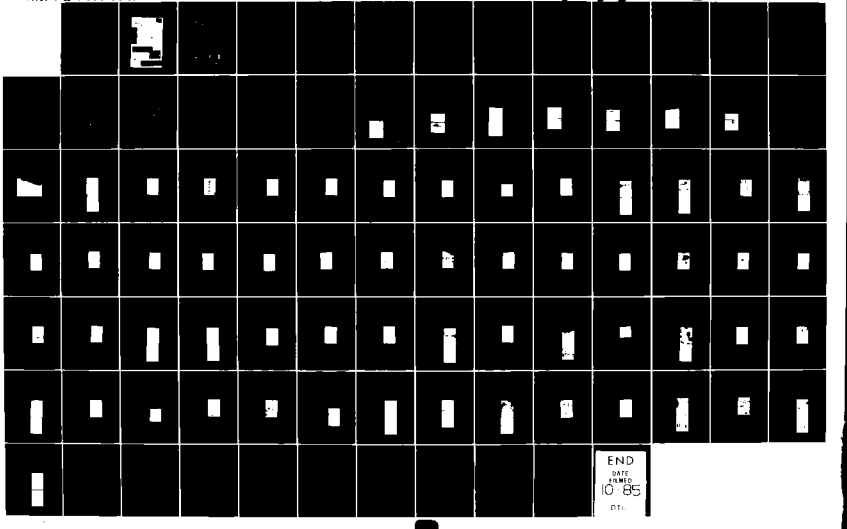
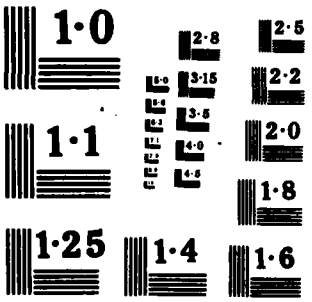
AD-A158 375 WETLAND PLANTS OF THE PACIFIC NORTHWEST(U) CORPS OF 1/4
ENGINEERS SEATTLE WA SEATTLE DISTRICT
F WEINMANN ET AL. SEP 84

UNCLASSIFIED F/G 6/3 NL




1·0
1·1
1·25
1·4
1·6
1·8
2·0
2·2
2·5
2·8
3·15
3·5
4·0
4·5

Wetland Plants of the Pacific Northwest

US Army Corps of Engineers

Wetland Plants of the Pacific Northwest

US Army Corps of Engineers
Seattle District

REPORT DOCUMENTATION

Title: WETLAND PLANTS OF THE PACIFIC NORTHWEST

Authors: Fred Weinmann
Marc Boule'
Ken Brunner
John Malek
Vic Yoshino

Prepared by: U.S. Army Corps of Engineers
Seattle District

Final Report: September, 1984; 85 pages; Unclassified

Key Words: *Eelgrass Beds* Salt Marshes Wetlands
Meadows Swamps Wetland Plants

Abstract: Fifty-nine species of wetland plants are described and illustrated with color photographs. These wetland species occur in eelgrass beds, low salt/brackish marshes, high salt/brackish marshes, deep freshwater marshes, shallow freshwater marshes, wet meadows and swamps. Definitions and a general introduction to wetlands are also provided.

ACKNOWLEGEMENTS

Even a small guide such as this cannot be prepared without the effort and support from many individuals and the authors are grateful to all those who assisted. Special appreciation is extended for the review and advice provided by our colleagues at the Pacific Ocean Division and Seattle District Corps of Engineers offices: James Maragos, Margaret Elliot, Mike Lee, Steve Dice, Steve Martin, Sam Casne, and Mike Bowlus provided particularly helpful comments. We are also grateful to David Mason of Western Washington University and Dick Butler of the King County Planning Department, who found time to review an early manuscript and provided a much needed critical review. J. Kirk Hilsabeck, Lonnie Reid, Bill Knox, Seattle District Graphics Branch, were particularly helpful in graphic design and layout; Caroline Maas created the wetland cross-section drawings; and the Seattle District word processing staff was ever patient in interpreting the various and unique handwritings of the authors. A special thanks is also due to Shapiro and Associates and their word processing staff for their timely support. Finally, the special ambiance provided by the seaside retreat of Joe and Elsie Fickel catalyzed the initial drafting of this wetland guide. All of the aforementioned assistance contributed positively to the finished product and has been appreciated throughout this lengthy process of preparation. Any and all errors of fact or omission in the guide can be attributed solely to the authors.

F.C.W.

CREDITS

Authors:

Marc Boule' likes plants and birds just fine, with no discernable preference. When he is not in the field increasing his extensive wetlands expertise and slides collection, he juggles paper and figures as Vice-President of Shapiro and Associates, Inc., an environmental consulting firm in Seattle. Mr. Boule' has a B.S. in Geology from Caltech and an M.S. in Marine Sciences from William and Mary College. He is the western representative for the Society of Wetland Scientists.

Ken Brunner has a marked preference for birds over plants and is delighted that he was able to find a bird in the cover photograph. Since he is a wildlife biologist, receiving his B.S. from the University of Washington, these eclectic tastes are tolerated. Mr. Brunner's experience with wetlands is one of the best results of his 7 years with the Seattle District, Corps of Engineers.

John Malek hunts birds and occasionally plants, and thinks fish are also fine, in their place. Mr. Malek has a B.A. from Western Washington State College and an M.A. from the University of Washington; both are in English. After 10 years with the Seattle District, Corps of Engineers, he has become reasonably proficient in environmental planning and can pronounce correctly the Latin names of several wetland species.

Fred Weinmann on the other hand, absolutely prefers plants to birds and managed to edit out nearly every wetland photograph showing a bird. Dr. Weinmann has been studying various aspects of wetland ecology for over 15 years. In addition to his duties as Chief, Estuarine Studies Unit, and wetland specialist for the Seattle District, Corps of Engineers, he is actively involved in the Society of Wetland Scientists and is acting as a regional coordinator for the Corps of Engineers and Fish and Wildlife Service to develop nationwide wetland plant species lists. Dr. Weinmann received his Ph.D. in Marine Ecology/Botany from the University of Washington.

