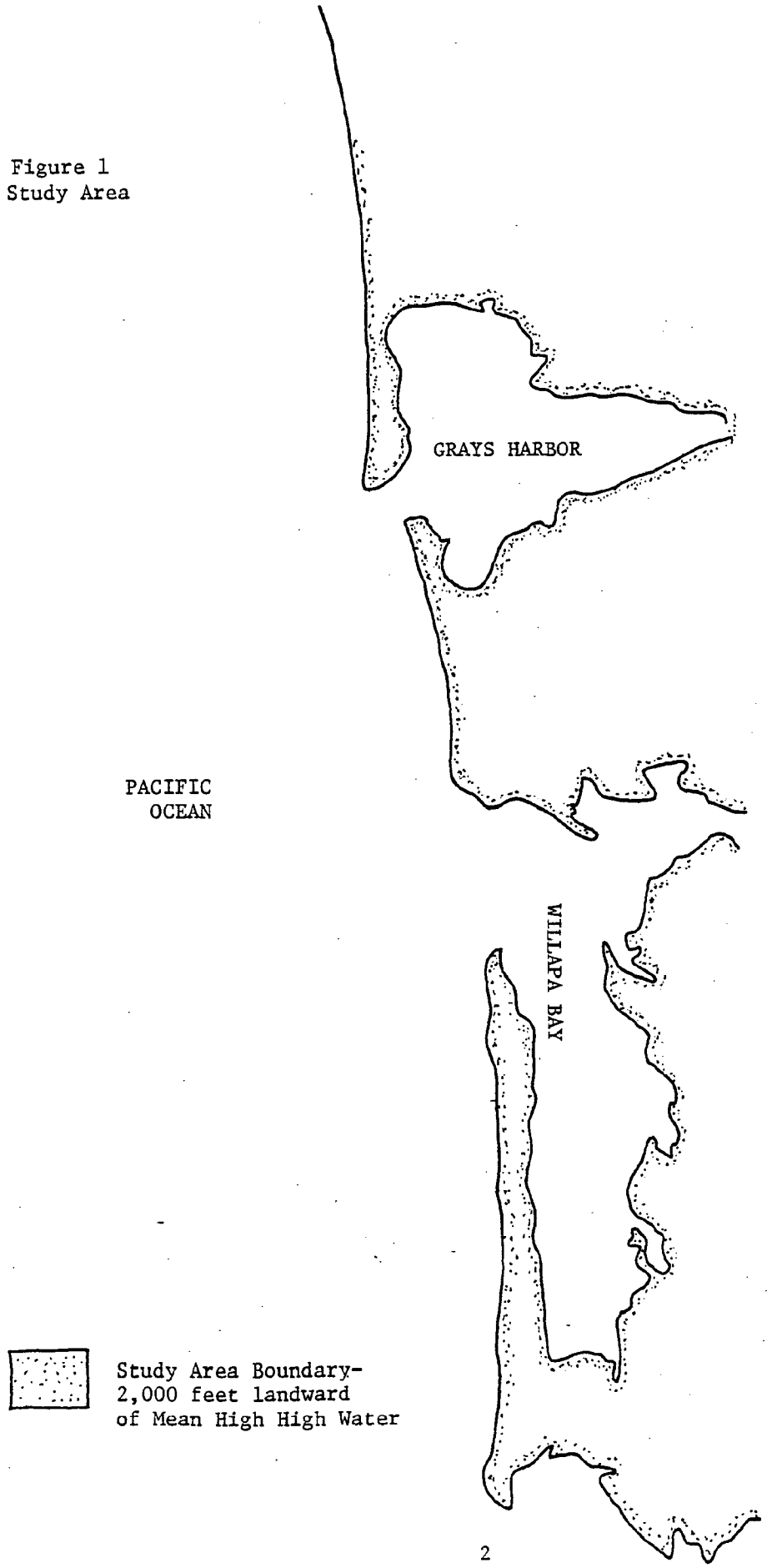
LITERATURE REVIEW

A review was conducted of existing literature, aerial photography and the Heritage data base to bring together existing information for the study area, to identify locations of potential interest and to provide a focus for field investigations (see bibliography).

Potential habitat and previously known sites were located for endangered, threatened and sensitive species listed in Endangered, Threatened and Sensitive Vascular Plants of Washington (Washington Natural Heritage Program, 1982). Sites were identified for plant community field surveys if they were 10 acres or greater in extent and if there were no obvious indications of alteration (i.e. diking, ditching, filling, logging or heavy grazing). Small (less than 10 acres) or highly disturbed areas were eliminated from consideration. Tidal marshlands were identified as the primary focus of field surveys. Other areas identified were portions of coastal dune systems, freshwater wetlands, sphagnum bogs and a few forested areas. A few sites were identified as being of importance because of their outstanding value as research sites of shorebird habitat.

A plant community classification system was developed for ecosystems included in this study. The classification for tidal marshes is based on Jefferson (1975) and that for coastal dunes on Wiedemann *et al*. (1974). Classifications and plant community abstracts are presented in Appendix I.

Figure 1
Study Area



FIELD SURVEYS

Field surveys were conducted between March 15 and August 6, 1982. Field data were gathered on distribution, extent, habitat and ecology of endangered, threatened and sensitive plant species. Plant communities for selected sites were surveyed and mapped.

Qualitative sampling techniques were determind to be appropriate for this study due to the spatial extent and time spanned by field surveys. Data were collected on species composition and relative cover values for communities occupying one acre or more using the following categories:

Dominant: A plant species having an above ground cover value of 20-100% over at least 50% of the total area covered by the plant community at a given site.

Sub-dominant: A plant species having an above ground cover value of 5-20% over at least 50% of the total area covered by the plant community at a given site.

Minor: A plant species occurring over less than 50% of the total area occupied by the plant community at a given site or having an above ground cover value of less than 5% throughout the community.

Mapping was primarily accomplished in the field using most current, available, aerial photographs, on a scale of 1:24,000, as base maps. Mapping was done either while the survey was conducted or from vantage points once data on species composition and relative cover were collected and visual signatures were determind for each plant community. Where lands were inaccessible, mapping was done from vantage points with binoculars, extrapolating probable plant communitites from surrounding surveyed lands. Mapping symbols followed with an "x" indicate extrapolation.

This study was intended to focus on native plant species and plant communities of particular botanical importance in Washington. However, during the course of the study, it also seemed appropriate to gather distributional information on one non-native species of concern, Spartina alterniflora. The species is a widely distributed salt marsh grass which was introduced from the east coast of the United States probably with oysters in the early 1900's. The ecology and distribution of this species is not well known, yet it is of growing concern due to its rapid growth and establishment in this area. Affects this

species may have on the native estuarine ecosystem are not well documented at this time. However, it appears to have the potential to radically alter tidal marsh sytems.

All field data were entered into the Washington Natural Heritage data base which is an integrated system of computer, manual and map files. This information will be maintained and updated by the Washington Natural Heritage Program and is accessible upon request.

MAP OVERLAYS AND TEXT FORMAT

Map transparencies are prepared to overlay corresponding U.S.G.S. 7.5' topographic quadrangle maps. High quality sites for plant communities and locations of endangered, threatened and sensitive plant species are recorded. Sites of significant botanical importance are keyed to written descriptions (write-ups) by unique Roman numerals and site names (site names are taken from U.S.G.S. 7.5' quadrangle maps where available, otherwise locally applied names are used).

Populations of two threatened plant species, *Poa pachypholis* and *Sanicula arctopoides*, are located and mapped to section. Locations are identified on the overlays as "special plant habitat" and numbered XXXVIII and XXXVII, respectively. Corresponding "write-ups" provide descriptions of the species, their state and federal status, general habitat and locational information.

High quality native plant communities for previously selected sites were surveyed and mapped. Corresponding "write-ups" are provided for forty-five of the sites. Information is presented in the "write-ups" using the following format:

LOCATION provides information on the location, county, state, quadrangle map(s) on which the area is mapped, township(s), range(s) and section(s).

GENERAL DESCRIPTION is subdivided into three headings. The first is physical description which gives information on the size of the area, drainage patterns, substrate, salinity, topography, etc. The second is land use history providing information on current and past use of the area and pertinent use of adjacent lands. Land use history is known to varying degrees for

different sites. Third is a coarse description of the vegetation giving relative proportions of each vegetation "type" (see Appendix I) and general distributional patterns.

PLANT COMMUNITY DESCRIPTION provides specific information on each mapped community in the site. Information provided varys depending upon time of year in which a survey was conducted, the degree of site disturbance and whether mapping surveys were conducted or signatures extrapolated. A short description of distinctive features of the community is given along with a species list distinguising dominant, sub-dominant and minor species. Species lists should be considered partial and cover values relative due to the time of year surveyed.

SITE EVALUATION

The area covered by this study has had at least a 125 year history of human activity centered around use of natural resources. This focus has resulted in extensive alteration of native ecosystems. Sites addressed by this study are relatively high quality remnants of native plant communities or habitats for endangered, threatened or sensitive plant species. Sites innumerated should not be considered for siting of secondary support systems under the OCS Oil and Gas Lease Program. This recommendation is based on the state-wide botanical and ecological value of these sites. Bowerman Basin, Goose Island, Sand Island, Gunpowder Island and Whitcom Flats have similarly been identified as important shorebird habitats.

SITE DESCRIPTIONS

I

"THE SINK"

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Point Brown, Washington 7.5' quad map. T17N, R12W, portions of sections 22, 23, 26 and 27. Embayment at the southern tip of Point Brown.

GENERAL DESCRIPTION:

Physical Description - Approximately 270 acres of saltmarsh occur in a shallow embayment at the tip of Point Brown behind the submerged portion of North Jetty. The substrate is predominantly sand with varying amounts of silt. The marsh is dissected to a limited extent by large tidal channels. Salt pannes occur in the low marsh.

Land Use History - The Oyhut Sink has had very little direct manipulative use. The construction and maintenance of North Jetty since 1907 may have an impact on the area, altering wave and tidal action and erosion or accreation of sands. As late as 1963 the area was part of a farm and the saltmarsh was likely grazed. There are a few vehicle tracks running through the upper reaches of the marsh. Currently the Sink is a Washington State Department of Game Habitat Management Area (HMA) and is managed for wildlife.

Vegetation - The area is dominated by low marsh. High marsh and, to a limited extent, intermediate marsh occur in a band along the landward boundary of the saltmarsh. *Carex lyngbyei* is found extensively in intermediate and high marsh indicating freshwater influence in those areas. Vegetation patterns are somewhat unusual with extensive mixing of high and low marsh species.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) is the predominant saltmarsh community in The Sink. Species composition is variable with local co-dominance of *Plantago maritima* and *Grindelia integrifolia*. Salt pannes and large tidal channels occur in this area of saltmarsh.

Dominants:	Distichlis spicata Jaumea carnosa Salicornia virginica
Sub-dominant:	Plantago maritima (local co-dominant)
Minor:	Agrostis alba Glaux maritima Grindelia integrifolia (local co-dominant) Triglochin maritimum

Salicornia virginica community (mapping symbol 7) occurs in a mosaic with 5 low marsh. In this area it is typically a monospecific community occurring in depressions or adjacent to salt pannes.

Dominant: Salicornia virginica

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs in two small areas; one along a section of accumulated driftwood and the second along tidal channels. Carex lyngbyei co-dominantes in the latter site.

Dominants:
- Carex lyngbyei
- Deschampsia caespitosa
- Jaumea carnosa
- Salicornia virginica

Minor:
- Agrostis alba
- Distichlis spicata
- Glaux maritima
- Grindelia integrifolia

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs along most of the landward boundary of the saltmarsh. Juncus balticus occurs in half of the community, along the uppermost band of marsh. Where Juncus balticus is not co-dominant, Carex lyngbyei is. The occurrence of Carex lyngbyei and Lilaeopsis occidentalis suggest considerable freshwater influence.

Dominants:
- Agrostis alba
- Carex lyngbyei
- Juncus balticus

Sub-dominant: Distichlis spicata

Minor:
- Deschampsia caespitosa
- Festuca rubra
- Glaux maritima
- Grindelia integrifolia
- Lilaeopsis occidentalis
- Potentilla pacifica

II

OCEAN SHORES MARSH AREA

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Copalis Beach, Washington and Point Brown, Washington U.S.G.S. 7.5' quad maps. T17N, R12W, portions of section 2 and T18N, R12W, portions of section 35. A tidal marsh area along the east side of Point Brown.

GENERAL DESCRIPTION:

Physical Description - Approximately 185 acres of tidal marsh lie along 1½ miles of shoreline on the east side of Point Brown, north of the entrance to Grays Harbor. Substrates are primarily sands and clay. There is little dissection of the marsh surface.

Land Use History - The tidal marshlands have received extensive human use. They have likely been grazed since the late 1800's though currently they are not used for that purpose. Old fence posts are found throughout the area. An extensive dike and ditch system was built along the bayward margin of the marsh. This system appears to have been in place for quite some time and is breached. There are indications that recent attempts have been made to repair and maintain the dike. A second dike and ditch, running east and west, bissects the southern portion of the marsh. It has apparently caused impoundment of freshwater to the south, an area presently dominated by a freshwater marsh.

Landfill has been pushed up along the entire western boundary of the tidelands accompanying road and home construction. This fill has altered freshwater drainage into the marsh.

The marsh area has been labeled a "proposed airport site" in a local real estate brochure.

Vegetation - The tidal marsh area is dominated by high marsh. Low marsh occurs on high terraces beyond the bayward dike, in depressions within high marsh and on sand flats along the bay edge in the southern portion of the marsh.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs as outer marsh edge strips on low sand flats in the southern portion of the marshlands. *Scirpus americanus* occurs in essentially pure stands.

Dominants: Scirpus americanus

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs on high terraces outside the old dike, and

in poorly drained depressions landward of the old dike.

Dominants:	Distichlis spicata Salicornia virginica
Minor:	Agrostis alba Deschampsia caespitosa Juncus balticus Plantago maritima Triglochin maritimum

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacific community (mapping symbol 15) dominates the center of the marsh, covering over ½ of the total marsh surface. Distichlis spicata is co-dominant over part of the area. Potentilla pacifica and Juncus balticus cover varies.

Dominants:	Agrostis alba Deschampsia caespitosa Juncus balticus (variable) Potentilla pacifica (variable)
Sub-dominants:	Distichlis spicata (local co-dominant) Festuca rubra (variable, local co-dominant)
Minor:	Triglochin maritimum

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs at highest marsh elevations, largely as a broad "zone" against the upland edge, along the west side of the marsh. Agrostis alba is absent as a co-dominant.

Dominants:	Juncus balticus Potentilla pacifica
Minor:	Agrostis alba (local co-dominant) Deschampsia caespitosa (local sub-dominant) Festuca rubra (local co-dominant)

III

HUMPTULIPS RIVER MARSHES

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Copalis Crossing, Washington, U.S.G.S. 7.5' quad map. T18N, R11W, portions of sections 16, 20, 21 and 22. Tidal marshes at the mouth of the Humptulips River.

GENERAL DESCRIPTION:

Physical Description - Approximately 165 acres of tidal marsh occur at the mouth of the Humptulips River, including marsh areas along Campbell, Jessie, and Gillis Sloughs. The area described extends west approximately ½ mile beyond the mouth of Campbell Slough, and is bounded on the southeast by a sandstone headland. Substrates vary from sands to silts. Marsh surfaces are generally dissected only by main tidal channels. Many large pieces of driftwood occur over the marsh surface.

Land Use History - The Humptulips River area has probably had a long history of human use. The area was likely homesteaded in the late 1800's. Dikes have been built, particularly along the east side of Gillis Slough, primarily for pasture use. Old pilings in tidal channels and flats indicate past fisheries and log rafting use. The area was likely initially logged in the late 1800's with some areas having recently been logged a second time. A county road runs along the upland edge from Jessie Slough west. It crosses the slough on a piling supported bridge. Farms and residences currently occur extensively throughout the area.

Vegetation - Extensive areas of sedge marsh and high marsh communities dominate most of the marshlands. Small areas of low marsh, intermediate marsh, and transition marsh occur locally.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs along the leading tidal marsh edge along the shoreline west and southeast of the delta. Along the western shoreline, the community is intermixed with 4 low marsh. The community appears to occur on sandy substrates.

Dominants:	Scirpus americanus
Sub-dominants:	Triglochin maritimum (variable)

Triglochin maritimum community (mapping symbol 4) occurs along the western shoreline, associated with 3 low marsh, along the leading marsh edge.

Dominants:	Triglochin maritimum

Sub-dominants: Scirpus americanus (variable)

Sedge Marsh

Carex lyngbyei community (mapping Symbol 11) occurs primarily on the river delta, dominating nearly one-third of the total tidal marsh area. The community is dissected by tidal channels to a limited degree. Substrates are silts.

Dominants: Carex lyngbyei

Minor: Lilaeopsis occidentalis
Triglochin maritimum

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs in one very small area associated with 11 sedge marsh.

Dominants: Carex lyngbyei
Triglochin maritimum

Minor: Lilaeopsis occidentalis

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs along the west and southeast shorelines, as a band between low marsh or sedge marsh elevations and high marsh elevations. *Carex lyngbyei* is co-dominant on the southeast portion. The community occurs on sandy substrates in this area.

Dominants: Deschampsia caespitosa
Distichlis spicata (variable)

Sub-dominants: Carex lyngbyei (local co-dominant)
Triglochin maritimum

Minor: Agrostis alba
Scirpus cernuus

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) dominates nearly ½ of the total marshlands, occurring primarily on the river delta at higher elevations than 11 sedge marsh. *Carex lyngbyei* occurs as co-dominant throughout the community. Amounts of *Juncus balticus*, *Potentilla pacifica*, and *Agrostis alba* are highly variable.

Humptulips River Marshes - cont.

Dominants:	Carex lyngbyei Deschampsia caespitosa
Sub-dominants:	Juncus balticus (variable)
Minor:	Agrostis alba (local co-dominant) Glaux maritima Lilaeopsis occidentalis Trifolium wormskjoldii

Agrostis alba-Juncus balticus-Potentilla pacific community (mapping symbol 17) occurs over a few areas at elevations above 15 high marsh. Typically it occurs along the upland edge in a zone with high driftwood accumulation. It also occurs on a high mound on an island in the river delta. Agrostis alba and Potentilla pacifica occur as co-dominants in localized areas.

Dominants:	Juncus balticus Trifolium wormskjoldii
Minor:	Agrostis alba (local co-dominant) Achillea millefolium Angelica lucida Carex lyngbyei Deschampsia caespitosa Grindelia integrifolia Potentilla pacifica (local co-dominant) Triglochin maritimum

Transition Marsh

Calamagrostis nutkaensis-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 20) occurs on a high ridge adjacent to the Humptulips River channel.

Dominants:	Calamagrostis nutkaensis
Minor:	Angelica lucida

IV

CHENOIS CREEK MARSH

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Copalis Crossing, Washington, U.S.G.S. 7.5' quad map. T18N, R11W, portions of sections 22, 23, and 26. Tidal marsh at the mouth of Chenois Creek and adjacent shoreline of Grays Harbor.

GENERAL DESCRIPTION:

Physical Description - Approximately 70 acres of tidal marsh occur primarily as bands along the shoreline flanking the mouth of Chenois Creek. The area is bounded abruptly on the north and south by sandstone headlands and encompasses approximately 1 3/4 miles of Grays Harbor shoreline. Substrates are primarily silts with local areas of gravels. Sandy substrates occur near the sandstone headlands, especially the northern most. Intermediate marsh and sedge marsh surfaces are dissected by networks of small tidal channels. High marsh surfaces are relatively undissected. There is an accumulation of driftwood along the upland edge of the tidal marsh.

Land Use History - The Chenois Creek marshes were likely subject to early homestead land uses, notably grazing where accessible to stock. Rows of pilings along the main tidal channel and building ruins suggest past log rafting and boat dock uses. All of the adjacent upland forests have been logged at least once, likely beginning in the late 1800's. Some areas have been cut a second time. Small farms occur on upland near each end of the area. A gas station and residence are located just across the highway at the south end of the Chenois Creek bridge. State Route 109 and a railroad line cross the main channel of Chenois Creek on separate piling-supported bridges. Some freshwater impoundment has occurred on small drainages feeding the marsh, apparently associated with the highway and railroad grades.

Vegetation - A variety of marsh communities occur, largely as bands parallelling the shoreline. Community patterns vary, apparently as substrates and freshwater influence vary.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs along the leading marsh edge north of the mouth of Chenois Creek, apparently associated with sandy substrates. *Carex lyngbyei* occurs as patches in this zone.

Dominants:	Scirpus americanus
Sub-dominants:	Carex lyngbyei (variable) Triglochin maritimum (local co-dominant)

Scirpus maritimus community (mapping symbol 13) occurs along the leading marsh edge south of the mouth of Chenois Creek, in a mosaic with 12 sedge marsh.

Dominants:	Scirpus maritimus
Minor:	Salicornia virginica (local sub-dominant)

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs south of Chenois Creek as a band adjacent to upland edges, apparently associated with freshwater seepages.

Dominants:	Carex lyngbyei

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs along the leading marsh edge south of the mouth of Chenois Creek, in some areas associated with 13 low marsh. Salicornia virginica is locally co-dominant.

Dominants:	Carex lyngbyei Triglochin maritimum (variable)
Minor:	Lilaeopsis occidentalis Salicornia virginica (local co-dominant)

Deschampsia caespitosa-Carex lyngbyei-(Triglochin maritimum) community (mapping symbol 21) dominates much of the marsh area south of the mouth of Chenois Creek, occurring as a broad band between low marsh and high marsh areas.

Dominants:	Deschampsia caespitosa Carex lyngbyei
Sub-dominants:	Triglochin maritimum
Minor:	Distichlis spicata (variable) Potentilla pacifica Sicrpus cernuus Scirpus maritimus

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs as a band between low marsh and high marsh areas north of the mouth of Chenois Creek. Carex lyngbyei occurs as a co-dominant.

Dominants:	Carex lyngbyei

	Deschampsia caespitosa Distichlis spicata
Sub-dominants:	Triglochin maritimum

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs as narrow strips along the upland marsh edges. *Trifolium wormskjoldii* occurs as a co-dominant in most areas. *Agrostis alba* is absent as a co-dominant over most of the community. There are large accumulations of driftwood throughout the area covered by this community.

Dominants:	Juncus balticus Potentilla pacifica (variable) Trifolium wormskjoldii (variable)
Sub-dominant:	Carex lyngbyei (local co-dominant)
Minor:	Deschampsia caespitosa Distichlis spicata Festuca rubra Grindelia integrifolia

V

GRASS CREEK MARSHES

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Copalis Crossing, Washington, and Westport, Washington U.S.G.S. 7.5' quad maps. T17N, R11N, portions of section 2 and T18N, R11N, portions of sections 35 and 36. Tidal marshes at the mouth of Grass Creek, immediately north of Point New.

GENERAL DESCRIPTION:

Physical Description - Approximately 55 acres of tidal marsh occur primarily as narrow bands along the shoreline flanking the mouth of Grass Creek. The area begins at the north side of Point New, and continues northerly along approximately 1 mile of shoreline, ending abruptly at the base of a sandstone bluff. A second small area of marsh occurs on tidelands a few hundred feet upstream along the Grass Creek channel. Substrates are primarily silts, however sands occur adjacent to and south of the sandstone bluff. Intermediate marsh and sedge marsh surfaces are dissected by networks of small channels. High marsh surfaces are relatively undissected.

Land Use History - The Grass Creek marshes likely were subject to early homestead land uses, notably grazing where accessible to stock. Areas of pasture occur nearby, associated with small farms. Rows of pilings along the main tidal channel and building ruins suggest past log rafting and boating uses. State Route 109 and a railroad line cross portions of the tidelands at the mouth of the creek, spanning the main channel on separate piling-supported bridges. Some freshwater impoundment has occurred on small drainages feeding the marsh, apparently due to the highway and railroad grades. All the adjacent upland forests have been logged at least once, likely beginning in the late 1800's. Some areas have been cut a second time.

Vegetation - A variety of low marsh, sedge marsh and high marsh communities occur, largely in bands parallelling the shoreline. Community patterns are apparently associated with varying sand/silt substrates, and freshwater influence.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs along the leading marsh edge north of Grass Creek. In most areas it is apparently associated with sandy substrates, and occurs in a mosaic with 4 low marsh.

Dominants: Scirpus americanus

Triglochin maritimum community (mapping symbol 4) occurs in a mosaic with 3 low marsh edges north of Grass Creek channel.

Dominants: Triglochin maritimum

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs as a narrow continuous band along the leading marsh edge or just inland of 3/4 low marshes. This community forms discontinuous hummocks elevated above the surrounding bare tideflats.

Dominants: Salicornia virginica
Triglochin maritimum

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs as a small strip along Grass Creek channel. Lesser amounts of 9 low marsh species are found mixed with the Carex.

Dominants: Carex lyngbyei
Triglochin maritimum

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs as a narrow, nearly continuous band between low marsh, and high marsh. Carex lyngbyei is co-dominant over most of this community.

Dominants: Deschampsia caespitosa
Distichlis spicata
Salicornia virginica
Carex lyngbyei (variable)

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs as a localized narrow strip between low marsh and high marsh on the northern side of the Grass Creek channel.

Dominants: Deschampsia caespitosa
Distichlis spicata

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs only on the upstream marsh area east of State Route 109.

Dominants: Agrostis alba
Deschampsia caespitosa
Juncus balticus
Potentilla pacifica

Grass Creek Marshes - cont.

Sub-dominants: Carex lyngbyei

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs on tidal marshes, largely as bands adjacent to upland edges. Carex lyngbyei is co-dominant over much of this community.

Dominants:
Agrostis alba
Juncus balticus
Potentilla pacifica
Carex lyngbyei (variable)

VI

POINT NEW

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Westport, Washington U.S.G.S. 7.5' quad map. T17N, R11W, portions of section 2. A promontory of land south of the mouth of Grass Creek marking the southeastern boundary of North Bay in Grays Harbor.

GENERAL DESCRIPTION:

Physical Description - Approximately 35 acres of wetlands and sand dunes occur around Point New; 9 acres of saltmarsh, 1 acre of dune and more than 25 acres of freshwater marsh. On the northwest side of the Point is a sand and gravel berm. Behind the berm is a small brackish wetland. On the south side of the Point is a second berm behind which is a freshwater wetland. A narrow strip of beach extends around the Point. Seaward of the beach are tidal flats ranging in substrate from silts to sandy gravel to a sandstone bench.

Land Use History - There has been logging of small areas adjacent to the freshwater wetlands at Point New. Neds Rock, off the Point was used for artillary practice during WW II. There is occasional use of the beach and berms by off-road-vehicles. The area receives use by bird watchers and occasional hunters. Currently the area is advertised for sale-presumably for urban development.

Vegetation - There is minor saltmarsh development in the area. Low marsh occurs to a limited extent on the tideflats. Low marsh, sedge marsh and a brackish Scirpus marsh occur behind the northwestern berm. There is some dune vegetation on this berm as well. A fairly extensive freshwater wetland is located behind the southeastern berm and inland.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs as a pure stand on the tidal flats. It is found on silts, sandy gravels and some areas of the sandstone bench which stretches between the mainland and Neds Rock.

Dominant: Scirpus americanus

Triglochin maritimum community (mapping symbol 4) occurs in one small area of tidal flat near the T17N-T18N township line. It occurs intermixed with Scirpus americanus.

Dominant: Triglochin maritimum

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs on the landward slope of the berm. The site is flooded at least a portion of the year.

Dominant: Distichlis spicata

Sub-dominant: Salicornia virginica

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs as a monospecific community. It is located against the upland bank at the northern end of the brackish wetland behind the northeastern berm.

Dominant: Carex lyngbyei

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) located at the northern end of the brackish marsh behind the northeastern berm. Only two species were observed to occur.

Dominants: Agrostis alba
Deschampsia caespitosa

Freshwater Marsh

(mapping symbol F/W)occurs behind the southeastern berm. This wetland was not surveyed. However, some of the features are: considerable accumulation of driftwood, an area of open water, numerous snags, and a variety of vegetation. There is a second, approximately 20 acre wetland north of and contiguous with this wetland. From an aerial photo, it appears to be dominated by herb and shrub vegetation.

MAP OVERLAY KEY

3 - Scirpus americanus salt marsh community
4 - Triglochin maritimum salt marsh community
5 - Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum salt marsh community
7 - Salicornia virginica salt marsh community
8 - Distichlis spicata salt marsh community
9 - Salicornia virginica-Triglochin maritimum salt marsh community
10 - Distichlis spicata-Salicornia virginica-(Triglochin maritimum) salt marsh community
11 - Carex lyngbyei salt marsh community
12 - Carex lyngbyei-Triglochin maritimum salt marsh community
13 - Scirpus maritimus salt marsh community
14 - Deschampsia caespitosa-Distichlis spicata-Salicornia virginica salt marsh community
15 - Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica salt marsh community
16 - Deschampsia caespitosa-Distichlis spicata salt marsh community
17 - Agrostis alba-Juncus balticus-Potentilla pacifica salt marsh community
17 FORB - Agrostis alba-Juncus balticus-Potentilla pacifica-Forbs salt marsh community
18 - Festuca rubra-Agrostis alba-Potentilla pacifica salt marsh community
20 - Calamagrostis nutkaensis-Agrostis alba-Juncus balticus-Potentilla pacifica salt marsh community
21 - Deschampsia caespitosa-Carex lyngbyei-Triglochin maritimum salt marsh community
A - Festuca rubra-Armeria maritima-Orthocarpus castillejoides salt marsh community
B - Deschampsia caespitosa salt marsh community
C - Unvegetated Beach
D - Ammophila Dunes
E - Elymus mollis dune community
F - Lupinus littoralis-Poa macrantha-Fragaria chiloensis and Festuca rubra dune communities
G - Juncus nevadensis-Juncus falcatus and Carex obnupta dune communities
H - Salix hookeriana/Carex obnupta dune community
I - Rosa nutkana/Festuca rubra dune community
J - Vaccinium ovatum-Gaultheria shallon-Arctostaphylos uva-ursi dune community
K - Pinus contorta/Vaccinium ovatum-Gaultheria shallon dune community
L - Picea sitchensis/Vaccinium ovatum-Gaultheria shallon dune community
M - Picea sitchensis wetland dune community
N - Unstable, unvegetated dunes
O - Shrub wetland dune community
P - Carex cusickii-Sphagnum spp. bog community
Q - Typha latifolia community
R - Snag wetland
F/W - Freshwater wetland
- - - Diked lands, probably previous tidelands
"DIKED" -Diked lands, undefined
x - species survey extrapolated

KEY - continued

• - Heavily grazed
OPEN WATER - freshwater wetland with unvegetated areas of water
Recently Breached - dikes around the area are recently broken
Altered - tidelands or previous tidelands that have sustained extensive humanly caused alteration

VII

BOWERMAN BASIN

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Hoquiam, Washington, U.S.G.S. 7.5' quad map. T17N, R10W, portions of sections 9 and 10. Located within a small embayment between Bowerman Airport and the mainland, a portion of which lies within the Hoquiam city limits.

GENERAL DESCRIPTION:

Physical Description - Approximately 175 acres of saltmarsh occur within a small, shallow bay lying between the Bowerman Airport spit and the mainland. The substrate is sand with varying amounts of silts. There is a slight gradual elevational gain from the bare tideflats to the vegetated saltmarsh. The marsh surface is dissected by a single channel which runs parallel to the shore along the northern boundary of the saltmarsh.

Land Use History - The area is highly disturbed. However, since the site is reportedly important for wildlife, particularly shorebirds, a brief description has been included (data on wildlife usage is maintained by the Washington State Department of Game, Nongame Program).

Bowerman Basin was the site of unconfined dredge spoil deposition as late as 1973. The bayward boundary of the marsh has been shifted to the west by the deposition of dredge spoils. The saltmarsh is bounded to the east by a series of dikes, to the north by a railroad grade and highway and to the south by a bulkhead constructed along the northern side of the airport. There is a sewage treatment facility on land-fill adjacent to the saltmarsh. There is evidence of sewage entering the marsh along its eastern boundary.

Vegetation - Marsh community patterns and species composition are unusual in Bowerman Basin, primarily the result of past disturbances. The present saltmarsh has developed since 1973. It is primarily low marsh with minor sedge marsh and intermediate marsh development. The low marsh occurs as discontinuous patches. A stand of young red alders (*Alnus rubra*) occurs in the southeastern potion of the marsh.

DOMINANT SALTMARSH PLANT SPECIES:

Low Marsh

Agrostis alba
Carex lyngbyei
Distichlis spicata
Puccinellia sp.
Salicornia virginica
Triglochin maritimum

Bowerman Basin - cont.

Sedge Marsh

Carex lyngbyei
Triglochin maritimum

Intermediate Marsh

Deschampsia caespitosa
Distichlis spicata
Grindelia integrifolia
Juncus balticus (minor)
Potentilla pacifica (minor)

VIII

JOHNS RIVER MARSHLANDS

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Hoquiam, Washington and Westport, Washington U.S.G.S. 7.5' quad maps. T17N, R11W, portions of sections 35 and 36; T16N, R11W, portions of sections 1, 2, and 12; T16N R10W, portions of section 7. Tidal marshes along the lower reaches of the Johns River.

GENERAL DESCRIPTION:

Physical Description - Approximately 310 acres of tidal marsh lie along the lowest 3 miles of the Johns River, including Markham Island beyond the river mouth. Dissection of high marsh and transition marsh surfaces is limited to main tidal channels. Low marsh and intermediate marsh surfaces become more highly dissected by small tidal channels. Substrates are primarily silts. A small sand ridge occurs at the north end of Markham Island.

Land Use History - The Johns river area has a long history of varied human use. Logging of forested uplands in the area began in the late 1800's. The river was used for log rafting and transport as is evidenced by river pilings. The tidal marshes were used for grazing, where accessible to cattle, probably since the turn of the century. Extensive systems of dikes and ditches were built removing nearly half of former tidal marsh area from saltwater influence. Small areas of previously diked pasture lands have been re-introduced to tidal influence through decay of dikes. An oyster processing facility and a large cranberry processing plant are located on land-fill at the mouth of the Johns River. A railroad line was built on land-fill across the tidelands at the mouth of the river. A railroad bridge was built spanning the river channel. The bridge and line west of the river have been abandoned. Highway 101 also crosses the tidelands on road-fill and the river on a piling supported bridge.

Most of the area around the Johns River is currently owned by the Washington State Department of Game and is managed as a Wildlife Recreation Area. A parking lot and boat launch area have been constructed for public use.

Vegetation - Markham Island and the lower reaches of the river tidelands are dominated by intermediate marsh, with small amount of low marsh and high marsh. Middle reaches of the tidelands are dominated by sedge marsh, high marsh, and some intermediate marsh, all occurring as narrow bands, outside the dikes along the river channel. Extensive high marsh and transition marsh areas dominate the uppermost river tidelands. Minor dune vegetation development occurs on the north end of Markham Island.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Distichlis spicata community (mapping symbol 8) occurs on the outer marsh point west of Highway 101. This community is poorly defined here, with Potentilla pacifica and Grindelia integrifolia occurring as co-dominants associated with 14 intermediate marsh and 15 high marsh. This outer point of marsh is highly dissected by deep tidal channels and contains some salt pannes.

Dominant:	Distichlis spicata
Sub-dominant:	Grindelia integrifolia (local co-dominant) Potentilla pacifica (local co-dominant)

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs primarily as a narrow leading marsh edge along the northern and western sides of Markham Island. The community occurs on highly dissected tidelands and grades into 14 intermediate marsh.

Dominants:	Salicornia virginica Triglochin maritimum

Sedge Marsh

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs as narrow bands of tidal marsh outside the dikes along lower portions of the river channel.

Dominants:	Carex lyngbyei Triglochin maritimum

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) dominates nearly all of Markham Island. Smaller areas occur on the outer marsh point west of Highway 101 and along the lower reaches of the river channel. Carex lyngbyei occurs as co-dominant over one area. Areas of this community tend to be highly dissected by tidal channels.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Sub-dominant:	Agrostis alba Glaux maritima Jaumea carnosa (variable)
Minor:	Carex lyngbyei Juncus balticus Potentilla pacifica (local sub-dominant)

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs in small areas outside the dikes along the river channel. *Carex lyngbyei* is co-dominant in one area.

Dominants:	Agrostis alba Deschampsia caespitosa Potentilla pacifica
Minor:	Carex lyngbyei (local co-dominant) Festuca rubra Juncus balticus (local-dominant)

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs widely on high terraces of uppermost river tidelands. It is associated with 20 transition marsh.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Minor:	Deschampsia caespitosa Festuca rubra (local co-dominant)

Transition Marsh

Calamagrostis nutkaensis-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 20) occurs extensively on high marsh terraces along the uppermost tidal river reaches. It is associated with 17 high marsh. *Picea sitchensis* individuals occur scattered over the marsh.

Dominants:	Agrostis alba Calamagrostis nutkaensis Juncus balticus Potentilla pacifica
Minor:	Festuca rubra (local co-dominant)

IX

BEARDSLEE SLOUGH MARSHES
(Elk River Estuary)

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Grayland, Washington and Westport, Washington U.S.G.S 7.5' quad maps. T16N, R11W, portions of sections 14, 15, 16, 21, and 22. Tidal marshes along Beardslee Slough, within the Elk River estuary.

GENERAL DESCRIPTION:

Physical Description - Approximately 100 acres of low salinity marsh occur on tidelands along Beardslee Slough. It is one of three tidal marsh areas defined for the Elk River estuary. Marshes are generally located on high terraces above tidal channels, occurring as narrow bands, contiguous with the upland, and several marsh islands within the slough channel. Substrates are primarily silts. Dissection of the high marsh surfaces is limited to main tidal channels. Intermediate and low marsh surfaces are generally highly dissected and contain salt pannes to a limited degree.

Land Use History - Beardslee Slough tidal marshes were likely subject to cattle grazing in the late 1800's. Old fence posts on upper reaches of tidal marsh are indicative of this past use. Most of the surrounding upland forests have recently been cut for the second time. Initial harvesting of the forests likely began in the late 1800's. Old pilings along the main channel testify to past use of the slough for log rafting and transport. A gravel road crosses the uppermost slough on a small bridge.

Vegetation - Most of the marsh area is dominated by high marsh. Lesser areas of intermediate marsh are found along the downstream half of the area, mostly as marsh islands. Traces of sedge marsh and low marsh occur near the mouth of the slough.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-*Triglochin maritimum* community (mapping symbol 9) occurs primarily on one low marsh island near the confluence of Beardslee Slough and the Elk River. This community is highly dissected by tidal channels and in one area contains salt pannes.

Dominants:	Salicornia virginica Triglochin maritimum
Minor:	Carex lyngbyei (local co-dominant) Jaumea carnosa Scirpus americanus

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs at the confluence of Beardslee Slough and the Elk River on an outer marsh terrace, slightly lower than contiguous intermediate marsh.

Dominants:	Distichlis spicata Salicornia virginica
Sub-dominants:	Carex lyngbyei Triglochin maritimum

Sedge Marsh

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs in two small areas along upper reaches of the slough, near the confluence at Dempsey Creek and Beardslee Slough.

Dominants:	Carex lyngbyei Triglochin maritimum
Minor:	Lilaeopsis occidentalis Salicornia virginica (local)

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs at elevations between low marsh and high marsh, dominating several marsh islands on the downstream half of the slough tidelands. Carex lyngbyei occur as a co-dominant in many areas. Salt pannes are common within this community.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Sub-dominants:	Carex lyngbyei (local co-dominant) Potentilla pacifica
Minor:	Festuca rubra Glaux maritima Grindelia integrifolia (local) Jaumea carnosa (local sub-dominant) Plantago maritima Scirpus cernuus Stellaria humifusa Triglochin maritimum

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs in one small strip between 10 low marsh and 15 high marsh, at the confluence of Beardslee Slough and the Elk River.

Dominants:	Deschampsia caespitosa Districhlis spicata
Minor:	Carex lyngbyei Potentilla pacifica Salicornia virginica Triglochin maritimum

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) dominates nearly three-quarters of the total tidal marsh area, especially along the upper slough reaches. Carex lyngbyei, Distichlis spicata, and Festuca rubra occur variously as local co-dominants.

Dominants:	Agrostis alba Deschampsia caespitosa Potentilla pacifica
Minor:	Achillea millefolium (local) Angelica lucida (local) Distichlis spicata (local co-dominant) Festuca rubra (local co-dominant) Grindelia integrifolia Juncus balticus (local co-dominant) Rumex sp (local) Triglochin maritimum

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs in two small areas along the upland edge, at the confluence of Beardslee Slough and the Elk River. Carex lyngbyei and Festuca rubra occur as co-dominants. Juncus balticus is absent as a co-dominant.

Dominants:	Agrostis alba Carex lyngbyei Festuca rubra Potentilla pacifica
Minor:	Achillea millefolium

$\overline{X}$

ELK RIVER MARSHES
(Elk River Estuary)

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Grayland, Washington and Western, Washington U.S.G.S. 7.5' quad map. T16N, R11W, portions of sections 25, 26, 27, and 35. Elk River estuary: Tidal marshes along the lower reaches of the Elk River and Andrews Creek.

GENERAL DESCRIPTION:

Physical Description - Approximately 320 acres of low salinity marsh occur along the tidelands upstream from the confluence of Andrews Creek and the main channel of the Elk River. It is one of the 3 marsh areas defined within the Elk River estuary. Most of the marsh area occurs contiguous with the upland, although a few marsh islands occur. Substrates are primarily silts. Dissection of the marsh surface is limited to main tidal channels in most areas.

Land Use History - The Elk River tidal marshes were likely subject to grazing use, where accessible, since the late 1800's. Nearly all of the surrounding upland forests have recently been cut for the second time. First harvesting of the original forests likely began in the late 1800's. An old logging railroad grade extends onto transition marsh at the upper reach of Andrews Creek tidelands, terminating in ruins of a railroad pier presumably used to empty logs from railroad cars into the channel waters. Rows of old pilings along the Elk River and Andrews Creek channels indicate past log rafting and transport activity.

Vegetation - Most of the marsh area is dominated by high marsh communities. Extensive amounts of well-developed transition marsh dominate uppermost reaches of the tidelands. Some sedge marsh, and traces of intermediate marsh are found on outlying (down-river) locations, largely as marsh islands.

