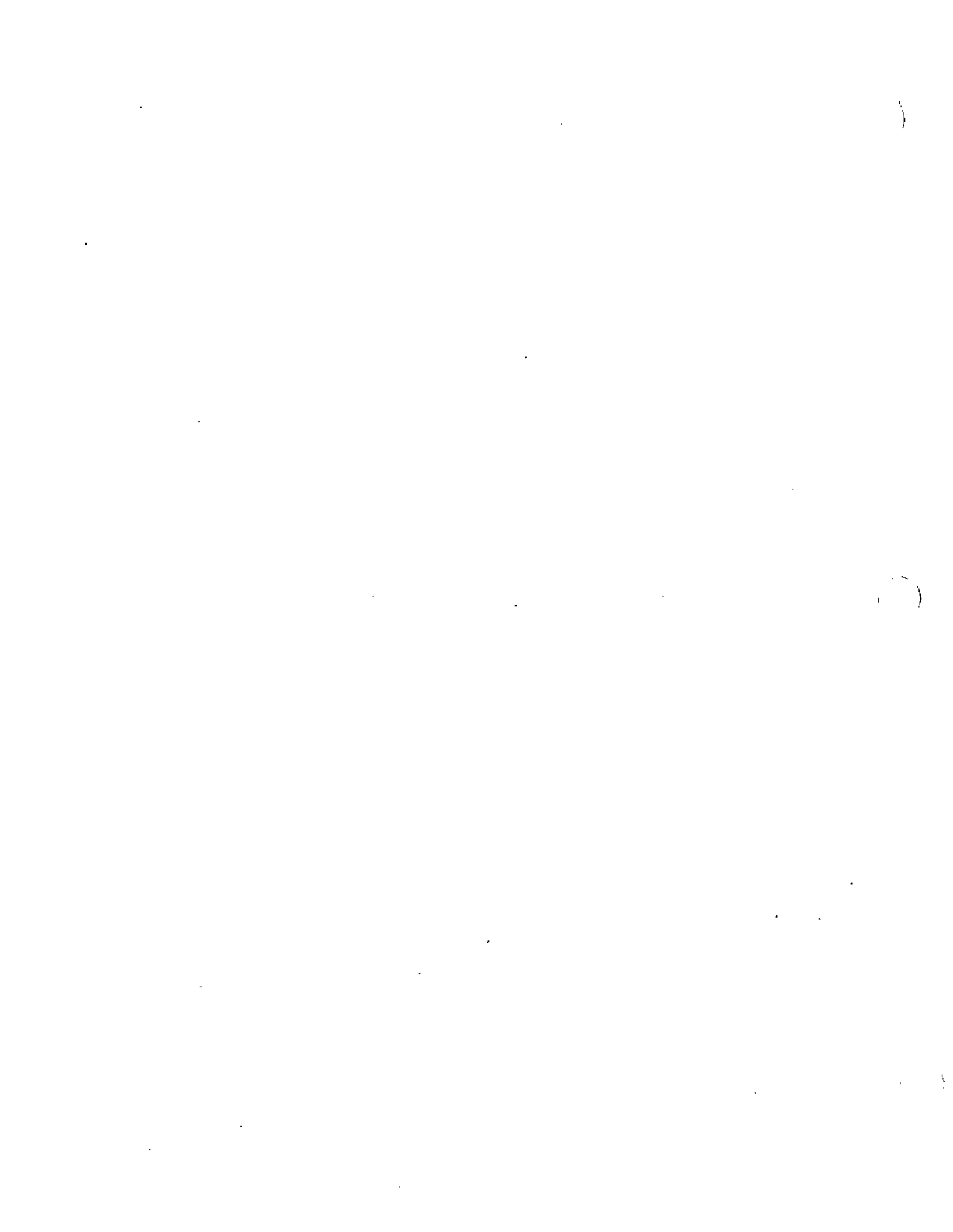

**BASELINE INVENTORY OF RARE, THREATENED AND
ENDANGERED PLANT SPECIES/COMMUNITIES
ALONG WASHINGTON'S PACIFIC COAST**

By The Washington Natural Heritage Program

December 1982



The preparation of this report was financially aided through a grant from the Washington State Department of Ecology with funds obtained from the National Oceanic and Atmospheric Administration, and appropriated for Section 308(c)(2) of the Coastal Zone Management Act of 1972.