***Victor Yoshino** once hunted birds and sprayed organophosphates over plants in* eastern Washington. He now prefers to photograph both plus motorcycles and fashion models. Mr. Yoshino has studied Pacific Northwest wetlands with Dr. Weinmann and wetlands of the Midwest and East Coast during Corps of Engineers sponsored training. He is currently pursuing an interdisciplinary degree in applied regional ecology and is a member of the Society of Wetland Scientists.

Photographs:

Cover photograph of Skagit Flats wetlands is by Fred Weinmann.

Some of the photographs appearing in this document were taken by Victor Yoshino or other Corps of Engineers' personnel during field inspections or other Corps duties. Other photographs were contributed by the authors from their personal collections and are used here by permission.

TABLE OF CONTENTS

INTRODUCTION

This guide was prepared to assist those persons involved in implementing Corps of Engineers' authorities and activities in wetlands of the Pacific Northwest. It is intended as a tool that will aid in identifying wetland plants and habitats for this region. While the guide is most representative of wetlands species and habitats in the state of Washington, very similar species and habitats exist in the state of Oregon and in northern California. In addition, freshwater wetlands throughout the north temperate United States share many commonalities, so portions of this guide will have application to other areas of the country.

Although this guide is principally intended to be used by agency personnel in interpreting whether or not a particular habitat is a wetland, the authors hope that it will appeal to others who wish to acquire an understanding of wetland plants and habitats. For those persons who do not work regularly with wetland jurisdictions and issues, some explanation of these topics as they relate to Corps of Engineers' authorities is provided in the following section. This discussion also describes briefly other agencies' involvement with wetlands management and protection, again, principally as they relate to Corps of Engineers' authorities and activities. Thereafter is provided explanation of the coverage, contents, and organization of this guide; brief descriptions of the wetland categories used by the authors; and finally a caution for those using this guide in the field, especially when attempting to determine whether a particular habitat is a wetland, since there are complexities and limitations to wetland identification that exceed the scope of this publication.

While an effort has been made to write and organize this guide so that an extensive knowledge of botany is unnecessary, some awareness of wetland functions and values on the part of the user was assumed. Some botanical terms are used throughout the species and habitat descriptions; these are defined in the glossary at the back of this publication. General plant descriptions, including anatomical terms, have been included in the glossary.

Finally, wetlands are ecologically important areas, and over the last several years the public has become aware and appreciative of their values and concerned with their preservation. Many Federal, state, and local agencies are interested in and may have regulatory responsibilities for managing or protecting wetlands. As a result, research that has been directed toward wetland ecology has changed and expanded our understanding of wetland values, functions, and processes. Exhaustive reference to this body of literature has been avoided in this document to maintain brevity. A limited bibliography is provided at the end of this publication for persons desiring to further explore some of the concepts, classification systems, and technical details that are alluded to in this guide.

WETLANDS, A DEFINITION AND OVERVIEW

For Corps of Engineers' authorities and activities, a formal definition of wetlands is provided by regulation. Wetlands are defined as :

> *Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (33 CFR 323)*

Corps of Engineers' concern and authority for wetlands stems from three major sources:

- *Pursuant to the Clean Water Act, Congress gave the Corps the responsibility and authority to issue permits for the discharge of dredged or fill material into waters of the United States, including adjacent wetlands. (Known commonly as "Section 404" permits.) This regulatory program is the one with which the public is most familiar in terms of wetland regulation and through which the above wetland definition was created.*

- *The Office of the Chief of Engineers has issued a very stringent policy with respect to Corps of Engineer's civil works projects and regulatory programs where wetlands may be affected. This policy states in part:*

> *The Corps of Engineers recognizes that wetlands constitute a productive and valuable public resource. Their unnecessary alteration or destruction is discouraged as contrary to the public interest. Wetlands considered to perform functions important to the public interest include:*
>
> *(1) Wetlands which serve significant natural biological functions, including food chain production, general habitat, and nesting, spawning, rearing, and resting sites for aquatic or land species;*
>
> *(2) Wetlands set aside for study of the aquatic environment or as sanctuaries or refuges;*
>
> *(3) Wetlands, the destruction or alteration of which would affect detrimentally natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other environmental characteristics;*

(4) Wetlands which are significant in shielding other areas from wave action, erosion, or storm damage. Such wetlands are often associated with barrier beaches, islands, reefs and bars;

(5) Wetlands which serve as valuable storage areas for storm and flood waters;

(6) Wetlands which are prime natural recharge areas. Prime recharge areas are locations where surface and ground water are directly interconnected; and

(7) Wetlands which through natural water filtration processes serve significant water purification functions.

• *In 1977, President Carter issued Executive Order 11990 which directs all Federal agencies to avoid activities that adversely affect wetlands unless there is no practicable alternative. Section 2(a) of Executive Order 11990 states, in part:*

...each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is not a practicable alternative to such construction and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.

In responding to this charge, the Corps has acquired considerable expertise in identifying and understanding wetland habitats as they relate to our regulatory definition. Other Federal agencies also play major roles in the overall Federal wetland program, both as part of their own agency responsibilities and expertise and in association with the Corps of Engineers' permitting program. The Fish and Wildlife Service of the U.S. Department of the Interior has long been concerned with wetlands because of their value to fish and wildlife species and is currently engaged in preparing a systematic inventory and classification of the Nation's wetlands known as the National Wetland Inventory. The Environmental Protection Agency, with the Corps of Engineers, is responsible for administration of Section 404 of the Clean Water Act and has promulgated technical guidelines for use in evaluating permit applications. These Federal agencies, and the National Marine

Fisheries Service of the National Oceanic and Atmospheric Administration, must review and comment on all Section 404 permit applications. In addition, all Federal agencies are charged with implementing Executive Order 11990.

In the Pacific Northwest, the states of Washington and Oregon have accorded protective status to wetlands in developing their Federally-approved Coastal Zone Management Programs. In addition, local governments within each state have become increasingly concerned with wetland issues. Several local governments have developed specific policies and regulations aimed at protecting and enhancing important wetlands through the administration of their land use programs. Foremost among these is the wetlands program developed under the Sensitive Areas Ordinance for King County in the state of Washington. Similar attention is being paid to wetlands by state and local authorities elsewhere in the Nation.