PLANT COMMUNITY DESCRIPTIONS:

Sedge Marsh

Deschampsia caespitosa-Carex lyngbyei-Triglochin maritimum (mapping symbol 21) community occurs at the confluence of Andrews Creek and the Elk River along the Elk River channel as a large marsh island, and smaller areas along the leading marsh edge. *Potentilla pacifica* occur as a sub-dominant in areas.

Dominants:	Carex lyngbyei Deschampsia caespitosa Trigochin maritimum

Sub-dominants: Potentilla pacifica (variable)

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community mapping symbol 14) occurs on small islands at the junction of the two main channels.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Minor:	Carex lyngbyei Triglochin maritimum

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) dominates over half of the total marsh area. Juncus balticus is absent as co-dominant over much of this community, especially along Andrews Creek. Festuca rubra occurs as a variable co-dominant in many areas.

Dominants:	Agrostis alba Deschampsia caespitosa Festuca rubra (variable) Potentilla pacifica
Minor:	Achillea millefolium Carex lyngbyei (local sub-dominant) Distichlis spicata Juncus balticus (local co-dominant) Rumex sp

Agrostis alba-Juncus balticus-Potentilla pacifica (mapping symbol 17) community occurs on slightly raised ground along stream channels or adjacent to upland, It is limited in extent in this area.

Dominants:	Agrostis alba Juncus balticus (variable) Potentilla pacifica
Sub-dominants:	Festuca rubra (local co-dominant)
Minor:	Achillea millefolium Angelica lucida Carex lyngbyei Deschampsia caespitosa Rumex sp

Transition Marsh

Calamagrostis nutkaensis-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 20) dominates upper reaches of the tidelands. Scattered individuals of *Picea sitchensis* and *Pyrus fusca* occur within uppermost areas of this community.

Dominants:	Agrostis alba Calamagrostis nutkaensis Juncus balticus Potentilla pacifica
Sub-dominants:	Sidalcea hendersonii (variable)
Minor:	Achillea millefolium Angelica lucida Aster subspicatus Carex obnupta (local) Deschampsia caespitosa Festuca rubra Rumex occidentalis Vicia gigantea

XI

HUNT CLUB/MALLARD SLOUGH MARSHLANDS
(Elk River Estuary)

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Grayland, Washington U.S.G.S. 7.5'quad map. T16N, R11W, portions of section 20, 21, 27, 28, and 29. Tidal marshlands within the Elk River estuary, around Mallard Slough, extending west from Andrews Slough to the "Hunt Club Road".

GENERAL DESCRIPTION

Physical Description - Approximately 550 acres of tidal marsh occur over nearly two square miles as numerous low islands and irregularly dissected shoreline marsh. It is one of three marshlands defined for the Elk River estuary. The marsh islands vary from less than 1 acre to more than 40 acres in size. Substrates are silts. The area is highly dissected by major tidal channels. Outer areas of low marsh contain salt pannes and are dissected by networks of small channels.

Land Use History - The tidal marsh, where accessible by stock, has been grazed probably since the late 1800's. An extensive system of dikes and ditches was built to convert former tidelands to pasture. A dam with a tidegate was built across Mallard Slough contiguous with the dike. Though cattle grazing no longer occurs, this system of dikes and ditches is maintained forming the western and southern boundaries of the current tidal marshlands.

Much of the forested lands adjacent to the tidelands have recently been logged for a second time. Initial cutting probably took place in the late 1800's. Sloughs and tidal channels likely were used for log rafting and transport.

The area is currently owned by a private hunting club and managed for waterfowl. The area shows signs of heavy elk use.

Vegetation - Nearly all of the marsh area is dominated by intermediate marsh and low marsh. Minor amounts of high marsh and sedge marsh occur along the upland edges and adjacent to the dikes. There is one very small area of transition marsh.

PLANT COMMUNITY DESCRIPTION:

Low Marsh

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) occurs extensively on bayward marsh islands near the main Elk River channel. The community is highly dissected and contains salt pannes.

Dominants:	Distichlis spicata Triglochin maritimum
Sub-dominant:	Jaumea carnosa
Minor:	Glaux maritima Grindelia integrifolia Plantago maritima Salicornia virginica (local sub-dominant)

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs on marsh islands along low leading edges and as small hummocks on bare tidal mudflats.

Dominants:	Salicornia virginica Triglochin maritimum
Minor:	Jaumea carnosa

Distichlis spicata-Salcornia virginica-(Triglochim maritmum) community (mapping symbol 10) occurs primarily on marsh islands near the center of the marshlands.

Dominants:	Distichlis spicata Salicornia virginica
Sub-dominants:	Triglochin maritimum

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs primarily in a small area on slumps adjacent to a freshwater stream channel.

Dominants:	Carex lyngbyei

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs in one small area on a low terrace along a freshwater stream channel.

Dominants:	Carex lyngbyei
Sub-dominant:	Triglochin maritimum
Minor:	Lilaeopsis occidentalis

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) dominates nearly two-thirds of the total marsh area,

at elevations above low marsh and below high marsh.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Minors:	Glaux maritima Grindelia integrifolia (local sub-dominant) Plantago maritima Potentilla pacifica Triglochin maritimum (local sub-dominant)

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs on shoreline marsh areas adjacent to the dikes and upland.

Dominants:	Deschampsia caespitosa Distichlis spicata
Minor:	Grindelia integrifolia Juncus balticus Potentilla pacifica Salicornia virginica

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs as scattered small areas along upland edges and adjacent to the dikes. Juncus balticus is absent as co-dominant in some areas. Carex lyngbyei is co-dominant over one large area.

Dominants:	Agrostis alba Deschampsia caespitosa Juncus balticus (variable) Potentilla pacifica
Sub-dominant:	Carex lyngbyei (locally co-dominant)
Minor:	Distichlis spicata (local co-dominant)

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs only on a narrow terrace along the uppermost reaches of a small creek slough, adjacent to the upland.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica

Transition Marsh

Calamagrostis nutkaensis-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 20) occurs in only one very small area adjacent to an upland forest point along the dike.

Dominants:	Agrostis alba Calamagrostis nutkaensis Juncus balticus Potentilla pacifica

XII

WESTPORT MARSHLANDS

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Westport, Washington and Grayland, Washington U.S.G.S. 7.5' quad maps. T16N, R11W, portions of sections 6, 7, 18, 19, and 20. Tidal marshlands east of Westport extending along the shoreline between the Westport marina and Elk River bridge.

GENERAL DESCRIPTION:

Physical Description - Approximatley 370 acres of shoreline tidal marsh stretches along the east side of the Westport peninsula. It is a high salinity marsh with few fresh water drainages. Substrates are primarily sand in the northern portion of the tidelands grading to silty-sands to the south. The marsh surface is dissected by large tidal channels. Salt pannes and networks of small tidal channels occur in low marsh areas.

Land Use History - The Westport area has a long and extensive history of human use. The tidal marshes were likely grazed where accessible to cattle since the late 1800's. Old fence lines exist throughout the marsh though only a narrow strip is presently grazed.

Most lands adjacent to the present tidelands have been diked, ditched and filled for housing and pasture. The northern portion of the marsh is bounded by a U.S. Army Corps of Engineers dredge spoil deposition site. It also contains a small airstrip, two dike systems which bisect the marsh and a number of large drainage ditches.

Vegetation - The tidal marshlands are dominated by low and intermediate marsh with little high marsh development. Minor areas of dune vegetation occur at the northern end of the marshlands.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs in pure stands on sands along the leading marsh edge or intermixed with 9 low marsh hummocks.

Dominant: Scirpus americanus

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) is the most wide spread low marsh community in the area. It occurs along low leading edges of marsh and in depression areas at the tidal channels. The marsh surface is frequently dissected by networks of small channels. Salt pannes are common.

Dominants:	Distichlis spicata (variable) Jaumea carnosa Salicornia virginica
Sub-dominants:	Triglochin maritimum (variable)
Minor:	Glaux maritima Grindelia integrifolia (local sub-dominant) Orthocarpus castillejoides Plantago maritima Spergularia marina

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs along the leading marsh edge on clays or silts and as hummocks on bare tidal flats.

Dominants:	Salicornia virginica Triglochin maritimum

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs extensively throughout the marshlands, at elevations slightly higher than low marsh. It dominates on high terraces along tidal channels and ditches where Grindelia integrifolia co-dominates.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Sub-dominants:	Jaumea carnosa Triglochin maritimum
Minor:	Agrostis alba Glaux maritima Grindelia integrifolia (local co-dominant) Orthocarpus castillejoides Plantago maritima Stellaria humifusa

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) is a minor community occurring along the upland or diked edge of the marsh. There is an apparent elevation gain and reduction in tidal channels where this community occurs.

Dominants:	Agrostis alba Deschampsia caespitosa Juncus balticus (variable) Potentilla pacifica

Westport Marshlands - cont.

Sub-dominants:	Distichlis spicata (variable)
Minor:	Atriplex patula Carex lyngbyei Festuca rubra

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs in two small areas adjacent to the upland midway along the marshlands.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Sub-dominants:	Festuca rubra
Minor:	Deschampsia caespitosa Glaux maritima

XIII

WHITCOMB FLATS
NATURAL AREA PRESERVE

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Westport, Washington U.S.G.S. 7.5' quad map. Portions of a tidal sand island lying at the entrance to South Bay, Grays Harbor, approximately 1 air mile east of Westport marina.

GENERAL DESCRIPTION:

The area comprises portions of an island which is part of Whitcomb Flats, a grouping of tidal sand islands surrounded by open estuarine waters at the mouth of South Bay, Grays Harbor. In 1981, this approximately 40 acre island was established as a Natural Area Preserve by the Washington State Department of Natural Resources, primarily for the protection of nesting habitat for Caspian Terns. The island is primarily a shifting, bare, tidal sand flat. Trace amounts of dune plant species occur, along with scattered pieces of driftwood.

XIV

SAND ISLAND and GOOSE ISLAND NATURAL AREA PRESERVES

LOCATION:

Grays Harbor, Grays Harbor County, Washington. Westport, Washington, U.S.G.S. 7.5' quad map. T17N, R11W. Two tidal sand islands lying near the center of Grays Harbor, approximately 3 air miles WSW of Point New.

GENERAL DESCRIPTION:

Two isolated tidal sand islands occur near the center of Grays Harbor. The islands lie approximately 1½ air miles apart, and are surrounded by open estuarine waters.

Goose Island was established by the Washington State Department of Natural Resources in 1973 as a 50 acre Natural Area Preserve, primarily for the protection of habitat for nesting Caspian Terns. Most of this acreage comprises shifting bare tidal sand flats, with scattered traces of dune plant species and varying amounts of driftwood. A dune area of approximately 10 acres, at the highest elevation of the island above tidal influences, is covered by dense grass-herb dune vegetation.

Sand Island was established by the Washington State Department of Natural Resources in 1974, as a 50 acre Natural Area Preserve, primarily for the protection of nesting Caspian Terns. Most of this acreage comprises shifting bare tidal sand flats with scattered traces of dune plant species and varying amounts of driftwood deposition. A dune area of approximately 10 acres occurs at the highest elevations of the island, above tidal influence. The dune area is covered by dense grass-herb dune vegetation, dominated largely by *Elymus mollis*.

XV

NORTH COVE MARSH

LOCATION:

Willapa Bay, Pacific County, Washington. North Cove, Washington, U.S.G.S. 7.5' quad map. T14N, R11W, portions of sections 3, 4, 9, 10, 11. Tidelands at North Cove, east of Tokeland.

GENERAL DESCRIPTION:

Physical Description - Approximately 300 acres of marsh occur within North Cove, at the northern shore of the mouth of Willapa Bay. Limited freshwater influence and proximity to the ocean contribute to high salinity conditions. Substrates are primarily sands, thinly overlain by silts in certain areas. Graveyard spit, a long sand spit with minor dune development, borders the marsh to seaward. The area is marked by extensive tidal channels and some salt pannes.

Land Use History - The nearby community of Tokeland was originally the site of an indian village. Pioneers first settled the area in the 1850's at Tokeland, and later founded the town of North Cove. The tidelands were likely subjected early to grazing and fisheries related uses.

State Highway 105 runs along the upland/marsh edge, protected by boulder rip-rap. Highway road-fill has altered freshwater drainage patterns into the marsh. "Pacific County Drainage Ditch No. 1" empties through a road-culvert into the westernmost end of the marsh. The eastern half of the marsh is part of the Shoalwater Indian Reservation.

The shoreline at North Cove has been undergoing rapid erosion over the last few decades, claiming several hundred acres of land, including the town of North Cove, a U.S. Coast Guard lighthouse, and numerous residences. State Highway 105 was re-routed farther inland several years ago, during which time the ocean claimed approximately one-half mile of the former highway route. Erosion continues to date at a reported rate of 50 to 150 feet per year at the most active erroding point. Continued erosion is predicted. Since 1974, significant erosion of the sand spit protecting North Cove can be seen from aerial photographs. The North Cove marshes appear threatened by erosion if current trends continue.

Vegetation - The marsh is dominated by low marsh. The inland half of the marsh is a mosaic of *Spartina* marsh and 4 low marsh. Small areas of sedge and high marsh occur at the western end around the mouth of the county drainage ditch. Minor dune development occurs along Graveyard Spit and on a second minor dune ridge.

PLANT COMMUNITY DESCRIPTIONS

Low Marsh

Triglochin maritimum community (mapping symbol 4) occurs primarily in an extensive mosaic with *Spartina* marsh colonies, dominating the inland half of the entire marsh. The area is highly dissected by tidal channels.

North Cove Marsh - cont.

Dominants:	Triglochin maritimum
Minor:	Salicornia virginica

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) dominates the bayward half of the marsh. Plantago maritima occurs in many areas as co-dominant. Deschampsia caespitosa and Juncus gerardii co-dominate in small locations at highest elevations. Triglochin maritimum is sub-dominant in most areas. Salt pannes are scattered. Dissection is limited to main tidal channels.

Dominants:	Salicornica virginica Distichlis spicata (variable) Jaumea carnosa (variable)
Sub-dominants:	Triglochin maritimum (locally co-dominat) Plantago maritima (locally co-dominant)
Minor:	Atriplex patula Deschampsia caespitosa (locally co-dominant) Glaux maritima Grindelia integrifolia (variable) Hordeum jubatum Juncus gerardii (locally co-dominant) Puccinellia sp. (prob. pumila) (variable) Stellaria humifusa

Salicornia virginica community (mapping symbol 7) occurs in one small previously diked, ditched and fenced area.

Dominant:	Salicornia virginica
Sub-dominat:	Grindelia integrifolia
Minor:	Deschampsia caespitosa Jaumea carnosa

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs mixed with 5 low marsh. Poorly defined.

Dominant:	Distichlis spicata Salicornia virginica
Sub-dominant:	Triglochin maritimum (variable)
Minor:	Jaumea carnosa (variable)

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs along and within the "Pacific County Drainage Ditch No. 1" where it first enters the tidal

marsh. No water was observed in the channel at the time of survey.

Dominant: Carex lyngbyei

Minor: Agrostis alba
Potentilla pacifica

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs at the western end of the tidal marsh near " Pacific County Drainage Ditch No. 1". Juncus balticus is absent.

Dominants: Agrostis alba
Deschampsia caespitosa
Potentilla pacifica

Minor: Carx lyngbyei
Grindelia integrifolia
Hordeum jubatum
Juncus gerardii
Rumex sp
Triglochin maritimum

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs in one small area at the western end of the tidal marsh adjacent to the upland. Juncus balticus is a minor component.

Dominants: Agrostis alba
Potentilla pacifica

Minor: Angelica lucida
Aster subspicatus
Deschampsia caespitosa
Elymus mollis
Grindelia integrifolia
Hordum jubatum
Juncus balticus
Rumex sp
Trigolium wormskjoldii

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs in an extensive mosaic with 4 low marsh, occupying the landward half of the tidal marsh area.

Dominant: Spartina alterniflora

XVI

TOKELAND AREA MARSHES

LOCATION:

Willapa Bay, Pacific County, Washington. Bay Center, Washington U.S.G.S. 7.5' quad map. T14N, R11W, portions of sections 1, 12, 13, and T14N, R10W, portions of sections 7,18. Tidelands along the mouths of Teal Duck Slough and Kindred Slough near Tokeland.

GENERAL DESCRIPTION:

Physical Description - Approximately 170 acres occur as three discontinuous tidal marshes lining the mouths of Teal Duck Slough and Kindred Slough, north of Toke Point. Substrates are primarily sands and silty sands at the southern marsh and south side of Kindred Island. Substrates are primarily silts at the northern marsh and along the north side of Kindred Island. Dissection of marsh surfaces is low, limited to main tidal channels. Low marsh areas contain salt pannes and slightly more extensive dissection.

Land Use History - The Tokeland area has long been a center for human activity. It was the former site of an Indian village. In the late 1800's it became the site of a pioneer settlement. Fishing and fish-processing were developed early and continue today. A rock breakwater was built to protect Tokeland Harbor, bounding the southern tidal marsh. Grazing was likely initiated in the late 1800's on tidal marshes accessible to cattle. In the 1940's a dike was constructed across the mouths of Teal Duck and Kindred Sloughs, converting upstream tidelands to pasture. A small diked area on the north side of Kindred Island has been breached, reintroducing tidal influence. Grazing currently occurs over at least portions of the remaining tidal marshes. Residences and small pastures occur adjacent to the southern tidelands along Tokeland Spit. In 1962, State Highway 105 was constructed, altering freshwater drainage patterns.

Vegetation - Low and intermediate marshes dominate all areas. High marsh occurs on the southern tidal marsh along the upland edge and on Kindred Island along the upland edge and in the formerly diked area. A small area of transition marsh occurs in the formerly diked area. *Spartina* marsh colonies occur scattered in slough channels and along low marsh edges.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs in one local area mixed with patches of 13 low marsh and *Spartina* marsh colonies.

Dominant: Scirpus americanus

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) occurs extensively, dominating nearly half of the total area tidal marshes. Plantago maritima is co-dominant over much of the Kindred Island marsh. Agrostis alba occurs as co-dominant in a large area along the Tokeland Spit. Deschampsia caespitosa is co-dominant on upper areas of the Kindred Island marsh. Salt pannes are found throughout this community.

Dominants:	Distichlis spicata Jaumea carnosa Salicornia virginica
Sub-dominants:	Plantago maritima (local co-dominant) Triglochin maritimum (local co-dominant)
Minor:	Agrostis alba (local co-dominant) Aster sp. (subspicatus Carex pansa Deschampsia caespitosa (local co-dominant) Festuca rubra (local) Glaux maritima Hordeum brachyantherum Juncus sp (gerardii) Orthocarpus castellejoides Scirpus americanus Stellaria humifusa

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs as hummocks on bare mudflats in areas along the leading marsh edge at Teal Duck Slough.

Dominants:	Salicornia virginica Triglochin maritimum

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs on the north side of Kindred Island associated with other low marsh communities.

Dominants:	Distichlis spicata Salicornia virginica
Sub-dominates:	Atriplex patula Triglochin maritimum
Minor:	Carex lyngbyei (variable) Deschampsia caespitosa (variable) Jaumea carnosa (variable)

Scirpus maritimus community (mapping symbol 13) occurs primarily in 2 areas: As a nearly pure stand at the northern marsh, and mixed with 3 low marsh and Spartina marsh colonies at Kindred Island.

Dominant: Scirpus maritimus

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs as one small, isolated area at the extreme northeast corner of the marshes.

Dominant: Carex lyngbyei

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs extensively over the tidal marshes, at elevations slightly above low marsh. Agrostis alba occurs as co-dominant over portions of the southern marsh.

Dominants: Deschampsia caespitosa
Distichlis spicata
Salicornia virginica

Sub-dominants: Agrostis alba (local co-dominant)
Festuca rubra (variable)
Jaumea carnosa

Minor: Glaux maritima
Grindelia integrifolia
Juncus balticus
Juncus gerardii
Scirpus americanus
Triglochin maritimum

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs primarily in 2 large areas: Both on Kindred Island, within a formerly diked area, and at highest marsh elevations along the upland. Juncus balticus is especially prominent within the formerly diked area.

Dominants: Agrostis alba
Juncus balticus
Potentilla pacifica

Minor: Distichlis spicata (local)
Triglochin maritimum (local)

Transition Marsh

Calamagrostis nutkaensis-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 20) occurs at uppermost elevations within the formerly diked area.

Dominants: Agrostis alba
Calamagrostis nutkaensis
Juncus balticus
Potentilla pacifica

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs as scattered colonies along low marsh edges and on mudflats in slough and tidal channels. Several colonies occur mixed with 13 low marsh and 3 low marsh in a local area at the Kindred Island marsh.

Dominant: Spartina alterniflora

XVII

CEDAR RIVER/NORRIS SLOUGH MARSHES

LOCATION:

Willapa Bay, Pacific County, Washington. Bay Center, Washington U.S.G.S 7.5' quad map. T15N R11W, portions of section 36; T15N R10W, portions of section 31; T14N R11W, portions of section 1; T14N R10W, portions of section 6. Tidelands at the confluence of Norris Slough and the mouth of the Cedar River.

GENERAL DESCRIPTION:

Physical Description - Approximately 40 acres of marsh lie along the lower reaches of Norris Slough and the mouth of the Cedar River, on the bay-side of State Highway 105. Substrates are primarily silts with areas of silty sands. Dissection is limited to major river tidal channels.

Land Use History - Past uses and alteration of the area have been extensive. All of the Cedar River tidelands north of Highway 105 were diked by 1962. At that time road-fill was laid down, ditches dug and a new tidegate built for the new highway, altering river drainage and tidal influence. Disposition of highway road-fill, ditching and emplacement of a culvert has also likely altered drainage of Norris Slough.

Old dike, ditch and fence remnants on Norris Slough tidelands testify to past (and more recent) cattle grazing. The tidal marsh bayward of Highway 105 at Cedar River also has an old dike and long grazing history.

It is likely that the river channels and tidelands were used in log transport and storage when the adjacent uplands were logged in the late 1800s and early 1900s.

Vegetation - Most of the tidelands are dominated by high marsh. Traces of low, sedge and intermediate marshes occur along the bayward marsh edges. Freshwater marsh and transition species occur extensively in the Cedar River tidalmarsh and to a limited extent at Norris Slough.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs on low terraces at the leading marsh edges in 2 small areas, one of which mixes with 9 low marsh.

Dominants:	Scirpus americanus
Sub-dominants:	Carex lyngbyei (local) Triglochin maritimum (local)

Triglochin maritimum community (mapping symbol 4) occurs in a small stand at the mouth of the Cedar River, and mixed with 8 low marsh south of the mouth of Norris Slough. Both areas are low leading marsh edges.

Dominants:	Triglochin maritimum

Distichlis spicata community (mapping symbol 8) occurs along leading marsh edge south of the mouth of Norris Slough, on a sloping sandy shore. It occurs with a variety of species particularly 4 low marsh.

Dominants:	Distchlis spicata
Minor:	Carex lyngbyei (local co-dominant) Deschampsia caespitosa Juncus balticus Potentilla pacifica Salicornia virginica Scirpus americanus Spergularia sp.

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs in a patchy mosaic with 3 low marsh on a low terrace at the leading marsh edge east of Cedar River.

Dominants:	Salicornia virginica Triglochin maritimum
Minor:	Carex lyngbyei

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs in 2 small patches adjacent to low marsh. (Nearly pure stands of Carex lyngbyei)

Dominants:	Carex lyngbyei

Deschampsia caespitosa-Carex lyngbyei-Triglochin maritimum community (mapping symbol 21) occurs in one small narrow strip along the leading marsh edge between the mouths of Cedar River and Norris Slough.

Dominants:	Carex lyngbyei Deschampsia caespitosa Triglochin maritimum
Minor:	Distichlis spicata Juncus balticus Salicornia virginica

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs in 2 small separate areas on the leading marsh edge at elevations between low and high marshes.

Dominants:	Deschampsia caespitosa Distichlis spicata
Sub-dominant:	Carex lyngbei
Minor:	Glaux maritima Jaumea carnosa Juncus balticus Salicornia virginica Triglochin maritimum

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs in 4 areas. The largest of these areas lies adjacent to Highway 105 road-fill. Fences and soil-surface distortion imply a more recent history of cattle grazing. *Carex lyngbyei* occurs as co-dominant in one area.

Dominants:	Agrostis alba Deschampsia caespitosa Juncus balticus Potentilla pacifica
Minor:	Atriplex patula Carex lyngbyei (local co-dominant) Distichlis spicata Glaux maritima Hordeum jubatum Triglochin maritimum

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) dominates the tideland area along Norris Slough. *Juncus balticus* occurs in patches as a sub-dominant over two large low areas. *Agrostis alba* forms dense mats with high litter in areas. Fencing and old dike remnants are most common in this marsh community. Traces of transition marsh forbs occur particularly at higher elevations along upland edges.

Dominants:	Agrostis alba Potentilla pacifica

Minor:	Aster subspicatus (local) Calamagrostis nutkaensis (local) Carex lyngbyei Festuca rubra Heracleum lanatum Jucus balticus (local sub-dominant) Lotus corniculatus (local, introduced) Sidalcea hendersonii (local) Triglochin maritimum Vicia gigantea (local)

Agrostis alba-Juncus balticus-Potentilla pacifica-Forbs community (mapping symbol 17FORB) occurs primarily on high elevation tidelands south of Highway 105, east of Cedar River. The bayward edge is marked by an old dike. There is a large accumulation of driftwood, particularly near the highway. The area appears not to be currently grazed.

Dominants:	Agrostis alba Potentilla pacifica
Minor:	Achillea millefolium Angelica lucida Calamagrostis nutkaensis (local co-dominant) Carex lyngbyei Deschampsia caespitosa Festuca rubra Heracleum lanatum Hordeum jubatum Juncus balticus Lotus corniculatus (local sub-dominant, introduced) Rumex sp Sidalcea hendersonii Vicia gigantea

XVIII

HAWKS POINT MARSH

LOCATION:

Willapa Bay, Pacific County, Washington. Bay Center, Washington U.S.G.S. 7.5' quad map. T15N, R10W, portions of sections 33 and 34; and T14N, R10W, portions of sections 3 and 4. Tidelands along the shoreline immediately north of Hawks Point.

GENERAL DESCRIPTION:

Physical Description - Approximately 70 acres of tidal marsh occur along about 1 mile of shoreline, northward from the tip of Hawks Point. A narrow sand ridge protrudes into the tidelands, partially enclosing the southern end of the marsh. Substrates are primarily silts over the northern and outer portions of the marsh, with sands in the vicinity of the sand ridge. Dissection of the marsh surface is restricted to main ditches over most of the higher marshes. Certain low and sedge marsh types are highly dissected.

Land Use History - Old posts in the vicinity of the sand ridge suggest early homestead uses. An overgrown rutted dirt road leads down to the marsh from the highway above. State Highway 105, contructed about 1962, runs through uplands above the tidelands. The highway crosses all freshwater drainages emptying into the marsh.

Nearly all adjacent upland forests have been logged at least once. An extensive zone of driftwood has accumulated on the southern portion of the tidelands along the upland edge.

Vegetation - A variety of low, sedge, intermediate and high marsh communities occur over the area. Minor dune vegetation development occurs along the sand ridge. The northernmost band of marsh leads east along the highway into the North River/Smith Creek tidelands.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Triglochin maritimum community (mapping symbol 4) occurs in a narrow outer zone of the northernmost marsh, alternating with patches of 11 sedge marsh. It is a monospecific community occurring as hummocks on the bare tide flats.

Dominant: Triglochin maritimum

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs over an extensive area of outermost marsh, as discontinuous hummocks above the bare mudflat. In one small area, *Deschampsia caespitosa* is co-dominant. Minor amounts of *Scirpus maritimus* are found on the mudflat in this vicinity.

Dominants:	Salicornia virginica Triglochin maritimum
Minor:	Deschampsia caespitosa (local co-dominant) Distichlis spicata (local) Scirpus maritimus (local)

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) is widespread occurring over low elevation, undissected tidal marsh adjacent to 14 intermediate marsh or associated with 9 low marsh.

Dominants:	Distichlis spicata Salicornia virginica
Sub-dominants:	Deschampsia caespitosa (variable) Triglochin maritimum (local co-dominant)
Minor:	Grindelia integrifolia (local) Jaumea carnosa (local)

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs as an inner zone adjacent to upland or high marsh, and as an outermost zone alternating with patches of 4 low marsh. Found only in the northern half of the marsh, associated with freshwater seepage or upper areas. Agrostis alba is co-dominant in one local area.

Dominant:	Carex lyngbyei
Minor:	Agrostis alba (local co-dominant)

Deschampsia caespitosa-Carex lyngbyei-(Triglochin maritimum) community (mapping symbol 21) occurs in the north half of the marsh as a zone between low marsh and 11 sedge or 17 high marshes.

Dominants:	Carex lyngbyei Deschampsia caespitosa
Sub-dominant:	Triglochin maritimum (local co-dominant)

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) is prominent at elevations between 10 low marsh and 17 high marsh.

Hawks Point Marsh - cont.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Minor:	Grindelia integrifolia (local) Jaumea carnosa (local)

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs at upper marsh elevations, primarily in a zone along the upland edge. Carex lyngbyei is co-dominant in areas associated with freshwater seepage.

Dominants:	Agrostis alba Juncus balticus (variable) Potentilla pacifica
Sub-dominants:	Carex lyngbyei (local co-dominant) Deschampsia caespitosa
Minor:	Distichlis spicata (local) Grindelia integrifolia (local) Salicornia virginica (local) Trifolium wormskjoldii (local sub-dominant)

XIX

NORTH RIVER/SMITH CREEK MARSHES

LOCATION:

Willapa Bay, Pacific County, Washington. Bay Center, Washington and South Bend, Washington, U.S.G.S. 7.5' quad maps. T15N, R10W, portions of sections 26, 27, 35, and 36. Tidal marshes at the mouths of the North River and Smith Creek.

GENERAL DESCRIPTION:

Physical Description - Approximatley 300 acres of marshland occur where the mouths of Smith Creek and the North River enter Willapa Bay. Substrates are primarily silts. Networks of small tidal channels dissect some areas of low and sedge marsh. Other marsh areas are dissected only by main tidal channels. Scattered driftwood occurs on outer bare mudflats.

Land Use History - Both North River and Smith Creek have had early histories as homestead ranches. Several hundred acres of diked former tidelands are found along the North River upstream from its mouth. Accessible tidelands were likely grazed. All uplands adjacent to the tidelands have been logged at least once. Old pilings along the North River channel and Smith Creek testify to early log rafting and transport. State Highway 105, constructed about 1962, runs along the upland shoreline edge and crosses both the North River and Smith Creek via piling-supported bridges. Road-fill and rock rip-rap disrupted small drainages feeding into tidal marshes.

Tidelands and uplands around Smith Creek are in Washington State Game Department ownership and have been designated a Habitat Management Area. The Game Department maintains a parking lot and boat launch for hunters at the mouth of Smith Creek.

Vegetation - Outer marshes are dominated by low and sedge marsh communities with small areas of high marsh. A large upstream area of transition marsh with lesser amounts of high marsh occur along Smith Creek. Further upstream is found wetland shrub and tideland spruce vegetation. No *Spartina* marsh colonies were observed.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs only as a small band associated with sandy road-fill west of the main marshes.

Dominants: Scirpus americanus

Triglochia maritimum community (mapping symbol 4) occurs on outermost marsh flats, and on lower mudflats in a mosaic with 9 low marsh.

Dominants:	Triglochin maritimum
Minor:	Dictichlis spicata (local) Puccinellia pumila Salicornia virginica Scirpus maritimus (local)

Scirpus maritimus community (mapping symbol 13) occurs as pure colonies within outer 11 sedge marsh. It also occurs in salt pannes scattered throughout the tidal marsh.

Dominants:	Scirpus maritimus

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occur as "hummocks" in a mosaic with 4 low marsh, and on mud flats at the leading marsh edge. Inland from the outermost marsh edges, where hummocks begin to coalesce, Deschampsia caespitosa becomes co-dominant.

Dominants:	Salicornia virginica Triglochin maritimum
Sub-dominants:	Deschampsia caespitosa (locally co-dominant)
Minor:	Distichlis spicata Plantago maritima

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs in one poorly-defined area between 9 low marsh (Deschampsia caespitosa co-dominant), and 11 sedge marsh.

Dominants:	Deschampsia caespitosa Distichlis spicata
Minor:	Carex lyngbyei Triglochin maritimum

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) is a widespread community associated with freshwater influences. It occurs at higher marsh elevations along river channels and low marsh communities. It occurs as nearly pure stands of Carex lynbyei.

Dominants:	Carex lyngbyei
Minor:	Triglochin maritimum (local) Scirpus maritimus (local)

Deschampsia caespitosa-Carex lyngbyei Triglochin maritimum community (mapping symbol 21) occurs largely as a zone between upper 11 sedge marsh and low marsh communities. It is highly dissected by networks of small channels, with some development of salt pannes.

Dominants:	Carex lyngbyei Deschampsia caespitosa Trigolochin maritimum
Minor:	Distichlis spicata Salicornia virginica (variable)

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs at higher elevations of the outer marsh, and at lower elevations within 20 transition marsh along Smith Creek. Carex lyngbyei occurs as a co-dominant in areas associated with freshwater seepage.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Sub-dominants:	Carex lyngbyei (local co-dominant)
Minor:	Deschampsia caespitosa (variable)

Transition Marsh

Agrostis alba-Juncus balticus Potentilla pacific-Forbs community (mapping symbol 17 FORB) occurs in 3 small areas within 17 high marsh and 20 transition marsh. Driftwood deposition is common over areas dominated by this community. Various forbs are collectively co-dominant.

Dominants:	Agrostis alba (variable) Potentilla pacifica Juncus balticus
Sub-dominants:	Aster subspicatus Heracleum lanatum Vicia gigantea Achillea millefolium Angelica lucida Sidalcea hendersonii

North River/Smith Creek Marshes - cont.

Minor:	Calamagrostis nutkaensis Cirsium edule Deschampsia caespitosa Lathyrus palustris (variable) Rumex occidentalis

Calamagrostis nutkaensis-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 20) lies in a large area along Smith Creek. The largest occurrence of this marsh community in Willapa Bay, this area makes up nearly half of the total marsh acreage at the North River/ Smith Creek estuary. Widely scattered individuals of Pyrus fusca and Picea sitchensis occur increasing along upland edges and upper channel reaches. The area is dissected only by a few major tidal channels. Typically freshwater wetland species occur as minor components.

Dominants:	Calamagrostis nutkaensis Juncus balticus Potentilla pacifica
Minor:	Agrostis alba Carex obnupta Cirsium edule Deschampsia caespitosa Epilobium watsonii Galium sp. (trifidum) Heracleum lanatum Juncus effusus var. gracilis Lathyrus palustris Picea sitchensis Pyrus fusca Rumex occidentalis Sidalcea hendersonii Vicia gigantea

XX

II SLOUGH/KELLOGG SLOUGH MARSH

LOCATION:

Willapa Bay, Pacific County, Washington. South Bend, Washington U.S.G.S. 7.5' quad map. T14N, R9W, portions of sections 6 and 7. Tideland marsh lying along II and Kellogg Sloughs, about 6 miles west of Raymond on State Highway 105.

GENERAL DESCRIPTION:

Physical Description - Approximately 134 acres of marsh lie adjacent to the mainland around the mouths of two small creeks draining into II and Kellogg Sloughs. Substrates are primarily silts. Low marsh areas are highly dissected with small channels. High marsh is dissected only by meandering main tidal channels. Large amounts of driftwood have accumulated at higher tideland elevations.

Land Use History - There are no apparent signs of recent use of the marsh proper. State Highway 105, built about 1962, cuts through upland slopes immediately adjacent to the marsh and consequently, road-fill crosses every freshwater drainage. Two major creeks pass through the road-fill via concrete culverts. The area was likely homesteaded in the late 1800's.

Vegetation - Most of the area is dominated by high marsh and transition marsh. Lesser amounts of low, intermediate and sedge marshes occur in strips along shorelines to the north and south of the main body of marshes. A few small, low marsh islands occur on outlying flats.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs as "hummocks" at the outermost low marsh edge.

Domimants:	Salicornia virginica Triglochin maritimum
Minor:	Plantago maritima Puccinellia pumila Spergularia candensis

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs as nearly pure stands of *Carex lyngbyei*. It occurs in areas with apparent freshwater influence.

Dominant:	Carex lyngbyei

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs in a narrow band between sedge marsh and low marsh. It is highly dissected by a network of small channels.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Sub-dominants:	Potentilla pacifica (local) Triglochin maritimum (variable)

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs near the center of the main marsh body in a mosaic with 17 high marsh. Deschampsia caespitosa is the major dominant.

Dominants:	Agrostis alba Deschampsia caespitosa Juncus balticus Potentilla pacifica
Minor:	Festuca rubra Sidalcea hendersonii Vicia gigantea

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs near the center of the main marsh in a mosaic with 15 high marsh. Slightly higher elevations include traces of transition marsh forbs.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Minor:	Carex lyngbyei (local) Deschampsia caespitosa Sidalcea hendersonii Vicia gigantea

Transition Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica-Forbs community (mapping symbol 17FORB) occurs in extensive areas, between upland or 20 transition marsh, and 17 high marsh. As much as 75% of the marsh surface is covered by driftwood in an upper zone along the upland edge. Various forbs occur collectively as co-dominants.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Sub-dominants:	Achillea millefolium Aster subspicatus Angelica lucida Heracleum lanatum Sidalcea hendersonii Vicia gigantea
Minor:	Calamagrostis nutkaensis Cirsium edule Deschampsia caespitosa Lathyrus palustris Rumex occidentalis

Calamagrostis nutkaensis-Agrostis alba-Potentilla pacifica-Juncus balticus community (mapping symbol 20) occurs at highest elevation of the marsh, and upstream of the highway where freshwater influence is high. Young trees and shrubs occasionally are found in the marsh, associated with driftwood debris.

Dominants:	Agrostis alba Calamagrostis nutkaensis Heracleum lanatum Juncus balticus Potentilla pacifica Sidalcea hendersonii
Sub-dominants:	Aster subspicatus Vicia gigantea
Minor:	Cirsium edule Galium sp. Rumex occidentalis

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs in a local area as several pure colonies of Spartina alterniflora, on bare tidal channels and flats within intermediate and low marshes.

Dominant:	Spartina alterniflora

XXI

FREDRICKSON SLOUGH MARSH

LOCATION:

Willapa Bay, Pacific County, Washington. South Bend, Washington U.S.G.S. 7.5' quad map. T14N, R9W, portions of sections 5, 8, and 17. Tidelands associated with Fredrickson Slough and the mouth of Johnson Slough.

GENERAL DESCRIPTION:

Physical Description - Approximately 320 acres of marsh lie adjacent to the mainland along Fredrickson Slough and the mouth of Johnson Slough. A small sand ridge protrudes into the northwest corner of marsh. Substrates are primarily silts. Low marsh areas are highly dissected by networks of small channels. High marsh areas are dissected only by main tidal channels. Large amounts of driftwood have accumulated on the upland edges of high and transition marshes.

Land Use History - Diked lands (pasture) border the southeast corner of the area. State Highway 105, built about 1962, runs along upland adjacent to the tidal marsh. Roadfill crosses all drainages entering the marsh. The main creek drainage passes through the highway roadfill via a large concrete culvert. Old pilings cross the southern end of marsh. Past homesteading is likely.

Vegetation - The tidal marsh is dominated by low marsh. Limited areas of intermediate marsh occur at the southern end of the tidal marsh. Extensive high marsh occurs adjacent to the upland slopes at the north end of the area. Transition marsh occurs on a ridge adjacent to low marsh. Minor dune vegetation development is found on highest portions of the sand ridge. *Spartina* colonies are common within the low marsh.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salincornia virginica-Triglochin maritimum community (mapping symbol 9) occurs extensively on the bay edge of the marsh, typically as discontinuous hummocks on otherwise bare mudflats. On higher mounds *Deschampsia caespitosa* becomes co-dominant. Along the west edge of this type community, bare mounds occur, suggesting erosion.

Dominants:	Salicornia virginica Triglochin maritimum
Sub-dominants:	Deschampsia caespitosa (local co-dominant)
Minor:	Distichlis spicata Puccinellia pumila

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs in a mosaic with coalesced hummocks of 9 low marsh. Salt pans are common in this area.

Dominants:	Distichlis spicata Salicornia virginica Triglochin maritimum (variable)
Minor:	Deschampsia caespitosa Puccinellia pumila (variable)

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs at elevations intermediate to low and high marshes.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Sub-dominants:	Triglochin maritimum (variable, local co-dominant)
Minor:	Carex lyngbyei (local) Grindelia integrifolia (variable)

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs in one small depression within 17 high marsh.

Dominants:	Agrostis alba Deschampsia caespitosa Juncus balticus Potentilla pacifica
Sub-dominants:	Carex lyngbyei

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) is widespread at higher elevations in the northern end of the marsh. In slight depressional areas, Juncus balticus is not found, however, here occur lower marsh species. A large quantity of driftwood has been deposited on this area of marsh along the upland forest edge, covering up to 75% of the marsh surface. Carex lyngbyei is co-dominant in a small area with apparently high freshwater influence.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica

Minor:	Carex lyngbyei (local co-dominant) Deschampsia caespitosa Distichlis spicata (variable) Grindelia integrifolia (variable) Trifolium wormskjoldii

Transition Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica-Forbes community (mapping symbol 17FORB) occurs on the highest elevational portions of the marsh, along the upland edge and on two ridges nearer the bay. Large quantities of driftwood have been deposited where this community occurs adjacent to the upland. Proportions of forb species are variable.

Dominants:	Agrostis alba Aster subspicatus Juncus balticus Potentilla pacifica
Sub-dominants:	Achillea millefolium Angelica lucida Heracleum lanatum Sidalcea hendersonii Vicia gigantea
Minor:	Calamagrostis nutkaensis Lotus corniculatus (introduced) Rumex occidentalis

Spartina Marsh

Spartina alterniflora community (mapped in red) is common as pure colonies on mudflats and intermixed with hummocks of 9 low marsh.