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

Prepared by the Washington Natural Heritage Program

Linda M. Kunze

Lynn C. Cornelius

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

December 1982

Prepared for Washington State Department of Ecology
and the National Oceanic and Atmospheric Administration

Coastal Zone Management Grant No. G82-029

164 pages

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

We would like to take this opportunity to thank the many people who gave of their time, experience and services to the enrichment of this study: The staff of the Willapa National Wildlife Refuge, particularly James Hidy and Ulrich Wilson; The Washington Department of Game particularly Eric Cummins, Steve Jefferies, William Nelson, Rocky Spencer and Steve Sweene; The staff of the Washington Natural Heritage Program in particular S. Reid Schuller; Jeff Picton with the Utah Wildlife Cooperative Unit; Mike Reuf with the Department of Ecology; Ralph Widrig, ornithologist and Alfred Wiedemann, authority on coastal dunes. A special thanks to the three people who typed this report, Charlott Duckwitz, Susan Klontz and Luwana Reinhart.

TABLE OF CONTENTS

Introduction	
Purpose	1
Literature Review	1
Field Surveys	3
Map Overlays and Text Format	4
Site Evaluation	5
Site Descriptions	
I "The Sink" Marshlands	8
II Ocean Shores Marshlands	10
III Humptulips River Marshlands	12
IV Chenois Creek Marshlands	15
V Grass Creek Marshlands	18
VI Point New Marshlands	21
VII Bowerman Basin Marshlands	23
VIII Johns River Marshlands	25
IX Beardslee Slough Marshlands	28
X Elk River Marshlands	31
XI Hunt Club/Mallard Slough Marshlands	34
XII Westport Marshlands	38
XIII Whitcomb Flats - Natural Area Preserve	41
XIV Sand Island and Goose Island - Natural Area Preserves	42
XV North Cove Marshlands	43
XVI Tokeland Marshlands	46
XVII Cedar River/Norris Slough Marshlands	50
XVIII Hawks Point Marshlands	54
XIX North River/Smith Creek Marshlands	57
XX II Slough/Kellogg Slough Marshlands	61
XXI Fredrickson Slough Marshlands	64
XXII Bruceport and Hansen Creek Marshlands	67
XXIII Bone River Marshlands	70
XXIV Niawiakum River Marshlands	74
XXV Palix River Marshlands	79
XXVI North Nemah River Marshlands	84
XXVII Middle and South Nemah River Marshlands	87
XXVIII Seal Slough Marshlands	91
XXIX Naselle River Marshlands	93
XXX Omeara Marshlands	96
XXXI Bear River Marshlands	99
XXXII Porter Point Area Marshlands	102
XXXIII Goulters Slough Marshlands	105
XXXIV Leadbetter Point Marshlands	108
XXXIV-XXXV Leadbetter Point Dune System	112
XXXVI Oceanside Dunes	118
XXXVII Special Plant Habitat - <u>Sanicula arctopoides</u>	120
XXXVIII Special Plant Habitat - <u>Poa pachypholis</u>	121
XXXIX Baker Bay Marshlands	122
XL Chinook River/Wallacut River Marshlands	124
XLI South Long Island Marshlands	127
XLII Baldwin Slough Marshlands	130



XLIII	Lewis Slough Area Marshlands	134
XLIV	Diamond Point - Research Natural Area	137
XLV	Long Island-Jensen Point Marshlands	140
XLVI	Smoky Hollow Bog	143
XLVII	Cedar Grove	145
XLVIII	Gunpowder Island - Natural Area Preserve	146
Appendix I: Plant Community Abstracts		
A.	Salt Marsh Communities	148
B.	Coastal Dune Communities	155
Bibliography		162

LIST OF FIGURES

Figure 1: Study Area

2

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).