COVERAGE, CONTENTS, AND ORGANIZATION

This wetland plant guide contains photographs and descriptions of 59 common wetland species in the Pacific Northwest. Our objective has been to illustrate, using a minimal number of plant species, the broad range of wetland habitat types in this portion of the country. A variety of plants are represented, including species that are permanently submerged by a meter or more of freshwater as well as species representative of wetlands that rarely have standing water. In like manner, representatives of marine areas include species that typically occur in habitats only exposed at the lowest tides and other species that only grow at elevations that are seldom (and then only for very short duration) inundated by tidal waters. While these represent only a small percentage of plant species that occur in Pacific Northwest wetlands, they include most of the best indicators of Pacific Northwest wetland types.

These types have been limited for this guide to those which traditionally have been considered "wetlands" by professional wetland ecologists. Habitat types which only in recent years have come to be defined as wetlands, but do not fall under the previously given Corps of Engineers' regulatory definition of wetlands, have not been included. Information on these wetland types may be found in other scientific publications, some of which are included in the bibliography at the back of this guide. Notable examples of these additions are algal- and/or invertebrate-dominated marine and estuarine shorelines, invertebrate-dominated streambeds without vascular plant populations, and ephemeral streams which have no significant populations of wetland plants (e.g. dry washes and gullies). Due to insufficient space in this edition, bogs also have not been included as a separate wetland type; although some of the dominant plant species of bogs are included.

Table 1 compares the wetland classification system of Martin, et al. (1953), published in U.S. Fish and Wildlife Service Circular 39 by Shaw and Fredine (1956), with the *Classification of Wetlands and Deepwater Habitats of the United States* by Cowardin, et al. (1978). The Circular 39 system, until recently the most widely used wetland classification system in the United States, was developed to inventory the Nation's wetlands in the early 1950's. In 1974, the U.S. Fish and Wildlife Service initiated another national inventory of wetlands. Whereas the earlier inventory primarily assessed the amount and distribution of waterfowl habitat, the primary objective of the National Wetlands Inventory classification system is to impose boundaries on natural ecosystems for the purposes of inventory, evaluation and management.

TABLE 1: COMPARISON OF WETLAND TYPES DESCRIBED IN U.S. FISH AND WILDLIFE SERVICE CIRCULAR 39 WITH SOME OF THE MAJOR COMPONENTS OF THE NATIONAL WETLAND INVENTORY CLASSIFICATION SYSTEM

USFWS Circular 39 Type	National Wetland Inventory Classification of Wetlands and Deepwater Habitats	
	Classes	Water Regimes
Type 1 - Seasonally Flooded Basins or Flats	Emergent Wetland Forested Wetland	Temporarily Flooded Intermittently Flooded
Type 2 - Inland Fresh Meadows	Emergent Wetland	Saturated
Type 3 - Inland Shallow Fresh Marshes	Emergent Wetland	Semipermanently Flooded Seasonally Flooded
Type 4 - Inland Deep Fresh Marshes	Emergent Wetland Aquatic Bed	Permanently Flooded Intermittently Flooded Semipermanently Flooded
Type 5 - Inland Open Fresh Water	Aquatic Bed Unconsolidated Bottom	Permanently Flooded Intermittently Exposed
Type 6 - Shrub Swamps	Scrub-Shrub Wetland	All nontidal regimes except Permanently Flooded
Type 7 - Wooded Swamps	Forested Wetland	All nontidal regimes except Permanently Flooded
Type 8 - Bogs	Scrub-Shrub Wetland Forested Wetland Moss-Lichen Wetland	Saturated
Type 9 - Inland Saline Flats	Unconsolidated Shore	Seasonally Flooded Intermittently Flooded Temporarily Flooded
Type 10 - Inland Saline Marshes	Emergent Wetland	Seasonally Flooded Semipermanently Flooded

WETLAND IDENTIFICATION COMPLEXITIES: LIFE IS NOT SIMPLE

For a number of reasons, when determining whether or not a particular habitat parcel is a wetland, the field person must exercise judgment and caution. Many plants that are not truly "wetland species" — *that is, they are not most* typically found in, or are not typically adapted to existence in wetlands — will occasionally be found in an obvious wetland habitat for any of many ecological reasons. In wetlands such as wet meadows, nonwetland annual plants and those perennials that die back to ground level each year, will begin their growth during the driest part of the season, grow rapidly, and complete their life cycle before the advent of wet conditions. Goldenrod and some common lotus species commonly follow this pattern. In other instances, plants that are particularly successful at populating disturbed areas, either wetland or nonwetland, will invade. Once they have become established on the site, these species can persist as sparse individuals or even dominate such areas. Blackberries and thistles are prime examples of such invader species.

Other species seem to occur at random in wetland and nonwetland situations; these plants readily adapt to a variety of moisture conditions. To further complicate wetland identification, many nonwetland plant species can occur in what appears to be a wet habitat, but in fact is a relatively dry microhabitat within a predominantly wet site. Finally, some species are broadly adapted for life in either wetland or nonwetland situations. A few notable examples are *twinberry, red alder, and fireweed.* Such species typically will often exhibit different morphological characteristics in wetlands as compared with their appearance in nonwetlands. Red alder, for example, will be shorter and appear more twisted in a swamp than in an upland habitat because its growth is inhibited by the high moisture content and resulting lack of oxygen in the soil. Persons identifying wetlands are encouraged to check beyond what appears obvious.

One also needs to be aware of the wide diversity of habitats that are transitional between wetlands and nonwetlands. These habitats typically occupy the shoreward edges of lakes, ponds, rivers, swamps, bogs, marshes, and estuaries, and their vegetation is a mixture of species typically associated with, and adapted to, saturated conditions and species that normally would not occur in a wetland situation. At times, these transitional zones or "ecotones" will be so narrow as to be barely discernable, easily defining the extent of the wetland area. Other times, these areas will be extremely broad with apparently no definitive boundary between the wetland and the nonwetland. The width of this transition zone will normally reflect the gradient in elevation and moisture regime. This knowledge, however, does not simplify the identification task.

To summarize, caution and judgement must be exercised in interpreting the nature of wetland habitats and in evaluating their floristic features. Where a diverse flora exists, the field person should not place great emphasis on the presence of any single species, but should focus on the community of species comprising the habitat. Where necessary, hydrologic and soil conditions should be identified and evaluated. Finally, the person attempting identification must recognize that some habitats cannot truly be termed wetland or nonwetland, but are a transition between the two.