Dominants:	Spartinia alterniflora

XXII

BRUCEPORT and HANSEN CREEK MARSHES

LOCATION:

Willapa Bay, Pacific County, Washington. Bay Center, Washington U.S.G.S. 7.5' quad map. T14N, R10W, portions of sections 27, 38, 39. Tidal marshes at Stony Point (Hansen Creek) and Bruceport.

GENERAL DESCRIPTION:

Physical Description - Two small tidal marshes occur along the shoreline of Willapa Bay at Stony Point and Bruceport. Approximately 6 acres lie along the north shoulder of Stony Point at the mouth of Hansen Creek. A similar marsh of approximately 25 acres occurs at Bruceport, associated with the mouth of a small, unnamed creek. Both marshes occur as narrow strips against abrupt upland slopes. Substrates are primarily silts, but local areas of sandy substrate occur, 2 of which may be related with past road construction.

Land Use History - The Bruceport area was one of the earliest pioneer settlements in Washington. Associated with the early oyster trade in the late 1850's, several buildings, a boat dock, and many residences occurred along a few miles of shoreline. Ruins of early structures can be seen, in a few areas, on the mudflats. In the early 1900's, U.S. Highway 101 was constructed along the upland adjacent to the tidal marshes, altering freshwater drainage patterns into the marshes. Concrete culverts carry the major creeks through the road-fill, although waters from the unnamed creek feeding the Bruceport marsh appear to have been partially impounded. In two areas sands excavated from upland slopes, to accommodate the highway bed, were apparently deposited onto the adjacent tideflats.

Vegetation - Low marsh and sedge marsh communities dominate both tidal marshes. *Scirpus americanus*, 3 low marsh, is associated with sand substrates at Bruceport. A small area of high marsh is found at Hansen Creek. Extensive *Spartina* colonies occur at Bruceport.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs in 2 local areas on sandy substrates at Bruceport. *Scirpus americanus* and 9 low marsh hummocks form a mosaic on an area of sands excavated for the highway.

Dominants:	Scirpus americanus
Minor:	Salicornia virginica (local)

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) dominates the leading marsh edge at Bruceport and occurs as a narrow leading edge at Hansen Creek. This community occurs as discontinuous "hummocks" above the tideflat surface.

Dominants:	Salicornia virginica Triglochin maritimum

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs in one small outer area at Hansen Creek.

Dominants:	Distichlis spicata Salicornia virginica Triglochin maritimum

Sedge Marsh

Deschampsia caespitosa-Carex lyngbyei-Triglochin maritimum community (mapping symbol 21) dominates upper elevation marsh areas. The marsh surface is highly dissected by many small tidal channels. Carex lyngbyei is especially prominent.

Dominants:	Carex lyngbyei Deschampsia caespitosa Triglochin maritimum

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs in a small area at Hansen Creek on the highest tidal marsh elevations. This area has been altered in the past due to adjacent highway development. Carex lyngbyei is co-dominant.

Dominants:	Carex lyngbyei Juncus balticus Potentilla pacifica
Minor:	Aster sp. (prob. subspicatus) Deschampsia caespitosa

Spartina Marsh

Spartina alterniflora colonies (mapped in red) occur extensively at Bruceport marsh on bare tideflat and within outer edges of 9/3 low marshes. A few colonies are found near the end of Stony Point west of the Hansen Creek marsh.

Dominant: Spartina alterniflora

XXIII

BONE RIVER MARSHLANDS

LOCATION:

Willapa Bay, Pacific County, Washington. Bay Center, Washington 7.5' U.S.G.S. quad map. T14N R10W, portions of sections 26, 33, 34, 35 and T13N R10W, portions of sections 3 and 4. The lower reaches of the Bone River.

GENERAL DESCRIPTION:

Physical Description - Approximately 300 acres of tidal marshes occur at the mouth and along the lower 3.5 miles of the Bone River and its tributaries. Marshes are located on terraces abruptly raised above the meanders of the main channel and tributary drainages. Substrates are primarily silts. Dissection of the high marsh is limited to main tidal channels. Low marshes are dissected by networks of small channels.

Land Use History - There is an "island" of forested upland in the marsh at the river mouth which was an Indian village site. In the early 1850's the village site was homsteaded. The presumed site of a second homestead was located on the marsh approximately 3/4 of a mile from the eastern extent of the tidelands. The site contains the charred remains of a cabin, old car body, fences, ditches and dikes. It is likely that grazing occurred on the saltmarshes in conjunction with the homesteading.

Portions of the adjacent forested upland were probably logged in the late 1800's. Those to the south of the river burned in 1853. Extensive diking of the main river channel would suggest that logs were transported across the marsh and rafted down the river. A majority of these forested lands have recently been cut.

Highway 101 crosses the Bone River at its mouth. It crosses the tidelands on a dike and spans the river channel on a piling-supported bridge.

Vegetation - The marshlands are predominately high marsh, with some low and intermediate marsh development near the river mouth. Marsh along the uppermost tidal reach contains an abundance of freshwater marsh species.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) occurs in a small area of outer marsh at the river mouth. Where there is a slight rise in elevation, *Deschampsia caespitosa* and *Juncus gerardii* are found as sub-dominants.

Dominants:	Salicornia virginica
	Jaumea carnosa
	Distichlis spicata

Sub-dominants:	Deschampsia caespitosa (local) Juncus gerardii (local)

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) dominates the leading outer marsh edge as discontinuous hummocks. On slightly higher areas where hummocks begin to coalesce, Deschampsia caespitosa occurs as a co-dominant. There is extensive dissection of the marsh surface.

Dominants:	Salicornia virginica Triglochin maritimum
Sub-dominants:	Deschampsia caespitosa (locally dominant)
Minor:	Distichlis spicata (local)

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) is a common low marsh community found on lower terraces and along channels within high marsh flats. There is little dissection except by main channels.

Dominants:	Distichlis spicata Salicornia virginica
Sub-dominants:	Triglochin maritimum
Minor:	Jaumea carnosa (local) Deschampsia caespitosa (local)

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) is common near the river mouth at elevations intermediate between high and low marsh.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Minor:	Agrostis alba (variable) Hordeum brachyantherum Potentilla pacifica (variable)

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) is widespread throughout the tidelands within and adjacent to 17 high marsh. Dissected only by main tidal channels.

Dominants:	Deschampsia caespitosa Agrostis alba Juncus balticus Potentilla pacifica
Minor:	Distichlis spicata Carex lyngbyei (local) Salicornia virginica (variable) Hordeum brachyantherum (local)

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occupies more area than any other marsh community along the Bone River tidelands. The community occurs on high undissected terraces. In slight depressions, the cover of Juncus balticus decreases while that of Distichlis spicata increases. Carex lyngbyei is a co-dominant along upland edges with freshwater influence and along channel edges.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Sub-dominants:	Distichlis spicata (local) Deschampsia caespitosa
Minor:	Trifolium wormskjoldii (locally sub-dominant) Carex lyngbyei (locally co-dominant) Hordeum brachyantherum

Transition Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica-Forb community (mapping symbol 17 FORB) occurs adjacent to upland vegeation at the river mouth. A number of forb species co-dominate. There is some driftwood accumulation.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Sub-dominants:	Heracleum lanatum Vicia gigantea Aster subspicatus Rumex occidentalis Lathyrus palustris
Minor:	Sidalcea hendersonii (local)

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs as several scattered colonies on bare mudflat along channel edges and between 9 low marsh hummocks. One large continuous mat occupies a tidal channel through an intermediate marsh flat.

Dominant: Spartina alterniflora

XXIV

NIAWIAKUM RIVER MARSHLANDS

LOCATION:

Willapa Bay, Pacific County, Washington. Bay Center, Washington and Nemah, Washington 7.5' U.S.G.S. quad maps. T13N R10W, portions of sections 3, 9, 10, 11, 14, 15 and 16. All tidal marshlands of the Niawiakum River, including certain marshlands southward along the bay shore between the Niawiakum and Palix Rivers.

GENERAL DESCRIPTION:

Physical Description - Approximately 450 acres of tidal marsh occur along the lowermost 4 miles of the Niawiakum River and its tributaries, including about 1 mile of bay shoreline marsh lying south of the river mouth. A majority of marsh occurs on high terraces elevated above the meanders of the Niawiakum and its tributaries. Substrates are primarily silts. As a whole, the marsh surface is relatively undissected though there are a few areas which contain networks of narrow tidal channels.

Land Use History - Use by early homesteaders of tidal marshes along the Niawiakum River was likely during the latter half of the 19th century. Recent signs of cattle grazing are apparent on some areas of high marsh along the upper tidal reaches. A boat dock and buildings used for oystering are located on land fill at the north side of the Highway 101 bridge.

Logs and debris are found in the marsh which are a consequence of past and present logging of adjacent lands. There are a few areas bordering the marsh which contain old second growth forest. However, many areas have been recently cut for a second time.

U.S. Highway 101, built in the early 1900's, spans the river mouth and adjacent tidelands on road-fill and a piling-supported bridge. A gravel road crosses the upper tideland reach. The road is built on a dike over the tidelands and spans the river channel on a piling-supported bridge.

Vegetation - A wide variety of tidal marsh communities occur, from low and intermediate marsh communities dominating the downstream half of the river tidelands, to extensive development of high marsh communities along the meandering upper reaches and tributaries. Along the upper tidal reach an abundance of freshwater marsh species were observed.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) a small, nearly pure stand occurs on a tideflat below an eroding sediment cliff near the river mouth.

Dominants: Scirpus americanus

Triglochin maritimum community (mapping symbol 4) a small area occurs on a mudflat at the river mouth.

Dominants:	Triglochin maritimum

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) occurs on undissected low terraces above bare tide flats. It occurs at elevations below intermediate and high marshes. Can grade into 10 low marsh.

Dominants:	Salicornia virginica Jaumea carnosa Distichlis spicata
Sub-dominants:	Hordeum brachyantherum Triglochin maritimum
Minor:	Atriplex patula (variable) Puccinellia nutkaensis (variable) Glaux maritima Carex lyngbyei Stellaria humifusa Grindelia integrifolia

Distichlis spicata community (mapping symbol 8) occurs in a small drainage depression at the head of a tidal channel within 17 high marsh. Carex lyngbyei occurs as co-dominant.

Dominants:	Distichlis spicata Carex lyngbyei (variable)
Minor:	Salicornia virginica Deschampsia caespitosa Triglochin maritimum Agrostis alba Grindelia integrifolia Hordeum brachyantherum

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs near the river mouth as hummocks on bare tidal flats and as a narrow band on low terraces at the leading marsh edge.

Domimants:	Salicornia virginica Triglochin maritimum

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) is the most widespread low marsh type. It is found most commonly near the river mouth but also on low terraces along the

river channel and in depressions within higher marsh types. Some areas appear to be former 9 low marsh hummocks which have coalesced.

Dominants:	Distichlis spicata Salicornia virginica Triglochin maritimum (variable)
Minor:	Jaumea carnosa Grindelia integrifolia Plantago maritima (local) Deschampsia caespitosa Hordeum brachyantherum Carex lyngbyei (local) Spergularia sp. Agrostis alba (local) Scirpus cernuus (local) Lilaeopsis occidentalis (local) Atriplex patula Stellaria humifusa

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) dominates the Niawiakum marshes, occurring at elevations intermediate to those of low and high marsh types. Salt pannes occur frequently.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Sub-dominants:	Triglochin maritimum (variable)
Minor:	Grindelia integrifolia Hordeum brachyantherum Carex lyngbyei (variable) Jaumea carnosa Plantago maritima (local) Orthocarpus castillejoides Glaux maritima Festuca rubra Potentilla pacifica (local) Juncus balticus (sub-dominants) Atriplex patula Agrostis alba Spergularia sp.

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs at elevations between 17 high marsh and intermediate marsh. Presence or absence of *Juncus balticus* varies.

Dominants:	Deschampsia caespitosa Agrostis alba Potentilla pacifica Juncus balticus
Sub-dominants:	Distichlis spicata
Minor:	Salicornia virginica Hordeum brachyantherum Carex lyngbyei (locally sub-dominant) Triglochin maritimum (locally sub-dominant) Glaux maritima (locally sub-dominant)

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) dominates the upper river tidelands along the Niawiakum. These marshes are dissected only by main tidal channels. *Juncus balticus* occurs as a co-dominant near the upland. *Distichlis spicata* co-dominates near the river channel. *Carex lyngbyei* becomes co-dominate where freshwater influence increases along upland edges.

Dominants:	Agrostis alba Potentilla pacifica Juncus balticus (variable) Distichlis spicata (variable)
Minor:	Deschampsia caespitosa Carex lyngbyei (locally co-dominant) Triglochin maritimum Trifolium wormskjoldii (locally sub-dominant)

Transition Marsh

Calamagrostis nutkaensis-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 20) occurs on the uppermost tidal reaches of the main river channel. *Picea sitchensis* individuals are scattered within this type.

Dominants:	Calamagrostis nutkaensis Agrostis alba Potentilla pacifica Juncus balticus

Minor:	Sidalcea hendersonii Picea sitchensis

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs near the mouth of the Niawiakum River. Approximately two dozen colonies occur in a few areas in the river channel associated mainly with low marsh types.

Dominants:	Spartina alterniflora

XXV

PALIX RIVER MARSHLANDS

LOCATION:

Willapa Bay, Pacific County, Washington. Nemah, Washington 7.5' U.S.G.S. quad map. T13N, R10W, portions of sections 15, 22, 23, 24, 27 and 34. Tidelands at the mouth and lower reaches of the Palix River System.

GENERAL DESCRIPTION:

Physical Description - Approximately 700 acres of tidal marsh occurs east of Highway 101 along the North, Middle and South forks of the Palix River. The majority of marsh lies along the North and Middle forks and along the river channel between the confluence of the three forks and Highway 101. Relatively little marsh occurs along the South fork.

Intermediate and high marsh are dissected only by large tidal channels. Some areas of low marsh are more finely dissected by small tidal channels. Substrates are primarily silts.

Land Use History - Large areas of floodplain have been diked notably those lying west of Highway 101 on the Bay Center Peninsula, those south of the main channel between Highway 101 and the South fork of the Palix and areas along the South fork. Some of the dikes have been breached and tidal influence re-established. A majority of the dikes are maintained and the lands intensively grazed. Grazing occurs in some of the undiked marshes as well and may have been a generalized practice at one time.

Highway 101 was constructed in the early 1900's and crosses the Palix River floodplain on a dike. The highway spans the main channel of the river on a piling-supported bridge.

Forested lands adjacent to the saltmarshes were probably logged in the late 1800's or early 1900's. Pilings along the river channel suggest that logs were rafted down the river during the initial logging. Most of these forested lands have recently been logged a second time.

Vegetation - The tideland vegetation is dominated by high marsh communities. Some intermediate and considerable low marsh occurs west of the confluence of the three forks. Transition and some sedge marsh occurs along the upper-most tidal reaches. A dike along the south side of the main channel between the highway and the South fork has been breached. The area behind the dike is now a well-developed saltmarsh dominated by high marsh, but with some intermediate and low marsh. Well developed *Spartina alterniflora* colonies are found in the lower reach of the river.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Triglochin maritimum community (mapping symbol 4) occurs as hummocks on bare mudflats in a small area of the river channel adjacent to a high marsh terrace.

Dominants: Triglochin maritimum

Distichlis spicata community (mapping symbol 8) is poorly defined in this area. Carex lyngbyei and Agrostis alba co-dominant with Distichlis spicata on low, flat drainage depressions within high marsh. These areas are little dissected by shallow channels.

Dominants:	Distichlis spicata Carex lyngbyei Agrostis alba
Sub-dominants:	Triglochin maritimum (locally co-dominant)
Minor:	Deschampsia caespitosa (variable) Potentilla pacifica (local)

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs as typical hummocks on mudflats at the leading marsh edges. Where the hummocks begin to coalesce, Deschampsia caespitosa can be co-dominant. Where this type occurs to greatest extent, near the Highway 101 bridge, extensive Spartina alterniflora colonies are intermixed. These two communities may be competing for the same space.

Dominants:	Salicornia virginica Triglochin maritimum
Minor:	Deschampsia caespitosa (locally co-dominant) Distichlis spicata

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs in 3 small outer marsh areas found on low terraces. Grindelia integrifolia is frequently co-dominant.

Dominants:	Distichlis spicata Salicornia virginica Triglochin maritimum (variable) Grindelia integrifolia (variable)
Minor:	Deschampsia caespitosa Hordeum brachyantherum Atriplex patula Glaux maritima Carex lyngbyei (local)

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs as nearly pure stands of Carex lyngbyei generally occurring along channels or where there is fresh-water influences. This type occurs to greatest extent within high and transition marshes of the uppermost river reaches.

Dominants:	Carex lyngbyei

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs in only 3 small depressional areas along the river channel.

Dominants:	Carex lyngbyei Triglochin maritimum
Minor:	Distichlis spicata (locally co-dominant) Deschampsia caespitosa Agrostis alba

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs at elevations intermediate between high and low marshes. Dissection is limited to main tidal channels. Best development is observed in the downstream half of the marshlands. Salt pans occur within this type.

Dominants:	Deschampsia caepitosa Distichlis spicata Salicornia virginica
Sub-dominants:	Grindelia intergrifolia Triglochin maritimum
Minor:	Hordeum brachyantherum Potentilla pacifica (locally co-dominant) Agrostis alba (variable) Carex lyngbyei (variable) Festuca rubra (local)

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) is the most widespread community in the Palix River marshlands. It is found on inner high marsh flats, dissected only by main tidal channels. This is also the dominant vegetation type within the formerly diked area. Juncus balticus occurs in small isolated patches. Where it occurs, it is co-dominant.

Dominants:	Deschampsia caespitosa Agrostis alba Potentilla pacifica.
Sub-dominants:	Triglochin maritimum Distichlis spicata

Minor:	Festuca rubra (variable, locally co-dominant) Glaux maritima Carex lyngbyei (variable) Salicornia virginica (variable) Hordeum brachyantherum Juncus balticus (locally co-dominant)

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) dominates the upper tidal reaches of the North and Middle forks, and meander points and tributary arms of the South fork of the Palix River. Carex lyngbyei is co-dominant in areas with increased freshwater influence, primarily in the upper tidal reaches and adjacent to the upland. Juncus balticus is absent as co-dominant in most outer high marsh areas and inner marsh along the Middle and North forks of the Palix River. One area of 17 high marsh lies behind a more recently breached dike. Dissections in 17 high marsh is largely limited to main tidal channels, but increases in areas where Carex lyngbyei is co-dominant.

Dominants:	Agrostis alba Potentilla pacifica Carex lyngbyei (local)
Sub-dominants:	Distichlis spicata (variable)
Minor:	Angelica lucida (local) Trifolium wormskjoldii Aster subspicatus (local) Cirsium edule (local) Hordeum brachyantherum Triglochin maritimum Deschampsia caespitosa Festuca rubra (local) Juncus balticus (local co-dominant)

Transition Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica-Forbs community (mapping symbol 17 FORB) occurs primarily along the upper tidal reaches of the Middle and South forks of the Palix River in areas with considerable freshwater influence. It occurs in a mosaic with 17 high marsh and, along the Middle fork, with sedge marsh. A number of forbs co-occur including some typically freshwater species.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Minor:	Carex lyngbyei (locally co-dominant) Deschampsia caespitosa

Achillea millefolium
Aster subspicatus
Trifolium wormskjoldii
Rumex occidentalis
Juncus effusus
Eleocharis palustris
Festuca rubra
Angelica lucida
Vicia gigantea
Hordeum brachyantherum
Cirsium edule
(+ other trace "weedy" spp.)

Spartina Marsh

Spartina alterniflora community (mapped in red) is found extensively near the Highway 101 bridge, on channel mudflats and intermixed with 9 low marsh.

Dominant: Spartina alternifolia

XXVI

NORTH NEMAH RIVER MARSHLANDS

LOCATION:

Willapa Bay, Pacific County, Washington. Nemah, Washington 7.5' U.S.G.S. quad map. T12N R10W portions of sections 14, 15, 22 and 23. Tidal marshes at the mouth of the North Nemah River, west of U.S. Highway 101.

GENERAL DESCRIPTIONS:

Physical Description - Approximately 125 acres of marsh occur on tidal flats, at the mouth of the North Nemah River, west of Highway 101. Substrates are primarily silts, with the exception of one narrow sand ridge bordering the western-most edge of the tidelands. Dissection of high marsh is limited to main tidal channels. Sedge and low marshes are extensively dissected by networks of small channels.

Land Use History - U.S. Highway 101 was constructed in the early 1900's. It crosses the tidelands at the mouth of the North Nemah River on approximately a one-half mile long dike. The highway spans the main river channel on a piling-supported bridge. A second drainage channel passes under the road-fill via a culvert and old tidegate. A restaurant and store are located on landfill in the marsh adjacent to the highway.

The adjacent upland forests were logged, probably in the late 1800's. Pilings along the river channel and in the marsh suggest past log rafting and transporting. Some of these lands have recently been logged a second time.

The area was probably homesteaded in the 1800's and tidelands subject to grazing. East of the highway the marshes were diked and are currently used for intensive grazing.

Vegetation - Most of the marshland is dominated by high marsh. Areas of low marsh and sedge marsh occur along the outermost edges. Some sedge marsh occurs along channels within the high marsh.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Triglochin maritimum community (mapping symbol 4) is the primary low marsh type. It occurs as hummocks at the outermost marsh edge.

Dominants: Triglochin maritimum

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs on slumps and low terraces along channels within 17 high marsh. *Carex lyngbyei* forms essentially pure stands.

Dominants:	Carex lyngbyei

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs in an area of marsh as a zone between 4 low marsh and 21 sedge marsh. It is extensively dissected by networks of small channels.

Dominants:	Carex lyngbyei Triglochin maritimum

Deschampsia caespitosa-Carex lyngbyei-(Triglochin maritimum) community (mapping symbol 21) occurs along the outer marsh edge as a zone between low marsh and upland or high marsh. It is highly dissected by networks of small channels.

Dominants:	Deschampsia caespitosa Carex lyngbyei Triglochin maritimum
Minor:	Distichlis spicata (variable)

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs in one small area associated with 17 high marsh.

Dominants:	Deschampsia caespitosa Agrostis alba Juncus balticus Potentilla pacifica
Sub-dominants:	Carex lyngbyei (locally co-dominant) Festuca rubra (variable)
Minor:	Aster subspicatus (local) Heracleum lanatum Vicia gigantea Deschampsia caespitosa

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs as a few, scattered pure colonies on mudflats along the outer edge of 4 low marsh, and extending a few hundred feet out onto bare mudflats.

Dominants: Spartina alterniflora

XXVII

MIDDLE AND SOUTH NEMAH RIVER MARSHLANDS

LOCATION:

Willapa Bay, Pacific County, Washington. Nemah, Washington and Long Island, Washington U.S.G.S. 7.5' quad maps. T12N, R10W, portions of sections 21, 22, 26 and 27. Tidal marshes along the South and Middle Nemah Rivers.

GENERAL DESCRIPTION:

Physical Description - Approximately 300 acres of currently undiked tidal marsh exists at the mouth and lower reaches of the Middle and South Nemah Rivers and Freshwater Creek. The marshlands are highly dissected by major tidal channels. Areas of low marsh are also dissected by networks of small channels. Freshwater Creek winds through the marshlands east of the main river channel providing additional freshwater influence. The substrates are primarily silts though silty sands occur in the low marsh areas.

Land Use History - Highway 101 bounds the marshlands to the east, crossing the Middle Nemah River tidelands on road-fill and Freshwater Creek on a piling-supported bridge. The South Nemah River tidelands are crossed by a second road. This road crosses diked tidelands on road-fill and spans the river on small piling-supported bridges.

Use by early homesteaders of these tidal marshlands was likely in the late 1800's and early 1900's. Ruins of an old cabin and corral lie in the adjacent forest at the mouth of the South Nemah River suggesting past grazing of accessible tidal marshes. The former tideland lying between the Middle and South Nemah has been diked and is intensively grazed. A private oyster processing facility is presently located on land-fill in this diked area.

Forests adjacent to the tidelands were probably logged in the late 1800's and possibly as late as the early 1900's. Logs were probably transported via the river channels.

A large island at the mouth of the river is thought to have received dredge spoils at one time.

Vegetation - The tidal marshlands are dominated by high marsh. There is also extensive sedge marsh, some low marsh but very little intermediate marsh development. *Spartina alterniflora* colonies are primarily scattered along the northeast side of the island.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Triglochin maritimum community (mapping symbol 4) occurs as hummocks on bare tidal flats. It is located in a band along the northeast side of the island and along the outer marsh edge at Weiss Point.

Dominant: Triglochin maritimum

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs to a limited extent on a narrow strip of tidal marsh along Lynn Point. It occurs on low terraces highly dissected by tidal channels.

Dominants:	Deschampsia caespitosa Distichlis spicata
Sub-dominants:	Salicornia virginica
Minor:	Carex lyngbyei Glaux maritimum Jaumea carnosa Triglochin maritimum Stellaria humifusa

Sedge Marsh

Deschampsia caespitosa-Carex lyngbyei-Triglochin maritimum community (mapping symbol 21) occurs primarily on the narrow strip of tidal marsh along Lynn Point and on the southwest side of the island. It also occurs to a limited extent along the South Nemah River. This marsh type tends to be highly dissected by narrow tidal channels.

Dominants:	Deschampsia caespitosa Carex lyngbyei
Sub-dominant:	Triglochin maritimum
Minor:	Agrostis alba

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) is the most extensive sedge marsh community in the area. It is most extensively developed north and east of the Middle Nemah River channel along Weiss Point. It also occurs in the strip of tidal marsh along Lynn Point, along the South fork and probably on the island at the mouth of the river. Agrostis alba is co-dominant in most areas which is unusual. This marsh type is found at relatively low elevations near the tip of Weiss Point and on higher terraces elsewhere. At lower elevations the surface tends to be highly dissected.

Dominants:	Carex lyngbyei Triglochin maritimum Agrostis alba (locally)
Minor:	Deschampsia caespitosa

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) is found on a terrace northwest of the confluence of the South and Middle Nemah Rivers. The terrace is dissected by large tidal channels. On slightly higher areas *Juncus balticus* is an obvious dominant. In lower areas *J. balticus* is absent and *Distichlis spicata* is a local co-dominant.

Dominants:	Deschampsia caespitosa Agrostis alba Carex lyngbyei (variable) Distichlis spicata (variable)
Sub-dominant:	Juncus balticus (locally dominant)
Minor:	Triglochin maritimum Potentilla pacifica

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) is the most extensive community in the tidal marsh. It occurs in the upper marsh adjacent to the forested uplands and on large high terraces along upper tidal reaches. The community is highly variable dependent upon the relative fresh and salt-water influences. The marsh surface is dissected very little.

Dominants:	Agrostis alba Juncus balticus (variable) Potentilla pacifica
Sub-dominants:	Carex lyngbyei (locally co-dominant)
Minor:	Festuca rubra (locally co-dominant) Deschampsia caespitosa Triglochin maritimum Distichlis spicata Hordeum brachyantherum

Transition Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica-Forbs community (mapping symbol 17 FORB) occurs in an area west of Highway 101 and to a minor extent along the forest edge of Weiss Point.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Sub-dominants:	Heracleum lanatum Festuca rubra Aster subspicatus

Middle and South Nemah River Marshlands - cont.

Minor:	Angelica lucida Vicia gigantea Deschampsia caespitosa Galium sp. Trifolium wormskjoldii Triglochin maritimum Carex lyngbyei Hordeum brachyantherum

Spartina Marsh

Spartina alternoflora community (mapped in red) occurs on low tidal flats at the mouth of the rivers.

Dominant:	Spartina alterniflora

XXVIII

SEAL SLOUGH MARSH

LOCATION:

Willapa Bay, Pacific County, Washington. Long Island, Washington 7.5' U.S.G.S. quad map. T12N R10W, portions of section 28. A small, isolated drainage lying between the Nemah and the Naselle Rivers.

GENERAL DESCRIPTION:

Physical Description - Approximately 30 acres of marsh occupy the mouth of a small, isolated watershed between the Nemah and Naselle Rivers. Substrate is primarily silts. High marsh areas are dissected only by main tidal channels. Low and sedge marsh areas are dissected by a network of small channels.

Land Use History - There are no obvious signs of past land uses on the marsh proper though homestead use in the late 19th century was likely, including grazing. The surrounding forest lands have recently been logged to within 20 feet of the marsh edge. Gravel roads cross both arms of the upper marsh on road-fill. Culverts bisect the fill in both arms; however, it appears as if the fill has altered freshwater drainage.

Vegetation - Most of the area is high marsh, with outer edges of sedge marsh and some low marsh development.

PLANT COMMUNITY DESCRIPTION:

Low Marsh

Triglochin maritimum community (mapping symbol 4) occurs in a narrow band at the leading edge of the marsh. It occurs as hummocks on bare mudflats.

Dominants:	Triglochin maritimum
Minor:	Deschampsia caespitosa Salicornia virginica

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs as a band between 4 low marsh and 17 high marsh.

Dominants:	Carex lyngbyei
Sub-dominants:	Deschampsia caespitosa
Minor:	Triglochin maritimum Distichlis spicata

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) dominates most of the marsh. Transition forbs occur locally as sub-dominants at the highest elevations. *Carex lyngbyei* becomes co-dominant, replacing *Juncus balticus* at lower elevations adjacent to sedge marsh.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Minor:	Carex lyngbyei (locally sub-dominant) Angelica lucida (locally sub-dominant) Vicia gigantea (locally sub-dominant) Rumex occidentalis (locally sub-dominant) Trifolium wormskjoldii (locally sub-dominant) Holcus lanatus Festuca arundinacea

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs as a half dozen circular monospecific colonies on mudflats beyond the marsh proper.

Dominants:	Spartina alterniflora

XXIX

NASELLE RIVER MARSHLANDS

LOCATION:

Willapa Bay, Pacific County, Washington. Long Island, Washington and Oman Ranch, Washington U.S.G.S. 7.5' quad maps. T11N, R10W, portions of sections 10, 13, 14, 15, 22, 23, 24, 25, and T11N, R9W, portions of sections 19,30. Tidelands along the lowest reaches of the Naselle River and tributary streams.

GENERAL DESCRIPTION:

Physical Description - Approximately 750 acres of low salinity marsh lie along the lowest reaches of the Naselle River, including Ellsworth Slough. Substrates are primarily silts. Tidal marsh surfaces are primarily dissected by large tidal channels.

Land Use History - The Naselle River area was settled before the turn of the century. A majority of the tidelands along the river and its tributaries have been diked and removed from tidal influence for farming and pasture. Grazing occurred on currently undiked tidal marshes since the late 1800's, where accessible to stock. Portions of Ellsworth Slough tidal marsh are currently grazed.

Nearly all of the adjacent forest has been cut at least once, beginning in the late 1800's. Many areas have recently received a second cutting. Sloughs and channels of the river were extensively used for log rafting and transport for many years. Scattered old pilings and an old log "dumping" ramp are remnants of past logging activities.

Highway 101 crosses the mouth of the Naselle on a piling and steel-framed bridge. U.S. Highways 830 and 101 border the north and eastern sides at the river, in places crossing the tidelands on road-fill. West Parpala Road borders the west side of the river. At Ellsworth Slough, the road crosses tidal marsh on road-fill and the slough channel on a piling-supported bridge. A gravel road runs north through tidal marsh between Highway 101 and Clearwater Creek. Construction of roads along the Naselle River has altered freshwater drainage into tidelands.

Vegetation - Tidal marshes are dominated by sedge and high marshes. Traces of low and intermediate marshes occur along sections of the main river channel. Transition marsh is found at the upper tidal reach of Ellsworth Slough.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs in two very small areas along the leading marsh edge, near the Highway 101 bridge.

Domimant: Scirpus americanus

Triglochin maritimum community (mapping symbol 4) occurs as discontinuous hummocks on tidal mudflats at the mouth of Ellsworth Slough.

Dominant: Triglochin maritimum

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occupies a narrow band of marsh along the main channel at the river mouth. It occurs as hummocks on tidal mudflats.

Dominants: Salicornia virginica
Triglochin maritimum

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs in a local area at the bayward most marsh, in depressions within high marsh. Agrostis alba is co-dominant throughout. Carex lyngbyei is co-dominant over the largest of the two areas.

Dominants: Agrostis alba
Carex lyngbyei (variable)
Deschampsia caespitosa
Distichlis spicata

Sub-dominant: Triglochin maritimum

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs over large areas, especially along river and slough channels. It is associated with 12 sedge marsh in many areas.

Dominant: Carex lyngbyei

Minor: Deschampsia caespitosa
Lilaeopsis occidentalis

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs over extensive areas, in many places associated with 11 sedge marsh.

Dominants: Carex lyngbyei
Triglochin maritimum

Minor: Agrostis alba (local)
Deschampsia caespitosa

Deschampsia caespitosa-Carex lyngbyei-(Triglochin maritimum) community (mapping symbol 21) occurs over several scattered areas, generally along channel edges, at elevations slightly below adjacent high marsh.

Dominants:	Carex lyngbyei Deschampsia caespitosa Triglochin maritimum
Minor:	Distichlis spicata

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) dominates most of the higher elevation marshes along the Nasalle River. Juncus balticus is absent as co-dominant in many places. Over much of this community, Carex lyngbyei occurs as a strong co-dominant. At the mouth of Ellsworth Slough, Festuca rubra occurs as a sub-dominant. Along the upland edge of high marsh, between the Highway 101 bridge and Clearwater Creek, occur traces of typically freshwater and upland species.

Dominants:	Agrostis alba Carex lyngbyei (variable) Potentilla pacifica
Sub-dominant:	Triglochin maritimum (variable)
Minor:	Angelica lucida Festuca rubra (local sub-dominant) Juncus balticus (variable) Lilaeopsis occidentalis Scirpus cernuus Trifolium wormskjoldii (local)

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs as pure colonies primarily on tidal mudflats north of the Highway 101 bridge. A few scattered colonies occur elsewhere.

Dominant:	Spartina alterniflora

XXX

OMEARA MARSH

LOCATION:

Willapa Bay, Pacific County, Washington. Long Island, Washington U.S.G.S. 7.5' quad map. T11N, R10W, portions of section 29. Tidal marsh along the north side of Omeara Point, opposite the south end of Long Island.

GENERAL DESCRIPTION:

Physical Description - Approximately 45 acres of marsh lie within a small bay at the north side of Omeara Point, at the mouths of four small, unnamed freshwater creeks. Substrates are primarily silts. The area is highly dissected by large tidal channels giving the appearance of numerous marsh islands.

Land Use History - U.S. Highway 101 runs along the upland edge of the marsh. Road-fill for the highway has altered freshwater drainage patterns into the marsh. The main creeks flow through culverts beneath the road-fill. The marsh lies within the proclamation boundary of the Willapa National Wildlife Refuge.

Vegetation - Most of the area is low marsh, appearing as highly dissected "islands". Areas of sedge, intermediate and high marsh occur at higher elevations around the upland edge.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) dominates the lower elevation, outer marsh. It also occurs as discontinuous "hummocks" on mudflats. *Deschampsia caespitosa* occurs frequently as a co-dominant. The marsh surface is highly dissected.

Dominants:	Deschampsia caespitosa
	Salicornia virginica
	Triglochin maritimum
Minor:	Carex lyngbyei (very locally co-dominant)
	Lilaeopsis occidentalis
	Plantago maritima
	Puccinelli sp.
	Scirpus americanus
	Scirpus cernuus

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs primarily as 3 narrow strips adjacent to upland or high marsh. Southern marsh areas are apparently influenced by freshwater inflow. *Potentilla pacifica* occurs as co-dominant at the south end of the marsh.

Dominant:	Carex lyngbyei
Sub-dominant:	Potentilla pacifica (locally co-dominant)

Deschampsia caespitosa-Carex lyngbyei-(Triglochin maritimum) community (mapping symbol 21) occurs at the mouth of the largest creek, and along the southern edge of the area.

Dominants:	Carex lyngbyei Deschampsia caespitosa Triglochin maritimum
Minor:	Distichlis spicata Jaumea carnosa Salicornia virginica

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs in one small area. *Carex lyngbyei* occurs as co-dominant.

Dominants:	Carex lyngbyei Deschampsia caespitosa Distichlis spicata Salicornia virginica Triglochin maritimum
Minor:	Jaumea carnosa

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs in one small area of highest elevation. *Carex lyngbyei* occurs as co-dominant.

Dominants:	Agrostis alba Carex lyngbyei Deschampsia caespitosa Juncus balticus Potentilla pacifica

Omeara Marsh - cont.

Minor: Festuca rubra
Hordeum jubatum
Grindelia integrifolia

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs as several pure colonies on mudflats along leading edges of the marsh.

Dominant: Spartina alterniflora

XXXI

BEAR RIVER MARSHLANDS

LOCATION: Willapa Bay, Pacific County, Washington. Long Island, Washington and Chinook, Washington U.S.G.S. 7.5' quad maps. T10N, R10W, portions of sections 7, 8, and 18. Tidelands along the lower reaches of the Bear River west of U.S. Highway 101, and Greenhead Slough.

GENERAL DESCRIPTION:

Physical Description - Approximately 330 acres of tidal marshes occur along approximately the lower 2 miles of the Bear River. The river channel is braided at it's mouth forming islands of tidal marsh. The marsh lands are dissected by tidal channels particularly the lower elevation, low and sedge marshes. Substrates are primarily silts. The northern 150 acres of tidelands are part of the Willapa National Wildlife Refuge.

Land Use History - Most of the periphery of the tidelands has been impacted by diking and road-fill. U.S. Highway 101 borders the eastern side of the current tidelands. Constructed in the early 1900's, the road-fill acted to dike former tidelands east of the highway, re-routing or impeding drainage patterns. Main channels of the Bear River and Greenhead Slough, pass through the highway road-dike under piling-supported bridges. Diking has altered the northwest edge of the tidelands as well, including the former Lewis Ranch site. One small area of formerly diked tidelands is associated with a second old ranch site at the up-river-end of the marshes. Dike remains and scattered fenceposts give evidence of past cattle grazing of accessible tidelands. Adjacent forested uplands were likely logged in the late 1800s. Pilings in the river channel suggest that logs were skidded into the river and rafted. Most of these uplands have been recently logged a second time.

Vegetation - The tidelands are dominated by high marsh. Some intermediate marsh and traces of low marsh occur at the northernmost leading edges. Sedge marsh is frequent on lower areas and along channels. A narrow strip of sedge marsh occurs associated with Highway 101 road-fill along the northeastern edge of the tidal marsh. Dissection of the marsh surface is common in low and sedge marshes

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs in small amounts along leading marsh edges at the river mouth. *Deschampsia caespitosa* is co-dominant over most areas. This marsh community occurs as typical "hummocks" along lowest elevations, coalescing into dissected marsh on higher areas.

Dominants:	Deschampsia caespitosa
	Salicornia virginica
	Triglochin maritimum

Sub-dominants: Distichlis spicata

Minor: Plantago maritima

Sedge Marsh

Carex lungbyei community (mapping symbol 11) is found along channels and low areas within high marsh areas. Carex lyngbyei occurs in nearly pure stands.

Dominants: Carex lyngbyei

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs predominantly in a few small patches at the mouth of Greenhead Slough, and as a narrow strip along the main Bear River channel.

Dominants: Carex lyngbyei
Triglochin maritimum

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs along the leading marsh edge at elevations above 9 low marsh and below 17 high marsh. Carex lyngbyei occurs as co-dominant throughout.

Dominants: Carex lyngbyei
Deschampsia caespitosa
Distichlis spicata

Minor: Agrostis alba (local)
Potentilla pacifica (local)
Salicornia virginica (local)
Triglochin maritimum (local)

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs in one small area at the mouth of Greenhead Slough, grading into 17 high marsh. Juncus balticus is absent.

Dominants: Agrostis alba
Deschampsia caespitosa
Potentilla pacifica

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) dominates nearly all of the tidelands. On the down-river half of high marsh, Carex lyngbyei is co-dominant and Juncus balticus is nearly absent. On the upper tidalmarsh reach, Festuca rubra

occurs as a co-dominant and traces of transition marsh forbs are found. Soil surface distortion over one large area suggests past cattle grazing.

Dominants:	Agrostis alba Juncus balticus (variable) Potentilla pacifica
Sub-dominants:	Carex lyngbyei (locally co-dominant)
Minor:	Achillea millefolium (local) Deschampsia caespitosa (local sub-dominant) Festuca rubra (locally co-dominant) Rumex occidentalis (local) Triglochin maritimum

XXXII

PORTER POINT AREA MARSHES

LOCATION:

Willapa Bay, Pacific County, Washington. Cape Disappointment, Washington-Oregon, Chinook, Washington-Oregon, and Long Island, Washington U.S.G.S. 7.5' quad maps. T10N, R11W, portions of sections 1, 2, 11, 12, and T10N, R10W, portions of sections 6, 7. Tidelands at the southern end of Willapa Bay, at Porter Point and along the mouths of Parker and Tarlatt Sloughs.

GENERAL DESCRIPTION:

Physical Description - Approximately 400 acres of tidal marsh occur along Porter Point and the mouths of Tarlatt and Parker Sloughs. The easternmost end of the area lies within the Bear River estuary. Substrates are primarily silts. Porter Point is unusual, for marshes with similar substrates, in having very little dissection by tidal channels of the marsh surface. Salt pannes occur in areas of 9 low marsh.

Land Use History - Nearly all the marshes lie within the Lewis, Porter and Riekkola units of the Willapa National Wildlife Refuge. The entire area of marsh is boarded, on the landward side, by a functioning dike system completed in the 1950's for waterfowl habitat management. The dike system removed some lands from tidal influence. All freshwater drainages feeding the tidal marshes have been altered. Major stream channels are regulated by tidegates. Portions of the dikes and drainage ditches in adjacent diked pasture were upgraded in 1982.

Tidal marshes, accessible to cattle and sheep, were grazed likely as early as the late 1800's. Private marsh lands west of Tarlatt Slough have been grazed by cattle until recently.

Vegetation - The entire area is dominated by zones of low and intermediate marshes. Traces of sedge marsh and high marsh occur locally. Many colonies of *Spartina* marsh occur within the outer low marsh zone and on adjacent bare mudflats.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-*Triglochin maritimum* community (mapping symbol 9) occurs extensively at the leading marsh edge. Outermost areas of this community occur as discontinuous "hummocks" elevated above the surrounding mudflat. Salt pannes are found in some areas of this community.