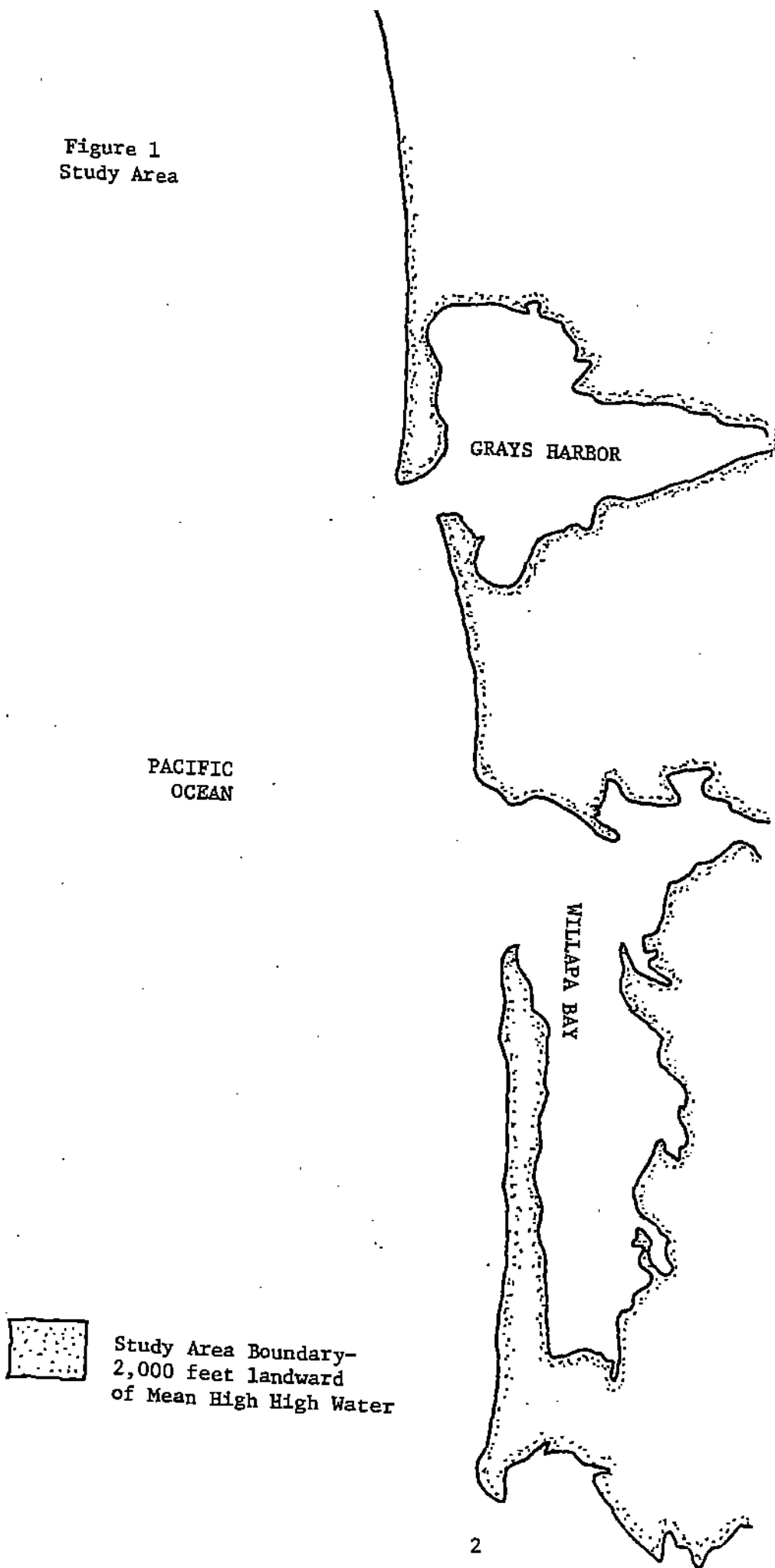
LITERATURE REVIEW

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 determined 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 determined for each plant community. Where lands were inaccessible, mapping was done from vantage points with binoculars, extrapolating probable plant communities 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 systems.