Swamps: The essential feature of swamps is the presence of (and usually dominance by) woody vegetation, either shrubs or trees. Swamps often have standing water during a portion of the growing season with water depths of 20 cm or more during wet seasons. Swamps occur most frequently along low-lying streams, in river overflow areas, and in shallow lake basins. Freshwater swamps may also be tidally influenced. The most common swamps in the Pacific Northwest are the coastal/maritime spruce swamps and the ubiquitous alder bottom swamps. Common woody plants in the swamps include Sitka spruce (*Picea sitchensis*), red alder (*Alnus rubra*) willow (*Salix spp.*), and Douglas spiraea (*Spiraea douglasii*).

The transition from deep fresh marsh (the tidal channel), to shallow marsh dominated by sedges, then to shrub-swamp dominated by willows and red alder, with a spruce swamp in the background, is shown near Junction City, Washington.

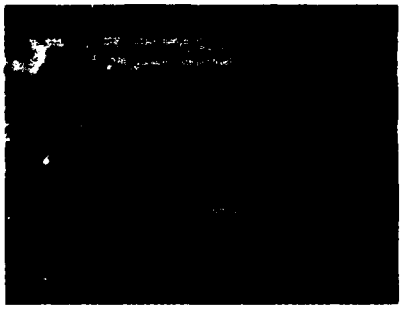
This photograph shows a typical association in Pacific Northwest coastal situations. A tidal channel in the foreground is bordered by a dense growth of sedges; adjacent to the sedges is a swamp dominated by red alder and Sitka spruce.

Wet meadows: these freshwater wetlands are normally inundated for only a portion of the growing season, but the soil remains saturated near the surface for most or all of the growing season. Wet meadows occur over large areas of the flood plains in western Washington and characterize many riparian areas east of the Cascades. The most obvious examples are wet pastures dominated by soft rush (*Juncus effusus*) as well as ungrazed open areas where reed canarygrass (*Phalaris arundinacea*) forms lush stands. Other species of grasses, sedges, and rushes occur in these habitats as do a number of showy wildflowers.

The wet meadow in the foreground is dominated by grasses and the tufted soft rush. Similar meadows are abundant throughout the Pacific Northwest, especially in pastures, diked areas, estuarine deltas, and adjacent to lakes and streams.

In the foreground is a typical wet meadow dominated by buttercups and grasses. In the background, an area having a similar water regime is being used for grazing and hay production.

Shallow fresh marshes: Surface water, up to several decimeters (dm), may persist for short periods, but water depth in this wetland type is typically less than 16 cm and there often is no standing water during the dry season. Shallow freshwater marshes have the most diverse assemblage of plant species of all wetland types and are perhaps the most commonly recognized. Two of the most apparent species are cattails (*Typha spp.*) and purple loosestrife (*Lythrum salicaria*). The margins of lakeshores, often adjacent to deep fresh marshes, are typical locations where examples of this wetland type may be found, although easily observable examples are ubiquitous along roadsides, in undeveloped urban areas, and virtually anywhere standing water persists during the growing season.

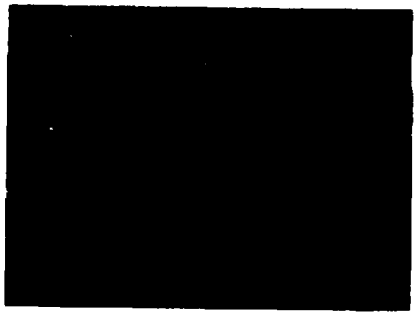


Seen in late summer, this shallow marsh is dominated by golden-brown reed canarygrass and cattails. The cattails probably indicate wetter areas. In the foreground is a deep marsh vegetated with submerged aquatic plants.

A shallow marsh at Lake Washington dominated by purple loosestrife and cattails with a willow swamp in the background.

Deep fresh marshes: This wetland type is usually permanently inundated by freshwater from a few centimeters (cm) to two meters (m) in depth. These habitats are best typified by the sheltered bays of large lakes, the shorelines of many small lakes and ponds, and sluggish streams and rivers. This wetland type contains a variety of different typical plant types, including submerged aquatic plants (watermilfoil), floating leaved aquatic plants (water lilies), floating plants (duckweed), and emergent plants (bulrushes). Easily observable examples are Union Bay on the west side of Lake Washington as well as near the mouth of Mercer Slough on the east side of Lake Washington.

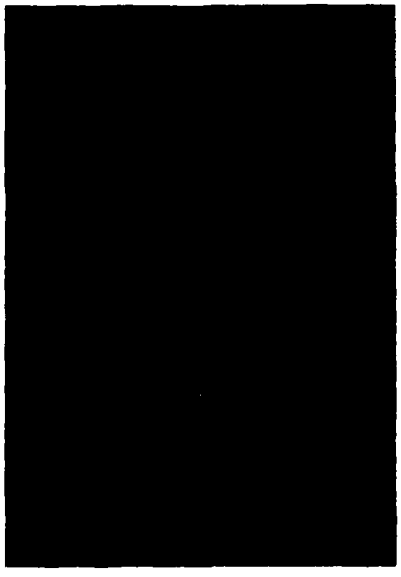
This deep fresh marsh has a water depth of nearly a meter and is dominated by a dense growth of Eurasian watermilfoil.



The transition from open water to a deep fresh marsh dominated by white water lilies and bulrushes, to a shallow marsh composed of purple loosestrife and cattails, then to a willow swamp, is shown at Lake Sammamish.

High salt/brackish marshes:
High marshes also occur in marine and estuarine areas, generally above MHHW where they are inundated by tidal waters on a less than daily frequency. High marshes occur contiguous with the shoreward edge of low marshes, although as noted, there is often much overlap. Typical dominant species include tufted hairgrass (*Deschampsia caespitosa*), Pacific silverweed (*Potentilla pacifica*), and meadow barley (*Hordeum brachyantherum*).

This high salt marsh is dominated by tufted hairgrass. The central portion of the picture shows a salt panne where sea water has evaporated creating a highly saline area essentially devoid of vegetation.



Pacific silverweed, and occasional clumps of tufted hairgrass dominate this high salt marsh.