Dominants: Salicornia virginica
Triglochin maritimum

Sub-dominants: Plantago maritima
Puccinellia sp. (variable)

Minor: Deschampsia caespitosa (locally co-dominant)

Distichlis spicata community (mapping symbol 8) occurs largely as an extensive zone along the eastern half of Porter Point, lying between outer 9 low marsh and inner 16 intermediate marsh. Various other species occur as sub-dominants.

Dominant: Distichlis spicata

Sub-dominants: Salicornia virginica
Triglochin maritimum

Minor: Carex lyngbyei (variable)
Deschampsia caespitosa

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs primarily in two areas, at the mouth of the Bear River and along Tarlatt Slough.

Dominant: Carex lyngbyei

Minor: Triglochin maritimum (local)

Deschampsia caespitosa-Carex lyngbyei-(Triglochin maritimum) community (mapping symbol 21) occurs in one local area at the mouth of the Bear River.

Dominants: Carex lyngbyei
Deschampsia caespitosa
Triglochin maritimum

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) dominates nearly half of the total marsh area as an upper zone between low marsh and bordering dikes. Carex lyngbyei occurs in patches as a community over much of this type.

Dominants: Carex lyngbyei (variable)
Deschampsia caespitosa
Distichlis spicata

Sub-dominants: Salicornia virginica
Triglochin maritimum

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs in one very small area adjacent to 17 high marsh. *Carex lyngbyei* is co-dominant. This area was grazed by cattle crossing the adjacent dike.

Dominants:	Agrostis alba Carex lyngbyei Deschampsia caespitosa Potentilla pacifica
Minor:	Festuca rubra Juncus balticus Rumex sp.

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs in 2 small areas near Parker Slough, on highest marsh elevations. *Carex lyngbyei* occurs as co-dominant over most of the areas. *Juncus balticus* is absent as co-dominant in one local area. One area was grazed by cattle crossing the adjacent dike.

Dominants:	Agrostis alba Carex lyngbyei Juncus balticus (variable) Potentilla pacifica
Minor:	Festuca rubra Rumex sp.

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs extensively in one area and scattered over other locations. It occurs on bare tidal mudflats and intermixed with 9 low marsh.

Domimant:	Spartina alterniflora

XXXIII

GOULTERS SLOUGH MARSH

LOCATION:

Willapa Bay, Pacific County, Washington. Oysterville, Washington 7.5' U.S.G.S. quad map. T13N R11W, portions of sections 27 and 34. East side of North (Long) Beach Peninsula, between Oysterville and Leadbetter Point.

GENERAL DESCRIPTION:

Physical Description - Approximately 250 acres of marsh lies along 2 miles of mainland. Proximity to the mouth of Willapa Bay and absence of major freshwater influences promote high salinity conditions. The substrate is primarily sand. There is little dissection, limited to occasional large tidal channels. The area was severely eroded in the winter of 1981-82 resulting in an abrupt drop from the marsh to adjacent tidal mudflats.

Land Use History - Past land use and disturbance are high. Approximately 70 acres were formerly diked; however, tidal influence has been re-established through broken tidegates. Over 2 miles of ditches were dug through the main body of marsh. Old homestead ruins, fencing remains and soil surface distortion suggest past grazing activities.

Vegetation - Vegetation patterns are unusual probably due to past land use. The main body of the marsh is a mixture of low, intermediate and high marsh types. Narrow strips of low marsh occur to the north and south. Small areas of dune vegetation occur along the higher outer edges of the marsh. *Spartina* colonies are common on tideflats beyond the leading edge of the marsh and are particularly frequent along the southern half.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) occurs as 3 small, more or less pure colonies at the leading edge of the northern portion of the marsh.

Dominants:	Scirpus americanus

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) occupies the lowest portions of the marsh.

Dominants:	Salicornia virginica Jaumea carnosa
Sub-dominants:	Distichlis spicata (variable) Grindelia integrifolia Hordeum brachyantherum

Minor:	Plantago maritima Triglochin concinnum (local)

Salicornia virginica community (mapping symbol 17) occurs primarily on low terraces along tidal channels. Other marsh species co-dominate.

Dominants:	Salicornia virginica Grindelia integrifolia Hordeum brachyantherum
Minor:	Jaumea carnosa Festuca rubra Deschampsia caespitosa Plantago maritima Glaux maritima

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs at elevations between low and high marshes on the outer half of the marsh.

Dominants:	Deschampsia caespitosa Salicornia virginica (variable)
Sub-dominants:	Jaumea carnosa
Minor:	Festuca rubra Distichlis spicata

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs in a limited area in the northern part of the marsh.

Dominants:	Deschampsia caespitosa Agrostis alba Juncus balticus Potentilla pacifica
Minor:	Festuca rubra Salicornia virginica

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs at higher elevations along the west half of the marsh adjacent to upland vegetation. A disturbed form of this community occurs extensively within the formerly diked area.

Goulters Slough Marsh - cont.

Dominants:	Juncus balticus Potentilla pacifica (variable)
Sub-dominants:	Agrostis alba (variable)
Minor:	Festuca rubra (local) Deschampsia caespitosa Poa sp.
	Salicornia virginica Distichlis spicata Grindelia integrifolia } occur within former diked area

Festuca rubra community (mapping symbol 18) is common at this site, particularly on elevated ridges along the high outer marsh. Intermediate and high marsh species occur as co-dominants.

Dominants:	Festuca rubra Deschampsia caespitosa (variable) Juncus balticus (variable)
Sub-dominants:	Hordeum brachyantherum (variable) Salicornia virginica
Minor:	Potentilla pacifica Poa sp. Grindelia integrifolia

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs on tidal flats beyond the leading edge of mainland marsh. An extensive zone of pure Spartina alterniflora colonies extends along the southern half of the area.

Dominants:	Spartina alterniflora

XXXIV

LEADBETTER POINT MARSHLANDS

LOCATION:

Willapa Bay, Pacific County, Washington. Oysterville, Washington and North Cove, Washington U.S.G.S. 7.5' quad maps. T13N, R11W, portions of sections 4, 5, 8, 9, 16 and 17. Tidal marshes extending along the east side of North Beach Peninsula lying within the boundaries of Leadbetter Point, Willapa National Wildlife Refuge, U.S. Fish and Wildlife Service.

GENERAL DESCRIPTION:

Physical Description - Nearly 400 acres of tidal marsh occur along the bay side of Leadbetter Point including Grassy Island. The sea channel between Leadbetter Point and Grassy Island is filling in making Grassy Island contiguous with the Peninsula. It is along this channel that the majority of saltmarsh occurs. This is a high salinity tidal marsh with very little freshwater influence. The marsh occurs on sands which slope up from the adjacent non-vegetated tidal flats. The lower marsh surface is marked by salt pannes and a modicum of tidal channels.

Land Use History - The tidal marsh apparently has had little human use. In the late 1800's an oyster processing facility was located a short distance south of the marsh at the present boundary between the Leadbetter Point Wildlife Refuge and the State Park. During World War II a Coast Guard Station was located a short distance west of the old oyster-processing plant. Currently the area receives restricted use, limited to foot traffic, and is utilized primarily by bird watchers and, in the fall, duck hunters. There is a vehicle track which enters the marsh south of the freshwater stream channel and continues north along the higher portion of marsh.

Vegetation - The tidal marsh is dominated by low elevation, high salinity marsh communities. It represents the least disturbed and most extensive tidal marsh of this kind in either Willapa Bay or Grays Harbor. There is some intermediate marsh and high marsh development along the upper boundaries of the tidelands. There is an increasing amount of Spartina marsh along the leading marsh edge, extending onto the bare tidal flats and in some areas intermixed with low marsh.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) is the dominant low marsh community in the area. Species composition is somewhat variable. Salt pannes and some tidal channel dissection occur in this area.

Dominants:	Salicornia virginica Jaumea carnosa Distichlis spicata (variable) Plantago maritima
Sub-dominants:	Triglochin maritimum Galux maritima
Minor:	Grindelia integrifolia Stellaria humifusa Puccinellia sp.

Salicornia virginica community (mapping symbol 7) occurs as a strip along the leading marsh edge. The marsh surface tends to be discontinuous where this community occurs either due to accreation or errosion. Puccinellia sp. occurs as a co-dominant with Salicornia on what appears to be an accreating tidal flat located at the northern end of the old channel separating the Peninsula and Grassy Island.

Dominants:	Salicornia virginica
Sub-dominants:	Puccinellia sp. (locally co-dominant)

Distichlis spicata-Salicornia virginica community (mapping symbol 10) occurs in a few slightly depressed areas between 5 low marsh and intermediate marsh. The marsh surface is not dissected.

Dominants:	Distichlis spicata Salicornia virginica
Minor:	Triglochin maritimum

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs as discontinuous patches and strips between low marsh and high marsh.

Dominants:	Deschampsia caespitosa Salicornia virginica Distichlis spicata Jaumea carnosa
Minor:	Triglochin maritimum Festuca rubra Grindelia integrifolia Agrostis alba Glaux maritima Plantago maritima

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs in a small area on Grassy Island. It is located between an area of 10 low marsh and a sand ridge with a variety of herbs and shrubs. Agrostis alba is co-dominant.

Dominants:	Deschampsia caespitosa Distichlis spicata Agrostis alba
Minor:	Triglochin maritimum

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) generally occurs as a high marsh strip adjacent to dune or forested upland. The distributions of Carex lyngbyei and Juncus balticus are variable.

Dominants:	Deschampsia caespitosa Agrostis alba Potentilla pacifica
Sub-dominants:	Juncus balticus (locally co-dominant)
Minor:	Carex lyngbyei (locally co-dominant) Distichlis spicata Festuca rubra (locally sub-dominant) Grindelia integrifolia Trifolium wormskjoldii Carex pansa

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) primarily on the Peninsula in the high marsh strip adjacent to the dune upland. Juncus balticus occurs as a local co-dominant. Carex lyngbyei occurs as a co-dominant throughout.

Dominants:	Agrostis alba Carex lyngbyei Potentilla pacifica
Minor:	Juncus balticus (locally co-dominant) Deschampsia caespitosa Angelica lucida Festuca rubra (locally co-dominant)

Festuca rubra-Armeria maritima-Orthocarpus castillejoides association (mapping symbol A) has been observed to occur on tidally-influenced sands at the interface between upper tidal marshland and coastal dunes. Species composition suggests that this association holds an intermediate position between coastal dune and tidal marsh vegetation and yet appears to be clearly delineated, unlike ecotonal "communities". This association occurs with such low frequency that it is not considered a community. However, since its occurence is highly predictable, a description has been included here.

Dominants:	Festuca rubra Armeria maritima Plantago coronopus (introduced)
Sub-dominants:	Orthocarpus castillejoides (locally co-dominant) Spergularia sp. Carex pansa
Minor:	Trifolium wormskjoldii (locally co-dominant) Agrostis alba Aira praecox Glaux maritima Fragaria chiloensis (locally sub-dominant) Jaumea carnosa Salicornia virginica

Spartina Marsh

Spartina alterniflora community (mapped in red) occurs as circular colonies on sand flats at the leading marsh edge. It also is found intermixed with low marsh communities.

Dominants:	Spartina alterniflora

XXXIV - XXXV

LEADBETTER POINT DUNE SYSTEM

Leadbetter Point Willapa National Wildlife Refuge
Leadbetter Point State Park Natural Area

LOCATION:

North Beach Peninsula, Pacific County Washington. North Cove, Washington and Oysterville, Washington U.S.G.S. 7.5' quad maps. T13N, R11W, portions of sections 3, 4, 5, 8, 9, 16, 17, 20, 29 and 32. Coastal dune systems occurring within Leadbetter Point-Willapa National Wildlife Refuge, Leadbetter Point State Park Natural Area, and portions of dune topography extending from the southern boundary of the State Park to the T12N-T13N township line.

GENERAL DESCRIPTION:

Physical Description - Approximately 2,800 acres of relatively undisturbed coastal dunes (1760 acres of active and 1040 acres of stabilized) occur on North Beach Peninsula north of the T12N-T13N township line. This area was formed by accreation of sands. A number of landforms occur as follows:

1) Foredune - a vegetated dune parallel with and adjacent to the beach, running the length of the peninsula.
2) Deflation Plain - an area, landward of the foredune, which has been excavated by the wind, in places down to the water table. It occurs as a wide trough along the eastern side of the peninsula, between the foredune and the stabilized dune systems. Within this area may occur eroded parallel dunes appearing as hummocks.
3) High Secondary Dune Ridge - extends along a majority of the peninsula. It marks the seaward edge of the stabilized dune system and in this area, corresponds to the leading edge of the *Pinus contorta* community. It is probably the deposition site of wind excavated sands from the deflation plain.
4) Stabilized Dune System - older dune system with a variety of topographic features. In this area it is covered by forest or inland wetlands. There is relatively high organic matter accumulation in the soils.

Land Use History - This area has been affected by a number of direct and indirect human activities. Damming of the Columbia River and building of the jetty at Cape Disappointment took place in the early 1900's. This affected the sediment load of off-shore currents along the peninsula, affecting the depositional and degradational patterns and subsequent landforms on Leadbetter Point.

Ammophila arenaria (European beachgrass) was primarily introduced along Washington and Oregon coasts through a dune stabilization program beginning in the 1930's. It has since come to dominate active, non-forested coastal dune sites in Washington. The foredune is generally considered a product of *Ammophila* establishment. The deflation plain may in turn be largely a

product of the foredune. The widespread establishment of Ammophila has also drastically altered the native dune vegetation.

Direct use of the area began with the Chinook Indians who established a small camp immediately north of Stackpole Harbor prior to the mid 1800's. Selective logging occurred during the late 1800's. A dock was built near Stackpole Harbor for the transport of logs. A small saw mill was established for a short period of time to lumber Pinus contorta. At least one homestead was built in this area. In conjunction with it were hayfields and limited grazing. An oyster-processing facility was located near the present northern terminus of Stackpole Road. A cannery was established one-half mile south of the present State Park southern boundary on the high secondary dune ridge. A road (Elliot's trail) provided access. During WWII, a coast guard station was established at the present boundary between the Wildlife Refuge and the State Park.

Currently, the non-forested dunes south of the State Park are slated for development and some preliminary work has begun. A portion of the forested dune area south of the State Park was recently logged. A drainage ditch was dug to drain the logged area to make it suitable for housing development. This drainage ditch affects the hydrology of the stabilized dune wetlands throughout this area. The Leadbetter Point State Park has been designated a State Park Natural Area and is being managed to provide access for the public with as limited impact as possible to the environment. Leadbetter Point-Willapa National Wildlife Refuge is managed for wildlife by the U.S. Fish and Wildlife Service. Cars are allowed on the beach and there is considerable use during certain times of the year.

Vegetation - The area is divided between Ammophila dune, deflation plain and stabilized dune forest development. There is minor wetland or bog development in the stabilized dunes and essentially no native dune grass deveopment.

PLANT COMMUNITY DESCRIPTION:

Ammophila Dune

Ammophila arenaria (mapping symbol D) is a non-native assemblage which occurs on active dry dune sites. It is prevalent on the foredune, parallel secondary dune ridges and sand hummocks in the deflation plain. A second non-native species, apparently Ammophila breviligulata (Atlantic beachgrass), occurs with Ammophila arenaria. The extent of Ammophila "breviligulata" is not known. In places A. "breviligulata" is dominant or co-dominant.

Dominants:	Ammophila arenaria (introduced)
Sub-dominant:	Ammophila sp. (probably breviligulata, introduced)

Minor:	Elymus mollis Festuca rubra Lathyrus japonicus Polystichum munitum

Deflation Plain

Lupinus littoralis-Poa macrantha-Fragaria chiloensis community (mapping symbol F) is a dry deflation plain community, occurring on slightly elevated sites in the deflation plain and in parallel dune troughs. It also occurs in a mosaic with Festuca rubra community and for the purposes of this study the two communities have been mapped together.

Dominants:	Fragaria chiloensis Lupinus littoralis
Sub-dominants:	Aira praecox (introduced) Hypochaeris radicata Poa macrantha Polygonum paronychia
Minor:	Abronia latifolia Achillea millefolium Ammophila arenaria (introduced) Glehnia leiocarpa Lathyrus japonicus

Festuca rubra community (mapping symbol F) is a dry to mesic deflation plain community. It is found in dune troughs and on the deflation plain. In this area it occurs in mosaic with Lupinus littoralis-Poa macrantha-Fragaria chiloensis community.

Dominants:	Aira praecox (introduced) Festuca rubra Fragaria chiloensis Hypochaeris radicata
Sub-dominants:	Anaphalis margaritacea Lupinus littoralis

Juncus nevadensis-Juncus falcatus community (mapping symbol G) is a wet deflation plain community occurring in areas containing water through early spring. In this study it is mapped with a second wet deflation plain community, dominated by Carex obnupta.

Dominants:	Juncus falcatus Juncus nevadensis

Minor:	Aster chilensis Epilobium franciscanum Potentilla pacifica Sisyrinchium californicum Trifolium wormskjoldii

Carex obnupta community (mapping sysbol G) is a wet deflation plain community occurring in areas containing standing water most of the year.

Dominants:	Carex obnupta
Minors:	Gentiana sp. Potentilla pacifica

Salix hookeriana/Carex obnupta community (mapping symbol H) is a wet deflation plain community occurring in sites containing standing water nearly all year.

Dominants:	Carex obnupta Salix hookeriana
Minor:	Alnus rubra Lysichitum americanum Myrica claifornica

Stabilized Dunes

Vaccinium ovatum-Gaultheria shallon-Arctostaphylos uva-ursi community (mapping symbol J) occurs to a limited extent in this area. It occurs on Grassy Island on a dune north of the forested sites, which is being invaded by Pinus contorta. It also occurs along the high secondary dune in an area receiving heavy off-road vehicle use, and in a small elevated area in the deflation plain (unmapped).

Dominants:	Arctostaphylos uva-ursi
Sub-dominants:	Gaultheria shallon Vaccinium ovatum
Minor:	Abronia latifolia Aira praecox (introduced) Ammophila arenaria (introduced) Festuca rubra Fragaria chiloensis Myrica claifornica Pinus contorta Poa macrantha Pteridium aquilinum

Pinus contorta/Vaccinium ovatum-Gaultheria shallon community (mapping symbol K) occurs on Grassy Island and in a zone between the non-forested dunes and dunes forested with Picea sitchensis. It ranges from stands of approximately 25 year old Pinus contorta with Ammophila arenaria as an understory dominant, to older stands with a dense understory of Vaccinium ovatum and Gaultheria shallon.

Dominants:	Gaultheria shallon Pinus contorta Vaccinium ovatum
Minor:	Alnus rubra (local sub-dominant) Ammophila arenaria (introduced, local dominant) Arctostaphylos uva-ursi (local sub-dominant) Myrica californica Picea sitchensis Tsuga heterophylla Vaccinium parviflora

Picea sitchensis/Vaccinium ovatum-Gaultheria shallon community (mapping symbol L) occurs extensively on stabilized dunes in Leadbetter Point State Park Natural Area. The shrub layer may be extremely dense reaching 100% cover and 12 feet in height.

Dominants:	Gaultheria shallon Picea sitchensis Vaccinium ovatum
Sub-dominants:	Tsuga heterophylla (variable)
Minor:	Alnus rubra Myrica californica Pinus contorta Pteridium aquilinum Rhamnus purshiana Vaccinium parviflora

Picea sitchensis wetland community (mapping symbol M) occurs in stabilized dune troughs or low areas in Leadbetter Point State Park Natural Area. Individual Picea are widely spaced but exceedingly large reaching a d.b.h. of 10 feet. The understory shrubs and herbs are highly variable but all typical of mesic sites.

Dominants:	Alnus rubra Picea sitchensis
Sub-dominants:	Carex obnupta (local co-dominant) Maianthemem dilatatum (local) Pyrus fusca Salix spp (probably hookeriana) Sambucus sp. (local)

Minor:	Carex sp. (probably deneyana)
	Luzula sp.
	Rhamnus purshiana
	Rubus spectabilis
	Spiraea douglasii
	Vaccinium ovatum
	Vaccinium parviflorum

Stabilized dune wetland community (mapping symbol O) represents deciduous tree, shrub or herb wetlands within Leadbetter Point State Park Natural Area. These wetlands are primarily dominated by *Pyrus fusca*, *Salix* spp., *Rhamnus purshiana*, *Alnus rubra* and *Spiraea douglasii*. Other species present include *Carex obnupta*, *Juncus effusus*, *Galium* sp., *Sparganium simplex* and *Veronica americana*.

XXXVI

OCEANSIDE DUNES

LOCATION:

North Beach Peninsula, Pacific County, Washington. Ocean Park, Washington U.S.G.S. 7.5' quad map. T11N, R11W, portions of sections 21 and 28. Two sites located on the stabilized dunes west of Island Lake.

GENERAL DESCRIPTION:

Physical Description - Approximately 180 acres of undeveloped stabilized dunes occur in two sites west of Island Lake. They are non-forested remnants of old parallel dune systems containing a series of troughs and ridges.

Land Use History - The area was part of a ranch and was probably subject to grazing in the late 1800's to early 1900's. Around the turn of the century, a railroad line was graded which bounds the two areas on their west sides. Both sites currently receive limited off-road vehicle use.

Vegetation - These two sites contain what is thought to be native stabilized dune vegetation. As such, they represent the largest high-quality remnants in Washington State. Both areas are dominated by native herbs and shrubs. *Pinus contorta* occurs in young dense stands along the eastern side of each site and on the dune ridges. A few individual Picea sitchensis also occur.

PLANT COMMUNITY DESCRIPTIONS:

Stabilized dunes

Rosa nutkana/Festuca rubra community (mapping symbol T) may be a mosaic of two or more plant communities. However, there is not sufficient information in the literature to allow designation of communities. The apparent components of this mosaic are 1) a *Festuca rubra* dominated association, including *Carex pansa*, *Fragaria chiloensis*, *Hypochaeris radicata*, *Luzula campestris*, *Plantago lanceolata*, *Ranunculus* sp. and *Viola adunca*. 2) *Rosa nutkana* nearly monospecific thickets and 3) *Vaccinium caespitosum* thickets with *Anaphalis margaritacea*, *Festuca rubra*, *Fritillaria lanceolata*, *Habenaria greenei*, *Juncus lesueurii*, *Picea sitchensis*, *Pteridium aquilinum* and *Rosa nutkana*. *Pteridium aquilinum* occurs scattered throughout the areas and in some cases is dominant or co-dominant. *Pinus contorta* is invading and is dominant on the eastern side of each site.

Dominants:	Festuca rubra (variable) Rosa nutkana (variable)
Sub-dominants:	Pinus contorta (local dominant) Pteridium aquilinum (local co-dominant)

Oceanside Dunes - cont.

Minor:	Anaphalis margaritacea
	Fragaria chiloensis
	Fritillaria lanceolata
	Habenaria greenei
	Hypochaeris radicata
	Juncus lesueurii
	Luzula campestris
	Picea sitchensis
	Plantago lanceolata
	Ranunculus sp.
	Vaccinium caespitosum (local co-dominant)
	Viola adunca

XXXVII

SPECIAL PLANT HABITAT

for

Sanicula arctopoides H.&A.* - bears-foot sanicula

LOCATION:

North Beach Peninsula, Pacific County, Washington. Ocean Park, Washington and Cape Disappointment, Washington U.S.G.S. 7.5' quad maps. T10N, R11W, portions of sections 4 and 9 and T11N, R11W, portions of sections 21, 28 and 33. Stabilized sand dunes dominated by native plant species.

GENERAL DESCRIPTION:

Sanicula arctopoides H.&A.* - bears-foot sanicula, is a taprooted perennial; stems much branched at the base either prostrate or ascending, 5-30 cm. long. Leaves are somewhat succulent, often yellowish, three cleft and irregularly toothed. Basal leaves are rosette-forming. Flowers yellow with conspicious involucel.

The plant is distributed along the coast from the southern tip of Vancouver Island, British Columbia, to Santa Barbara County, California. In Washington it is known from one population on North Beach Peninsula, Pacific County.

FEDERAL STATUS: none

STATE STATUS:

Threatened - listed in Endangered, Threatened and Sensitive Vascular Plants of Washington, Washington Natural Heritage Program (1982).

Further information on the species is on file at:

Department of Natural Resources
Washington Natural Heritage Program
3111 Seminar Building SE 3109
The Evergreen State College
Olympia, Washington 98505

* Taxonomic authority

XXXVIII

SPECIAL PLANT HABITAT

for

Poa pachypholis Pipe* - seacliff bluegrass

LOCATION:

Cape Disappointment and vicinity, Pacific County, Washington. *Cape Disappointment*, *Washington - Oregon* U.S.G.S. 7.5' quad map. T10N, R11W, portions of sections 29 and 32 and T9N, R11W, portions of sections 5, 8, 9. Open ocean cliffs along the North Head and Cape Disappointment coastline.

GENERAL DESCRIPTION:

Poa pachypholis Pipe* - seacliff bluegrass, is a densely tufted perennial grass 10-30 cm tall. The species is a local endemic known only from two populations in Pacific County, Washington

FEDERAL STATUS:

Candidate, 1980 Federal Register, Notice of Review.

STATE STATUS:

Threatened- listed in *Endangered, Threatened and Sensitive Vascular Plants of Washington*, Washington Natural Heritage Program (1982)

Further information on the species is on file at:

Department of Natural Resources
Washington Natural Heritage Program
3111 Seminar Building SE 3109
The Evergreen State College
Olympia, Washington 98505

* Taxonomic authority

XXXIX

BAKER BAY MARSHES

LOCATION:

Columbia River, Pacific County, Washington. Cape Disappointment, Washington - Oregon 7.5' U.S.G.S. quad map. T9N R11W, portions of sections 4 and 9. West shore of Baker Bay between Ilwaco, Washington and Cape Disappointment.

GENERAL DESCRIPTION:

Physical Description - Approximately 100 acres of marsh occurs as 3 mainland marshes and one near-shore marsh island. The marshes lie inside the mouth of the Columbia River estuary where freshwater influence is high. The substrate is primarily sand, with little dissection by shallow tidal channels.

Land Use History - Baker Bay has a long history of fishing and fish-processing. There are scattered old pilings throughout the tidelands. Dredging has occurred in the bay over the years for channel maintenance. The dredge spoils are typically deposited on Sand Island, Oregon, south of the town of Ilwaco. A paved roadway now crosses drainages just above the mainland marshes.

Vegetation - The area is dominated by two tidal marsh communities, *Scirpus americanus* low marsh and sedge marsh, with traces of transition marsh development. Minor dune development is found on the southeast end of the marsh island.

PLANT COMMUNITY DESCRIPTION:

Low Marsh

Scirpus americanus community (mapping symbol 3) is the only low marsh community represented. Nearly pure stands of this species occur along the outer marsh edge. Along main drainage channels *Scirpus validus* may occur as a dominant.

Dominants:	Scirpus americanus
Minor:	Scirpus validus (local co-dominant) Lileaopsis occidentalis Triglochin maritimum

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) is the most widespread community in these marshes, occurring in nearly pure stands. Traces of *Typha angustifolia* and *Scirpus validus* indicate low salinities.

Dominants:	Carex lyngbyei

Minor:	Scirpus validus Typha angustifolia Triglochin maritimum

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs in one small, poorly defined section with varying amounts of low and high marsh species.

Dominants:	Carex lyngbyei Triglochin maritimum
Sub-dominants:	Potentilla pacifica Agrostis alba Scirpus americanus
Minor:	Lilaeopsis occidentalis Deschampsia caespitosa Scirpus cernuus

Transition Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica-Forbs community (mapping symbol 17 FORB) occurs infrequently but then on higher areas near the upland.

Dominants:	Potentilla pacifica Agrostis alba Juncus balticus Aster subspicatus Lathyrus palustris Festuca arundinacea
Sub-dominants:	Angelica lucida Phalaris arundinacea
Minor:	Carex lyngbyei

XL

CHINOOK RIVER/WALLACUT MARSHES

LOCATION:

Columbia River Mouth, Pacific County, Washington. Chinook, Washington-Oregon, and Cape Disappointment, Washington-Oregon U.S.G.S. 7.5' quad maps. T9N, R10W, portions of sections 6, 7, 8, and T10N, R11W, portions of sections 27, 34, 35, 36. Shoreline tidelands associated with the mouths of the Chinook and Wallacut Rivers.

GENERAL DESCRIPTION:

Physical Description - Approximately 340 acres of tidal marshes lie as a narrow strip along 5 miles of shoreline in Baker Bay, associated with the mouths of the Chinook and Wallacut Rivers. Lying within the mouth of the Columbia River estuary, freshwater influence is high. Substrates are sandy. Dissection of the marsh surface is limited to meandering main tidal channels. Salt pannes are found to a limited extent in some areas of low marsh. Driftwood has accumulated along the upland-marsh interface.

Land Use History - Baker Bay is a site of some of the earliest pioneer activity in Washington State. Harbor development, pilings and ruins at the towns of Chinook and Ilwaco indicate early fishing and fish processing activities. Tidelands along the Chinook and Wallacut Rivers, except for the immediate mouths, have been diked for farmland and grazing. Old barbed-wire fencing suggest past grazing of high and transition marsh areas south of the Chinook River. Current residential development occurs on uplands adjacent to portions of tidal marsh. Roadways have been constructed on upland adjacent to much of the marsh. Road-fill has affected small freshwater drainages emptying into the marsh. The Chinook River passes beneath Highway 101 via a functioning tide-gate.

Vegetation - Low marsh and sedge marsh dominate tidal marshes north and west of the Chinook River with varying amounts of high marsh along the upland edge. South of the Chinook River, high marsh is dominant with lesser amounts of low and sedge marsh occurring along the outer marsh edge. An area of high and transition marshes occurs along a small slough south of the Chinook River. Minor amounts of typically freshwater species indicate low salinities.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Scirpus americanus community (mapping symbol 3) is the only low marsh community, dominating the leading marsh edge, especially north of the Chinook River. *Triglochin maritimum* occurs as a co-dominant in areas with minor amounts of *Elecharis palustris* and *Lilaeopsis occidentalis* indicating high freshwater influences.

Dominant: Scirpus americanus

Sub-dominant: Triglochin maritimum (local co-dominant)

Minor: Eleocharis palustris (variable)
Lilaeopsis occidentalis (local)

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) dominates upper elevations north of the Chinook River. A small area occurs south of the Chinook River, between the river mouth and the mouth of a small tributary slough. Carex lyngbyei occurs in nearly pure stands. Traces of Lilaeopsis occidentalis, Scirpus validus and Typha sp. (probably angustifolia) indicate high freshwater influence.

Dominant: Carex lyngbyei

Minor: Lilaeopsis occidentalis
Scirpus validus (local)
Typha sp. (angustifolia) (local)

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12) occurs in a small area east of the Ilwaco jetty.

Dominants: Carex lyngbyei
Triglochin maritimum

Sub-dominant: Scirpus americanus

Minor: Deschampsia caespitosa
Lilaeopsis occidentalis
Orthocarpus castillejoides

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs south of the Chinook River, in a zone between 3 low marsh or 11 sedge marsh, and 17 high marsh. Juncus balticus is absent as co-dominant. Carex lyngbyei is co-dominant, with major amounts of low marsh species. A variable community.

Dominants: Agrostis alba
Carex lyngbyei
Deschampsia caespitosa
Potentilla pacifica

Sub-dominants: Scirpus americanus
Triglochin maritimum

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) dominates most higher elevations. Carex lyngbyei is co-dominant over an inner pocket of high marsh, where traces of transition marsh species occur.

Dominants: Agrostis alba
Carex lyngbyei
Potentilla pacifica

Sub-dominant: Juncus balticus (local co-dominant)

Minor: Aster subspicatus
Deschampsia caespitosa
Festuca arundinaceae (introduced)
Lathyrus palustris
Trifolium wormskjoldii
Triglochin maritimum

Transition Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica-Forbs community (mapping symbol 17FORB) occurs at highest elevations of an inner marsh pocket south of the Chinook River. Extensive accumulations of driftwood occur in this area, literally choking the main tidal channel and covering over half of the marsh surface.

Dominants: Agrostis alba
Aster subspicatus
Potentilla pacifica
Vicia gigantea

Sub-dominants: Angelica lucida
Heracleum lanatum
Rumex occidentalis
Sidalcea hendersonii

Minor: Iris pseudacorus (local)
Lathyrus palustris
Poa sp.
Phalaris arundinaceae (introduced)

XLI

SOUTH LONG ISLAND MARSH

LOCATION:

Long Island, Willapa Bay, Pacific County, Washington. Long Island, Washington U.S.G.S. 7.5' quad map. T11N, R10W, portions of sections 20 and 29. Tidal marsh at the southeastern tip of Long Island.

GENERAL DESCRIPTION:

Physical Description - Approximately 75 acres of marsh occur along the mouths of 2 small freshwater drainages, at the southeastern tip of Long Island. Substrates are primarily silts. The low marsh is highly dissected by small tidal channels and contains scattered salt pannes.

Land Use History - All of the adjacent forested upland has been logged. Old pilings along the main tidal channel and Long Island Slough indiciate past log rafting and transport. Access to Long Island for logging activity after the 1940's was provided by a barge. A barge landing area was developed at the south end of this tidal marsh area. A gravel road, built on road-fill, leads from the landing around the south end of the tidal marsh, altering drainage patterns of a small freshwater creek and probably tidal influence. Grazing likely occurred on the tidal marsh where accessible by cattle since the late 1800's. The marsh is currently part of the Willapa National Wildlife Refuge managed by the U.S. Fish and Wildlife Service.

Vegetation - Extensive low marsh dominates the area. Minor areas of sedge, intermediate and high marshes occur.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) occurs in a small area of the southern portion of tidal marsh near the old barge landing. *Carex lyngbyei* occurs as co-dominant.

Dominants:	Distichlis spicata Jaumea carnosa Salicornia virginica Triglochin maritimum
Minor:	Deschampsia caespitosa Orthocarpus castellejoides Plantago maritima Stellaria humifusa

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs extensively, covering nearly two-thirds of the total marsh surface. Deschampsia caespitosa occurs as co-dominant over nearly the entire area. The community occurs as discontinuous hummocks on tidal mudflats. The main marsh surface is highly dissected.

Dominants:	Deschampsia caespitosa Salicornia virginica Triglochin maritimum
Minor:	Jaumea carnosa (variable) Plantago maritima (variable) Puccinellia sp. (variable)

Sedge Marsh

Deschampsia caespitosa-Carex lyngbyei-(Triglochin maritimum) community (mapping symbol 21) occurs primarily as narrow bands along the main slough adjacent to the upland.

Dominants:	Carex lyngbyei Deschampsia caespitosa Triglochin maritimum
Sub-dominants:	Distichlis spicata Salicornia virginica
Minor:	Agrostis alba (local) Jaumea carnosa (local) Stellaria humifusa (local)

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs as a small area at the southern end of the marsh.

Domimants:	Carex lyngbyei (variable) Deschampsia caespitosa (variable) Distichlis spicata Jaumea carnosa Salicornia virginica
Sub-dominant:	Glaux maritima (variable)
Minor:	Agrostis alba Stellaria humifusa Triglochin maritimum

High Marsh

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs as small areas at the southern end of the marsh.

Dominants:	Agrostis alba Deschampsia caespitosa Potentilla pacifica
Minor:	Carex lyngbyei Juncus balticus (local co-dominant)

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs at highest elevations along upland edges at the north and south ends of the marsh.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Minor:	Carex lyngbyei

Spartina Marsh

Spartina alterniflora community (mapped in red). Three colonies occur on mudflats between hummocks of 9 low marsh.

Dominant:	Spartina alterniflora

XLII

BALDWIN SLOUGH MARSHES

LOCATION:

Long Island, Willapa Bay, Pacific County, Washington. Long Island, Washington, U.S.G.S. 7.5' quad map. T11N, R10W, portions of sections 7, 8, 17 and 18. Tidal marshes at Baldwin Slough, and adjacent tidal marshes along the east side of Long Island, within the boundaries of the Willapa National Wildlife Refuge, U.S. Fish and Wildlife Service.

GENERAL DESCRIPTION:

Physical Description - Approximately 230 acres of tidal marsh occur along Baldwin Slough and a second major unnamed slough, at the east side of Long Island. Substrates are primarily silts.

Land Use History - Over 75 percent of the tidelands were diked, reportedly in the early 1900's. The dike has since been breached and tidal influence re-established. Grazing likely took place early on the tidelands where accessible to stock. Logging of the Long Island forests began before the turn of the century. As late as the 1960's, the sloughs and tidelands were used for log storage and transport. The uppermost area of Baldwin Slough is crossed by a road, on gravel road-fill, which impedes freshwater flow.

The area is currently managed as part of the Willapa National Wildlife Refuge. A primitive public campground is located in upland forest at the edge of Baldwin Slough, receiving primarily summer and fall use by campers and hunters. Grazing and trampling effects due to elk use on the tidal marshes can be seen in a few areas.

Vegetation - Most of the marsh is dominated by intermediate marsh, largely lying within the formerly diked area. Areas of sedge marsh occur primarily along the unnamed slough and the bayward edge of the tidal marsh. Small strips and pockets of high marsh occur along uppermost reaches of the main sloughs and side tributaries. Low marsh occurs along outer bayward edges of the marsh and in small areas within intermediate marsh.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritmum community (mapping symbol 5) occurs primarily in three areas, two of which are behind old dikes and one on a point of land at the mouth of Baldwin Slough. All occur on relatively low tidelands with salt pannes.

Dominants: Distichlis spicata (variable)
Jaumea carnosa (variable)
Salicornia virginica

Sub-dominant: Triglochin maritimum

Minor: Carex lyngbyei
Deschampsia caespitosa
Plantago maritima
Stellaria humifusa

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs largely as "hummocks" elevated above surrounding mudflats in three areas along the leading marsh edge. Deschampsia caespitosa occurs in local areas as a co-dominant. Other low marsh species occur locally on flats between hummocks.

Dominants: Salicornia virginica
Triglochin maritimum

Sub-dominants: Deschampsia caespitosa (local co-dominant)
Distichlis spicata (local)
Jaumea carnosa (local)

Minor: Puccinellia sp.

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs primarily in one area along Baldwin Slough. Agrostis alba occurs as co-dominant.

Dominants: Agrostis alba
Distichlis spicata
Salicornia virginica

Minor: Glaux maritima
Hordeum brachyantherum
Stellaria humifusa

Sedge Marsh

Carex lyngbyei community (mapping sumbol 11) occurs in a depression behind an old dike north of Baldwin Slough and in a strip along the bayward side of another dike. Distichlis spicata occurs as co-dominant.

Dominants: Carex lyngbyei
Distichlis spicata

Minor: Agrostis alba
Atriplex patula
Deschampsia caespitosa
Triglochin maritimum

Deschampsia caespitosa-Carex lyngbyei-(Triglochin maritimum) community (mapping symbol 21) dominates areas along the inner reaches of the unnamed slough within the formerly diked area. Agrostis alba occurs as co-dominant along the uppermost slough reaches.

Dominants:	Carex lyngbyei Deschampsia caespitosa Triglochin maritimum
Sub-dominant:	Agrostis alba (local co-dominant)
Minor:	Distichlis spicata (local) Salicornia virginica (local)

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) is the most widespread community, covering nearly half of the total marsh areas. Most of this community is found within the formerly diked area. Jaumea carnosa is co-dominant in some areas.

Dominants:	Deschampsia caespitosa Distichlis spicata Salicornia virginica
Sub-dominants:	Jaumea carnosa (local co-dominant) Triglochin maritimum (variable)
Minor:	Agrostis alba Carex lyngbyei Festuca rubra Glaux maritima (local) Plantago maritima Stellaria humifusa

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) dominates marsh at the southern end of the area, primarily lying within the formerly diked area. Carex lyngbyei is co-dominant in many areas. Agrostis alba is co-dominant in local areas along a slough bank and along the old diking ditch.

Dominants:	Deschampsia caespitosa Distichlis spicata
Sub-dominants:	Agrostis alba (local co-dominant) Carex lyngbyei (local co-dominant)

Minor:	Jaumea carnosa (local) Potentilla pacifica (local) Salicornia virginica (local) Triglochin maritimum

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs primarily in narrow strips against upland edges along the upper reaches of Baldwin Slough, and along the unnamed slough within the formerly diked area. *Carex lyngbyei* occurs as co-dominant in many areas. *Juncus balticus* is absent as a co-dominant in a few areas.

Dominants:	Agrostis alba Juncus balticus (variable) Potentilla pacifica
Sub-dominant:	Carex lyngbyei (local co-dominant)
Minor:	Angelica lucida Atriplex patula Deschampsia caespitosa Distichlis spicata (local) Festuca rubra Glaux maritima Grindelia integrifolia Rumex sp. Trifolium wormskjoldii Triglochin maritimum

Spartina Marsh

Spartina alterniflora community (mapped in red). Two colonies occur on mudflats within 9 low marsh at the mouth of Baldwin Slough.

Dominant:	Spartina alterniflora

XLIII

LEWIS SLOUGH AREA MARSHES

LOCATION:

Long Island, Willapa Bay, Pacific County, Washington. Long Island, Washington U.S.G.S. 7.5' quad map. T11N, R10W, portions of sections 5, 6; T11N, R11W, portions of section 1; T12N, R10W, portions of section 31; T12N, R11W, portions of section 36. Tidal marshes along Lewis Slough, Kaffee Slough, and an unnamed slough, towards the northern end of Long Island.

GENERAL DESCRIPTION:

Physical Description - Approximately 150 acres of marsh occur primarily in narrow bands along the many branches of Lewis Slough, Kaffee Slough, and an unnamed slough, at the north end of Long Island. Substrates are primarily silts.

Land Use History - Logging of forested lands adjacent to Lewis Slough probably began in the late 1800's and continued through the late 1960's. The sloughs were used for log rafting and transport. Tidal marshes were likely grazed where accessible to cattle, beginning with early homesteads during the late 1800's. This use has been discontinued. The area is currently part of the Willapa National Wildlife Refuge and receives some seasonal hunting and camping uses. Substantial grazing and trampling by elk, deer, and bear occur on marshes along the upper reaches of Lewis Slough.