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 varies 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 distinguishing 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 innumerable 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 accretion 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
 Claux maritima
 Grindelia integrifolia (local co-dominant)
 Triglochin maritimum

The Sink - cont.

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-dominates 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, bisects 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

Ocean Shores Marsh Area - cont.

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, cover-
ing over $\frac{1}{2}$ 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 $\frac{1}{2}$ 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

Humptulips River Marshes - cont.

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 paralleling 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)

Chenois Creek Marsh - cont.

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
 Scirpus 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*

Chenois Creek Marsh - cont.

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

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.

Grass Creek Marshes - cont.

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 artillery 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

Point New - cont.

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.

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 portion 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

Johns River Marshlands - cont.

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)

Johns River Marshlands - cont. 1

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

Beardslee Slough Marshes - cont.

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.

Beardslee Slough Marshes - cont.

Dominants: *Deschampsia caespitosa*
 Distichlis 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*

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
 Triglochin maritimum

Elk River Marshes - cont

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

Elk River Marshes - cont.

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.

Hunt Club/Mallard Slough Marshlands - cont.

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-*Salicornia virginica*-(*Triglochin maritimum*) 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,

Hunt Club/Mallard Slough Marshlands - cont:

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

Hunt Club/Mallard Slough Marshlands - cont.

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 - Approximately 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.

Westport Marshlands - cont.

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 approxi-
mately 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.

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 eroding 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: *Salicornia virginica*
Distichlis spicata (variable)
Jaumea carnosa (variable)

Sub-dominants: *Triglochin maritimum* (locally co-dominant)
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-dominant: *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

North Cove Marsh - cont.

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: Carex 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
Hordeum 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

Tokeland Area Marshes - cont.

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).

Tokeland Area Marshes - cont.

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

Tokeland Area Marshes - cont.

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)

Cedar River/Norris Slough Marshes - cont.

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: Distichlis 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

Cedar River/Norris Slough Marshes - cont.

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

Cedar River/Norris Slough Marshes - cont.

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, constructed 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.

Hawks Point Marsh - cont.

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 - Approximately 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

North River/Smith Creek Marshes - cont.

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: Distichlis 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 lyngbyei.

North River/Smith Creek Marshes - cont.

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
Triglochin 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

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.

Dominants: 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

II Slough/Kellogg Slough Marsh - cont.

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.

II Slough/Kellogg Slough Marsh - cont.

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

Salicornia 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

Fredrickson Slough Marsh - cont.

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: Spartina 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)

Bruceport and Hansen Creek Marshes - cont.

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

) Bruceport and Hansen Creek Marshes - cont.

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 homesteaded. 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 tide-
lands 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 carnososa-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 carnososa
 Distichlis spicata

Bone River Marshlands - cont.

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.

Bone River Marshlands - cont.

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 vegetation 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)

) Bone River Marshlands - cont.

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

Niawiakum River Marshlands - cont.

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 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 low 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.

Dominants: 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

Niawiakum River Marshlands - cont.

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.

Niawiakum River Marshlands - cont.

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-dominant 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

Niawiakum River Marshlands - cont.

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

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

Palix River Marshlands - cont.

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

Palix River Marshlands - cont.

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 caespitosa
 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

Palix River Marshlands - cont.

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

Palix River Marshlands - cont.

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

North Nemah River Marshlands - cont:

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

North Nemah River Marshlands - cont.

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

Middle and South Nemah River Marshlands - cont.

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 carnososa
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

Middle and South Nemah River Marshlands - cont.

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 alterniflora 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

Seal Slough Marsh - cont

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.

Dominant: Scirpus americanus

Nasalle River Marshlands - cont.

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

Nasalle River Marshlands - cont.

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

Omeara Marsh - cont.

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

Bear River Marshlands - cont.

Sub-dominants: *Distichlis spicata*

Minor: *Plantago maritima*

Sedge Marsh

Carex lyngbyei 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

() Bear River Marshlands - cont.

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

Porter Point Area Marshes - cont.

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

Porter Point Area Marshes - cont.

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.

Dominant: 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

Goulters Slough Marsh - cont

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
Glauca 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 } occur within
 Distichlis spicata } former diked area
 Grindelia integrifolia }

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.