Low salt/brackish marshes:
These wetlands occur in marine and estuarine areas below mean higher high water (MHHW) where they can be inundated by high tides on most days. Low salt marsh species can extend down to about 1.8 m above MLLW where they may mix with algae and narrow-bladed eelgrass. Salinities can range broadly from essentially marine (30 to 35 parts per thousand) to only mildly brackish (5 to 7 parts per thousand). Under high salinities, these marshes are often dominated by fleshy jaumea (*Jaumea carnosa*) or pickleweed (*Salicornia virginica*). In brackish conditions, low marshes are often dominated by sedges (*Carex spp.*) and sometimes by arrowgrass (*Triglochin maritimum*), bulrush (*Scirpus spp.*), or various combinations of other species. There is considerable intergradation and overlap between low and high marsh species so there may not be a distinct boundary. Examples of low salt and brackish marshes occur throughout the Pacific Northwest in relatively sheltered marine waters. Broad expanses of these marshes can be found in Grays Harbor and Willapa Bay.

This low brackish marsh in Willapa Bay has circular patches of Lyngby's sedge (left corner) and salt marsh cordgrass (right center). Eventually these patches will expand until the circles meet, forming a complete vegetation cover.

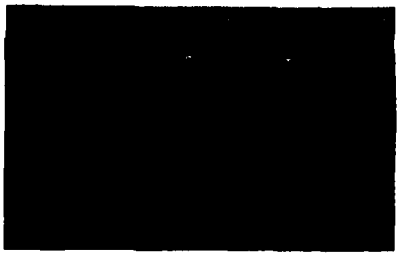
A tidal channel, near Westport, Washington, bordered by a low salt marsh composed of pickleweed and fleshy jaumea.

WETLAND HABITATS

The species described and illustrated here are organized into seven sections that represent distinct wetland types. A brief description and example photographs of the seven wetland types are provided in the following paragraphs. For purposes of simplification, we have combined some of the Circular 39 *habitat types as follows*:

Eelgrass Beds	includes	Type 19
Low Salt/Brackish Marsh	includes	Type 17
High Salt/Brackish Marsh	includes	Type 17
Shallow Fresh Marsh	includes	Type 3
Deep Fresh Marsh	includes	Types 4 and 5
Wet Meadow	includes	Type 2
Swamp	includes	Types 6 and 7

Eelgrass beds: *These intertidal and subtidal wetlands are dominated by* eelgrass (*Zostera marina*) and/or narrow-bladed eelgrass (*Z. japonica*). This wetland type can be found throughout the extensive intertidal lands in Grays Harbor and Willapa Bay as well as in protected embayments in Puget Sound and the San Juan Archipelago. The substrate is usually mud or mixed mud and sand. *Z. marina* generally occurs between 6.6 m below mean lower low water (MLLW) and 1.8 m above MLLW. At its upper limits, *Z. marina* often intermixes with *Z. japonica,* which generally occurs between 1.0 m above MLLW and 2.4 m above MLLW. At its upper limits of growth, *Z. japonica* will intermix with low salt marsh vegetation.



A dense bed of eelgrass imparts the greenish color to this intertidal beach near Gooseberry Point on Puget Sound.

This detailed view of a portion of an eelgrass bed shows a number of algal species intermingled with the eelgrass blades.

Field Characters: Nontechnical descriptions of identifying characteristics that can be easily observed in the field are presented. These descriptions supplement the photographs, pointing out distinctive features that can be seen in the accompanying photographs. All dimensions given are approximations in metric measurements; a conversion table is provided on the inside back cover. As most species are quite variable morphologically, they will not always exhibit field characters precisely as described. Also, some species do not have easily observable and/or describable nontechnical characters, even though their overall appearance is distinctive to the experienced wetland biologist.

Familiarity with the botantical characteristics of the different plant families aids considerably in field identification. Reference to one of the publications cited in the bibliography may be necessary to obtain specific botantical descriptions or to distinguish some of the more difficult species from similar species. Field experience will aid in recognizing many species, and is necessary to correctly identify most wetland species during their nonflowering seasons and in the winter. Some species illustrated in this guide have nonwetland counterparts that are quite similar in appearance.

Habitats: The guide provides a brief narrative of the general nature of all habitats where the plant may be found. Many species, while typical of one wetland type, commonly occur in other wetland types and may occur in nonwetland situations as well. This is expressed in a more compact form in Table 2. Other species commonly associated with the illustrated plant are listed. This section represents the combined experience of the authors with Pacific Northwest wetlands rather than a textbook approach detailing where the species ought to be found. Also, functional values, such as wildlife habitat value and primary productivity, are not discussed. To be properly treated, these values require lengthy and complex discussion beyond the scope of this guide. Furthermore, and in most cases, the important functional values attributable to wetlands are on a community rather than an individual species basis.

Lythrum salicaria				I	T			
Myriophyllum spicatum				T				
Nuphar polysepalum				T				
Nymphaea odorata				T				
Oenanthe sarmentosa					T		I	
Orthocarpus castillejoides			T					
Phalaris arundinacea					T	C		X
Phragmites communis			I		T	I		X
Physocarpus capitatus							T	X
Picea sitchensis							T	X
Plantago maritima		T	C					
Polygonum spp				T	T			X
Potentilla pacifica			T			I		
Pyrus fusca							T	X
Ranunculus spp.				I	I	T	I	X
Rumex crispus			I		I	T		X
Sagittaria spp.				I	T			
Salicornia virginica	I	T	C					
Salix spp.							T	X
Scirpus acutus			I	T	C			
Scirpus americanus		T	C					
Scirpus maritimus		I	T					
Scirpus microcarpus					T	I	C	
Sparganium spp.				I	T			
Spartina alterniflora		T	I					
Spergularia marina		T	C					
Spiraea douglasii					I		T	X
Trifolium wormskjoldii			T			I		
Triglochin maritimum	I	T	C					
Typha angustifolia				I	T			
Typha latifolia				I	T			
Zostera japonica	T	I						
Zostera marina	T							