Vegetation - Sedge marsh, intermediate marsh and high marsh communities dominate marsh along Lewis Slough. Some low marsh also occurs. Low and intermediate marshes appear to dominate along Kaffee Slough. Intermediate and high marshes appear to dominate along the unnamed slough east of Kaffee Slough.

Large areas of *Spartina* marsh occur on mudflats bayward of the sloughs. In areas the individual *Spartina* colonies have coalesced into continuous mats.

A freshwater pond and marsh, reportedly impounded by beaver activity, occur along the upper reaches of the unnamed slough east of Kaffee Slough.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica community (mapping symbol 7) occurs as 2 small, poorly defined areas within intermediate marsh along Lewis Slough. *Puccinellia sp.* and *Deschampsia caespitosa* occur as co-dominants. The areas receive substantial elk use.

Dominants: Deschampsia caespitosa (variable)
Puccinellia sp. (probably)
Salicornia virginica

Salicornia virginica-Triglochin maritimum community (mapping symbol 9) occurs at lowest marsh elevations or in tidal channels, as discontinuous "hummocks" above surrounding mudflats. Deschampsia caespitosa occurs as co-dominant at slightly higher elevations.

Dominants: Salicornia virginica
Triglochin maritimum

Sub-dominant: Deschampsia caespitosa (local)

Minor: Carex lyngbyei (local)
Puccinellia sp.
Spergularia sp.

Sedge Marsh

Deschampsia caespitosa-Carex lyngbyei-(Triglochin maritimum) community (mapping symbol 21) occurs relatively extensively along upper reaches of Lewis Slough. The largest area of this type receives heavy use by big-game species, especially elk.

Dominants: Carex lyngbyei
Deschampsia caespitosa (variable)
Triglochin maritimum

Minor: Lilaeopsis occidentalis

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping sumbol 14) occurs extensively at elevations between low marsh and high marsh. Carex lyngbyei occurs over some areas as co-dominant. Agrostis alba is locally co-dominant along upper reaches of the middle branch of Lewis Slough. This community receives substantial use by big-game species (especially elk) in local areas.

Dominants: Deschampsia caespitosa
Distichlis spicata
Salicornia virginica

Minor: Agrostis alba (local co-dominant)
Carex lyngbyei (local co-dominant)
Festuca rubra
Glaux maritima
Grindelia integrifolia (local)
Jaumea carnosa (variable)
Plantago maritima (local)
Potentilla pacifica (local)
Triglochin maritimum (local sub-dominant)

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs in association with 14 intermediate marsh. Carex lyngbyei occurs as co-dominant in most areas.

Dominants: Deschampsia caespitosa
Distichlis spicata
Carex lyngbyei (variable)

Minor: Glaux maritima
Salicornia virginica
Triglochin maritimum

High Marsh

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs on highest marsh elevations primarily along upland edges. In most areas Juncus balticus is absent. Carex lyngbyei is typically co-dominant.

Dominants: Agrostis alba
Carex lyngbyei (variable)
Potentilla pacifica

Minor: Deschampsia caespitosa
Festuca rubra
Juncus balticus (local)
Scirpus cernuus
Triglochin maritimum

Spartina Marsh

Spartina alterniflora community (mapped in red) accounts for more than half of the total marsh area, occurring primarily as 2 large, continuous areas on flats outside the mouths of the sloughs. Numerous scattered colonies occur on the outermost mudflats. Many colonies also occur scattered within the sloughs on channel mudflats.

Dominant: Spartina alterniflora

XLIV

DIAMOND POINT

RESEARCH NATURAL AREA

LOCATION:

Long Island, Pacific County, Washington. Long Island, Washington U.S.G.S. 7.5' quad map. T12N, R11W, portions of section 25. An upland forest stand located at the northernmost tip of Long Island, Willapa National Wildlife Refuge.

GENERAL DESCRIPTION:

The following is an excerpted description of Diamond Point RNA taken from Franklin, J.F., F.L. Hall, C.T. Dyrness and C. Maser. 1972. Federal Research Natural Areas in Oregon and Washington: A Guidebook for Scientists and Educators. 498 p., illus. U.S.D.A. Forest Service. Pac. Northwest Forest and Range Experiment Station, Portland, Oregon.

ENVIRONMENT

Topography on the Diamond Point Research Natural Area is, for the most part, composed of moderate slopes along several broad ridges which are interrupted by short drainage channels. There are small areas of steeper slopes, notably along the northwest-facing shore where slopes plunge abruptly to the bay. Elevations range from sea level to just over 30 m. (100 ft.). The natural area is bounded on the east, north, and west by approximately 1.2 km. (3/4 mile) of shoreline.

BIOTA

Estimated areas by SAF cover types (Society of American Foresters 1954) are:

No.	Name	Area
225	Sitka Spruce-Western Hemlock	18 ha. (45 acres)
224	Western Hemlcok	10 ha. (25 acres)
221	Red Alder	7 ha. (18 acres)

The area falls within Kuchler's (1964) Type 1, Spruce-Cedar-Hemlock Forest, and the *Picea sitchensis* Zone of Franklin and Dyrness (1969).

There are only three tree species of any importance in the natural area: red alder (*Alnus rubra*), Sitka spruce, and western hemlock. Most of the stands appear to be approximately 70 to 80 years old, having resulted from logging of the area some time near the turn of the century. Composition of coniferous stands ranges from Sitka spruce, with minor amounts of hemlock on north and west facing slopes, to pure stands of western hemlock on ridgetops and south slopes. Tree regeneration under spruce-hemlock stands usually consists of scattered stems of both spruce and hemlock. Red alder also occasionally occurs in small openings. In stands where hemlock is the dominant tree in the overstory, regeneration is dominantly western hemlock with very few Sitka spruce. Pure, even-aged stands of red alder occur in drainageways and in low areas along the shoreline.

Tree overstory coverage in coniferous stands varies from about 60 to 75 percent. In the denser alder stands it averages 90 to 100 percent. Typical western hemlock and Sitka spruce trees are from 30- to 46-cm. (12- to 18-in.) d.b.h., with the largest specimens ranging up to 91-cm. (36-in.) d.b.h.

There are two main understory community types in coniferous stands within the natural area: (1) the *Polystichum munitum* type found in moist areas where Sitka spruce is the dominant tree species, and (2) a *Gaultheria shallon* type generally associated with hemlock-dominated timber stands. The *Polystichum* community is characterized by only scattered shrub cover contributed mainly by *Vaccinium parvifolium, V. ovatum, Rhamnus purshiana, Sambucus melanocarpa, and Rubus spectabilis. Gaultheria shallon,* if present, is often restricted to rotten logs and stumps. The herb layer is dominated by luxurious growth of *Polystichum munitum* which may cover as much as 80 percent of the ground surface. Other common herbaceous species include *Blechnum spicant, Athyrium filix-femina, Galium triflorum, Pyrola uniflora, Luzula parviflora, Maianthemum bifolium* var. *kamtschaticum, Lysichitum americanum, Dryopteris dilatata, Oxalis oregana, Tiarella trifoliata, Trillium ovatum,* and *Monotropa hypopitys*. A heavy growth of moss covers the ground in all coniferous stands. Average moss cover is generally 80 to 90 percent, with *Eurynchium oreganum* probably the most common species.

The *Gaultheria* community is dominated by large amounts of *Gaultheria shallon,* some of it up to 2 m. (6 ft.) in height. Other common shrubs are *Vaccinium parvifolium, V. ovatum, Rhamnus purshiana,* and *Menziesia ferruginea*. The herb layer is scattered and made up of species such as *Polystichum munitum, Blechnum spicant, Dryopteris dilatata, Polypodium scouleri* (both on the ground and as an epiphyte), *Galium triflorum, Luzula parviflora,* and *Osmorhiza nuda*.

The vegetation under pure stands of red alder in drainages and swampy swales is made up of the above mentioned ferns, *Lysichitum americanum, Montia sibirica, Carex* spp., *Cardamine* sp., *Melissa officinalis, Equisetum* sp., and a variety of other moisture-loving species. Several low-lying alder stands adjacent to the bay have an almost pure *Carex* understory which is unusually lush and dense (fig. DP-2).

Mammals believed to utilize the area as either residents or transient visitors are listed in table DP-1. Birds frequenting the area include band-tailed pigeons *(Columba fasciata)*, bluegrouse *(Dendragapus obscurus)*, and ruffed grouse *(Bonasa umbellus)*.

HISTORY OF DISTURBANCE

As previously mentioned, the area was logged some 70 to 80 years ago. Since then, there appears to have been very little additional disturbance by man. There is a small, primitive campground (Diamond Point Campground) reached only by water near the northwestern corner of the area, but so far the user-related disturbances do not extend very far inland. All of

Long Island is a big-game, bow-hunting area, and hunters undoubtedly pass through the area, but effects of this use appear negligible. There is, however, considerable evidence of heavy browsing of shrubs and ferns by deer and elk in some of the more open stands.

In 1966 a clearcut logging operation came close to the southern boundary of the natural area. Because of the lack of natural area boundary markers, it is difficult to tell exactly how much of a buffer, if any, remains between the clearcut and the natural area.

XLV

LONG ISLAND-JENSEN POINT MARSH

LOCATION:

Long Island, Willapa Bay, Pacific County, Washington. Long Island, Washington U.S.G.S. 7.5' quad map. T11N, R11W, portions of sections 1, 2, 11 and 12. Tidal marsh associated with Jensen Point on the west side of Long Island.

GENERAL DESCRIPTION:

Physical Description - Approximately 65 acres of marsh occur on tidelands inside Jensen Point, a mile-long vegetated sand spit protruding from the west side of Long Island. A small intermittent freshwater drainage empties into the higher marsh from the adjacent upland. Substrates associated with the sand spit and along the immediate mainland shoreline are primarily sands. Outer tideflat substrates are primarily silts. Minor dune development occurs along the sand spit. Beach areas along the south half of the sand spit are primarily gravelly.

Land Use History - Remains of a small dike crosses the middle of the higher marsh suggesting use by settlers, probably in the late 1800's. Apparently man-made berms and a storage shed occur at the tip of the point. The area is part of the Willapa National Wildlife Refuge, and receives minor amounts of recreational and hunting activities.

Vegetation - Inner, higher marsh areas are dominated by high marsh and intermediate marsh. Small areas of low and sedge marshes are found. An extensive area of *Spartina* marsh occurs contiguous with the higher marshes, and dozens of colonies occupy outer bare mudflats. Minor dune vegetation development occurs along higher elevations of the sand spit. Dune and marsh species intermingle at the dune/marsh ecotone, especially on low outermost areas of the sand spit.

PLANT COMMUNITY DESCRIPTIONS:

Low Marsh

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5) occurs in one small area. *Salicornia virginica* occurs in minor quantities. *Triglochin maritimum* is absent as co-dominants. *Orthocarpus castillejoides* occurs as co-dominant.

Dominants:	Distichlis spicata Jaumea carnosa
Sub-dominant:	Orthocarpus castillejoides

Minor: Agrostis alba (local)
Deschampsia caespitosa (local)
Salicornia virginica
Spergularia sp.

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10) occurs as a small area within high marsh. Triglochin maritimum is absent.

Dominants: Distichlis spicata
Salicornia virginica

Sedge Marsh

Carex lyngbyei community (mapping symbol 11) occurs as a narrow strip against the upland, apparently associated with freshwater seepage.

Dominant: Carex lyngbyei

Intermediate Marsh

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14) occurs as a small area below high marsh elevations. Extensive Spartina marsh occurs contiguous with the outer edge of this community.

Dominants: Deschampsia caespitosa
Distichlis spicata
Jaumea carnosa

Minor: Agrostis alba
Festuca rubra
Grindelia integrifolia
Salicornia virginica

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16) occurs below high marsh elevations. Extensive Spartina marsh occurs contiguous with the outer edge of this community.

Dominants: Deschampsia caespitosa
Distichlis spicata

Sub-dominant: Salicornia virginica

Minor: Jaumea carnosa

High Marsh

Deschampsia caespitosa community (mapping symbol B) occupies much of the inner high marsh elevations. Most of this type lies inside the formerly diked area. Dominated nearly entirely by dense tufts of Deschampsia caespitosa.

Dominant:	Deschampsia caespitosa
Minor:	Atriplex patula

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15) occurs in a depression between the spit and the old dike.

Dominants:	Agrostis alba Deschampsia caespitosa Festuca rubra
Sub-domimant:	Distichlis spicata
Minor:	Grindelia integrifolia Jaumea carnosa Salicornia virginica

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17) occurs extensively at the highest tideland elevation. Where adjacent to the sand pit, dune species intermingle. Most of this type lies within the formerly diked area.

Dominants:	Agrostis alba Juncus balticus Potentilla pacifica
Sub-dominant:	Festuca rubra (local)

Spartina Marsh

Spartina alterniflora community (mapped in red) dominates lowest marsh elevations, occupying two-thirds of the total marsh area. It occurs as contiguous colonies along the outer edge of the higher marshes and along the inside edge of the outer sand spit.

Dominant:	Spartina alterniflora

XLVI

SMOKY HOLLOW BOG

LOCATION:

Long Island, Willapa Bay, Pacific County, Washington. Long Island, Washington U.S.G.S. 7.5' quad map. T11N, R10W, portion of section 18. A small freshwater bog formed behind a berm on the west side of Long Island, Willapa National Wildlife Refuge, U.S. Fish and Wildlife Service.

GENERAL DESCRIPTION:

Physical Description - Approximately 15 acres of freshwater marsh occur at the mouth of a small watershed on the southern end of Long Island. The freshwater marsh is separated from adjacent estuarine tidelands by an apparently natural sand/gravel berm and a small forested upland mound. A few acres of open water occur between the western marsh edge and the berm/upland.

Land Use History - Most of the adjacent upland forest was logged during the 1940's and 1950's. A few cut stumps among the standing dead snags on an upper area of the marsh suggest some past logging activity on the wetland itself. Many standing dead snags along the upper reaches of the marsh suggest a sudden increased impoundment of freshwater in the past. The occurrence or extent of past water level manipulations due to human activity is unknown. Reported past management activity by the Willapa National Wildlife Refuge includes the introduction of non-native *Zizania aquatica* (wild rice) for waterfowl use, and rumors of stocking of the open waters with trout. Currently, the wildlife refuge maintains a primitive campground on the upland forest mound at the berm edge.

Vegetation - Wetland vegetation over the area has been separated into 4 major groupings, described below.

1) Open water areas (mapping symbol OPEN WATER) are primarily open water surfaces. Scattered individuals of *Juncus effusus* and introduced *Zizania aquatica* occur locally.

2) *Carex cusickii-Sphagnum spp.* bog (mapping symbol "P") occurs primarily as a floating mat (quaking bog) in the southeastern portion of the wetland. There is an accumulation of downed logs throughout this area. Typically, forest species occur on the logs. *Sphagnum* is discontinuous through the area. There is probably a mixture of sphagnum and sedge peat.
   Partial Species List:
   - Alnus rubra
   - Carex cusickii
   - Carex obnupta
   - Drosera rotundifolia
   - Juncus effusus
   - Lonicera involucrata
   - Lysimachia terrestris (introduced)
   - Myrica californicum

Picea sitchensis
Sphagnum spp.
Thuja plicate
Tsuga heterophyla
Vaccinium ovatum

3) Typha latifolia area (mapping symbol "Q") occurs predominantly in two locations.

Partial Species List:
Carex obnupta
Hypocotyle ranunculoides
Lysichitum americanum
Oenanthe sarmentosa
Potentilla palustris
Typha latifolia

4) "Snag wetland" area (mapping symbol R) occurs on uppermost marsh reaches, and is poorly defined. The area is visually identified by the large number of even aged snags throughout. There is a large accumulation of fallen logs. A number of typically upland species occur on the logs.

Partial Species List:
Athyrium filix-femina
Belchnum spicant
Carex cusickii
Carex obnupta
Cicuta sp.
Gaultheria shallon
Galium trifidum
Juncus sp. (probably acuminatus)
Lysichitum americanum
Menziesia ferruginea
Rubus spectabilis
Sphagnum spp.
Thuja plicata

XLVII

CEDAR GROVE

LOCATION:

Long Island, Pacific County, Washington. Long Island, Washington U.S.G.S. 7.5' quad map. T11N, R10W, portions of sections 19 and 20. An old-growth upland forest stand at the southern end of Long Island.

GENERAL DESCRIPTION:

Approximately 264 acres of virgin old-growth upland forest occur within a small watershed at the southern end of Long Island. The forest is dominated by *Thuja plicata* (western red-cedar) and *Tsuga heterophylla* (western hemlock). Older cedars in the stand are estimated to be between 400 and 1,000 years old. None of the forest has ever been cut. The area lies within the proclamation boundary of the Willapa National Wildlife Refuge, U.S. Fish and Wildlife Service. If a current land-timber exchange program is completed as proposed by the U.S. Fish and Wildlife Service, the stand would be proposed for classification as a natural area.

XLVIII

GUNPOWDER ISLAND NATURAL AREA PRESERVE

LOCATION:

Willapa Bay, Pacific County, Washington. North Cove, Washington U.S.G.S. 7.5' quad map. T14N, R11W. Portions of a tidal sand island lying at the mouth of Willapa Bay, approximately two air miles north of the tip of Leadbetter Point.

GENERAL DESCRIPTION:

Gunpowder Island is an isolated tidal sand island surrounded by open estuarine waters at the mouth of Willapa Bay. In 1981, most of the island was established as a 197 acre Natural Area Preserve by the Washington State Department of Natural Resources, primarily for the protection of nesting habitat for Caspian Terns. The island is primarily a shifting, bare tidal sandflat. Trace amounts of dune plant species occur over the surface, along with scattered pieces of driftwood.

APPENDIX I

APPENDIX I

PLANT COMMUNITY ABSTRACTS

A. SALT MARSH COMMUNITIES

Identification and definition of salt marsh plant communities is based on Carol Jefferson's (1975) work in Oregon. We have modified her marsh types and plant communities, for purposes of this study, based on the work of other researchers in Washington State and our own field experience.

Plant communities are listed by salt marsh community type. Communities are named primarily by their dominant species. Species names in brackets are significant indicator species rather than dominants. Species names are separated by hyphens. The mapping symbol representing the community on map overlays follows the community name. Abstracts provide information on habitat, geographic distribution in Washington State, literature referenced, comments and partial plant species lists for each community.

LOW MARSH

Scirpus americanus community (mapping symbol 3)
Habitat: Polyhaline, sandy, low intertidal marsh.
Distribution: Puget Sound, Grays Harbor, Willapa Bay and Columbia River mouth.
References: K. Ewing (1982); C. Jefferson (1975); L. Kunze and L.Cornelius, field observations.
Associated Species:
Puccinellia sp.
Scirpus americanus
Spergularia marina
Triglochin maritimum

Triglochin maritimum community (mapping symbol 4)
Habitat: Low silty to sandy marsh, with a wide range of salinities.
Distribution: Grays Harbor and Willapa Bay
References: L. Kunze and L. Cornelius, field observations.
Comments: Apparently a tideflat colonizer, forming hummocks on mudflats. K. Ewing considered describing it as a community for the Skagit Estuary but ultimately decided it is co-dominant in a number of communities but does not constitute its own in that area.
Associated Species:
Triglochin maritimum

Salicornia virginica-Jaumea carnosa-Distichlis spicata-Triglochin maritimum community (mapping symbol 5)
Habitat: High salinity low intertidal marsh on silty sands.
Distribution: Puget Sound, Grays Harbor and Willapa Bay
References: M. Burg (1980); R. Frenkel, T. Boss, S.R. Schuller (1978); C. Jefferson (1975); L. Kunze and L. Cornelius, field observations.
Comments: This is a highly variable species rich community. *Plantago maritima* may be co-dominant.

Associated Species:
Distichlis spicata
Glaux maritima
Grindelia integrifolia
Hordeum jubatum
Jaumea carnosa
Orthocarpus castillejoides
Plantago maritima
Salicornia virginica
Stellaria humifusa
Triglochin cocinnum
Triglochin maritimum

Salicornia virginica community (mapping symbol 7)
Habitat: Polyhaline, low intertidal marsh on well aerated silts and sands.
Distribution: Grays Harbor, Willapa Bay and Puget Sound.
References: M. Burg (1980); R. Frenkel, T. Boss, S.R. Schuller (1978)
Comments: The community seldom occurs in this monospecific form. When it does, it appears to be colonizing newly acreated sandy tideflats, breached diked areas or occassionally, depressions in high marsh zones. Aeration of soils appears to be important.
Associated Species:
Salicornia virginica

Distichlis spicata community (mapping symbol 8)
Habitat: High salinity, sandy or silty, low intertidal marsh.
Distribution: Puget Sound, Grays Harbor and Willapa Bay
References: M. Burg (1980); R. Frenkel, T. Boss, S.R. Schuller (1978); C. Jefferson (1975)
Comments: Depressions in high marsh or occassionally in low marsh.
Associated Species:
Distichlis spicata
Grindelia integrifolia
Salicornia virginica
Triglochin maritimum

Salicornia virginica-Triglochin maritimum community (mapping symbol 9)
Habitat: High salinity, silty, low intertidal marsh.
Distribution: Puget Sound, Grays Harbor and Willapa Bay
References: R. Frenkel, T. Boss, R. Schuller (1978); C. Jefferson (1975); L. Kunze, L. Cornelius, field observations.
Comments: Colonizes tidalflats and channels, forming hummocks.
Associated Species:
Fucus distichus
Salicornia virginica
Triglochin maritimum

Distichlis spicata-Salicornia virginica-(Triglochin maritimum) community (mapping symbol 10)
Habitat: High salinity low intertidal marsh on silty-sands. Also in depressions in high marsh.
Distribution: Puget Sound, Grays Harbor and Willapa Bay
References: M. Burg (1980); R. Frenkel, T. Boss, S.R. Schuller (1978); L. Kunze and L. Cornelius, field observations.
Associated Species:
Distichlis spicata
Salicornia virginica
Triglochin maritimum

Scirpus maritimus community (mapping symbol 13)
Habitat: High salinity (8ppt), anoxic intertidal marshes on silty or clay soils.
Distribution: Puget Sound, Grays Harbor, Willapa Bay and Baker Bay.
References: K. Ewing (1982); C. Jefferson (1975)
Associated Species:
Scirpus maritimus

SEDGE MARSH

Carex lyngbyei community (mapping symbol 11)
Habitat: Brackish, silty or sandy, intertidal marsh, ranging from low intertidal to high marsh.
Distribution: Puget Sound, Grays Harbor, Willapa Bay and the mouth of the Columbia River.
References: M. Burg (1980); R. Frenkel, T. Boss, S.R. Schuller (1978); K. Ewing (1982); C. Jefferson (1975); L. Kunze and L. Cornelius, field observations.
Comments: Two ecotypes may occur having different salt tolerences. Often occurs along stream channels.
Associated Species:
Carex lyngbyei

Carex lyngbyei-Triglochin maritimum community (mapping symbol 12)
Habitat: Brackish, silty or sandy, intertidal marsh, typically along tidal channels.
Distribution: Puget Sound, Grays Harbor, Willapa Bay and the mouth of the Columbia River.
References: K. Ewing (pers. comm.); R Frenkel, T. Boss, S.R. Schuller (1978); L. Kunze and L. Cornelius
Associated Species:
Carex lyngbyei
Triglochin maritimum

Deschampsia caespitosa-Carex lyngbyei-Triglochin maritimum community (mapping symbol 21)
Habitat: Brackish, silty tidal marshes. Often occurring along tidal channels.
Distribution: Puget Sound, Grays Harbor and Willapa Bay.
References: M. Burg (1980); R. Frenkel, T. Boss, S.R. Schuller (1978); C. Jefferson (1975); L. Kunze and L. Cornelius, field observations.
Associated Species:
Carex lyngbyei
Deschampsia caespitosa
Lilaeopsis occidentalis
Triglochin maritimum

INTERMEDIATE MARSH

Deschampsia caespitosa-Distichlis spicata-Salicornia virginica community (mapping symbol 14)
Habitat: High salinity, low to moderate elevation saltmarsh on silts.
Distribution: Grays Harbor and Willapa Bay
References: R. Frenkel, T. Boss, S.R. Schuller (1978); C. Jefferson (1975); L. Kunze and L. Cornelius, field observations.
Comments: Species rich, variable community.
Associated Species:
Carex lyngbyei
Deschampsia caespitosa
Distichlis spicata
Festuca rubra
Glaux maritima
Grindelia integrifolia
Jaumea carnosa
Potentilla pacifica
Salicornia virginica
Triglochin maritimum

Deschampsia caespitosa-Distichlis spicata community (mapping symbol 16)
Habitat: Moderate elevation marsh, brackish to high salinities.
Distribution: Grays Harbor and Willapa Bay.
References: C. Jefferson (1975); L. Kunze and L. Cornelius, field observations.
Comments: Infrequently occurring community
Associated Species:
Deschampsia caespitosa
Distichlis spicata

HIGH MARSH

Deschampsia caespitosa-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 15)
Habitat: High marsh on silts.
Distribution: Puget Sound, Grays Harbor and Willapa Bay
References: M. Burg (1980); R. Frenkel, T. Boss, S.R. Schuller (1978); C. Jefferson (1975); L. Kunze and L. Cornelius, field observations.
Comments: Wide spread high marsh community. Presence of *Juncus balticus* is variable.
Associated Species:
- Agrostis alba
- Aster subspicatus
- Carex lyngbyei
- Deschampsia caespitosa
- Distichlis spicata
- Festuca rubra
- Juncus balticus
- Potentilla pacifica
- Trifolium wormskjoldii

Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 17)
Habitat: High marsh on silts with little dissection by tidal channels
Distribution: Puget Sound, Grays Harbor and Willapa Bay.
References: R. Frenkel, T. Boss, S.R. Schuller (1978); L. Kunze and L. Cornelius, field observations.
Comments: Wide spread high marsh community. Cover of *Juncus balticus* is variable.
Associated Species:
- Agrostis alba
- Aster subspicatus
- Carex lyngbyei
- Juncus balticus
- Potentilla pacifica
- Trifolium wormskjoldii

Festuca rubra-Agrostis alba-Potentilla pacifica community (mapping symbol 18)
Habitat: High marsh or transition zone community on silts.
Distribution: Grays Harbor and Willapa Bay.
References: R. Frenkel, T. Boss, S.R. Schuller (1978); L. Kunze and L. Cornelius.
Comments: Frenkel *et al*. describe this as a transition zone community. We have found *F. rubra* as a sub- to co-dominant in high marsh communities.
Associated Species:
- Agrostis alba
- Deschampsia caespitosa
- Festuca rubra
- Juncus balticus
- Juncus lesueurii
- Potentilla pacifica
- Trifolium wormskjoldii

Festuca rubra-Armeria maritima-Orthocarpus castillejoides community (mapping symbol A)
Habitat: On tidally-influenced sands at the interface between upper tidal marshland and coastal dunes.
Distribution: Willapa Bay
References: L. Kunze and L. Cornelius, field observations.
Associated Species:
Aira praecox (introduced)
Armeria maritima
Carex pansa
Festuca rubra
Fragaria chiloensis
Glaux maritima
Orthocarpus castillejoides
Plantago coronopus (introduced)
Spergularia sp.
Trifolium wormskjoldii

Deschampsia caespitosa community (mapping symbol B)
Habitat: Intermediate to high marsh on sandy to silty substrates.
Distribution: Grays Harbor and Willapa Bay
References: L. Kunze and L. Cornelius, field observations.
Comments: Deschampsia occurs as densely spaced hummocks with very few associated species. It is theorized that areas where this community occurs may have been heavily grazed at one time.
Associated Species:
Atriplex patula
Deschampsia caespitosa

TRANSITION MARSH

Agrostis alba-Juncus balticus-Potentilla pacifica-Forbs community (mapping symbol 17FORB)
Habitat: High marsh with freshwater influence or slight elevation gain above high marsh communities.
Distribution: Puget Sound, Grays Harbor and Willapa Bay.
References: L. Kunze and L. Cornelius, field observations.
Associated Species:
Achillea millefolium
Agrostis alba
Angelica lucida
Carex lyngbyei
Festuca rubra
Heracleum lanatum
Juncus balticus
Oenanthe sarmentosa
Potentilla pacifica
Rumex sp
Sedalcia hendersonii (Washington State Monitor Species)
Trifolium wormskjoldii
Viccia gigantea

Calamagrostis nutkaensis-Agrostis alba-Juncus balticus-Potentilla pacifica community (mapping symbol 20)

Habitat: High marsh on the upper tidal river reaches.

Distribution: Puget Sound, Grays Harbor and Willapa Bay

References: L. Kunze and L. Cornelius, field observations.

Comments: Found at the heads of drainages still affected by tidal water but with strong freshwater influence.

Associated Species:

- Agrostis alba
- Angelica lucida
- Calamagrostis nutkaensis
- Festuca rubra
- Heracleum lanatum
- Juncus balticus
- Potentilla pacifica
- Pyrus fusca
- Sidalcea hendersonii

PLANT COMMUNITY ABSTRACTS

B. COASTAL DUNE COMMUNITIES

Identification and definition of coastal dune plant communities is based on Wiedemann, et al. (1974) for Oregon dunes. We have modified their work for Washington State based on personal communications with Al Wiedemann and our field experience.

Plant communities are listed by community type. Communities are named by their dominant species and in some cases by characteristic community features. Hyphens are used to separate species names for species found within the same strata. Slashes separate strata. The mapping symbol representing the community on the map overlays follows the community name. In some cases communities have been lumped for mapping purposes - hence more than one community may be given the same mapping symbol. Abstracts provide information for each community on habitat, geographic distribution within Washington State literature,references, comments and partial plant species lists.

AMMOPHILA DUNE

Ammophila arenaria community (mapping symbol D)

Habitat: Foredune and secondary dunes, areas of active sand deposition.

Distribution: Outer coastline of Pacific and Grays Harbor County

References: Wiedemann, et al. (1974)

Comments: Ammophila arenaria is a European dune binding grass species introduced in this area as part of a dune stabilization program. It has since come to dominate active dune sites in Washington State.

Associated Species:

Ammophila arenaria (introduced)
Ammophila breviligulata (introduced)
Lathyrus japonicus

FOREDUNE AND SECONDARY DUNE

Elymus mollis community (mapping symbol E)

Habitat: Areas of active sand deposition

Distribution: Bay shorelines, sand spits and the outer coastlines of Pacific and Grays Harbor Counties

References: Wiedemann, et al. (1974); L. Kunze and L. Cornelius field observations

Comments: This community lumps two native dune colonizing communities described by Wiedemann, et al. It occurs to a very limited extent in Washington, presumably having been displaced by Ammophila arenaria and A. breviligulata.

Associated Species:

Ambrosia chamissonis
Cakile edentula
Carex macrocephala
Convolvulus soldanella
Elymus mollis
Honkenya peploides

DEFLATION PLAIN

Lupinus littoralis-Poa macrantha-Fragaria chiloensis community (mapping symbol F)

Habitat: Dry deflation plain areas on secondary dunes and eroded secondary dune hummocks. The water table is a meter or more below the surface.

Distribution: Outer coastline of Pacific and Grays Harbor Counties.

References: Wiedemann, *et al*. (1974)

Comments: There may be considerable open sand associated with this community. Wiedemann *et al*. described it as being moderately to slightly tolerant of sand movement. A number of dune binding plant species may be found here.

Associated Species:
- Abronia latifolia
- Convolvulus soldanella
- Fragaria chiloensis
- Glehnia leiocarpa
- Lathyrus littoralis
- Lupinus littoralis
- Poa macrantha
- Polygonum paronychia

Festuca rubra community (mapping symbol F)

Habitat: Deflation plain areas with standing water in the winter and spring but where the water table drops to as much as one meter below surface in summer.

Distribution: Outer coastline of Grays Harbor and Pacific Counties.

References: Wiedemann, *et al*. (1974)

Associated Species:
- Achillea millefolium
- Aira praecox (introduced)
- Anaphalis margaritacea
- Festuca rubra
- Fragaria chiloensis
- Gnaphalium purpureum
- Hypochaeris radicata
- Lupinus littoralis
- Tanecetum camphoratum

Juncus nevadensis-Juncus falcatus community (mapping symbol G)

Habitat: Deflation plain areas with standing water through early summer.

Distribution: Outer coastline of Grays Harbor and Pacific Counties.

References: Wiedemann, *et al*. (1974)

Associated Species:
- Agrostis spp.
- Aster chilensis
- Centarurium umbellatum
- Epilobium franciscanum
- Juncus falcatus
- Juncus nevadensis

Sisyrinchium californicum
Trifolium wormskjoldii

Carex obnupta community (mapping symbol G)
Habitat: Deflation plain areas containing standing water year round though typically shallow during summer.
Distribution: Outer coastline of Grays Harbor and Pacific Counties.
References: Wiedemann, et al. (1974)
Associated Species:
Carex hindsii
Carex obnupta
Gentian sceptrum
Lycopodium inundatum (Washington State Threatened)
Potentilla pacifica
Ranunculus flammula

Salix hookeriana/Carex obnupta community (mapping symbol H)
Habitat: Deflation plain areas with standing water year round from a few decimeters to two meters.
Distribution: Outer coastline of Pacific and Grays Harbor Counties.
References: Wiedemann, et al. (1974)
Comments: This community ranges from a low shrub wetland dominated by Salix hookeriana to "swamps" with small tree size Alnus rubra and Salix hookeriana.
Associated Species:
Alnus rubra
Carex obnupta
Lysichitum americanum
Myrica californica
Salix hookeriana

STABILIZED DUNES

Rosa nutkana/Festuca rubra community (mapping symbol I)
Habitat: Non-forested stabilized dunes. Relatively high organic material accumulation in soils.
Distribution: Highly limited distribution, between stabilized forested dune and deflation plain in Grays Harbor and Pacific Counties.
References: L. Kunze and L. Cornelius, field observations
Comments: Habitat for this community was probably maintained by occassional fires prior to settlement of the coast by white people. Supression of fires, grazing, home development, off-road-vehicle use and introduction of weedy species for dune stabilization appear to be severly threatening this community.
Associated Species:
Festuca rubra
Fragaria chiloensis
Fritillaria lanceolata
Habenaria greenei
Hypochaeris radicata
Pteridium aquilinum
Ranunculus sp

Rosa nutkana
Vaccinium caespitosum
Viola adunca

Vaccinium ovatum-Gaultheria shallon-Arctostaphylos uva-ursi community (mapping symbol J)
Habitat: In a zone preceeding Pinus contorta establishment and in the deflation plain on dry stable sites.
Distribution: Outer coastline of Grays Harbor and Pacific Counties.
References: Wiedemann, et al. (1974)
Comments: This community occurs to a limited extent in Washington. Arctostaphylos uva-ursi frequently forms expansive mats on dry hummocks in the deflation plain and along the high secondary dune ridge landward of the deflation plain.
Associated Species:
Arctostaphylos uva-ursi
Gaultheria shallon
Myrica californica
Vaccinium ovatum

Pinus contorta/Vaccinium ovatum-Gaultheria shallon community (mapping symbol K)
Habitat: Dry stabilized dune sites extending into drier areas in the deflation plain.
Distribution: Outer coastline of Grays Harbor and Pacific Counties.
References: Wiedemann, et al. (1974) Schreüder et al. (1974)
Associated Species:
Alnus rubra
Arctostaphylos uva-ursi
Gaultheria shallon
Myrica californica
Pinus contorta
Vaccinium ovatum
Vaccinium parvifolium

Picea sitchensis/Vaccinium ovatum-Gaultheria shallon community (mapping symbol L)
Habitat: Dry stabilized dune sites with relatively high organic matter accumulation.
Distribution: Outer coastline of Grays Harbor and Pacific Counties.
References: Wiedemann, et al. (1974)
Comments: This may be the climax community for coastal dune systems. Dominant shrubs form a dense layer up to three meters in height. Tsuga heterophylla may be co-dominant.
Associated Species:
Gaultheria shallon
Picea sitchensis
Pinus contorta
Tsuga heterophylla
Vaccinium ovatum
Vaccinium parvifolium

Picea sitchensis wetland community (mapping symbol M)
Habitat: Dune troughs in stabilized dune systems.
Distribution: Outer coastline of Pacific County and perhaps Grays Harbor County.
References: L. Kunze and L. Cornelius field observations
Comments: Individual Picea are widely spaced reaching DBHs of 10 feet. A number of typically freshwater wetland species occur.
Associated Species:
Alnus rubra
Carex obnupta
Gaultheria shallon
Luzula sp
Maianthemum dilatatum
Myrica californica
Picea sitchensis
Pyrus fusca
Rhamnus purshiana
Rubus spectabilis
Salix spp
Spiraea douglasii
Vaccinium ovatum
Vaccinium parvifolium

Shrub Wetland community (mapping symbol O)
Habitat: Wet, stabilized dune troughs.
Distribution: Grays Harbor and Pacific Counties.
References: Schreuder et al. (1974)
Comments: Occur regularly along Washington's coast as virtually impenetrable shrub wetlands. Species composition is partially known.
Associated Species:
Carex obnupta
Lysichitum americanum
Pyrus fusca
Rhamnus purshiana
Rubus spectabilis
Salix hookeriana
Salix lasiandia
Salix sp
Spiraea douglasii

BIBLIOGRAPHY

BIBLIOGRAPHY

Burg, M.E., D.R. Tripp, E.S. Rosenberg. 1980. Plan association and primary productivity of the Nisqually salt marsh on southern Puget Sound, Washington. N.W. Sci. 54(3):222-236.

Chapman, V.J. 1976. Coastal vegetation. 2nd edition. Pergamon Press. 292pp.

Cooper. W.S. 1958. Coastal sand dunes of Oregon and Washington. Geological Society of America Memoir 72.

Franklin, J.F., F.C. Hall, C.T. Dyrness, C. Maser. 1972. Diamond Point Research Natural Area in Federal Research Natural Areas in Oregon and Washington: A guide book for scientists and educators. Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S.D.A. Portland, Oregon. p DP1-DP9.

Frenkel, R.E., T. Boss, S.R. Schuller. 1978. Transition zone vegetation between intertidal marsh and upland in Oregon and Washington. EPA grant #R804963-01. Dept. of Geography, Oregon State University., Corvallis, Oregon.

Frenkel, R.E., H.P. Eilers. 1976. Tidal datums and characteristics of the upper limits of coastal marshes in selected Oregon estuaries. Report to the E.P.A., Corvallis, Oregon.

Frenkel, R.E., H.P. Eilers, and C.A. Jefferson. 1981. Oregon coastal salt marsh upper limits and tidal datums. Estuaries. 4(3):198-205.

Hansen, D.J., P. Dayanandan, P.B. Kaufman and J.D. Brotherson. 1976. Ecological adaptations of salt marsh grass, Distichlis spicata (Gramineae), and environmental factors affecting its growth and distribution. Amer. J. Bot. 63(5):635-650.

Hinde, H.P. 1954. The vertical distribution of salt marsh phanerogams in relation to tide levels. Ecol. Monogr. 24(2):209-225.

Jefferson, C.A. 1975. Plant communities and succession in Oregon coastal salt marshes. Ph.D. Thesis, Oregon State University, Corvallis, Oregon. 192pp.

Jefferson, C.A. 1976. Relationship of vegetation and elevation at upper and lower limits of the transition zone between wetland and upland in Oregon's estuaries. Report to the E.P.A., Corvallis, Oregon.

Kumler, M.L. 1969. Plant succession on the sand dunes of the Oregon coast. Ecol. 50(4):695-704.

Levings, C.D. and A.I. Moody. 1976. Studies of intertidal vascular plants, especially sedge (Carex lyngbyei), on the disrupted Squamish River delta, British Columbia. D.O.E. Fisheries, and Marine Service, Technical Report #606, 51pp.

Bibliography - cont.

Mahall, B.E. and R.B. Park. 1976. The ecotone betwen Spartina foliosa Trin. and Salicornia virginica L. in salt marshes of northern San Francisco Bay: III. Soil aeration and tidal immersion. J. Ecol. 64:811-819.

Mahall, B.E. and R.B. Park. 1976. The ecotone between Spartina foliosa Trin. Salicornia virginica L. in salt marshes of northern San Francisco Bay: II. Soil water and salinity. J. Ecol. 64:793-809.

Messmer, L., D.R. Mudd, S.L. Smith. ____. Salt marshes in Grays Harbor, Washington. Unpub.

Northwest Environmental Consultants. 1974. Environmental evaluation of the Willapa River and Harbor Navigation Project, Pacific County, Washington, for U.S. Army Corps of Engineers Contract No. DACW67-74-C-0156.

Ranwell, D.S. 1972. Ecology of salt marshes and sand dunes. London, Chapman and Hall. 258 pp.

Rozema, J. and B. Blom. 1977. Effects of salinity and inundation on the growth of Agrostis stolonifera and Juncus gerardii. J. Ecol. 65:213-222.

Scheffer, T.H. 1945. The introduction of Spartina alterniflora to Washington with oyster culture. Leaflets of Western Botany 4(6):163-164.

Schreuder, G.F., G.A. Bradley, et al. 1974. Leadbetter Point environmental assessment. Washington State Parks and Recreation Commission by Univ. of Washington, College of Forest Resources Center for Resource Management Studies. 156p.

Smith, J.L., D.R. Mudd and L.W. Messmer. 1975. Maintenance dredging and the environment of Grays Harbor, Washington: Appendix F. Vegetation. U.S. Army Corps of Engineers.

U.S. Fish and Wildlife Service. 1970. Proceedings of the northwest estuarine and coastal zone symposium. Bureau of Sport Fisheries and Wildlife, U.S.F.W.S. 318pp.

U.S. Fish and Wildlife Service. 1978. Environmental assessment: Acquisition of Long Island, Willapa National Wildlife Refuge, Washington. U.S. Fish and Wildlife Service, Dept. of Interior, Portland, Oregon. 92p.

U.S. Fish and Wildlife Service and Weyerhaeuser Co. 1979. Long Island Forest Management Plan, Willapa National Wildlife Refuge, Pacific County, Washington. U.S. Fish and Wildlife Service, Region I, Portland, Oregon. 89p.

Washington Natural Heritage Program. 1981. An illustrated guide to the endangered, threatened and sensitive vascular plants of Washington. 328p.

Bibliography - cont.

Washington Natural Heritage Program. 1982. Endangered, threatened and sensitive vascular plants of Washington. Department of Natural Resources. 25 p.

Widrig, R.S. 1980. The birds and plants of Long Beach Peninsula, Pacific County, Washington. 22 p.