Leadbetter Point Marshlands - cont.

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 accretion or erosion. *Puccinellia* sp. occurs as a co-dominant with *Salicornia* on what appears to be an accreting 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

Leadbetter Point Marshlands - cont.

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 occurrence is highly predictable, a description has been included here.

- Dominants: Festuca rubra
 Armeria maritima
 Plantago coronopus (introduced)
- Sub-dominants: Orthocarpus castillejoides (locally co-dominant)
 Spargularia 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

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 accretion 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

Leadbetter Point Dune System - cont.

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 development.

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)

Leadbetter Point Dune System - cont.

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

Leadbetter Point Dune System - cont.

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

Carex obnupta community (mapping symbol 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 claiifornica

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 claiifornica
Pinus contorta
Poa macrantha
Pteridium aquilinum

Leadbetter Point Dune System - cont.

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)
 Maianthemum dilatatum (local)
 Pyrus fusca
 Salix spp (probably hookeriana)
 Sambucus sp. (local)

Leadbetter Point Dune System - cont.

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

Stabilized dune wetland community (mapping symbol 0) 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:	<u>Festuca rubra</u> (variable) <u>Rosa nutkana</u> (variable)
Sub-dominants:	<u>Pinus contorta</u> (local dominant) <u>Pteridium aquilinum</u> (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 conspicuous involucrel.

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)
 Lileopsis 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

Baker Bay Marshes - cont.

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.

Chinook River/Wallacut Marshes - cont.

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

Chinook River/Wallacut Marshes - cont.

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 indicate 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 carnosu-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 carnosu
 Salicornia virginica
 Triglochin maritimum

Minor: Deschampsia caespitosa
 Orthocarpus castellejoides
 Plantago maritima
 Stellaria humifusa

South Long Island Marsh - cont.

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.

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

Sub-dominant: Glaux maritima (variable)

Minor: Agrostis alba
 Stellaria humifusa
 Triglochin maritimum

South Long Island Marsh - cont.

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 maritimum 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

Baldwin Slough Marshes - cont.

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 symbol 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

Baldwin Slough Marshes - cont.

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)

Baldwin Slough Marshes - cont.

Minor: Jaumea carnososa (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.

Lewis Slough Area Marshes - cont.

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 symbol 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

Lewis Slough Area Marshes - cont.

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 Hemlock	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 muritum* 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 muritum* 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 oregonum* 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 muritum*, *Blechnum spicant*, *Dryopteris dilatata*, *Polypodium scoleri* (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

Long Island-Jensen Point Marsh - cont.

Minor: Agrostis alba (local)
 Deschampsia caespitosa (local)
 Salicornia virginica
 Spargularia 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

Long Island-Jensen Point Marsh - cont.

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-dominant: *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

Smoky Hollow Bog - cont.

Picea sitchensis
Sphagnum spp.
Thuja plicata
Tsuga heterophylla
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
Belchium 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 estu-
arine 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.

) Plant Community Abstracts - cont.

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 created sandy tideflats, breached diked areas or occasionally, 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 occasionally 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

Plant Community Abstracts - cont.

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 tolerances. 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

) Plant Community Abstracts - cont.

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

Plant Community Abstracts - cont.

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
Sédalcia hendersonii (Washington State Monitor Species)
Trifolium wormskjoldii
Vicia gigantea

Plant Community Abstracts - cont.

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
Tanacetum 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

Plant Community Abstracts - cont.

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 occasional fires prior to settlement of the coast by white people. Suppression of fires, grazing, home development, off-road-vehicle use and introduction of weedy species for dune stabilization appear to be severely threatening this community.

Associated Species:

Festuca rubra

Fragaria chiloensis

Fritillaria lanceolata

Habenaria greenii

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) Schreuder 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

Plant Community Abstracts - cont.

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 lasiandra
Salix sp
Spiraea douglasii

)

BIBLIOGRAPHY

BIBLIOGRAPHY

- Burg, M.E., D.R. Tripp, E.S. Rosenberg. 1980. Plant 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 between 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.

)

)

)