T Typical C Common I Infrequent X Occurs in non-wetland habitats

TABLE 2: OCCURRENCE OF PLANT SPECIES IN DIFFERENT WETLAND TYPES

HABITAT TYPE / SCIENTIFIC NAME	Alisma plantago-aquatica	Alnus rubra	Aster subspicatus	Athyrium filix-femina	Atriplex patula	Bidens cernua	Carex lyngbyei	Carex obnupta	Cornus stolonifera	Cotula coronopifolia	Cuscuta salina	Deschampsia caespitosa	Distichlis spicata	Eleocharis spp	Epilobium angustifolium	Epilobium watsonii	Fraxinus latifolia	Grindelia integrifolia	Hordeum brachyantherum	Impatiens noli-tangere	Iris pseudacorus	Jaumea carnosa	Juncus effusus	Lemna minor	Lilaeopsis occidentalis	Lysichium americanum
Eelgrass Beds																										
Low Salt Brackish Marsh					C		T			T	T		C									T			T	
High Salt Brackish Marsh			T		T		C	C		I	I	T	T	I				T	T			C				
Deep Fresh Marsh	I																				T			T		
Shallow Fresh Marsh	T			C		T		C				I		T	T	T				T	C		C	C	I	I
Wet Meadow			I	I		I								C	I	I		I		I			T			C
Swamps	I	T		T		I		T	T					I	I	I	T			C						T
Non-Wetlands		X	X	X	X				X	X		X	X		X	X	X	X					X			

T = Typical C = Common I = Infrequent X = Occurs in non-wetland habitats

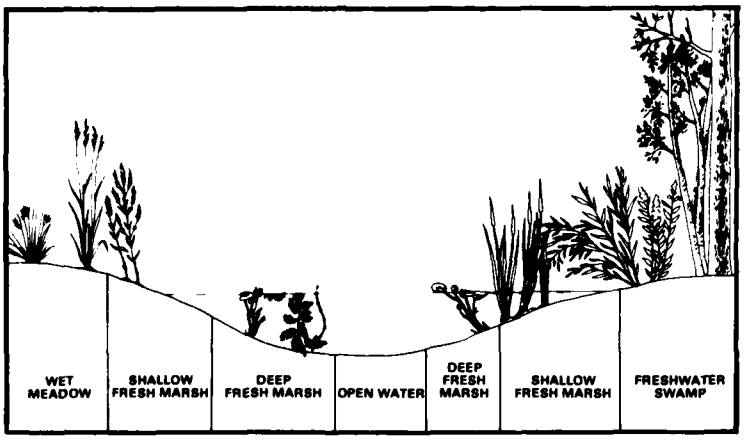


FIGURE 2: IDEALIZED CROSS SECTIONAL VIEW OF FRESHWATER WETLANDS.

Table 2 lists all of the plant species included in this guide and references them to the habitat types where they occur; the habitat type where they are boldfaced (e.g. **T**) indicates the habitat section in which the plant's description and illustration appear (refer to pages 10 and 11).

The plant descriptions section provides the following information for each species:

Scientific Name: Genus and species are given, or where the plant type is represented by a group of similar species, the notation "spp." is substituted for the species name. Scientific names are based on nomenclature in *Vascular Plants of the Pacific Northwest* (Hitchcock, et al, 1969). A few exceptions to this nomenclature are noted.

Common Name: Only the name or names most commonly applied to the illustrated plant are given. In cases where no vernacular name is known, a generic name is given.

Figures 1 and 2 show generalized spatial relationships of selected types of wetlands; the user should understand that each of these wetland types represents a diversity of habitats with much overlap in plant species composition in response to site-specific environmental conditions. As a result, many of these species will be found in more than one wetland type and may also occur in nonwetland situations.

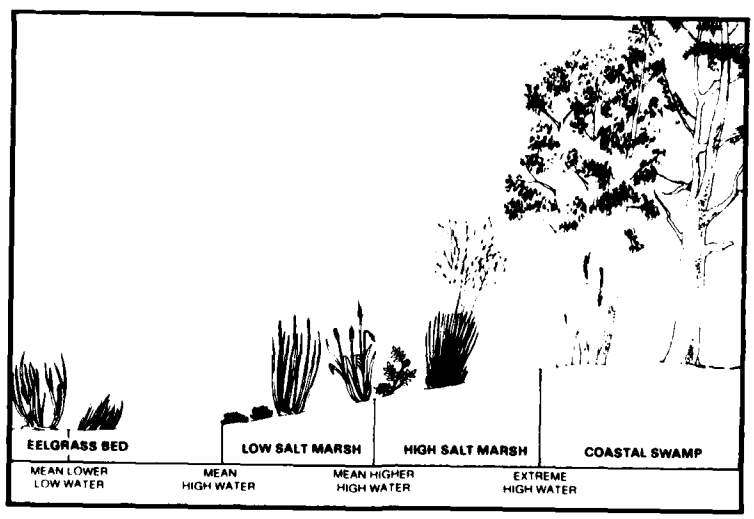


FIGURE 1: IDEALIZED CROSS SECTIONAL VIEW OF SPATIAL AND VERTICAL RELATION OF ESTUARINE WETLAND TYPES.

USFWS Circular 39 Type	National Wetland Inventory Classification of Wetlands and Deepwater Habitats	
	Classes	Water Regimes
Type 11 - Inland Open Saline Water	Unconsolidated Bottom	Permanently Flooded Intermittently Flooded
Type 12 - Coastal Shallow Fresh Marshes	Emergent Wetland	Regularly Flooded Irregularly Flooded Semipermanently Flooded-Tidal
Type 13 - Coastal Deep Fresh Marshes	Emergent Wetland	Regularly Flooded Semipermanently Flooded-Tidal
Type 14 - Coastal Open Fresh Water	Aquatic Bed Unconsolidated Bottom	Subtidal Permanently Flooded-Tidal
Type 15 - Coastal Salt Flats	Unconsolidated Shore	Regularly Flooded Irregularly Flooded
Type 16 - Coastal Salt Meadows	Emergent Wetland	Irregularly Flooded
Type 17 - Irregularly Flooded Salt Marshes	Emergent Wetland	Irregularly Flooded
Type 18 - Regularly Flooded Salt Marshes	Emergent Wetland	Regularly Flooded
Type 19 - Sounds and Bays	Unconsolidated Bottom Aquatic Bed Flat	Subtidal Irregularly Exposed Regularly Flooded Irregularly Flooded
Type 20 - Mangrove Swamps	Scrub-Shrub Wetland Forested Wetland	Irregularly Exposed Regulary Flooded Irregularly Flooded