Wiedemann, A.M., L.R.J. Dennis, F.H. Smith. 1974. Plants of the Oregon Coastal dunes. O.S.U. Book Stores, Inc. 117 p.

SECTION II.

LAND USE/LAND COVER
WILDLIFE HABITATS

Title: Baseline Inventory of Land Cover/Land Use and Wildlife Use In the Coastal Zone of Grays Harbor and Pacific Counties, Washington

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ABSTRACT

The Washington Department of Game (WDG) mapped wildlife use and land cover at a scale of 1:24,000 for the coastal zone of Grays Harbor County and Pacific County, Washington. This was part of a coastal resource inventory conducted by the Washington Department of Ecology to provide baseline data that will support state participation in the federal policy, planning and managerial decisions regarding Outer Continental Shelf (OCS) oil/gas development.

Wildlife use data was mapped from literature and revised based on field surveys and discussions with experts. Land cover/land use was interpreted from aerial photographs and verified in the field. In addition, occurrences of endangered, threatened and sensitive species were mapped and briefly described in a computerized data base. These data were transferred to mylar overlays for use with U. S. Geological Survey Topographic Maps, 7.5 min. series, which are compatible with the Washington Coastal Zone Atlas (1980).

The maps will help decision-makers determine which areas are most important for wildlife and should receive special consideration in the planning process.

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INTRODUCTION

This is the final report of a 10-month study of wildlife* and habitats in the coastal zone of Grays Harbor and Pacific Counties, Washington. We performed the study under contract to the Washington State Department of Ecology. The goal of the study was to collect and map baseline data on wildlife use and land cover/land use in the coastal zone.

The state will use this information to help plan for projects, such as onshore support bases, pipeline landfalls, and fabrication yards, which may arise from the Federal Government's Outer Continental Shelf (OCS) Oil and Gas Lease Program.

MAPPING STUDIES

Study Area

Wildlife use and land cover/land use for much of Washington's coastline were mapped and described in the Coastal Zone Atlas of Washington[36], and accompanying Land Cover/Land Use Narratives[37]. The present study supplements those works, covering the coastal zone of Grays Harbor and Pacific Counties, from the southern boundary of the Quinalt Indian Reservation to the Astoria-Megler bridge. The coastal zone is defined as extending inland 2,000 ft from mean high water, and seward to approximately 30 ft below mean sea level. It also extends upriver 2,000 ft past the end of saltwater influence. Land cover/land use maps adhere closely to this definition. However, the three major peninsulas - Point Brown, Point Chehalis, and Long Beach - were mapped entirely, in spite of some parts being slightly outside the 2,000-ft coastal strip. Also, the Chehalis and Willapa Rivers were not mapped to the upper end of saltwater influence. Wildlife use maps include some areas outside the coastal zone, because of the mobile nature of many animals using coastal habitats.

Methods

Land Cover/Land Use Mapping

We mapped land cover/land use types in the study area, using the classification system developed by the Washington Department of Game (WDG) for the Coastal Zone Atlas[36] and Narratives[37], as modified for land cover mapping on the Chehalis River floodplain[42]. Three new land cover types - Cranberry Bog, Freshwater Swamp, and Sand Dune - were added or changed, because they are unique to the study area, or their characteristics differ from related cover types elsewhere.

Specific activities were to: 1) interpret aerial photographs and map preliminary land cover/land use types; 2) verify cover/use types in the field; and 3) transfer map data to mylar (clear plastic) overlays of U. S. Geological Survey (USGS) quadrangle maps. These activities were completed between 1 February and 30 July.

*Including fishes

We used both true color (1974) and infrared (1981) aerial photographs for land cover/land use mapping. Scale was 1:24,000. True color photographs provided by the Washington Departments of Ecology (WDE) and Natural Resources (WDNR) were used for the bulk of the mapping. Infrared photographs were used at the U. S. Army Corps of Engineers, Seattle Distict Office, to update land cover/land use data.

Mapping was done by first placing stereo pairs of aerial photographs under a mirror stereoscope on a light table. A sheet of mylar was placed over one of the stereo pairs. Polygons were then traced around all land cover/land use units greater than or equal to one-half acre. Units less than one-half acre were incorporated with adjoining units.

We verified and updated mapped land cover/land use types in the field, by comparing aerial photographs and mylar overlays with the units themselves. We reached units by truck, boat, and on foot.

After field verification, we transferred map data to mylar overlays of USGS 7.5 minute (1:24,000 scale) topographic series maps. (The latter are hereafter referred to as USGS base maps.) Completed land cover/land use maps were sprayed with lacquer to preserve them.

Wildlife Use Mapping

Wildlife use data for the study area were initially drawn from a literature review and from the WDG/WDNR Natural Heritage Data System. Preliminary maps were made on mylar overlays of National Ocean Survey Nautical Charts (1:40,000 scale) and USGS base maps. We then revised and refined these maps, based on discussions with experts on wildlife use in the study area, and on our own field observations. Reviewed and corrected wildlife use data were then transferred to mylar overlays on USGS base maps, and sprayed with lacquer to preserve them. Wildlife use maps were essentially complete by 30 July. We added a small amount of new information to the maps between 1 August and 30 October, after a second review by experts.

Results

Maps

Five copies each of the land cover/land use and wildlife use overlay maps accompany this report. Land cover/land use maps consist of a series of polygons representing units of land cover or land use. Each polygon contains a number, coded to a land cover/land use type listed in Appendix 1. Certain land cover types contain highly productive, sensitive or limited habitat types: meadows and beach grasslands (311, 312), riparian zones (33, 46) mature and old-growth conifer forests (413, 414), mature broadleaf and mixed forests (423, 433), rivers/streams (51), lakes/ponds (52), bays/estuaries (54), lagoons (56), sloughs (57), wetlands (6), and exposed/other lands (7). These types are marked with an asterisk in the classification (Appendices 1, 2), and their wildlife values are described in the Coastal Zone Atlas Narratives[37].

Wildlife use overlays consist of species names, accompanied by letters and symbols indicating type and location of wildlife use. Letter and symbol codes are listed in Appendix 3. Two additional Appendices - 4 and 5 - list animals in the study area having special legal or administrative status, and status definitions for those species.

Land cover/land use and wildlife use overlays can be used together or separately with USGS base maps, by placing them on a light table and aligning their respective register marks. Map data are then interpreted by consulting the appropriate appendices. For information on species generally associated with each land cover/land use type, refer to the Coastal Zone Atlas of Washington: Land Cover/Land Use Narratives[37].

Computer Data Base

Land cover/land use data mapped for the Coastal Zone Atlas of Washington[36] have been digitized and stored by computer[43]. Similarly, land cover/land use data compiled for the present study can be digitized and stored, possibly together with data for the Coastal Zone Atlas. Digitized storage will facilitate both retrieval and updating of information on land cover and land use in the coastal zone of Washington.

Information on Special Species* occurrences in Washington is continually updated through the Natural Heritage Data System. Updating is needed as wildlife use changes, and as new information is acquired. The computer printout lists location, site description, ownership, and other pertinent data for each element (Special Species) occurrence. A printout of element occurrences appearing on the wildlife use overlay maps accompanies this report (Appendix 6). To prevent disturbance of special species and habitats, occurrence locations should not be released to the general public.

Conclusion

The land cover/land use and wildlife use maps provide information that will help planners and developers avoid or mitigate impacts on wildlife habitats. The special habitat types (*in classification, Appendix 1), special species locations (Appendix 6) and areas on the wildlife overlays that show concentrated wildlife use are generally the most significant for wildlife. During the planning process, these areas should receive special consideration and further study.

*Special Species are listed and defined in Appendices 4 and 5.

References

1. Beccasion, A. D., et al. 1981. Pacific Coast Ecological Inventory. U. S. Fish and Wildlife Service, National Coastal Ecosystems Team, NASA-Slidell Computer Complex, 1010 Gause Boulevard, Slidell, Louisiana 70458. Published by Biological Services Program, U. S. Fish and Wildlife Service, Washington, D.C.

2. Gardner, F. (ed). 1981. Washington Coastal Areas of Major Biological Significance. State of Washington Department of Ecology. 631pp.

3. Washington Department of Game and Washington Department of Natural Resources, Natural Heritage Data System, Olympia, Washington.

4. Kalinowski, S. A., et al. 1982. Wildlife Studies on Proposed Disposal Sites in Grays Harbor, Washington. Washington Department of Game, Aberdeen, Washington. U. S. Army Corps of Engineers, Seattle District. 202pp.

5. Brittell, J. D., et al. 1976. Marine Shoreline Fauna of Washington, Vol. II, Habitat Requirements of Selected Species. State of Washington Departments of Game and Ecology. 341pp.

6. Widrig, R. S. 1982. Personal Communication, Ocean Park, Washington.

7. Wilson, U., and J. Hidy. 1982. Personal Communication, Willapa National Wildlife Refuge, Ilwaco, Washington.

8. Cummins, E. 1982. Personal Communication, Washington Department of Game, Aberdeen, Washington.

9. Anonymous. 1973. South Coastal Basin Study, Fish and Wildlife Appendix. Washington Department of Game, Environmental Management Division

10. Wahl, T. R. 1977. Sight Records of Some Marine Mammals Offshore from Westport, Washington. Murrelet - Spring Issue: pp 21-23

11. Smith, J. L., et al. 1976. Impact of Dredging on the Avian Fauna in Grays Harbor. Appendix H, Maintenance Dredging and the Environment of Grays Harbor Washington. Washington Department of Game, Olympia, Washington. U. S. Army Corps of Engineers District, Seattle, Washington. 217pp.

12. Fields, D. 1982. Personal Communications, Washington Department of Natural Resources, Chehalis, Washington.

13. Bell, H. 1982. Personal Communication, ITT Rayonier, Inc., Hoquiam, Washington.

14. Anonymous. 1978. Environmental Assessment, Acquisition of Long Island, Willapa National Wildlife Refuge, Washington. U. S. Fish and Wildlife Service, Department of Interior, Oregon. 72pp.

References (cont)

15. Smith, J. L. 1982. Personal Communication, Washington Department of Game, Aberdeen, Washington.

16. Peters, C. F., et al. 1978. Colonial Nesting Sea and Wading Bird Use of Estuarine Islands in the Pacific Northwest. Technical Report D-78-17, Dredged Material Research Program. Office, Chief of Engineers, U. S. Army, Washington, D.C. 20314.

17. Jones and Stokes Associates, Inc. 1981. Columbia River Estuary Data Development Program Final Report: Avifauna. Pacific Northwest River Basins Commission, 1 Columbia River, Vancouver, Washington 98660.

18. Tabor, J. E. 1976. Inventory of Riparian Habitats and Associated Wildlife along Columbia and Snake Rivers, Vol. 2A, Lower Columbia River. Oregon Cooperative Wildlife Research Unit, Oregon State University. Wildlife Work Group, U. S. Army Corps of Engineers, North Pacific Division. 861pp.

19. Brunner, K. 1982. Grays Harbor and Chehalis River Improvements to Navigation Study, Biological Assessment on the Brown Pelican. U. S. Army Corps of Engineers, Seattle District. 7pp.

20. Jeffries, S. 1982. Personal Communication, Washington Department of Game, Astoria, Oregon.

21. Widrig, R. S. 1979 (revised 1981). The Shorebirds of Leadbetter Point. A Twelve Month Census with Notes on Other Records from Willapa Bay, Washington. Published Independently. Ocean Park, Washington. 60pp.

22. Kalinowski, S. A. 1982. Personal Communication, North Cove, Washington.

23. Nielsen, J. 1982. Personal Communication, Washington Department of Game, Aberdeen, Washington.

24. Garcia, J., et al. 1982 (in press). Energy-Related Use Conflicts for the Columbia River Estuary. Final Draft, Vol. II. Bio-Systems Analysis, Inc., San Francisco, California. Office of Biological Services, Fish and Wildlife Service, U. S. Department of the Interior, Washington, D.C. 20240.

25. Jordan, M. 1982. Personal Communication, Trumpeter Swan Society, Bothell, Washington.

26. Crawford, B. 1982. Personal Communication, Washington Department of Game, Vancouver, Washington.

27. Gibbons, R. 1982. Personal Communication, Washington Department of Game, Olympia, Washington

28. Herman, S. G., and J. B. Bulger. 1981. The Distribution and Abundance of Shorebirds during the 1981 Spring Migration at Grays Harbor, Washington. Seattle District, U. S. Army Corps of Engineers. 64pp.

29. Paulson, D. 1982. Personal Communication, Thomas Burke Memorial Museum, University of Washington, Seattle, Washington.

30. Guy, D. 1982. Personal Communication, Washington Department of Game, Aberdeen, Washington.

31. Alcorn, G. 1982. Personal Communication, Museum of Natural History, University of Puget Sound, Tacoma, Washington.

32. Smith, J. L., et al. 1976. Impact of Dredging on the Mammalian Fauna in Grays Harbor. Appendix I, Maintenance Dredging and the Environment of Grays Harbor Washington. Washington Department of Game, Olympia, Washington. U. S. Army Corps of Engineers, Seattle, Washington. 47pp.

33. Hoge, G., and W. Hoge. n.d. Birds of Ocean Shores. Published Independently. Olympia, Washington. 50pp.

34. Samuelson, D. 1982. Personal Communication, Grays Harbor College, Aberdeen, Washington.

35. Dobler, F. 1982. Personal Communication, Washington Department of Game, Olympia, Washington.

36. Washington Department of Ecology. 1977-1979. Coastal Zone Atlas of Washington. 12 Volumes. Olympia, Washington.

37. Albright, R., et al. 1980. Coastal Zone Atlas of Washington: Land Cover/Land Use Narratives. 2 Volumes. Washington Department of Ecology. Olympia, Washington. 887pp.

38. Wahl, T. 1982. Personal Communication, Bellingham, Washington.

39. Speich, S. M., and T. R. Wahl. Catalog of Washington Seabird Colonies. In preparation, U. S. Fish and Wildlife Service. Portland, Oregon.

40. Hammond, P. C., and D. V. McCorkle. 1982. The 1982 Field Survey Results for the Oregon Silverspot Butterfly (Speyeria zerene hippolyta). Office of Endangered Species, U. S. Fish and Wildlife Service, Department of the Interior.

41. Manuwal, D. A., and R. W. Campbell. 1979. Status and Distribution of Breeding Seabirds of Southeastern Alaska, British Columbia, and Washington. In J. C. Bartonek and D. N. Nettleship (eds.). Conservation of Marine Birds of Northern North America. Papers from the International Symposium held at Seattle Hyatt House, Seattle, Washington, 13-15 May 1975. USDI Fish and Wildlife Service, Wildlife Research Report 11, Washington, D. C.

References (cont)

42. Nelson, W. H., S. Kalinowski, and L. Lynam. 1980. Chehalis River Floodplain Land Cover Mapping between Aberdeen and Montesano, Washington. U. S. Army Corps of Engineers, Seattle. 45pp.

43. Washington Department of Ecology. 1980. Coastal Zone Atlas of Washington: Automated Data Base - An Introduction. Olympia, Washington.

Appendix 1.

Land/Cover/Land Use Classification System

LAND COVER/LAND USE CLASSIFICATION SYSTEM

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
1 Urban	11 Residential	111 Low Density	1111 Single Family	
			1112 Multi-Family	
		112 High Density	1121 Single Family	
			1122 Multi-Family	
		113 Wooded Residential		
	12 Commercial Complex	121 Business/Govt.		
		122 Commercial/Light Industrial		
		123 Institutional	1231 School	
			1232 Hospital	
			1233 Cemetary	
		124 Resort/Hotel		
		125 Other		
	13 Industrial Complex	131 Light Industry		
		132 Heavy Industry		
		133 Petroleum/Chemical Processing		
		134 Food Processing		
		135 Other		
	14 Transportation/ Utilities	141 Airport		
		142 Ferry Service Facility		
		143 Highway		
		144 Railroad		
		145 Pipeline		
		146 Bridges		
		147 Power Lines/ Right-of-Way		
		148 Water Treatment/ Storage	1481 Water Supply	
			1482 Sewage Treatment	

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
1 Urban (cont)		149 Other		
	15 Harbor/Port	151 Commercial Cargo/ Shipping		
		152 Marina		
		153 Log Storage	1531 Water	
			1532 Land	
		154 Riprap		
		155 Dike		
		156 Breakwater		
		157 Pilings		
		158 Pier		
		159 Other		
	16 Construction Under Development	161 Residential		
		162 Commercial		
		163 Industrial		
		164 Other		
	17 Extractive	171 Mineral Extraction		
		172 Stone Quarries		
		173 Sand, Gravel, Clay		
		174 Oil, Gas Wells		
		175 Abandoned Mining Operations		
	18 Open Lands	181 Scraped Areas		
		182 Dredge/Fill		
		183 Refuse Stations		
	19 Recreational	191 Park		
		192 Golf Course		
		193 Urban Wooded		
	20 Mixed Complex			
2 Agriculture	21 Crop/Pasture	211 Row Crops		
		212 Field Crops/ Pasture		

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
	22 Orchards/Groves/ Vineyards/ Nurseries	221 Orchard		
		222 Vineyards		
		223 Nurseries		
		224 Groves		
	23 Mariculture	231 Oyster		
		232 Salmonid		
	24 Inactive Agriculture			
	25 Other Agriculture	251 Cranberry Bog		
3 Nonforested, Vegetated Uplands	31 Grassland	311 Meadow		
		*312 Beach Grassland		
		*313 Open Grassland		
	32 Shrub	321 Successional Shrub		
		322 Coastal Shrub		
		323 Shrub/Exposed Rock		
	*33 Riparian	331 Shrub		
	34 Bluff	341 Grass		
		342 Shrub		
4 Forested Uplands	41 Coniferous	411 Regeneration Conifer (to 14 yrs)		
		412 Pole Stage Conifer (closed canopy)	4121 Successional Shrub	
		*413 Mature Conifer (open canopy)		
		*414 Old Growth (approx. 150 yrs)	4141 Douglas Fir-Madrona, Old Growth	
		415 Christmas Trees		

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
	42 Broadleaf	421 Regeneration Broadleaf (less than or equal to 40')		
		422 Pole Stage Broadleaf		
		*423 Mature Broadleaf		
	43 Mixed Forest	431 Regeneration Mixed		
		432 Pole Stage Mixed		
		*433 Mature Mixed		
	44 Open Woodland			
	45 Disturbed Forest	451 Clearcut		
		452 Burn		
		453 Selective Logging		
		454 Grazed Forest		
	*46 Riparian	461 Coniferous	4611 Regeneration	
			4612 Pole Stage	
			4613 Mature	
			4614 Old Growth	
		462 Broadleaf	4621 Regeneration	
			4622 Pole Stage	
			4623 Mature	
		463 Mixed Forest	4631 Regeneration	
			4632 Pole Stage	
			4633 Mature	
5 Water	*51 Rivers/Streams	511 Estuarine		
		522 Pastoral		
	*52 Lakes/Ponds	521 Lake		
		522 Inland Pond		
		524 Coastal Pond		
		525 Beaver Pond		
		526 Farm Pond		

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
	53 Reservoirs			
	*54 Bays/Estuaries	541 Bays		
		542 Estuaries		
	55 Impoundments			
	*56 Lagoon	561 Enclosed		
		562 Open		
	*57 Slough	571 Freshwater Slough		
		572 Marine Slough		
	58 Canals/Channels			
	59 Open Water	591 Exposed Open Water		
		592 Protected Open Water		
*6 Wetlands	61 Wetland-Forested	611 Intertidal Freshwater/ Brackish Swamp	6111 w/Picea	
			6112 w/o Picea	
		612 Freshwater	6121 Shrub Swamp	
			6122 Coniferous Swamp	61221 Regeneration
				61222 Pole Stage
				61223 Mature
				61224 Old Growth
			6123 Broadleaf Swamp	61231 Regeneration
				61232 Pole Stage
				61233 Mature
			6124 Mixed Forested Swamp	61241 Regeneration
				61242 Pole Stage
				61243 Mature

Appendix 1 (cont)

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
	62 Wetland-Vegetated Nonforested	621 Inland Freshwater Marsh		
		622 Coastal Freshwater Marsh		
		623 Salt Marsh		
		624 Bog		
		625 Salt Meadow		
		626 Brackish Marsh		
		627 Eelgrass		
		628 Kelp Community		
		629 Other Algal Assoc, (community)		
	63 Wetland-Non-vegetated (or Beach Substrates)	631 Rock (includes boulders)		
		632 Cobble (relatively pure cobble)		
		633 Mixed Coarse (cobble, gravel and sand - occ. boulders)		
		634 Mixed Medium (coarse gravel, sand-includes a pure gravel beach)		
		635 Mixed Fine (fine gravel, sand, mud)		
		636 Sand		
		637 Sand-Silt (fine sand, silt/clay)		
		638 Silt/Clay		
*7 Exposed/Other Lands	71 Rock	711 Rock Outcroppings		
		712 Talus		
		713 Islands, Rock	7131 Grass	
			7132 Shrub	
			7133 Conifer	
			7134 Broadleaf	
			7135 Mixed Forest	

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
		714 Cliffs		
	72 Sand	721 Island, Sand	7211 Vegetated	
			7212 Nonvegetated	
		722 Sand Dune	7221 Grass	
			7222 Shrub	
			7223 Forest	
			7224 Wet Depression	
		723 Slide		
		724 Sand Bar		
	74 Spit	741 Vegetated Spit		
		742 Nonvegetated Spit		
	76 Bluff			

* Special Habitat Types, see results section of this report.
Also see reference # 37 for a discussion of wildlife values.

Appendix 2.

Land Cover Descriptions for the Coastal Zone
of Grays Harbor and Pacific Counties

Land Cover Descriptions for the Coastal Zone of Grays Harbor and Pacific Counties *

1 Urban. Developed areas are given this designation. Such areas support residential, commercial, industrial, and transportation uses. Wildlife use and degree of natural cover serve as indicators of the value of existing urban habitats relative to natural conditions.

11 Residential. Human dwellings and adjacent lands (lawns, gardens, parking area, etc.) are included in the designation. Residential development substantially degrades much of an area's value to wildlife resources by destroying natural vegetative cover and associated habitat values. Residential areas provide a limited amount of habitat to a few kinds of wildlife such as common songbirds and small mammals, e.g., house finch, house sparrows, robins, squirrels, and raccoons. Larger birds and mammals require larger territories and are the first to disappear with residential construction. In general, areas of low density housing contain a greater amount and diversity of wildlife habitat than areas of high density housing. As a result, numbers of wildlife species also increase.

111 Nonwooded Residential. This designation applies to nonwooded areas of low density housing (less than two dwellings per acre) usually occurring outside incorporated communities. Natural cover usually is drastically altered and replaced with horticultural plantings.

112 High Density Residential. Areas designated have high density housing including single and multi-family units as well as neighborhood services.

113 Wooded Residential. Well wooded areas with low density housing (less than two dwellings per acre) are included in this class. The natural cover is usually minimally altered.

12 Commercial/Service/Industrial. The designation includes areas developed for commercial, public service, and industrial purposes. Such areas are usually, but not always, heavily impacted by human structures and activities. Values to wildlife are usually extremely limited. In most cases, development has decreased or eliminated wildlife that formerly used these habitats.

13 Industrial Complex. Manufacturing, chemical plants, food processing and other facilities.

14 Transportation/Utilities. Areas of sufficient size to be mapped which are used for transportation and utility purposes and have an important impact on wildlife resources are included in this designation. Positive and negative influences on wildlife vary depending on the type of facility present.

143 Highway. This designation is assigned to major thoroughfares and adjacent rights-of-way. Highways are highly detrimental to wildlife: habitat is permanently eliminated by construction, traffic and pedestrians

*Taken from Dept. of Ecology, 1979[36], Burrell, 1978[44], and Nelson, et al, 1980[42].

are a constant disturbance to wildlife, many animals are killed attempting to cross highways, and highways can encourage dispersal of exotic pests such as starlings. Secondary losses of wildlife habitat which occur with developments along highways such as commercial services and housing are also important.

Value of roadside vegetation to birds and other animals can be increased by proper management, such as planting shrubs which do not need mowing or spraying, or by delaying roadside mowing and spraying until July or later.

Sections of highways built along the shoreline of Grays Harbor and Willapa Bay have severely altered important edge habitat between upland and aquatic environments.

144 Railroad. Railroads and adjacent rights-of-way are included in this designation. Railroads have negative impacts on wildlife habitat similar to those associated with roads - habitat loss during construction and animal kills during crossings.

146 Bridge. Major bridges are included in this designation. Negative effects on habitat values can occur during construction, including alteration in current, velocity, and water circulation patterns. Salinity may be affected in estuarine environments. Bridges can encourage human use of undeveloped areas.

147 Powerlines and Rights-of-Way. This designation includes powerlines and associated rights-of-way. These lands are used by wildlife preferring "edge", habitat where brush and trees occur next to open lands. Such wildlife include black-tailed deer, red-tailed hawks, and rodents. Powerline rights-of-way may act as corridors for the dispersal of exotic species, such as dogs.

148 Water and Waste Treatment/Storage. Ponds used for treatment of sewage effluent and storage of potable water are assigned this designation.

1482 Sewage Treatment. This designation includes ponds used for treatment of sewage and mill effluent.

15 Harbor/Port. This designation includes facilities located along the shoreline and/or extending beyond the shoreline, which service commercial and recreational water-oriented commerce. It also includes structures necessary for protected moorage. Port associated activities can have profound effects on marine wildlife and plants.

152 Marina. Included are moorage areas for public or private use generally consisting of multiple piers or docks and related service facilities.

153 Log Storage. This designation includes areas used for log storage occurring on uplands, along the shoreline, or in open water. Water storage is more detrimental to wildlife resources than upland storage. It can destroy invertebrates, including those fed upon by

shorebirds, alter vegetation, and thus negatively impact biologic production, adversely affect juvenile salmon and flatfish which may feed in the area and seriously degrade water quality.

Log rafts can be beneficial to wildlife by serving as artificial islands. As islands they may provide resting areas for several marine birds and river otter (Lutra canadensis). They may also be used by birds, such as great blue herons as feeding platforms.

1531 Water Storage. Commercial log raft storage facilities.

1532 Land Storage. Areas on land used for log storage. Filling of swamps for such use has destroyed valuable wetlands in the study area.

17 Extractive. This designation includes areas used for mining, especially sand and gravel extraction. Extraction mining usually destroys habitat for flora and fauna inhabiting the site. It can result in excessive upland erosion and increased sedimentation of nearby waters. Moreover, recreational opportunities may be eliminated. In general, these areas have little wildlife value.

18 Open Land. The open land designation applies to areas which have little vegetation due to scraping, dredging, filling, or use as refuse stations. This designation does not refer to undeveloped or park areas.

181 Scraped Area. The designation refers to areas cleared of vegetation for subsequent development.

183 Refuse Station. Areas where garbage is dumped are designated refuse stations.

19 Recreation. This designation includes parks, camps, golf courses, or small woodlots within well-developed residential areas. These areas exhibit varying degrees of habitat alteration.

193 Urban Wooded. Included in this designation are small areas of undeveloped wooded land within well-developed urban areas. Vegetation is usually undisturbed except where occasional trails occur. In general, these woodlots help to control noise and air pollution, create welcome visual diversity, and provide urban refuges for plants, animals, and man. Wildlife may use woodlots for feeding, resting, nesting, and cover. Small urban woods and sometimes single trees can play a critical role in maintaining wildlife species not commonly found in developed areas (e.g., hawks). These woods commonly support some small mammals, a high density of bird species, and domestic dogs and cats. Series of small woodlots often occurring in urban areas can serve as a corridor for birds. Larger woodlots with diverse vegetation support more types of wildlife than smaller woodlots. In addition to small mammals and birds, these large woodlots may support large mammals, such as black-tailed deer (Odocoileus hemionus) and coyote (Canis latrans). Sensitive species (eagles, bobcats, etc.) are not common in these areas.

2 Agriculture. Lands designated as agriculture are being used, or were used, for crops, pasture, orchards, vineyards, and/or nursery lands. Agricultural lands generally provide a greater amount and diversity of wildlife habitat than urban areas. Wildlife value is correspondingly higher. The degree to which agriculture benefits wildlife depends on what crops are grown and how fields are maintained. In the study area, pasture is the most common agricultural use. Inactive agricultural areas are also present.

21 Crop/Pasture. Crops and pastures are cultivated, mowed, or grazed lands, and usually occur on flat to gently rolling slopes with good moisture levels. Use may change on an annual basis due to crop rotation. Many of these areas may have been initially created by eliminating marshes and swamps. Losses of diverse marsh communities for crop and pasture lands undoubtedly results in a reduction of many wildlife species.

Crops and pastures may be the agricultural lands most extensively used by wildlife with the possible exception of inactive agricultural areas (24). Field crops and pastures provide cover, feeding, and resting, and sometimes nesting habitat for small mammals, songbirds, waterfowl, and birds of prey. Black-tailed deer (Odocoileus hemionus columbianus), elk (Cervus canadensis), coyote (Canis latrans), marsh hawks, and swallows are some of the wildlife commonly found in this agricultural habitat. Fields and pastures which support waterfowl and other concentrations of birds also attract birds of prey which may include peregrine falcons and bald eagles.

24 Inactive Agriculture. This designation includes agricultural fields left fallow for a period of time and undergoing a process of invasion by a variety of plant species, such as annual grasses and forbs. These areas often occur as strips along agricultural fields.

These agricultural areas usually are of more value to wildlife than areas which are cultivated or grazed each year because there is greater vegetative diversity and more cover. These areas and associated aging farm structures are used by such wildlife species as red-tailed hawks, marsh hawks, owls, kestrels, California quail, ring-necked pheasants, coyote (Canis latrans), long-tailed weasel (Mustela frenata), bats and mice.

25 Other Agriculture.

251 Cranberry Bog. Field of cultivated cranberry (Vaccinium macrocarpa, a species native to northeastern North America. Converted from bog (624) and possibly other coastal fresh water wetlands. Soil is saturated throughout much of the year. Unlike natural wetlands, cranberry bogs support little wildlife, other than occasional depredations by black bears.

3 Nonforested Vegetated Uplands. Uplands which are not forested are assigned this designation. Included are areas dominated by grasses, shrubs, riparian vegetation, and bluffs. Areas of riparian vegetation included in this designation are not contiguous with forests. Non-forested uplands are generally less disturbed by man than urban and agricultural areas. Wildlife use and habitat more closely resemble natural conditions.

31 Grassland. Included are all open, ungrazed upland areas with grasses as their dominant vegetation. Woody species are not present. This vegetative type occurs under many environmental conditions.

311 Meadow. Open areas which may contain surface water during late fall, winter, and early spring. The vegetative cover is predominantly grasses and sedges, although an abundance of other flowering annuals and perennials is characteristic.

312 Beach Grassland. Strands of beach or dune grasses closely associated with sandy or cobbled substrates; partially protected from high winds, salt spray, and sand blasting by drift log barriers. Dune grass (Elymus mollis) and Mirram grass (Ammophila arenaria) are usually present in association with a wide variety of other herbaceous plants. These areas are considered upland because they are rarely inundated.

313 Open Grassland. Usually natural grassland occurring on deep soil, frequently adjacent to rock outcrops. Dominated by grasses and forbs, but may have scattered low shrubs.

32 Shrub. The shrub designation includes upland areas in which the dominant vegetation consists of woody perennials up to 20 feet in height. Shrub-dominated communities often represent a successional stage in regenerating forests; that is, the communities are in a transitional stage slowly evolving from a disturbed condition towards a climax forest community. This habitat has a high productivity level. Shrub browse supports a large population of large mammals and a great diversity of other wildlife species.

Small mammals, birds, and lizards generally use the ground layer for cover, burrows, and nests. Many species may forage on herbaceous and shrub vegetation. The shrub layer is usually used as forage by small birds and usually provides browse for deer and bears. Above the shrub layer, raptors may hunt for small mammals and birds. Hawks and owls may forage in this habitat for sparrows, mice, chipmunks, and large insects.

Shrub habitats are often closely related to other habitats because of their somewhat patchy occurrence. Many wildlife species which use shrub habitat derive the benefit of the edge effect of two adjoining habitats. For example, bears browse on shrubs but prefer coniferous forest nearby for cover. Raptors may perch on forest trees and hunt over areas of grass and shrub.

321 Successional Shrub. Successional shrub is a disturbed area undergoing a series of changes in plant types as it matures toward its previous climax type of vegetation. This process is referred to as plant succession.

Shrubs are part of a natural succession of plant communities which begins with herbaceous plants and climaxes with coniferous forests. The composition of the successional shrub community may well influence what future communities will or will not develop if natural succession is altered by disturbance or management. Successional shrub is a highly productive community. Later successional stages of shrub support greater species diversity of birds and small mammals than do subclimax and climax forests.

Successional shrub provides nest sites, cover, and food for many species of wildlife ranging from hummingbirds to deer and bears. Early successional shrub communities which follow clearcutting provide concentrations of food, e.g., trailing blackberry (Rubus ursinus), huckleberries (Vaccinium spp.) and salmonberry (Rubus spectabilis) for berry eating rodents, birds, and bears. Seed eating rodents and birds also find support in these areas. Shrub areas are used for forage by pollen and nectar feeding butterflies, bees, wasps, and hummingbirds and for browse by deer and elk.

33 Riparian. This designation includes uplands which are adjacent to and influenced by streams or standing water. The diversity of riparian communities is a product of the transition from water to land and the vegetation associated with each medium. Riparian zones provide significant habitat for a wide variety of terrestrial and aquatic wildlife. This is primarily due to the presence of water which allows greater plant biomass, faster growth, and greater plant diversity than drier sites in the vicinity. Animals which commonly use riparian areas include elk (Cervus canadensis), nutria (Myocastor coypu), beaver (Castor canadensis), muskrat (Ondatra zibethica), river otter (Lutra canadensis), mink (Mustela vison), coyote (Canis latrans), raccoon (Procyon lotor), long-tailed weasel (Mustela frenata), opossum (Didelphis marsupialis), black-tailed deer (Odocoileus hemionus columbianus), mallards, American widgeons, green-winged teals, song sparrows, sharp-shinned hawks, and red-tailed hawks. Birds are especially numerous in riparian areas. Moreover, riparian vegetation contributes significantly to the food base of aquatic organisms which ultimately become prey of commercially and recreationally valuable species such as trout and salmon.

331 Shrub. Areas included in this designation are riparian habitats where shrubs are dominant. Shrubs commonly associated with this designation include salmonberry (Rubus spectabilis), trailing blackberry (R. ursinus), Himalayan blackberry (R. discolor), nootka rose (Rosa nutkana), red elderberry (Sambucus racemosa), vine maple (Acer circinatum), devil's club (Oplopanax harridum), swamp gooseberry (Ribes lucustre), and stink currant (Ribes bracteosum).

Riparian shrub occur adjacent to water and swamps. These areas are usually flooded periodically but do not have standing water as does the shrub swamp.

332 Grass. Areas of riparian habitat where grasses, sedges, and rushes are dominant are included in this designation.

4 Forested Uplands. This designation is given to all upland areas in which tree species form a complete or partial canopy and where trees dominate grass, shrub, or exposed rock communities. Forested uplands include areas of coniferous forest, broadleaf forest, mixed forest, open woodland, disturbed forest, riparian forest, and forested bluff.

A forest ecosystem is a complex interaction of physical and biological factors which supply rich and varied wildlife habitat. It is capable of perpetuating itself. Forest cover provides nesting, feeding, and resting sites, as well as thermal cover and migratory pathways. Coastal forests support typical lowland forest animal species including elk (Cervus elaphus),

black-tailed deer (Odocoileus hemionous columbianus), bobcat (Lynx rufus), as well as small birds, small mammals, reptiles, and amphibians. Coastal forests also support several species which are rare or uncommon in inland communities. Examples include bald eagles, great blue herons, and river otters (Lutra canadensis).

41 Coniferous Forest. Forested lands in which the canopy is comprised of at least 80 percent coniferous species are assigned this designation. This vegetative cover type is extremely diverse in the Pacific Northwest and contains a complexity of constituent plant communities. Species commonly encountered in the canopy of a coastal coniferous forest include Douglas fir (Pseudostuga menziesii), western hemlock (Tsuga heteropyhlla), western red cedar (Thuja plicata), and Sitka spruce (Picea sitchensis). Depending on the age of the stand, there is usually a rather definitive subcanopy, shrub layer, and ground cover associated with a coniferous forest. This is climax vegetation in the Pacific Northwest.

411 Regeneration Conifer. A regenerating forest in very early stages; individual trees may be up to fourteen years of age. Introduced herbaceous species are often interspersed with the conifer saplings because of open canopy.

412 Pole Stage Conifer. A class following the regeneration stage and preceding the second growth stage (413). The tree age and size may vary between sites.

413 Mature Conifer. This age class follows the pole stage and precedes old growth. It is usually characterized by an open canopy, dense subcanopy and understory.

414 Old-Growth Conifer. An age class in which individual trees are approximately 150 years or more; characterized by unevenly aged stands and high species diversity.

42 Broadleaf Forest. As the name implies, this designation is assigned to areas where broadleaf deciduous species comprise 80 percent or more of the canopy. Regenerating conifers in the subcanopy are typical of the broadleaf forest. A diverse ground cover may be present. Broadleaf species typically occupy wetter sites than do conifers. Characteristic species of this vegetative type include red alder (Alnus rubra), willow (Salix spp.), and bigleaf maple (Acer macrophyllum). These are important areas for wildlife.

421 Regenerating Broadleaf. This designation is comprised of an age class consisting of deciduous tree species less than or equal to 15 feet in height.

422 Pole Stage Broadleaf. This designation covers a forest age class greater than 45 feet in height with a well-developed subcanopy and ground cover present.

423 Mature Broadleaf. This designation covers a forest age class greater than 45 feet in height with a well-developed subcanopy and ground cover present.

43 Mixed Forest. This designation applies to areas in which both broadleaf and coniferous species are present but where neither makes up more than 80 percent of the canopy.

Mixed forest types are probably of greater value to more species of wildlife than either coniferous or broadleaf forests. Since broadleaf and conifers occur together, this increased habitat diversity is reflected by increased wildlife diversity. Animals found in either coniferous or broadleaf forests probably occur in this forest type. Some common bird species found nesting in the mixed forest community are western flycatchers, hairy woodpeckers, pileated woodpeckers, yellow warblers, solitary vireos, and western wood pewees.

431 Reproduction Mixed. A regenerating forest in early stages, with trees up to 15 feet in height.

432 Pole Stage Mixed. This age class is comprised of individual trees 15 to 45 feet in height.

433 Mature Mixed. This designation includes canopy of second growth conifers and broadleaf species usually with a dense subcanopy, shrub layer, and ground cover.

45 Disturbed Forest. Forested areas which have been severely altered or destroyed by natural events or human activities and have not had sufficient time to regenerate are considered disturbed. This classification excludes urban wooded areas and farm woodlots.

46 Forested Riparian. Forested riparian habitats are upland types which are adjacent to water and swamps. These areas are usually flooded periodically but do not have standing water as does the forested swamp. Vegetation is dominated by coniferous and broadleaf trees. Common trees are Sitka spruce (*Picea sitchensis*), western red cedar (*Thuja plicata*), lodgepole pine (*Pinus contorta*), cottonwood (*Populus trichocarpa*), alder (*Alnus rubra*), and willow (*Salix* spp.).

Upland vegetation and water are found in close association making this a highly diverse wildlife habitat. Animals commonly found in this type are ruffed grouse, great blue herons, sharp-shinned hawks, great horned owls, flicker, common crows, Bewick's wrens, cedar waxwings, yellow-breasted chats, red-winged blackbirds, fox sparrows, song sparrows, beaver (*Castor canadensis*), muskrat (*Onadatra zibethica*), mink (*Mustela vison*), long-tailed weasel (*Mustela frenata*), black-tailed deer (*Odocoileus hemionus columbianus*), elk (*Cervus elaphus*), and small rodents.

461 Coniferous. Included in this designation are coniferous communities which occur adjacent to and are directly affected by rivers and streams. For descriptions of 4611, 4612, 4613, and 4614, see 411, 412, 413, and 414, respectively.

462 Broadleaf Forest. This designation is assigned to areas where broadleaf deciduous species usually comprise 80 percent or more of the canopy. Regenerating conifers in the subcanopy are typical of the broadleaf forest. A diverse ground cover may be present. Broadleaf species typically occupy wetter sites than do conifers. Characteristic species of this vegetative type include red alder (*Alnus rubra*), willow (*Salix* spp.), and maple (*Acer* spp.). These are important areas for wildlife. For description of 4621, 4622, and 4623, see 421, 422, and 423, respectively.

463 Mixed Forest. Areas adjacent to and directly affected by rivers and streams where broadleaf and coniferous species are present but where neither makes up more than 80 percent of the canopy are included in this designation. For description of 4631, 4632, and 4633, see 431, 432, and 433, respectively.

47 Forested Bluff. Steep to moderate slopes with forest cover. Bluffs provide perching sites for raptors and influence other wildlife use. For descriptions of 471, 472, and 473, see their respective descriptions under 41, 42, and 43.

5 Water. Both marine and freshwater habitats are considered. Water areas include river/stream, lake/pond, reservoir, bay estuary, lagoon, blind channel, canal/waterway, and open water communities.

51 River/Stream. Running water habitats are characterized by a definite current which varies greatly with valley shape and other geo-hydraulic features in different streams and in different segments of the same stream course. Wolf Bauer's geohydraulic classification system identifies four general river zones - estuarine, pastoral, floodway, and boulder. Segments included in the study fall within the pastoral zone and estuarine zone.

Rivers and streams allow movement of nutrients from upper segments of drainages into estuaries. Coastal rivers are important habitat for many wildlife including benthic invertebrates, anadromous fishes, ospreys, great blue herons, double-crested cormorants, belted kingfishers, waterfowl, grebes, gulls, river otter (*Lutra canadensis*), mink (*Mustela vison*), beaver (*Castor canadensis*), muskrat (*Ondatra zobethica*), and raccoon (*Procyon lotor*). Decline in water quality and alteration to rivers and streams may result in decreased productivity and numbers of animal species.

511 Estuarine Zone. Strongly influenced by the marine environment and can be distinguished by a branching channel pattern in a broad, flat valley. The stream channel gradient is near zero feet per mile with the result that weak currents deposit silt and mud in the stream bed.

512 Pastoral Zone. A sinuous channel pattern, characteristic of the pastoral zone, meanders through broad valleys with gently sloping walls. Sand and silt are deposited in the stream bed along the channel which slopes approximately 5 feet per mile. Oxbow lakes, which represent river channels cut off from the main stream course, are typical in this zone.

52 Lake/Pond. Permanent standing water habitats are numerous in the recently glaciated Pacific Northwest. They occur in local depressions of varying depth and may or may not contain emergent vegetation. They are important habitats for waterfowl, shorebirds, aquatic mammals, amphibians, fish, and, in general, species which are associated with marshes, swamps, and riparian vegetation.

521 Lake. For mapping purposes, bodies of standing water with a surface area greater than 20 acres. Open water areas are relatively large compared to nearshore zones and are the primary producing regions for the lake.

522 Inland Pond. Standing water with a surface area less than 20 acres situated at higher elevations than the beach fringe or river delta. Ponds are typically shallow; therefore, the nearshore zone is an important primary producing area.

524 Coastal Pond. Standing water of less than 20 acres which is located along the beach fringe behind drift logs and at the base of shoreline bluffs. Coastal ponds also form on river deltas when old stream channels are blocked by levees or natural stream course shifts.

526 Farm Pond. Created by damming a stream or through excavation of basins by man. Stream water is generally detoured around the pond or the pond is formed in a basin without permanent streamflow. The intensity of management of these ponds will determine their resemblance to natural lentic habitats and the diversity of organisms present.

53 Reservoir. All manmade water storage areas identifiable as sources of water for domestic or industrial purposes are included. These bodies of water will differ from natural lakes due to several factors, including basin geomorphology, controlled discharge and resultant fluctuating water level.

54 Bay/Estuary. These moderately protected marine embayments are commonly refered to as bays, harbors, inlets, and coves. They have free connections with the open sea; wind and wave action is modified by protective uplands and freshwater inflow creates variable salinities. Bluffs, beach substrates, marshes, eelgrass beds, and other intertidal habitats associated with these embayments are greatly affected by upland, freshwater and marine influences and should be viewed as integrated communities, not as individual habitat types.

55 Impoundment. Those portions of both marine and freshwater habitats isolated from marine waters by manmade obstructions.

56 Lagoon. Highly protected brackish or freshwater embayments formed when bars partially or completely close the opening to shallow bays.

561 Enclosed Lagoon. Completely enclosed lagoons form when freshwater inflow is too weak to maintain a channel through the bar. Typical patterns include rapid siltation and vegetative succession, which may lead to complete coverage by marsh plants.

562 Open Lagoon. Partially enclosed lagoons are common, being formed when freshwater inflow has maintained a stream channel through bars formed by alongshore deposition. Marsh and tidal flats cover much of the lagoon which is drained and filled diurnally with tidal waters.

57 Slough. Sloughs along streams and narrow marine inlets are included in this classification. They often result from abandoned stream channels which, unlike oxbow lakes and coastal ponds, have not been isolated from adjacent water masses.

Freshwater and marine sloughs are an important part of the estuarine system, since they allow the movement of tidal waters and, thus, nutrients

into and out of the marshes. They are also important feeding and resting areas for wildlife such as waterfowl, aquatic mammals, great blue herons, and anadromous fishes.

571 Freshwater Slough. Inlets along streams which receive backup water from the major channel are designated as freshwater sloughs. They are similar to standing water habitats, but maintain a more open connection with the parent streams. Freshwater vegetation is typically associated with the parent margins. Vegetation of freshwater sloughs is similar to that occurring along ponds and creeks. Marginal plant species include willows (Salix spp.), red alder (Alnus rubra), black cottonwood (Populus trichocarpa), red-osier dogwood (Cornus stolonifera), and currants (Ribes divaricatum, R. bracteosum). Emergent vegetation occurring in freshwater sloughs includes cattails (Typha latifolia), slough sedge (Carex donupta) and small-fruited bulrush (Scirpus microcarpus). Narrow strips of marsh vegetation occur along sloughs in the study area but such units of habitat are often too small to be mapped.

Sloughs offer a quiet water refuge for stream animals and furbearers and, therefore, are frequented by wildlife species preferring still waters. They offer an advantage over ponds to some wildlife species because of the open connection with moving streams. Fish, such as coho salmon, which use sloughs for feeding, use nearby streams for spawning and as refuges when young.

Sloughs contribute to the productivity of an area by diversifying available habitat and providing stable systems for plants and animals to inhabit. Sloughs have a high shoreline to volume ratio and thus are greatly affected by detritus and nutrients derived from terrestrial systems. Freshwater sloughs are especially important in the production of salmon, waterfowl and furbearers.

6 Aquatic Lands. This designation includes lands which are either covered by water or strongly influenced by adjacent waters. Areas included are aquatic land/forested, aquatic land/vegetated, and aquatic land/nonvegetated.

61 Aquatic Land - Forested. Areas included in this designation have surface or standing water during some portion of the year and are at least partially forested. Inhabitants of swamps include pileated woodpeckers, wood ducks, ruffed grouse, bald eagles, black bear (Euarctos americanus), and black-tailed deer (Odocoileus hemionus columbianus). Forested aquatic lands are generally divided according to salinity into either intertidal brackish swamp or freshwater swamp.

612 Freshwater Swamp. Freshwater swamps occur in valley bottoms, along river drainages, and in other low-lying coastal areas. They usually have some open water, at least seasonally, relatively dense vegetation, and level terrain. There are two major types; tree dominated and shrub dominated. Tree dominated swamps include coniferous, broadleaf, and mixed forest. The presence of woody vegetation in swamps is a primary factor which helps differentiate them from a marsh.

Swamps in which trees, marsh, and open water areas are interspersed provide habitat for a diverse group of wetland birds, mammals and

amphibians, as well as terrestrial species. Characteristic species include wood ducks, hooded mergansers, great blue herons, pileated woodpeckers, tree swallows, chickadees, common flickers, and downy woodpeckers. Hawks and owls, coyotes (Canis latrans), bobcat (Lynx rufus), and river otter (Lutra canadensis) are examples of predatory birds and mammals which may be present. The occurrence of larger carnivores is especially dependent on the size of the swamp and the presence of suitable adjacent habitats.

6121 Shrub Swamp. Shrub dominated areas which usually have some open water at least seasonally are included in this designation. Hardhack (Spiraea douglasii), willows (Salix ssp.) and crabapples (Pyrus fusca) are common shrubs.

6122 Coniferous Swamp. Freshwater swamps in which the forest canopy is comprised of at least 80 percent coniferous species are assigned this designation.

61221 Regeneration. Coniferous swamps are included which are in early stages of regeneration. Introduced herbaceous species are often interspersed with the conifer saplings because of the open canopy.

61222 Pole Stage. This class follows the regenration state and precedes the second growth stage. It is characterized by a closed canopy and slender, even-aged stands. The tree age and size may vary between sites.

61223 Mature. This age class follows the pole stage and precedes the old growth stage. It is usually characterized by an open canopy, dense subcanopy, and understory.

61224 Old-Growth. Characterized by large trees, standing dead trees, and diverse understory.

6123 Broadleaf Swamp. This designation includes freshwater swamps in which the forested canopy is comprised primarily of broadleaf deciduous species. Such species usually comprise 80 percent or more of the canopy. The subcanopy typically includes regenerating conifers, and ground cover may be diverse.

61231 Regeneration. This designation includes an age class consisting of deciduous tree species less than or equal to 15 feet in height.

61232 Pole Stage. An age class consisting of deciduous tree species between 15 and 45 feet in height is covered by this designation.

61233 Mature. An age class comprised of deciduous tree species greater than 45 feet in height is included in this designation. A well-developed subcanopy and ground cover are present.

6124 Mixed Forested Swamp. Freshwater swamps in which broadleaf and coniferous species are present but where neither makes up more than 80 percent of the canopy are designated as mixed forest swamps.

61241 Regeneration. This designation includes an age class consisting of mixed conifer and deciduous trees less than or equal to 15 feet in height.

61242 Pole Stage. This designation refers to the stage in forest development which follows regeneration and precedes the second growth stage. It is characterized by a closed canopy and slender even age stands. Tree age and size may vary between sites.

61243 Mature. This designation is characterized by a canopy of second growth conifers and broadleaf species usually with a dense subcanopy, shrub layer, and ground cover.

62 Vegetated Wetland, Nonforested. That portion of the wetlands which is nonforested but may be densely vegetated, e.g., marshes, bogs, meadows, and intertidal areas.

621 Inland Freshwater Marsh. Low areas or depressions which contain standing water for all or a portion of the year, not under marine influence. Characteristic vegetation consists of cattails (*Typha* spp.), sedges (*Carex* spp.), bulrushes (*Scirpus* spp.), and other marsh plants.

622 Coastal Freshwater Marsh. Similar in physical characteristics to inland freshwater marsh except subject to the more exposed, coastal environmental regime and may be somewhat brackish. The vegetation is dominated by marsh plants.

623 Salt Marsh. A complex of plant communities strongly influenced by tidal ebb and flow. Some of the more prevalent plant species in Washington salt marshes include pickleweed (*Salicornia* spp.), salt grass (*Distichlis spicata*), arrow grass (*Triglochin maritimum*), and jaumea (*Jaumea carnosa*).

624 Bog. Composed of several plant communities associated with a high water table and maintained by high precipitation and low evaporation. Vegetative cover is usually dense at the margins and may extend over the surface of standing water creating "floating" vegetation. The standing water is often acidic and usually has associated with it several species of the heath family, such as labrador tea (*Ledum*), salal (*Gaultheria*), and huckleberry (*Vaccinium*). Bog vegetation is usually sharply delimited from surrounding vegetation.

625 Salt Meadow. Usually adjacent to salt marshes but slightly higher in elevation. The vegetation receives saline influence either from the presence of marine sloughs or from salt spray. The greater soil depths of the meadow supports taller marshes. Alkali grass (*Puccinellia*), hair grass (*Deschampsia*), and creeping bentgrass (*Argrostis alba*) are common salt-tolerant inhabitants of salt meadows.

626 Brackish Marsh. Characteristically forming at river deltas. The marine influence is mediated by a high volume of freshwater runoff. Dominant vegetation consists of sedges, cattails, bulrushes, and associated grass species.

627 Seagrass. Vascular plants (i.e., related to terrestrial) which grow in the marine environment. These plants are more productive than many crops cultivated by man, and support a wide variety of marine organisms. There are two major types of seagrass in Washington, eelgrass (Zostera), and surfgrass (Phyllospadix).

629 Other Algal Community. The numerous algal communities present in intertidal areas are short bladed and composed of green, brown, and red algal types. Certain types may be separated on the basis of their occurrence on selected substrate types and tidal levels.

63 Beach Substrate. Beach substrates are a critical habitat factor for marine plants and animals. A variety of plant and animal species either live in or on the substrate depending on the character of that substrate. The dependency on specific substrates by organisms is more pronounced in the intertidal zone than on upland soils. In Willapa Bay and Grays Harbor, sand, sand/silt, and mud are by far the most common intertidal substrates.

631 Rock (R). Includes both solid bedrock and boulders which are too large to be constantly moved about by wave or current action. Rock habitats are most characteristic of high exposure areas (high degree of wave or current action), although they also occur in more protected environments. The occurrence of tidepools in this habitat offers a unique microhabitat. Rock habitats are generally characterized by an abundant and diverse community.

632 Cobble (Cob). Consists almost entirely of uniformsized cobbles (6.4-25.6 cm), with very little sand or gravel present. The absence of smaller particles distinguishes this substrate from the mixed coarse class (633), and results from high energy wave conditions capable of moving even the cobbles. This biological community is characterized by a low diversity and low number of organisms.

633 Mixed Coarse (MC). Consists of cobbles, gravel, and sand. Associated with moderate energy conditions, but is occasionally found in lower energy areas; in this case, there is often some mud present. High diversity and high numbers of organisms are associated with this habitat.

634 Mixed Medium (MM). Includes beaches comprised of coarse gravel and sand occurring together and those beaches consisting of essentially pure coarse gravel. Mixed medium beaches occur along high energy shorelines. As with a cobble beach, the biological community has low numbers of individuals and low diversity.

635 Mixed Fine (MF). Composed of fine gravel, sand and mud. Usually occurs in protected areas but occasionally in moderate energy areas, and is associated with a rich diverse biological community.

636 Sand (S). Occurs in either highly or moderately exposed beaches. As a rule, the more protected the beach, the finer the sand particles. Coarseness of the sand greatly affects the associated biological community.

637 Sand-Silt or Muddy-Sand (S-Mud). Fine sand and silt form a characteristic habitat in protected areas such as bays and estuaries. Contains a more diverse and abundant biological community than either a sand or mud habitat.

638 Silt/Clay or Mud (Mud). Made up of very fine particles. This substrate is extremely soft, and sometimes dangerous to walk on. Mud occurs only in areas where wave action and current energy are extremely low, such as at the heads of bays and estuaries. Due to this location, mud is often associated with brackish water.

7 Exposed and Other Lands. Includes physical features which are treated usually as geologic landscape features. However, the interrelationships between physical and biological communities have been recognized and some significant formations which have important biological values or which may serve as useful introductions to more detailed analyses have been mapped.

71 Rock. Upland habitats in which exposed rock composes approximately 30 percent or more of surface areas.

711 Rock Outcropping. Occur on gentle to steep slopes. Shallow soil may occur in depressions supporting grasses and low shrubs. Mosses and lichens occur on the rock faces. When along the shoreline, this type is associated with rocky, cobble, or mixed medium intertidal habitats.

712 Talus. Also referred to as talus slopes, consist of rock fragments which drop from cliffs or steep walls and accumulate in uniform masses at the base.

713 Rock Island, Islet. Arbitrarily defined for mapping purposes as islands and/or islets with a surface area less than fifty acres and includes both vegetated and nonvegetated islands. Uplands are generally limited to grassland or shrub vegetation, however, where soil is more fully developed, tree species do occur. A rocky or cobble intertidal area with offshore kelp beds is common on these important refuges for nesting seabirds, marine mammals and bald eagles.

7131 Grass. Grasses are the dominant vegetative cover.

7132 Shrub. Shrubs are the dominant vegetative cover.

7133 Conifer. Coniferous trees are the dominant vegetative cover.

7135 Mixed Forest. Both broadleaf and coniferous trees occur, with neither being dominant.

714 Cliff. Steep slopes consisting of exposed rock. A limited, rocky intertidal area is typically associated with these rugged shorelines.

72 Sand. Areas in which sand or aggregate comprises approximately 30 percent or more of exposed surface areas.

722 Sand Dune. Upland accumulations of wind blown sand. Stabilized by dune grasses. An undisturbed sand dune community will establish a complex series of successional stages leading from the beach margin to relatively stable forested uplands in back-dune reaches.

7221 Grass. Dunes with a dominant grass-forb vegetation cover.

7222 Shrub. Dunes with a dominant shrub vegetation cover.

7223 Forest. Dunes with a dominant forest cover.

7224 Wet Depression. Within the dune complex, this area is the lowest topographical zone. It typically has standing water, especially after heavy rains, or is moist and poorly drained. Vegetation is marsh or swamp like.

723 Slide. Areas of sand and/or gravel substrates which drop from steep slopes, leaving a scar at the source and an accumulation of substrate at the base.

724 Sand and/or Gravel Bar. Intertidal deposits which are covered at mean high water. The substrate is unstable and subject to movement by waves and currents.

74 Spits. Shoreforms created when sand and other fine sediments eroded from cliffs or bluffs are carried by along-shore drift and deposited at bay mouths or coastal obstructions. Marsh and beach grassland vegetation typically invade the upper portions of these important resting areas for gulls and shorebirds.

741 Vegetated Spit. Spits with a vegetated area smaller than can be mapped.

76 Bluff. Nonvegetated, steep to moderate slopes of varying substrate. Burrow nesting birds use exposed surfaces along steeper bluffs for nest sites. Bluffs often serve as buffers between developed uplands and wetlands at their base, creating important strips of coastal habitat for many species, including bald eagles and river otters.

Appendix 3.

Key to Mapping Criteria and Symbols for Wildlife Use Maps

Key to Mapping Criteria and Symbols for Wildlife Use Maps

io individual occurrence

ri regular individual

rc regular concentration

w wintering area

su summering area

m migratory area

n nesting area

s spawning area

r rearing area (fishes)

h hauling out area (harbor seal)

f sport fishing/hunting area

□ within several miles

△ within 1 mile

+ within 1/4 mile (not yet verified by Washington Department of Game)

⊕ precise location (verified by Washington Department of Game)

within area denoted by polygon

within areas denoted by several polygons

Appendix 4.

List of Animals in the Study Area with Special Status

LIST OF ANIMALS IN THE STUDY AREA WITH SPECIAL STATUS

Special Species (Federal and State Listed Species)	Mapping Criteria
sperm whale - *Physeter catodon* FE, SE	
gray whale - *Eschrichtius robustus* FE, SE	m
finback whale - *Balaenoptera physalus* FE, SE	
sei whale - *B. borealis* FE, SE	
blue whale - *B. musculus* FE, SE	
hump-backed whale - *Megaptera novaeangliae* FE, SE	
right whale - *Balaena glacialis* FE, SE	
bowhead whale - *B. mysticetus* FE, SE	
brown pelican - *Pelecanus occidentalis* FE, SE	rc
great blue heron - *Ardea herodias* SC	n
great egret - *Casmerodius albus* SC	ri
trumpeter swan - *Olor buccinator* SC	rc
Aleutian Canada goose - *Branta canadensis leucopareia* FE, SE	ri
white-tailed kite - *Elanus leucurus* SC	ri
bald eagle - *Haliaeetus leucocephalus* FT, SS	n, rc
osprey - *Pandion haliaetus* SC	n
peregrine falcon - *Falco peregrinus* FE, SE	w, m
snowy plover - *Charadrius alexandrinus* SE	su, n
spotted owl - *Strix occidentalis* SS	su, n
western pond turtle - *Clemmys marmorata* SS	io
green sea turtle - *Chelonia mydas* FT, SS	io
leatherback sea turtle - *Dermochelys coriacea* FE, SE	io
Dunn's salamander - *Plethodon dunni* SC	rc
Van Dyke's salamander - *Plethodon vandykei* SC	rc
Oregon silverspot butterfly - *Speyeria zereme hippolyta* FT, SS	io
Newcomb's littorine snail - *Algamorda newcombiana* SC	rc

Game, Furbearing Animals and Protected Wildlife	Mapping Criteria
snowshoe hare - *Lepus americanus* GA	
Townsend's chipmunk - *Eutamias townsendii* PW	
gray squirrel - *Sciurus carolinensis* PW	
Douglas squirrel - *Tamiasciurus douglasii* PW	
northern flying squirrel - *Glaucomys sabrinus* PW	
beaver - *Castor canadensis* GA, FA	
muskrat - *Ondatra zibethicus* GA, FA	
whales and porpoises not otherwise classified as endangered - Cetacea PW	m, ri
red fox - *Vulpes vulpes* GA, FA	
black bear - *Ursus americanus* GA	
raccoon - *Procyon lotor* GA, FA	
ermine - *Mustela erminea* GA, FA	
long-tailed weasel - *M. frenata* GA, FA	
mink - *M. vison* GA, FA	
river otter - *Lutra canadensis* GA, FA	b, ri
cougar - *Felis concolor* G	
bobcat - *Lynx rufus* GA, FA	
seals not otherwise classified as endangered - Pinnipedia PW	h
elk - *Cervus elaphus* G	rc
black-tailed deer - *Odocoileus hemionus columbianus* GA	rc
Canada goose - *Branta canadensis* GB	rc, w, su, m, n
brant - *B. bernicla* GB	rc, w, su, m, n
snow goose - *Chen caerulescens* GB	rc, w, su, m, n
mallard - *Anas platyrhynchos* GB	rc, w, su, m, n
gadwall - *A. strepera* GB	rc, w, su, m, n
pintail - *A. acuta* GB	rc, w, su, m, n
green-winged teal - *A. crecca* GB	rc, w, su, m, n
blue-winged teal - *A. discors* GB	rc, w, su, m, n
cinnamon teal - *A. cyanoptera* GB	rc, w, su, m, n
European wigeon - *A. penelope* GB	rc, w, su, m, n
American wigeon - *A. americana* GB	rc, w, su, m, n
northern shoveler - *A. clypeata* GB	rc, w, su, m, n
wood duck - *Aix sponsa* GB	rc, w, su, m, n

	Mapping Criteria
redhead - Aythya americana GB	rc, w, su, m, n
ring-necked duck - A. collaris GB	rc, w, su, m. n
canvasback - A. valisineria GB	rc, w, su, m, n
greater scaup - A. marila GB	rc, w, su, m, n
lesser scaup - A. affinis GB	rc, w, su, m,-n
common goldeneye - Bucephala clangula GB	rc, w, su, m, n
Barrow's goldeneye - B. islandica GB	rc, w, su, m, n
bufflehead - B. albeola GB	rc, w, su, m, n
oldsquaw - Clangula hyemalis GB	rc, w, su, m, n
harlequin duck - Histrionicus histrionicus GB	rc, w, su, m, n
white-winged scoter - Melanitta fusca GB	rc, w, su, m, n
surf scoter - M. perspicillata GB	rc, w, su, m, n
black scoter - M. nigra GB	rc, w, su, m, n
ruddy duck - Oxyura jamaicensis GB	rc, w, su, m, n
hooded merganser - Lophodytes cucullatus GB	rc, w, su, m, n
common merganser - Mergus merganser GB	rc, w, su, m, n
red-breasted merganser - M. serrator GB	rc, w, su, m, n
blue grouse - Dendragapus obscurus GB	rc, w, su, m, n
ruffed grouse - Bonasa umbellus GB	rc, w, su, m, n
California quail - Lophortyx californicus GB	rc, w, su, m, n
ring-necked pheasant - Phasianus colchicus GB	rc, w, su, m, n
Virginia rail - Rallus limicola GB	rc, w, su, m, n
sora - Porzana carolina GB	rc, w, su, m, n
American coot - Fulica americana GB	rc, w, su, m, n
band-tailed pigeon - Columba fasciata GB	rc, w, su, m, n
rock dove - C. livia GB	rc, w, su, m, n
mourning dove - Zenaida macroura GB	rc, w, su, m, n
all birds not otherwise classified - Aves PW	rc, w, su, m, n
all wild turtles not otherwise classified as endangered - Testudinata PW	io
bullfrog - Rana catesbeiana G	
brown bullhead - Ictalurus nebulosus GF	rc
largemouth bass - Micropterus salmoides GF	rc
black crappie - Pomoxis nigromaculatus GF	rc

	Mapping Criteria
cutthroat trout - *Salmo clarki* GF	m, s, r, f
rainbow or steelhead trout - *S. gairdneri* GF	m, s, r, f
dolly varden trout - *Salvelinus malma* GF	m, s, r, f
Unclassified Wildlife	
northwestern salamander - *Ambystoma gracile*	rc
Pacific giant salamander - *Dicamptodon ensatus*	rc
Olympic salamander - *Rhyacotriton olympicus*	rc
Olympic mudminnow - *Novumbra hubbsi*	io
Oreas anglewing butterfly - *Polygonia oreas*	io

Appendix 5.

Species Administrative and Legal Status Definitions

SPECIES ADMINISTRATIVE AND LEGAL STATUS DEFINITIONS

Special Species

a. Species listed or proposed for listing under the Federal Endangered Species Act. These may include a subspecies or distinct population (see definition of "species" in Section 3 of the Endangered Species Act). Protected under Section 9 of Federal Endangered Species Act.

   1) Federal Endangered (FE) - A species in danger of extinction throughout all or a significant portion of its range.

   2) Federal Threatened (FT) - A species which is likely to become an endangered species within the foreseeable future.

   3) Proposed Federal Threatened or Endangered Species (FP) - Those species which have been proposed for listing with supporting data in the Federal Register and are therefore legally recognized under the Endangered Species Act.

b. State Endangered (SE) - A species which is seriously threatened with extirpation throughout all or a significant portion of its range within Washington. These species are classified by the State Game Commission as endangered wildlife (WAC 232-12-014). Protected from taking due to damage (RCW 77.16.040), and taking, possession, control or destruction of nests or eggs (RCW 77.16.120).

c. State Sensitive (SS) - A species that could become endangered within Washington in the foreseeable future without active management or removal of threats. These species are classified by the State Game Commission as Protected Wildlife (WAC 232-12-011). Protected from taking, possession, control, or destruction of nests or eggs (RCW 77.16.120).

d. State Concern (SC)* - Species of concern because of uniqueness, rarity, scientific value, or vulnerability to human disturbance or land management, such as timber, range, or wildlife habitat management practices. Classified by the State Game Commission as Protected Wildlife (WAC 232-12-011). Protected from taking, possession, control, or destruction of nests or eggs (RCW 77.16.120). Examples: effects of logging on cavity nesters, range reseeding on ground nesters, disturbance on waterbird colonies, etc. This class also includes species of unknown status since information is inadequate for evaluation of population status. These species are a focus for future monitoring, inventory, or study.

Game, Furbearing, and Protected Species

a. Game Animals (GA) - Wild animals that shall not be hunted except as authorized by rule of the State Game Commission. (RCW 77.08.010)

b. Game Birds (GB) - Wild birds that shall not be hunted except as authorized by rule of the State Game Commission. (RCW 77.08.010)

c. Furbearing Animals (FA) - Game animals that shall not be trapped except as authorized by rule of the State Game Commission. (RCW 77.08.010)

d. Game Fish (GF) - Those species of the class Osteichthyes that shall not be fished except as authorized by rule of the State Game Commission. (RCW 77.08.020)

e. Protected Wildlife (PW) - Wildlife designated by rule of the State Game Commission that shall not be hunted or fished. (RCW 77.08.010)

* Species list being revised.

Appendix 6.

Special Species Occurrence Data (Computer Printout)

WASHINGTON DEPT. GAME - NONGAME DATA SYSTEM
GRAYS HARBOR & PACIFIC COUNTIES SPECIAL ANIMAL OCCURRENCES
DATA CURRENT AS OF NOVEMBER 8, 1982
USGS QUAD NAME: ABERDEEN 7.5

NAME: AMBYSTOMA GRACILE 023 TRS: T17N R09W S04
SOURCE OF LEAD: BALTZELL,TERRY LATLONG: 465935N1234817W
NAME OF AREA: QUADCODE: 4612387
DATE OF SIGHTING: 198112 QUADNAME: ABERDEEN 7.5
NUMBER OF OWNERS: 1 COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT MAYR BRO. LOGGING CO. PVT STATE: WA
GENERAL DESCRIPTION: NORTHWESTERN SALAMANDER. 1 ADULT,UPPER WISHKAH R. IN REARING PONDS.

NAME: CLEMMYS MARMORATA 019 TRS: T17N R09W S09
SOURCE OF LEAD: BALTZELL,TERRY LATLONG: 465835N1234837W
NAME OF AREA: QUADCODE: 4612387
DATE OF SIGHTING: 198111 QUADNAME: ABERDEEN 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: WESTERN POND TURTLE. FOUND DEAD, WISHKAH R.DRAINAGE UNDER WISHKAH BLVD.

NAME: MUSTELA ERMINEA 013 TRS: T17N R09W S05
SOURCE OF LEAD: ALCORN GD FROM STATE GAME DEPT LATLONG: 465825N1234950W
NAME OF AREA: QUADCODE: 4612387
DATE OF SIGHTING: 194305 QUADNAME: ABERDEEN 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: UUU UUU STATE: WA
GENERAL DESCRIPTION: ERMINE SSP OLYMPICA ABERDEEN T17N R9W

NAME: NOVUMBRA HUBBSI 005 TRS: T17N R09W S12
SOURCE OF LEAD: HARRIS, COLIN K 1974 LATLONG: 465837N1234512W
NAME OF AREA: QUADCODE: 4612387
DATE OF SIGHTING: 1974 QUADNAME: ABERDEEN, WASH. 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. SWAMP JUST OFF HWY 8 ACROSS FROM 2ND LK ABERDEEN TURNOFF GOIN
G WEST. T17N R9W S12.

NAME: RHYACOTRITON OLYMPICUS 038 TRS: T17N R09W S05
SOURCE OF LEAD: PSM #5835-5836 LATLONG: 465930N1234909W
NAME OF AREA: QUADCODE: 4612387
DATE OF SIGHTING: 193903 QUADNAME: ABERDEEN 7.5
NUMBER OF OWNERS: 1 COUNTY: GRAYS HARBOR
NAME OF OWNER: LOC CITY OF ABERDEEN MUN STATE: WA
GENERAL DESCRIPTION: OLYMPIC SALAMANDER, 2 COLLECTED AT CITY RESERVOIR, ABERDEEN.

WASHINGTON DEPT. GAME - NONGAME DA... SYSTEM
GRAYS HARBOR & PACIFIC COUNTIES SPECIAL ANIMAL OCCURRENCES
DATA CURRENT AS OF NOVEMBER 8, 1982
USGS QUAD NAME: BAY CENTER 7.5

NAME: HALIAEETUS LEUCOCEPHALUS 140 TRS: T14N R11W S01
SOURCE OF LEAD: ANDERSON, BOB WEYERHAEUSER LATLONG: 464337N1235700W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 1979 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: PVT WEYERHAEUSER CORP PVT STATE: WA
GENERAL DESCRIPTION: 1 OF 2 NESTS TEAL SLOUGH, 5-10 AC STD MATURE TREES SEE ALSO OCC# 409.

NAME: HALIAEETUS LEUCOCEPHALUS 261 TRS: T14N R10W S04
SOURCE OF LEAD: ANDERSON, B WEYCO LATLONG: 464411N1235600W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 1979 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: PVT WEYERHAUESER CO PVT STATE: WA
GENERAL DESCRIPTION: BALD EAGLE IN CLUMP OF OLD GROWTH LEFT BY WEYCO NW4 NW4 OF SECTION. 1YG-77;UNSUC
C-78;2YG-79;ACT-80;

NAME: HALIAEETUS LEUCOCEPHALUS 409 TRS: T14N R11W S01
SOURCE OF LEAD: ANDERSON, B WEYCO LATLONG: 464337N1235700W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 1979 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: PVT WEYERHAUSER CO PVT STATE: WA
GENERAL DESCRIPTION: BALD EAGLE NEST 1 OF 2 NESTS IN SAME LOCALE TEAL SLOUGH IN 5-20 ACRE PATCH OF
MATURE TREES SEE OCC #140. INACT-79

NAME: HALIAEETUS LEUCOCEPHALUS 569 TRS: T14N R10W S05
SOURCE OF LEAD: CHEHALIS REGION DNR FILES LATLONG: 464405N1235650W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 1981 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HAWKS PT TERR,NEST NEST IN NE4 NW4 S5. QUESTIONABLE I.D. AND UNKNOWN DATE OF OBS
ERVATION.

NAME: LARUS DELAWARENSIS 001 TRS: T14N R10W S30
SOURCE OF LEAD: PENLAND 1976 LATLONG: 464005N1235735W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 1975 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: ST UUU STATE: WA
GENERAL DESCRIPTION: RING-BILLED GULLS 40 BIRDS

WASHINGTON DEPT. GAME - NONGAME DA.. SYSTEM
GRAYS HARBOR & PACIFIC COUNTIES SPECIAL ANIMAL OCCURRENCES
DATA CURRENT AS OF NOVEMBER 8, 1982
USGS QUAD NAME: BAY CENTER 7.5

NAME: LARUS_DELAWARENSIS_013 TRS: T14N R10W S30
SOURCE OF LEAD: PENLAND,5 T AND S J JEFFRIES 1977 MURRELET 58(3):86-87 LATLONG: 463935N1235740W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 197606 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: RING-BILLED GULL, 27 NESTS WITH EGGS & 1YG,40 GULLS ON A SAND ISLAND IN ELLEN SANDS AREA 3 KM N OF GOOSE PT NEAR BAY CENTER.

NAME: NUMENIUS_AMERICANUS_036 TRS: T14N R11W S12
SOURCE OF LEAD: CARMODY MIKE SEATTLE AUD NOTES 21(2) LATLONG: 464235N1235850W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 198109 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: LONG-BILLED CURLEW 10-50 1976,79,80,81,RSC TOKELAND.

NAME: OSTREA_LURIDA_007 TRS: T14N R10W SNS
SOURCE OF LEAD: SMITH, L LATLONG: 464042N1235347W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 196408 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIA OYSTER SPECIMEN FOUND IN WILLAPA BAY.1979-R WESTLEY FINDS SAME.

NAME: PHOCA_VITULINA_048 TRS: T14N R10W S03
SOURCE OF LEAD: EVERITT R 1979 CAT#2292 LATLONG: 464248N1235400W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 197707 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA SSE OF HAWKS PT (TOKELAND).

NAME: PHOCA_VITULINA_050 TRS: T14N R10W S30
SOURCE OF LEAD: EVERITT,R-WDOG 1981 CAT#3447 P52 LATLONG: 463930N1235900W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 198007 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA SE ELLEN SANDS 2 SITES. ALSO REPORTED 7-77.

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USGS QUAD NAME: BAY CENTER 7.5

NAME: PHOCA_VITULINA_138 TRS: T14N R10W S20
SOURCE OF LEAD: EVERITT,R, R BEACH ET AL 1981 CAT #3447 P52 LATLONG: 464045N1235717W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 198009 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: UUU UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HAULOUT ON PINE IS CHANNEL.

NAME: PLETHODON_DUNNI_011 TRS: T14N R10W S39
SOURCE OF LEAD: MAAHS,ROBERT PUYALLUP 206-848-2917 LATLONG: 464045N1235350W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 197905 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: DUNN'S SALAMANDER 6 MI SW OF S BEND, 10' WIDE RIVER MAKES A BEND,SEEPAGE AREA.

NAME: RHYACOTRITON_OLYMPICUS_012 TRS: T13N R10W S11
SOURCE OF LEAD: PSM #1415-1416 LATLONG: 463743N1235110W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 193109 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIC SALAMANDER, 2 COLLECTED AT FALLS 6 MLE SW OF SOUTH BEND.

NAME: RHYACOTRITON_OLYMPICUS_049 TRS: T14N R10W S39
SOURCE OF LEAD: MAAHS,ROBERT PUYALLUP LATLONG: 464045N1235350W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 197905 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIC SALAMANDER 6 MI SW OF S BEND. 10' WIDE RIVER MAKES A BEND,SEEPAGE AREA.

NAME: STERNA_CASPIA_004 TRS: T14N R10W SNS
SOURCE OF LEAD: PENLAND,S 1976 MS THESIS LATLONG: 464005N1235735W
NAME OF AREA: QUADCODE: 4612368
DATE OF SIGHTING: 197606 QUADNAME: BAY CENTER 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: ST UUU STATE: WA
GENERAL DESCRIPTION: CASPIAN TERN NESTING COLONY ON A SAND IS. IN ELLEN SANDS AREA. 450 PRS-1976;

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USGS QUAD NAME: CAPE DISAPPOINTMENT 7.5

NAME: DICAMPTODON_ENSATUS_055 TRS: T10N R11W S28
SOURCE OF LEAD: MILLER, GC LATLONG: 461933N1240240W
NAME OF AREA: QUADCODE: 4612431
DATE OF SIGHTING: 195706 QUADNAME: CAPE DISAPPOINTMENT 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: PACIFIC GIANT SALAMANDER, LARVAE COLLECTED 1 MI N OF ILWACO.

NAME: PHALACROCORAX_PELAGICUS_019 TRS: T09N R11W S05
SOURCE OF LEAD: LESHNER,L. WDOG OLYMPIA 754-1449 LATLONG: 461750N1240430W
NAME OF AREA: FORT CANBY SPK QUADCODE: 4612431
DATE OF SIGHTING: 197904 QUADNAME: CAPE DISAPPOINTMENT 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: ST SPR STATE: WA
GENERAL DESCRIPTION: PELAGIC CORMORANT NESTS ON CLIFF, FORT CANBY SPK.

NAME: PHALACROCORAX_PELAGICUS_034 TRS: T09N R11W S09
SOURCE OF LEAD: TABOR J CAT #1130 LATLONG: 461813N1240435W
NAME OF AREA: FORT CANBY SPK QUADCODE: 4612431
DATE OF SIGHTING: 1974 QUADNAME: CAPE DISAPPOINTMENT 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: ST PARKS & RECREATION SPR STATE: WA
GENERAL DESCRIPTION: PELAGIC CORMORANT COLONY ON SEAWARD FACING CLIFFS AT CAPE DISAPPOINTMENT.

NAME: PLETHODON_DUNNI_004 TRS: T09N R11W S05
SOURCE OF LEAD: #2724 LATLONG: 461822N1240435W
NAME OF AREA: QUADCODE: 4612431
DATE OF SIGHTING: 194004 QUADNAME: CAPE DISAPPOINTMENT 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: DUNNS SALAMANDER, 1 COLLECTED AT NORTH HEAD.

NAME: POLYGONIA_OREAS_001 TRS: T10N R11W S33
SOURCE OF LEAD: PYLE RM 1976 LATLONG: 461822N1240230W
NAME OF AREA: QUADCODE: 4612431
DATE OF SIGHTING: 1975 QUADNAME: CAPE DISAPPOINTMENT 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OREAS ANGLE WING BUTTERFLY SIGHTINGS AT ILWACO.

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USGS QUAD NAME: CHINOOK 7.5

NAME: HALIAEETUS LEUCOCEPHALUS 145
SOURCE OF LEAD: FIELDS,DARRELL-DNR
NAME OF AREA: FORT COLUMBIA SHA
DATE OF SIGHTING: 198105
NUMBER OF OWNERS: 1
NAME OF OWNER: ST PARKS AND RECREATION SPR
GENERAL DESCRIPTION: CHINOOK NEST.UNSUCC-75,ACT-81.

TRS: T09N R10W S16
LATLONG: 461615N1235508W
QUADCODE: 4612338
QUADNAME: CHINOOK 7.5
COUNTY: PACIFIC
STATE: WA

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GRAYS HARBOR & PACIFIC COUNTIES SPECIAL ANIMAL OCCURRENCES
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USGS QUAD NAME: COPALIS BEACH 7.5

NAME: CASMERODIUS_ALBUS_009 TRS: T18N R12W S27
SOURCE OF LEAD: SPRAGG,E SEATTLE AUD NOTES 18(4) 1977 LATLONG: 470130N1240940W
NAME OF AREA: QUADCODE: 4712412
DATE OF SIGHTING: 197710 QUADNAME: COPALIS BEACH 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: GREAT EGRET RI OYEHUT AT OCEAN SHORES 1973,76,77.

NAME: LUTRA_CANADENSIS_062 TRS: T19N R12W S22
SOURCE OF LEAD: RAMMER,ALAN WDF LATLONG: 470655N1241010W
NAME OF AREA: QUADCODE: 4712412
DATE OF SIGHTING: 198204 QUADNAME: COPALIS BEACH 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: UUU UUU STATE: WA
GENERAL DESCRIPTION: RIVER OTTERS-2. SWIMMING ALONG BANK OF COPALIS RIVER AND INTERSECTION OF HWY 109 FEEDING-8AM.

NAME: NOVUMBRA_HUBBSI_007 TRS: T18N R12W S15
SOURCE OF LEAD: HARRIS, COLIN K 1974 LATLONG: 470237N1240940W
NAME OF AREA: QUADCODE: 4712412
DATE OF SIGHTING: 1974 QUADNAME: COPALIS BEACH 7.5
NUMBER OF OWNERS: 1 COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT OCEANS WEST CMPNG CLUB PVT STATE: WA
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. LG SHALLOW MARSH ON EXTREME UPPER BEACH, OCEANS WEST CAMPING CLUB. T18N R12W S15.

NAME: NOVUMBRA_HUBBSI_009 TRS: T18N R12W S10
SOURCE OF LEAD: HARRIS, COLIN K 1974 LATLONG: 470323N1240944W
NAME OF AREA: QUADCODE: 4712412
DATE OF SIGHTING: 1974 QUADNAME: COPALIS BEACH 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. CONNER CR INTERSECTION HWY 109. SECTIONS 10,15.

NAME: NOVUMBRA_HUBBSI_013 TRS: T19N R12W S34
SOURCE OF LEAD: HARRIS, COLIN K 1974 LATLONG: 470551N1241006W
NAME OF AREA: QUADCODE: 4712412
DATE OF SIGHTING: 1974 QUADNAME: COPALIS BEACH 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. STAGNANT DRAINAGE DITCHES ON BOTH SIDES OF HWY 109, ABT 1MI S COPALIS BEACH. T19N R12W S34.

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USGS QUAD NAME: COPALIS BEACH 7.5

NAME: NOVUMBRA_HUBBSI_052
SOURCE OF LEAD: MCPHAIL JD 1969 CAT #20
NAME OF AREA:
DATE OF SIGHTING: 1969
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. TRIBUTARY OF CEDAR CREEK 1.5 MILE E OF COPALIS BEACH. T19N R12W S23.

TRS: T19N R12W S23
LATLONG: 470707N1240748W
QUADCODE: 4712412
QUADNAME: COPALIS BEACH 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: NOVUMBRA_HUBBSI_064
SOURCE OF LEAD: LABLANTE, J A UOW COLL FISH #8655
NAME OF AREA:
DATE OF SIGHTING: 195301
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW SPECIMEN FOUND AT COPALIS BEACH.

TRS: T19N R12W S22
LATLONG: 470655N1241010W
QUADCODE: 4712412
QUADNAME: COPALIS BEACH 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: PHOCA_VITULINA_067
SOURCE OF LEAD: EVERITT R 1978 CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL N BAY SLOUGH 3, GRAYS HARBOR.