WETLAND PLANT DESCRIPTIONS

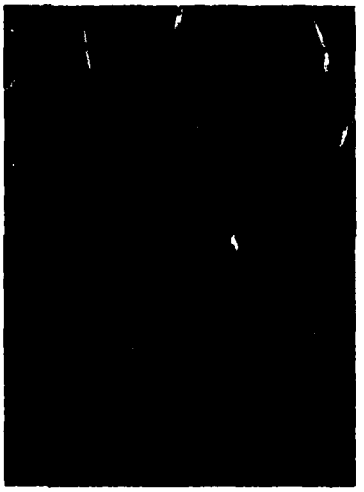
EELGRASS BEDS

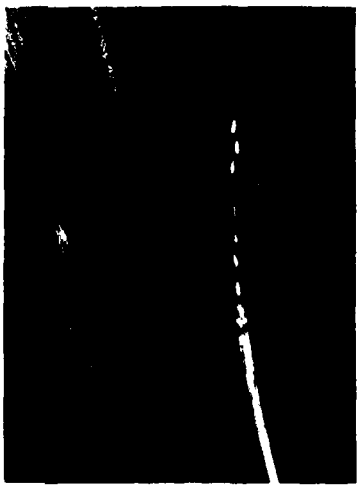
Zostera marina; Zostera japonica
SCIENTIFIC NAME

EELGRASS, GRASS-WRACK; DWARF EELGRASS, NARROW-BLADED EELGRASS
COMMON NAME

Field Characters: In *Z. marina,* the flat, grass-like leaves are up to 1.4 cm wide and can be over 3 meters in length while the leaves of *Z. japonica* are up to 2 mm wide and do not exceed 15 cm in length. In both species, the upright stems originate from an underground rhizome. The seeds are enclosed in elongated membranous, translucent packets.

Habitats: *Z. marina* occurs up to about 1.8 m above MLLW and as deep as 6.6 m below MLLW. *Z. japonica* occurs higher on the intertidal, between about 1.0 m and 2.4 m above MLLW. Both species grow well in sandy or muddy substrate and may be found along both low and moderate energy shorelines throughout Puget Sound.





LOW SALT/BRACKISH MARSHES

Cotula coronopifolia
SCIENTIFIC NAME

BRASS BUTTONS
COMMON NAME

Field Characters: This low, sometimes creeping, fleshy plant is readily distinguished by its many bright yellow flowers (approximately 1 cm in diameter) looking much like the buttons for which they are named. The flowers are borne singly on stems about 3 to 6 cm above the highest leaves. The *narrow, often toothed or divided* leaves have no petiole and clasp the round fleshy stem.

Habitats: Although extremely salt tolerant, this plant only occasionally is found in undisturbed tidal marshes. It is more common in isolated saline habitats where drainage is poor and semi-permanent inundation in the spring may be followed by severe drying in the summer. Brass buttons is most commonly found in isolated depressions (salt pannes) of tidal wetlands, on dredged material, or behind dikes. As with saltweed, these conditions may discourage competition by other species. It is frequently associated with saltweed, pickleweed, or saltgrass.

LOW SALT/BRACKISH MARSHES

Cuscuta salina
SCIENTIFIC NAME

SALTMARSH DODDER
COMMON NAME

Field Characters: Saltmarsh dodder is a parasitic plant that entwines itself about a host plant from which it obtains essential nutrients. As a parasite, it lacks chlorophyll and appears to be without leaves, which have been reduced to microscopic scales. The stems are yellow-orange, while the tiny bell-shaped flowers (2 to 4.5 mm) are white to cream in color.

Habitats: Typically found in low salt marshes, this plant is most often associated with pickleweed and fleshy jaumea, though it will also parasitize other plants, primarily those of the goosefoot and sunflower families. It occurs infrequently in high salt marshes.

Jaumea carnosa
SCIENTIFIC NAME

FLESHY JAUMEA
COMMON NAME

Field Characters: The leaves are fleshy and succulent. Stems, up to 3 dm long are lax, so the plant appears matted. The yellow composite heads of flowers (1.5 to 2 cm in diameter) are solitary and showy, but rarely appear to be fully open. The lax stems, fleshy leaves, *and yellow composite flowers* distinguish the plant from all others in the salt marsh.

Habitats: Along with pickleweed, this plant best typifies low salt marsh habitats of the Pacific Northwest, although it is commonly found in high salt marshes as well. Fleshy jaumea forms extensive marshes as a codominant with pickleweed or in monospecific stands at and above the mean high water level.

LOW SALT/BRACKISH MARSHES

Lilaeopsis occidentalis
SCIENTIFIC NAME

LILAEOPSIS
COMMON NAME

Field Characters: The cylindrical, hollow leaves of lilaeopsis grow in tufts at intervals along a rhizome. These leaves are generally less than 5 mm in diameter and less than 10 cm long, although they may grow to 15 cm. Each leaf is divided by partitions, appearing in cross-section to consist of 5 to 10 sections. The plant is usually not erect when exposed at low tide and often appears similar to algae or dwarf eelgrass lying in the bottom of a tidal channel. The flowers are smaller than the leaves and rarely seen, but when carefully examined they look like those of other members of the parsley family.

Habitats: Lilaeopsis is common on the bottom of channels that are exposed only at low water in tidal and brackish marshes. Although water velocity may be high in these channels during ebb tide, during most of the tidal cycle the plants are inundated by very slow moving water. As a result the substrate is usually mud or silt. Lilaeopsis is rarely associated with other vegetation, although narrow-bladed eelgrass may also occur in channel bottoms.

Salicornia virginica
SCIENTIFIC NAME

PICKLEWEED, GLASSWORT
COMMON NAME

Field Characters: This plant has no true leaves; its cylindrical, fleshy stems (to 5 mm in diameter) are a unique feature. The low growing plants often form dense mats, sometimes 20 cm thick. Tiny yellow flowers are clustered at the tips of the stems, emerging from depressions at the joints. New growth is succulent, edible, and may take on a reddish tinge; older stems are woody and perennial. In winter, much of the fleshy growth is lost, leaving only a tangle of woody stems.

Habitats: Pickleweed is most common in low salt marshes all along the Pacific Coast where it is generally inundated twice daily. It is also common in high salt marshes and may occasionally be observed mixed with eelgrass. Pickleweed is usually found in sandy substrate, but also grows in muddy or clayey material. Associates in low salt marshes are salt grass, arrowgrass, and fleshy jaumea.