TRS: T18N R12W S26
LATLONG: 470130N1240800W
QUADCODE: 4712412
QUADNAME: COPALIS BEACH 7.5
COUNTY: GRAYS HARBOR
STATE: WA

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USGS QUAD NAME: COPALIS CROSSING 7.5

NAME: HALIAEETUS LEUCOCEPHALUS 285 TRS: T18N R11W S23
SOURCE OF LEAD: CUMMINS,E-WDG LATLONG: 470150N1240057W
NAME OF AREA: QUADCODE: 4712411
DATE OF SIGHTING: 198206 QUADNAME: COPALIS CROSSING 7.5
NUMBER OF OWNERS: 1 COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT ITT RAYONIER TIMBER CO PVT STATE: WA
GENERAL DESCRIPTION: GRASS CRK TERR,NEST IN SPRUCE,NE4 SW4 S23.TERR:OCC-78,79;NOT LOCATED-80;2YG-82;

NAME: NOVUMBRA HUBBSI 006 TRS: T18N R11W S01
SOURCE OF LEAD: HARRIS, COLIN K 1974 LATLONG: 470321N1240421W
NAME OF AREA: QUADCODE: 4712411
DATE OF SIGHTING: 1974 QUADNAME: COPALIS CROSSING 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. WIDE MARSH 1.7MI E OF W BURROWS RD INTERSECTION. T18N R11W S1
7.

NAME: NOVUMBRA HUBBSI 008 TRS: T18N R11W S03
SOURCE OF LEAD: HARRIS, COLIN K 1974 LATLONG: 470420N1240231W
NAME OF AREA: QUADCODE: 4712411
DATE OF SIGHTING: 1974 QUADNAME: COPALIS CROSSING 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. LG CR CROSSING OCEAN BCH RD, 1MI N POWELL RD,INTERSECTION BUR
G SLOUGH.

NAME: NOVUMBRA HUBBSI 046 TRS: T18N R11W S24
SOURCE OF LEAD: MCPHAIL JD 1969 CAT #20 LATLONG: 470157N1240007W
NAME OF AREA: QUADCODE: 4712411
DATE OF SIGHTING: 1969 QUADNAME: COPALIS CROSSING 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. MARSHY HEADWATERS OF GRASS CREEK. T18N R11W S24,25.

NAME: NOVUMBRA HUBBSI 047 TRS: T18N R11W S12
SOURCE OF LEAD: MCPHAIL JD 1969 CAT #20 LATLONG: 470335N1240007W
NAME OF AREA: QUADCODE: 4712411
DATE OF SIGHTING: 1969 QUADNAME: COPALIS CROSSING 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. CHENOIS CREEK. T18N R11W S12.

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USGS QUAD NAME: COPALIS CROSSING 7.5

NAME: NOVUMBRA_HUBBSI_048
SOURCE OF LEAD: MCPHAIL JD 1969 CAT #20
NAME OF AREA:
DATE OF SIGHTING: 1969
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. TRIBUTARY OF BURG SLOUGH. T18N R11W S10.
TRS: T18N R11W S10
LATLONG: 470352N1240206W
QUADCODE: 4712411
QUADNAME: COPALIS CROSSING 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: NOVUMBRA_HUBBSI_049
SOURCE OF LEAD: MCPHAIL JD 1969 CAT #20
NAME OF AREA:
DATE OF SIGHTING: 1969
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. SWAMPY HEADWATERS OF CONNOR CREEK ABOUT 1.5 MILE SW OF COPALIS CROSSING. T19N R11W S31.JNE 63,>5 TAKEN,UW FISH COLLECTION.
TRS: T19N R11W S31
LATLONG: 470542N1240536W
QUADCODE: 4712411
QUADNAME: COPALIS CROSSING 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: NOVUMBRA_HUBBSI_050
SOURCE OF LEAD: MCPHAIL JD 1969 CAT #20
NAME OF AREA:
DATE OF SIGHTING: 1969
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW. CONNOR CREEK. T18N R11W S6.
TRS: T18N R11W S06
LATLONG: 470435N1240632W
QUADCODE: 4712411
QUADNAME: COPALIS CROSSING 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: NOVUMBRA_HUBBSI_062
SOURCE OF LEAD: MCPHAIL, J D UOW COLL FISH #17337
NAME OF AREA:
DATE OF SIGHTING: 196402
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW TWO SPECIMENS FOUND IN SMALL STREAM ONE MILE WEST OF COPALIS CROSSING.
TRS: T19N R11W S29
LATLONG: 470630N1240435W
QUADCODE: 4712411
QUADNAME: COPALIS CROSSING 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: PHOCA_VITULINA_065
SOURCE OF LEAD: EVERITT R 1976 CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL N BAY SLOUGH 1, GRAYS HARBOR.
TRS: T18N R11W S30
LATLONG: 470130N1240548W
QUADCODE: 4712411
QUADNAME: COPALIS CROSSING 7.5
COUNTY: GRAYS HARBOR
STATE: WA

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USGS QUAD NAME: COPALIS CROSSING 7.5

NAME: PHOCA_VITULINA_066
SOURCE OF LEAD: EVERITT R 1970 CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL N BAY SLOUGH 2, GRAYS HARBOR.

TRS: T18N R12W SNS
LATLONG: 470036N1240624W
QUADCODE: 4712411
QUADNAME: COPALIS CROSSING 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: PHOCA_VITULINA_070
SOURCE OF LEAD: JEFFRIES S 272-0209 CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197604
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL HO HUMPTULIPS RIVER CHANNEL OF GRAYS HARBOR 8 SITINGS.

TRS: T18N R11W S31
LATLONG: 470009N1240405W
QUADCODE: 4712411
QUADNAME: COPALIS CROSSING 7.5
COUNTY: GRAYS HARBOR
STATE: WA

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USGS QUAD NAME: GRAYLAND 7.5

NAME: ARDEA_HERODIAS_073 TRS: T15N R11W S06
SOURCE OF LEAD: MAJORS, HH 1975 EXPLORING WASHINGTON PG 115 LATLONG: 464030N1240540W
NAME OF AREA: QUADCODE: 4612471
DATE OF SIGHTING: 1975 QUADNAME: GRAYLAND 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: GREAT BLUE HERON ROOKERY NEAR GRAYLAND S6 OR 7.

NAME: CASMERODIUS_ALBUS_004 TRS: T16N R11W S20
SOURCE OF LEAD: RANMER_A_533-9335 LATLONG: 465150N1240410W
NAME OF AREA: QUADCODE: 4612471
DATE OF SIGHTING: 197908 QUADNAME: GRAYLAND 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: GREAT EGRET 3 FEEDING IN S BAY OF GRAYS HARBOR NEAR ELK RIV BRIDGE. 1 SEEN 1976, 1974.

NAME: HALIAEETUS_LEUCOCEPHALUS_139 TRS: T16N R11W S27
SOURCE OF LEAD: CUMMINS,E-WDG LATLONG: 465040N1240154W
NAME OF AREA: QUADCODE: 4612471
DATE OF SIGHTING: 198206 QUADNAME: GRAYLAND 7.5
NUMBER OF OWNERS: 1 COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT TIMBER COMPANY UUU STATE: WA
GENERAL DESCRIPTION: ANDREWS CRK TERR,NEST IN LIVE WESTERN HEMLOCK,SE4 NW4 S27,TERR:OCC-75,79,80;1YG-81;UNSUCC-82;

NAME: HALIAEETUS_LEUCOCEPHALUS_465 TRS: T16N R11W S27
SOURCE OF LEAD: SMITH,J-WDOG LATLONG: 465027N1240141W
NAME OF AREA: QUADCODE: 4612471
DATE OF SIGHTING: 197906 QUADNAME: GRAYLAND 7.5
NUMBER OF OWNERS: 1 COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT TIMBER COMPANY UUU STATE: WA
GENERAL DESCRIPTION: ANDREWS CRK S NEST APPROX 400FT S OF NEST #139. SEE #139 FOR TERR DATA. #465 INACT,PARTIALLY FALLEN-79;NOT LOCATED-82;

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USGS QUAD NAME: HOQUIAM 7.5

NAME: ARDEA_HERODIAS_049
SOURCE OF LEAD: MANDERY, JOHN SPOKANE 466-2274
NAME OF AREA: JOHNS RIVER HMA
DATE OF SIGHTING: 1972
NUMBER OF OWNERS: .
NAME OF OWNER: ST SWI OR PVT SP POT
GENERAL DESCRIPTION: GREAT BLUE HERON. ROOKERY ON JOHNS RIVER JUST OFF WDOG LAND 100+ NESTS.

TRS: T16N R10W S08
LATLONG: 465250N1235700W
QUADCODE: 4612388
QUADNAME: HOQUIAM 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: PHOCA_VITULINA_076
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER:
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA MID-HARBOR FLATS 2, GRAYS HARBOR. ALSO S JEFFRIES 04-1976.

TRS: T17N R11W SNS
LATLONG: 465624N1235925W
QUADCODE: 4612388
QUADNAME: HOQUIAM 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: STERNA_CASPIA_008
SOURCE OF LEAD: LARRISON, EJ & KG SONNENBERG 1968 CAT #R-20
NAME OF AREA:
DATE OF SIGHTING: 1968
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: CASPIAN TERN BREEDS ON ISLAND NEAR HOQUIAM.

TRS: T17N R10W SNS
LATLONG: 465755N1235235W
QUADCODE: 4612388
QUADNAME: HOQUIAM 7.5
COUNTY: GRAYS HARBOR
STATE: WA

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USGS QUAD NAME: LONG ISLAND 7.5

NAME: ARDEA_HERODIAS_038 TRS: T11N R10W S05
SOURCE OF LEAD: USFWS 1978A LATLONG: 462801N1235648W
NAME OF AREA: WILLAPA NWR QUADCODE: 4612348
DATE OF SIGHTING: 1978 QUADNAME: LONG ISLAND 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: USA FWS STATE: WA
GENERAL DESCRIPTION: GREAT BLUE HERON ROOKERY 150 NESTS T11N R10W S5 BETWEEN 2 CRK MOUTHS BETWEEN KAFFEE SLOUGH & PARADISE PT.

NAME: HALIAEETUS_LEUCOCEPHALUS_141 TRS: T11N R11W S13
SOURCE OF LEAD: GRUBB,T LATLONG: 462637N1235840W
NAME OF AREA: WILLAPA NWR QUADCODE: 4612348
DATE OF SIGHTING: 1975 QUADNAME: LONG ISLAND 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: USA FWS STATE: WA
GENERAL DESCRIPTION: LONG IS. W TERR,NEST IN LIVE HEMLOCK WITH INTACT DEAD TOP.TERR:UNOCC-75;

NAME: HALIAEETUS_LEUCOCEPHALUS_142 TRS: T11N R10W S05
SOURCE OF LEAD: POELKER,R-WDG LATLONG: 462753N1235645W
NAME OF AREA: WILLAPA NWR QUADCODE: 4612348
DATE OF SIGHTING: 198006 QUADNAME: LONG ISLAND 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: USA FWS STATE: WA
GENERAL DESCRIPTION: LONG IS. E TERR,NEST IN SAME VICINITY AS LARGE HERON ROOKERY.TERR:UNOCC-75,78;OC-79,80;

NAME: HALIAEETUS_LEUCOCEPHALUS_256 TRS: T11N R10W S06
SOURCE OF LEAD: POELKER,R-WDG LATLONG: 462751N1235738W
NAME OF AREA: WILLAPA NWR QUADCODE: 4612348
DATE OF SIGHTING: 198006 QUADNAME: LONG ISLAND 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: USA FWS STATE: WA
GENERAL DESCRIPTION: LONG IS. E TERR,NEST IN CEDAR TREE.SEE #142 FOR TERR DATA.

NAME: HALIAEETUS_LEUCOCEPHALUS_547 TRS: T11N R10W S21
SOURCE OF LEAD: FIELDS,DARRELL DNR 1-800-562-6010 LATLONG: 462518N1235435W
NAME OF AREA: QUADCODE: 4612348
DATE OF SIGHTING: 198106 QUADNAME: LONG ISLAND 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: PVT WEYERHAEUSER CO. PVT STATE: WA
GENERAL DESCRIPTION: NASELLE RIVER TERR, NEST IN UPPER THIRD OF TREE, SE4 S21. TERR:ACT-81;

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USGS QUAD NAME: LONG ISLAND 7.5

NAME: LARUS_DELAWARENSIS_012
SOURCE OF LEAD: SALO,LJ 1975 CAT #177R
NAME OF AREA: WILLAPA NWR
DATE OF SIGHTING: 1975
NUMBER OF OWNERS: 1
NAME OF OWNER: USA FWS
GENERAL DESCRIPTION: RING-BILLED GULL BREEDING IN GENERAL AREA OF SMOKY HOLLOW, LONG ISLAND.
TRS: T11N R10W S19
LATLONG: 462555N1235740W
QUADCODE: 4612348
QUADNAME: LONG ISLAND 7.5
COUNTY: PACIFIC
STATE: WA

NAME: PHOCA_VITULINA_053
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA NE OF LONG IS 1, WILLAPA BAY.
TRS: T12N R10W S30
LATLONG: 462912N1235700W
QUADCODE: 4612348
QUADNAME: LONG ISLAND 7.5
COUNTY: PACIFIC
STATE: WA

NAME: PHOCA_VITULINA_056
SOURCE OF LEAD: EVERITT R 1978 CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA, SHOALWATER BAY 1, WILLAPA BAY.
TRS: T11N R11W S26
LATLONG: 462405N1235958W
QUADCODE: 4612348
QUADNAME: LONG ISLAND 7.5
COUNTY: PACIFIC
STATE: WA

NAME: PHOCA_VITULINA_057
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA SHOALWATER BAY 2, WILLAPA BAY.
TRS: T11N R11W S25
LATLONG: 462404N1235900W
QUADCODE: 4612348
QUADNAME: LONG ISLAND 7.5
COUNTY: PACIFIC
STATE: WA

NAME: PHOCA_VITULINA_058
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA SHOALWATER BAY 3, WILLAPA BAY.
TRS: T11N R11W S24
LATLONG: 462507N1235808W
QUADCODE: 4612348
QUADNAME: LONG ISLAND 7.5
COUNTY: PACIFIC
STATE: WA

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USGS QUAD NAME: LONG ISLAND 7.5

NAME: PLETHODON_DUNNI_010
SOURCE OF LEAD: MAAHS,ROBERT PUYALLUP
NAME OF AREA: WILLAPA NWR
DATE OF SIGHTING: 197705
NUMBER OF OWNERS: 1
NAME OF OWNER: USA FWS
GENERAL DESCRIPTION: DUNN'S SALAMANDER .3 MI N OF WILLAPA WILDLIFE STATION.
TRS: T11N R10W S20
LATLONG: 462500N1235550W
QUADCODE: 4612340
QUADNAME: LONG ISLAND 7.5
COUNTY: PACIFIC
STATE: WA

NAME: RHYACOTRITON_OLYMPICUS_048
SOURCE OF LEAD: MAAHS,ROBERT PUYALLUP
NAME OF AREA: WILLAPA NWR
DATE OF SIGHTING: 197705
NUMBER OF OWNERS: 1
NAME OF OWNER: USA FWS
GENERAL DESCRIPTION: OLYMPIC SALAMANDER .3 MI N OF WILLAPA WILDLIFE STATION.
TRS: T11N R10W S20
LATLONG: 462500N1235550W
QUADCODE: 4612348
QUADNAME: LONG ISLAND 7.5
COUNTY: PACIFIC
STATE: WA

NAME: STRIX_OCCIDENTALIS_166
SOURCE OF LEAD: FORSMAN ERIC ORE ST UNIV
NAME OF AREA: WILLAPA NWR
DATE OF SIGHTING: 197207
NUMBER OF OWNERS: 1
NAME OF OWNER: USA FWS
GENERAL DESCRIPTION: SPOTTED OWL- LONG ISLAND- 1 HEARD.
TRS: T11N R10W S18
LATLONG: 462705N1235750W
QUADCODE: 4612348
QUADNAME: LONG ISLAND 7.5
COUNTY: PACIFIC
STATE: WA

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USGS QUAD NAME: MOCLIPS 7.5

NAME: NOVUMBRA_HUBBSI_032
SOURCE OF LEAD: ASPINWALL
NAME OF AREA:
DATE OF SIGHTING: 196906
NUMBER OF OWNERS:
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: OLYMPIC MUDMINNOW COPALIS R 3 MI E OF HIWAY CROSSING

TRS: T19N R12W S14
73LATLONG: 470020N1240820W
QUADCODE: 4712422
QUADNAME: MOCLIPS 7.5
COUNTY: GRAYS HARBOR
STATE: WA

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USGS QUAD NAME: NEMAH 7.5

NAME: PHOCA_VITULINA_049 TRS: T12N R10W S28
SOURCE OF LEAD: JEFFRIES S.272-0209 LATLONG: 462950N1235700W
NAME OF AREA: QUADCODE: 4612358
DATE OF SIGHTING: 197604 QUADNAME: NEMAH 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HO SEAL SLOUGH-NEEDLE POINT 3 SIGHTINGS.

NAME: PHOCA_VITULINA_051 TRS: T13N R10W S31
SOURCE OF LEAD: JEFFRIES S.272-0209 CAT#2292 LATLONG: 463410N1235850W
NAME OF AREA: QUADCODE: 4612358
DATE OF SIGHTING: 197604 QUADNAME: NEMAH 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HO RIDDLE SPIT 2 SIGHTINGS.

NAME: PHOCA_VITULINA_054 TRS: T12N R10W S29
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292 LATLONG: 463048N1235700W
NAME OF AREA: QUADCODE: 4612358
DATE OF SIGHTING: 197707 QUADNAME: NEMAH 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA NE OF LONG IS 2, WILLAPA BAY.

NAME: PHOCA_VITULINA_055 TRS: T12N R10W S20
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292 LATLONG: 463048N1235642W
NAME OF AREA: QUADCODE: 4612358
DATE OF SIGHTING: 197707 QUADNAME: NEMAH 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA NE OF LONG IS 3, WILLAPA BAY.

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GRAYS HARBOR & PACIFIC COUNTIES SPECIAL ANIMAL OCCURRENCES
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USGS QUAD NAME: NORTH COVE 7.5

NAME: ANSER_ALBIFRONS_001 TRS: T14N R11W S08
SOURCE OF LEAD: SAUL S. SEATTLE AUD. NOTES DEC 1979 ALSO T WAHL CAT #R33 P21 LATLONG: 463845N1240223W
NAME OF AREA: WILLAPA NWR QUADCODE: 4612461
DATE OF SIGHTING: 197910 QUADNAME: NORTH COVE 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: USA FWS STATE: WA
GENERAL DESCRIPTION: WHITE-FRONTED GOOSE RLC STOPOVER IN MIGRATION AT LEADBETTER POINT. 1977.

NAME: CASMERODIUS_ALBUS_005 TRS: T14N R11W S17
SOURCE OF LEAD: WIDRIG R SEATTLE AS OCT 1978 LATLONG: 463835N1240320W
NAME OF AREA: WILLAPA NWR QUADCODE: 4612461
DATE OF SIGHTING: 197808 QUADNAME: NORTH COVE 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: USA WILLAPA NWR FWS STATE: WA
GENERAL DESCRIPTION: GREAT EGRET RSC 1 SEEN IN WILLAPA BAY LEADBETTER PT. 2 SEEN 1976.

NAME: CHARADRIUS_ALEXANDRINUS_002 TRS: T13N R11W S04
SOURCE OF LEAD: WIDRIG R SEATTLE AUD NOTES 9-79 LATLONG: 463832N1240320W
NAME OF AREA: WILLAPA NWR (LEADBETTER POINT SNA) QUADCODE: 4612461
DATE OF SIGHTING: 197909 QUADNAME: NORTH COVE 7.5
NUMBER OF OWNERS: 2 COUNTY: PACIFIC
NAME OF OWNER: USA FS MIX STATE: WA
GENERAL DESCRIPTION: SNOWY PLOVER NESTING AT LEADBETTER POINT.ACT-78;4YG-79;

NAME: NYCTEA_SCANDIACA_007 TRS: T13N R11W SNS
SOURCE OF LEAD: KRAUSE,FAY & JAN SEATTLE AUD SOC "SAS NOTES" MAY 1974 LATLONG: 463835N1240320W
NAME OF AREA: WILLAPA NWR QUADCODE: 4612461
DATE OF SIGHTING: 197404 QUADNAME: NORTH COVE 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: USA FWS STATE: WA
GENERAL DESCRIPTION: SNOWY OWL RI INDIVIDUALS AT LEADBETTER PT 1974,1975,1977.

NAME: OLOR_BUCCINATOR_005 TRS: T13N R11W SNS
SOURCE OF LEAD: VAN WORMER R.L 1973 LATLONG: 463845N1240223W
NAME OF AREA: WILLAPA NWR QUADCODE: 4612461
DATE OF SIGHTING: 197112 QUADNAME: NORTH COVE 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: USA FWS STATE: WA
GENERAL DESCRIPTION: TRUMPETER SWAN AOU181 WINTERING JUST NORTH LEADBETTER PT T13N R11W.

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USGS QUAD NAME: NORTH COVE 7.5

NAME: PHOCA_VITULINA_052
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292
NAME OF AREA: WILLAPA NWR
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: 1
NAME OF OWNER: USA FWS
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA SSE OF GRASSY IS. WILLAPA BAY.
TRS: T14N R11W SNS
LATLONG: 463754N1240124W
QUADCODE: 4612461
QUADNAME: NORTH COVE 7.5
COUNTY: PACIFIC
STATE: WA

NAME: PHOCA_VITULINA_059
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA LEADBETTER CHANNEL 1, WILLAPA BAY.
TRS: T14N R11W S16
LATLONG: 464118N1240300W
QUADCODE: 4612461
QUADNAME: NORTH COVE 7.5
COUNTY: PACIFIC
STATE: WA

NAME: PHOCA_VITULINA_060
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA LEADBETTER CHANNEL 2, WILLAPA BAY.
TRS: T14N R11W S16
LATLONG: 464143N1240300W
QUADCODE: 4612461
QUADNAME: NORTH COVE 7.5
COUNTY: PACIFIC
STATE: WA

NAME: PHOCA_VITULINA_061
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197707
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA LEADBETTER CHANNEL 3, WILLAPA BAY.
TRS: T14N R11W S20
LATLONG: 464036N1240400W
QUADCODE: 4612461
QUADNAME: NORTH COVE 7.5
COUNTY: PACIFIC
STATE: WA

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USGS QUAD NAME: NORTH NEMAH 7.5

NAME: DICAMPTODON_ENSATUS_051 TRS: T13N R09W S30
SOURCE OF LEAD: #1417 LATLONG: 463505N1235037W
NAME OF AREA: QUADCODE: 4612357
DATE OF SIGHTING: 193109 QUADNAME: NORTH NEMAH 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: PACIFIC GIANT SALAMANDER, 1 COLLECTED AT FALLS 6 MLE SW OF SOUTH BEND.ALSO SLATER.

NAME: PLETHODON_DUNNI_005 TRS: T13N R10W S30
SOURCE OF LEAD: OSUMNH-STORM, R LATLONG: 463505N1235037W
NAME OF AREA: QUADCODE: 4612357
DATE OF SIGHTING: 195308 QUADNAME: NORTH NEMAH 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: DUNNS SALAMANDER, 3 COLLECTED 7 MI SW OF SOUTH BEND.

NAME: PLETHODON_VANDYKEI_014 TRS: T13N R09W S29
SOURCE OF LEAD: MAAHS,ROBERT PUYALLUP. LATLONG: 463450N1234953N
NAME OF AREA: QUADCODE: 4612357
DATE OF SIGHTING: 193003 QUADNAME: NORTH NEMAH 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: VAN DYKE'S SALAMANDER, 5.5 MI BY RD S. SO. BEND. VERY STEEP AND OVERGROWN CANYON WITH CREEK AT BOTTOM. 3-17-79 YNG FOUND UNDER LOG. 3-25-79 2 YNG WET TALUS SEEPAGE. 3-12-80 16 BETWEEN CEDAR SLABS AT CANYON BOTTOM.

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GRAYS HARBOR & PACIFIC COUNTIES SPECIAL ANIMAL OCCURRENCES
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USGS QUAD NAME: OCEAN PARK 7.5

NAME: ALGAMORDA_NEWCOMBIANA_002 TRS: T12N R11W S27
SOURCE OF LEAD: DUGGAN, E.P. 1963. DSRS #1511 REPORT OF NON-INDIGENOUS MARINE SHELLS COLATLONG: 463000N1240205W
NAME OF AREA: QUADCODE: 4612441
DATE OF SIGHTING: 196305 QUADNAME: OCEAN PARK 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: NEWCOMB'S LITTORINE SNAIL NAHCOTTA. ABUNDANT UNDER ABANDONED OYSTER CANNERY.

NAME: OLOR_BUCCINATOR_006 TRS: T11N R11W S16
SOURCE OF LEAD: MATIA W 1979 LATLONG: 462625N1240230W
NAME OF AREA: QUADCODE: 4612441
DATE OF SIGHTING: 197901 QUADNAME: OCEAN PARK 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: ST DNR STATE: WA
GENERAL DESCRIPTION: TRUMPETER SWAN REGULAR WINTERING AREA LOOMIS LK ON LONG BCH PENINSULA.

NAME: PANDION_HALIAETUS_070 TRS: T11N R11W S21
SOURCE OF LEAD: MATIA W 1979 LATLONG: 462548N1240220W
NAME OF AREA: QUADCODE: 4612441
DATE OF SIGHTING: 197806 QUADNAME: OCEAN PARK 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: ST DNR STATE: WA
GENERAL DESCRIPTION: OSPREY NEST ACT & SUCCESSFUL TOP OF DEAD SITKA SPRUCE, S END OF LOOMIS LK, EAST SHORE.

NAME: PANDION_HALIAETUS_310 TRS: T11N R11W S04
SOURCE OF LEAD: WILSON, ULRICH LATLONG: 462643N1240200W
NAME OF AREA: QUADCODE: 4612441
DATE OF SIGHTING: 198208 QUADNAME: OCEAN PARK 7.5
NUMBER OF OWNERS: . COUNTY: PACIFIC
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: OSPREY NEST IN SNAG SSW OF PAULS LK. 2YG-82;

NAME: SPEYERIA_ZERENE_HIPPOLYTA_001 TRS: T11N R11W S16
SOURCE OF LEAD: PYLE RM 1976 LATLONG: 462642N1240235W
NAME OF AREA: QUADCODE: 4612441
DATE OF SIGHTING: 1975 QUADNAME: OCEAN PARK 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: ST SHI OR PVT SP POT STATE: WA
GENERAL DESCRIPTION: ZERENE FRITILLARY. LAKE LOOMIS STATE FISHING ACCESS ON LONG BEACH PENINSULA. LARVAL POPULATION IN DUNE MEADOW NEAR THE COAST. WOODLAND AT LOOMIS LAKE IS ADULT RENDEZVOUS OR FEEDING STATION.

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USGS QUAD NAME: OCEAN PARK 7.5

NAME: SPEYERIA_ZERENE_HIPPOLYTA_003
SOURCE OF LEAD: MCCORKLE, USFS & USDA REPORT
NAME OF AREA:
DATE OF SIGHTING: 193807
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: OREGON SILVER-SPOT BUTTERFLY AT NAHCOTTA, LONG BEACH PENINSULA.

TRS: T12N R11W S28
LATLONG: 463000N1240205W
QUADCODE: 4612441
QUADNAME: OCEAN PARK 7.5
COUNTY: PACIFIC
STATE: WA

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USGS QUAD NAME: OMAN RANCH 7.5

NAME: ARDEA HERODIAS 011 TRS: T11N R10W S36
SOURCE OF LEAD: WASH DEPT OF GAME 1973 LATLONG: 462315N1235058N
NAME OF AREA: QUADCODE: 4612347
DATE OF SIGHTING: 1973 QUADNAME: OMAN RANCH 7.5
NUMBER OF OWNERS: COUNTY: PACIFIC
NAME OF OWNER: ST DNR STATE: WA
GENERAL DESCRIPTION: NORTHWESTERN GREAT BLUE HERON ROOKERY. NASELLE RIVER T11N R10W S36. 5 NESTS. AOU194A.

NAME: HALIAEETUS LEUCOCEPHALUS 559 TRS: T11N R09W S19
SOURCE OF LEAD: BRUCE, ANNA WEYCO LATLONG: 462514N1235033W
NAME OF AREA: QUADCODE: 4612347
DATE OF SIGHTING: 198106 QUADNAME: OMAN RANCH 7.5
NUMBER OF OWNERS: 1 COUNTY: PACIFIC
NAME OF OWNER: ST DNR STATE: WA
GENERAL DESCRIPTION: BALD EAGLE NEST-RADAR II,NW4 SW4 S19,IN OLD GROWTH CEDAR. UNSUCC-81.

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USGS QUAD NAME: POINT BROWN 7.5

NAME: CHARADRIUS ALEXANDRINUS 001 — TRS: T17N R12W S24
SOURCE OF LEAD: BERGMAN C TAS 13(3) ALSO HOSEA WDG-1978 — LATLONG: 465828N1240000W
NAME OF AREA: JOHNS RIVER HMA (OYHUT UNIT) — QUADCODE: 4612482
DATE OF SIGHTING: 198104 — QUADNAME: POINT BROWN 7.5
NUMBER OF OWNERS: 1 — COUNTY: GRAYS HARBOR
NAME OF OWNER: ST DEPT OF GAME SP MIX — STATE: WA
GENERAL DESCRIPTION: SNOWY PLOVER NESTS AT DAMON PT NEAR OCEAN SHORES.ACT-78,74YG-78;1YG-79;ACT-81;

NAME: CIRCUS CYANEUS 008 — TRS: T17N R12W S15
SOURCE OF LEAD: PAULSON D SEATTLE AUD NOTES 21(1) — LATLONG: 465745N1240950W
NAME OF AREA: — QUADCODE: 4612432
DATE OF SIGHTING: 1980 — QUADNAME: POINT BROWN 7.5
NUMBER OF OWNERS: . — COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU — STATE: WA
GENERAL DESCRIPTION: MARSH HAWK NEST AT OCEAN SHORES. 1YG-78; ACT-80;

NAME: ELANUS LEUCURUS 001 — TRS: T17N R12W S15
SOURCE OF LEAD: HOGE,G.&W. SAS — LATLONG: 465745N1240950W
NAME OF AREA: — QUADCODE: 4612482
DATE OF SIGHTING: 198101 — QUADNAME: POINT BROWN 7.5
NUMBER OF OWNERS: . — COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU — STATE: WA
GENERAL DESCRIPTION: WHITE-TAILED KITE WINTERS IN OCEAN SHORES AREA. 1 AD AT PT BROWN,8-17-79.1 IMM OCEAN SHORES,11-22-80.1 IMM NW OF O.S. GAME RANGE,1-9-81.

NAME: NYCTEA SCANDIACA 004 — TRS: T17N R12W S22
SOURCE OF LEAD: LUCKE, LAUREN SEATTLE AUD. NOTES V.20 #6 — LATLONG: 465637N1240914W
NAME OF AREA: — QUADCODE: 4612482
DATE OF SIGHTING: 197912 — QUADNAME: POINT BROWN 7.5
NUMBER OF OWNERS: . — COUNTY: GRAYS HARBOR
NAME OF OWNER: ST DEPT OF GAME SP POT — STATE: WA
GENERAL DESCRIPTION: SNOWY OWL WINTERS OCEAN SHORES AREA. MAX # IN SINGLE DAYS COUNT: WINTER OF 73&74 -19;OF 74&75-2;OF 75&76-2;OF 77&78-4;OF 79&80-1;

NAME: PELECANUS OCCIDENTALIS 001 — TRS: T16N R12W S02
SOURCE OF LEAD: HOSEA, FRED WDOG — LATLONG: 465427N1240755W
NAME OF AREA: — QUADCODE: 4612482
DATE OF SIGHTING: 197807 — QUADNAME: POINT BROWN 7.5
NUMBER OF OWNERS: . — COUNTY: GRAYS HARBOR
NAME OF OWNER: USA UUU — STATE: WA
GENERAL DESCRIPTION: BROWN PELICAN OCCURS REGULARLY IN SMALL GROUPS IN WATERS AROUND WESTPORT DURING SUMMER & FALL 1975-1977,S JETTY.

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USGS QUAD NAME: WESTERN 7.5

NAME: ARDEA_HERODIAS_013
TRS: T15N R10W S26
SOURCE OF LEAD: MATIA W 1978
LATLONG: 464507N1235323W
NAME OF AREA:
QUADCODE: 4612378
DATE OF SIGHTING: 1978
QUADNAME: WESTERN 7.5
NUMBER OF OWNERS: .
COUNTY: PACIFIC
NAME OF OWNER: PVT UUU
STATE: WA
GENERAL DESCRIPTION: GREAT BLUE HERON ROOKERY AOU194A. MOUTH OF NORTH RIVER INTO WILLAPA BAY. WEST BANK IN TALL DOUGLAS FIR-HEMLOCK. HUNDREDS OF NESTS REPORTED. T15N R10W.

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USGS QUAD NAME: WESTPORT 7.5

NAME: ALGANORDA_NEWCOMBIANA_001
SOURCE OF LEAD: MACDONALD, K.B. 1969. DSRS LIB #1508 QUANT STUDIES OF SALT MARSH MOLLLAT
NAME OF AREA:
DATE OF SIGHTING: 196508
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: NEWCOMB'S LITTORINE SNAIL WESTPORT MARSHES.
TRS: T16N R11W S06
LATLONG: 465325N1240540W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: BRANTA_BERNICLA_002
SOURCE OF LEAD: WASH DEPT OF ECOLOGY 1977 P622
NAME OF AREA:
DATE OF SIGHTING: 1977
NUMBER OF OWNERS: .
NAME OF OWNER: UUU UUU
GENERAL DESCRIPTION: BLACK BRANT SSP NIGRICANS AOU 174 POINT NEN
TRS: T R SNS
LATLONG: 465923N1240103W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: BRANTA_BERNICLA_011
SOURCE OF LEAD: WELCH,JOE USFWS WILLAPA NWR
NAME OF AREA:
DATE OF SIGHTING: 197902
NUMBER OF OWNERS: .
NAME OF OWNER: UUU UUU
GENERAL DESCRIPTION: BRANT RLC LARGE NUMBERS DURING MIGRATION ON GRAYS HARBOR 1977-1979.
TRS: T17N R11W S32
LATLONG: 465506N1240418W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: LARUS_DELAWARENSIS_006
SOURCE OF LEAD: HOSEA, FRED WDG3 ABERDEEN 249-3038
NAME OF AREA: SAND AND GOOSE ISLANDS NAP
DATE OF SIGHTING: 197205
NUMBER OF OWNERS: 1
NAME OF OWNER: ST NATURAL RESOURCES DNR
GENERAL DESCRIPTION: RING-BILLED GULL COLONY ON SAND ISLAND IN GRAYS HARBOR.
TRS: T17N R11W SNS
LATLONG: 465745N1240325W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: LARUS_DELAWARENSIS_015
SOURCE OF LEAD: PENLAND,S T AND S J JEFFRIES 1977 MURRELET 58(3):86-87
NAME OF AREA:
DATE OF SIGHTING: 197607
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: RING-BILLED GULL, 2 PAIR NESTING ON WHITCOMB ISLAND IN GRAYS HARBOR.
TRS: T17N R11W S32
LATLONG: 465450N1240416W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

WASHINGTON DEPT. GAME - NONGAME DATA SYSTEM
GRAYS HARBOR & PACIFIC COUNTIES SPECIAL ANIMAL OCCURRENCES
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USGS QUAD NAME: WESTPORT 7.5

NAME: NYCTEA_SCANDIACA_003 TRS: T16N R11W S07
SOURCE OF LEAD: SEATTE AUD SOC "BIRD NOTES" 18(5):3 1978 LATLONG: 465315N1240550W
NAME OF AREA: QUADCODE: 4612481
DATE OF SIGHTING: 197801 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: SNOWY OWL RI WINTER WESTPORT 1976-1978.

NAME: PHALACROCORAX_AURITUS_012 TRS: T17N R11W S08
SOURCE OF LEAD: SMITH J WDOG LATLONG: 465841N1240409W
NAME OF AREA: SAND AND GOOSE ISLANDS NAP QUADCODE: 4612481
DATE OF SIGHTING: 198005 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: 1 COUNTY: GRAYS HARBOR
NAME OF OWNER: ST NATURAL RESOURCES DNR STATE: WA
GENERAL DESCRIPTION: DOUBLE-CRESTED CORMORANT COLONY W END OF GOOSE ISLAND ON TOP OF SAND DUNES 295 NESTS WITH EGGS.1979 110 NESTS.

NAME: PHOCA_VITULINA_062 TRS: T17N R11W SNS
SOURCE OF LEAD: EVERITT,R-WDOG 1981 CAT#3447 P52 LATLONG: 465745N1240325W
NAME OF AREA: SAND AND GOOSE ISLANDS NAP QUADCODE: 4612481
DATE OF SIGHTING: 198007 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: ST DNR OR PVT SP POT STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HO SAND ISLAND OF GRAYS HARBOR 7 SITINGS & ON SURROUNDING TIDE FLATS ALSO REPORTED 4-76.

NAME: PHOCA_VITULINA_063 TRS: T17N R11W SNS
SOURCE OF LEAD: EVERITT,R 1981 CAT#3447 P.52 LATLONG: 465730N1240240W
NAME OF AREA: SAND AND GOOSE ISLANDS NAP QUADCODE: 4612481
DATE OF SIGHTING: 198008 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: ST DNR OR PVT SP POT STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA SAND IS SHOALS 6 DIFFERENT HO SIGHTS. ALSO REPORTED 7-77

NAME: PHOCA_VITULINA_068 TRS: T17N R12W SNS
SOURCE OF LEAD: EVERITT R 1978 CAT#2292 LATLONG: 465800N1240718W
NAME OF AREA: QUADCODE: 4612481
DATE OF SIGHTING: 197707 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL SHOALS E OF OCEAN SHORES, GRAYS HARBOR.

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NAME: PHOCA_VITULINA_069 TRS: T17N R11W SNS
SOURCE OF LEAD: EVERITT R 1978 CAT#2292 LATLONG: 465918N1240500W
NAME OF AREA: QUADCODE: 4612481
DATE OF SIGHTING: 197707 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL SHOALS NW OF GOOSE IS 2 SITES, GRAYS HARBOR.

NAME: PHOCA_VITULINA_071 TRS: T18N R11W S33
SOURCE OF LEAD: EVERITT R 1978 CAT#2292 LATLONG: 465948N1240342W
NAME OF AREA: QUADCODE: 4612481
DATE OF SIGHTING: 197707 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HUMPTULIPS RIV, E CHANNEL 1, GRAYS HARBOR.

NAME: PHOCA_VITULINA_072 TRS: T17N R11W SNS
SOURCE OF LEAD: EVERITT R 1978 CAT#2292 LATLONG: 465841N1240409W
NAME OF AREA: SAND AND GOOSE ISLANDS NAP QUADCODE: 4612481
DATE OF SIGHTING: 197707 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: 1 COUNTY: GRAYS HARBOR
NAME OF OWNER: ST NATURAL RESOURCES DNR STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL SE END OF GOOSE IS, GRAYS HARBOR. IMPORTANT AREA.

NAME: PHOCA_VITULINA_073 TRS: T17N R11W S34
SOURCE OF LEAD: EVERITT, RD NOAA 1979 REPORT CAT#2292 LATLONG: 465456N1240212W
NAME OF AREA: QUADCODE: 4612481
DATE OF SIGHTING: 197707 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA E OF WHITCOMB, GRAYS HARBOR.

NAME: PHOCA_VITULINA_074 TRS: T17N R11W SNS
SOURCE OF LEAD: EVERITT,R 1981 CAT#3447 P.52 LATLONG: 465506N1240418W
NAME OF AREA: QUADCODE: 4612481
DATE OF SIGHTING: 190008 QUADNAME: WESTPORT 7.5
NUMBER OF OWNERS: . COUNTY: GRAYS HARBOR
NAME OF OWNER: PVT UUU STATE: WA
GENERAL DESCRIPTION: HARBOR SEAL HAUL OUT AREA WHITCOMB FLATS, GRAYS HARBOR. ALSO REPORTED 7-77

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NAME: PHOCA_VITULINA_075
SOURCE OF LEAD: JEFFFRIES S 272-0209 CAT#2292
NAME OF AREA:
DATE OF SIGHTING: 197604
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: HARBOR SEAL HO SOUTH BAY OF GRAYS HARBOR 2 SITINGS.

TRS: T17N R11W S17
LATLONG: 465248N1240416W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: SPEYERIA_ZERENE_HIPPOLYTA_002
SOURCE OF LEAD: MCCORKLE, DAVID V. 1975. SILVERSPOT SALVATION SUMMARIES ATALA 3(1):10
NAME OF AREA:
DATE OF SIGHTING: 1950
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU
GENERAL DESCRIPTION: OREGON SILVER-SPOT FRITILLARY COMMON NEAR WESTPORT.

TRS: T16N R12W S13
LATLONG: 465305N1240630W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: STERNA_CASPIA_001
SOURCE OF LEAD: PENLAND 1976
NAME OF AREA: SAND AND GOOSE ISLANDS NAP
DATE OF SIGHTING: 1975
NUMBER OF OWNERS: 1
NAME OF OWNER: ST DNR
GENERAL DESCRIPTION: CASPIAN TERN NESTING COLONY 1200 BIRDS

TRS: T17N R11W SNS
LATLONG: 465445N1240325W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: STERNA_CASPIA_002
SOURCE OF LEAD: PENLAND 1976. ALSO NAT. AREAS ADVISORY COM. 1974 CAT#2895 P.3
NAME OF AREA: SAND AND GOOSE ISLANDS NAP
DATE OF SIGHTING: 1975
NUMBER OF OWNERS: 1
NAME OF OWNER: ST DNR
GENERAL DESCRIPTION: CASPIAN TERN NESTING COLONY ON GOOSE IS. 2000 BIRDS-73,75;

TRS: T17N R11W SNS
LATLONG: 465835N1240430W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

NAME: STERNA_CASPIA_010
SOURCE OF LEAD: PENLAND,S.& S.JEFFRIES 1977 MURRELET 58(3):86-87;NAAC 1974 CAT#2895
NAME OF AREA:
DATE OF SIGHTING: 197607
NUMBER OF OWNERS: .
NAME OF OWNER: PVT UUU

TRS: T17N R11W S32
LATLONG: 465450N1240416W
QUADCODE: 4612481
QUADNAME: WESTPORT 7.5
COUNTY: GRAYS HARBOR
STATE: WA

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USGS QUAD NAME: WESTPORT 7.5

GENERAL DESCRIPTION: CASPIAN TERN COLONY-WHITCOMB IS.,GRAYS HARBOR.2400 IND-75;2480-76;

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