LOW SALT/BRACKISH MARSHES

Scirpus americanus
SCIENTIFIC NAME

AMERICAN THREESQUARE
COMMON NAME

Field Characters: American threesquare forms stands of scattered culms from 0.3 to 1.5 m in height. Each culm is triangular in cross section, with flat sides. The several flat, elongated leaves (2 to 4 mm in width and 0.2 to 1.0 m long) are borne near the base. A compact cluster composed of one to eight yellowish-brown to reddish-purple spikelets protrudes at the base of a prominent, sharply tipped green bract, 2 to 15 cm in length, which appears as a continuation of the culm. American threesquare is a perennial and fruits from June through September. The plant grows from dark brown rhizomes as does a similar species, Olney's threesquare; the latter appears slightly stouter, and its culm appears three-winged in cross section.

Habitats: American threesquare is typical of low salt and brackish marshes occurring at or near mean high water, but extends into high marshes such as the fringing salt marshes of Grays Harbor, Willapa Bay and Padilla Bay. The species does not appear to tolerate high salinity compared to Olney's threesquare. Associated species include smooth cordgrass, seaside arrowgrass, and Lyngby's sedge.

Spartina alterniflora
SCIENTIFIC NAME

SMOOTH CORDGRASS
COMMON NAME

Field Characters: This robust perennial grass may reach 2.5 m in height, but is most commonly 1 to 2 m. The stems are often 1 cm or more in diameter. Long flat leaves are 0.5 to 1.5 cm wide and to 0.5 m in length. The panicle has numerous branches, but these are closely appressed, giving the appearance of a single cylindrical flower spike. The plant is lush green in summer and fades to gold in the fall.

Habitats: This prolific grass dominates most salt marshes of the Atlantic Coast, but is known only from Willapa Bay on the west coast, where it is thought to have been introduced by the oyster industry. A similar, hybrid species common to Great Britain *(S. townsendii)* has been identified in northern Puget Sound, where it was undoubtedly introduced. Cordgrass typically occurs in low salt and brackish marshes in sandy to muddy substrates where it may be inundated twice a day.

LOW SALT/BRACKISH MARSHES

Spergularia marina
SCIENTIFIC NAME

SALTMARSH SANDSPURRY
COMMON NAME

Field Characters: This sprawling annual plant feels fleshy to the touch. The drab white to pale pink flowers are about 1 cm in diameter. The sepals are longer than the petals, partially obscuring them. Opposite, narrow linear leaves are 2 to 4 cm long.

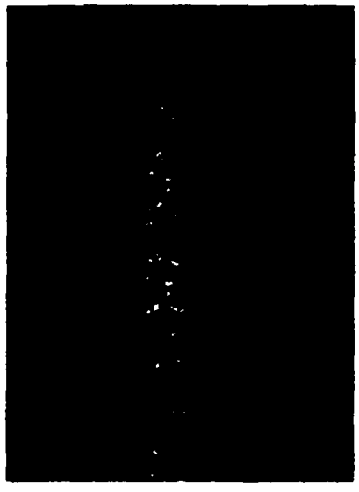
Habitats: This plant is most typical of low salt and brackish marshes where it is sometimes a pioneer species; it may also range into the high salt marsh. Capable of withstanding regular tidal inundation, it is also particularly adapted to high salinities. As the common name implies, it generally grows on sandy substrate. The plant is often inconspicuous among its dominant associates, which include pickleweed and fleshy jaumea.

Triglochin maritimum
SCIENTIFIC NAME

SEASIDE ARROWGRASS
COMMON NAME

Field Characters: The fleshy, succulent leaves are 1 to 8 dm in length and tufted from the root mat or from short rhizomes. Each leaf has a sheath which encircles the inner, older, and usually shorter leaves. This sheath may extend as much as one-third of the leaf length. The sheath distinguishes seaside arrowgrass from seaside plantain, which appears similar when not in flower. A long flower stalk extends from the center of the plant above the leaves. The tiny, green or purplish flowers are numerous, individually stalked, and densely clustered along the upper one-third of the stalk. The plant is nonpersistent in winter, the aboveground portion being removed by winter tides.

Habitats: Arrowgrass is common in low salt or brackish marshes where it is usually inundated twice a day. Occasionally arrowgrass may be found in high marshes where inundation occurs once daily; however, only rarely is it a dominant feature in these communities. In salt marshes, it may be associated with pickleweed, fleshy jaumea, and salt grass. In brackish marshes, common associates are sedges, Pacific silverweed, and American threesquare. Although not common, seaside arrowgrass has also been noted in alkaline seeps east of the Cascades.



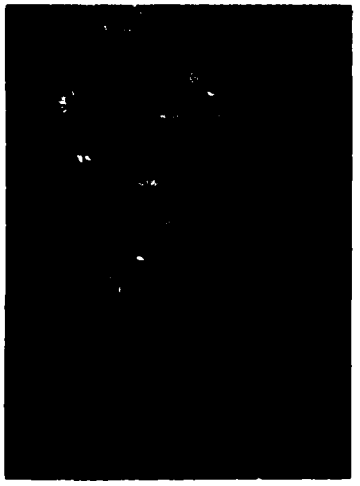
HIGH SALT/BRACKISH MARSHES

Aster subspicatus
SCIENTIFIC NAME

DOUGLAS ASTER
COMMON NAME

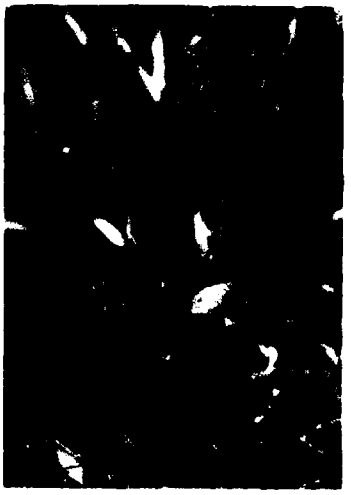
Field Characters: This plant stands about 6 to 10 dm tall with narrow, linear alternate leaves about 1.5 to 3 cm long. Stems are stiff and fibrous, nearly woody at the base, and freely branching. Flower heads are numerous, each about 2 to 3 cm in diameter with distinctive purple rays and yellow centers.

Habitats: This showy wildflower is common in high brackish tidal marshes and can be found along stream banks and in moist woods. In high tidal marshes, it is usually found close to the transition zone where it is inundated less than once a day. Common associates are bentgrass, Pacific silverweed, and meadow barley.



Atriplex patula
SCIENTIFIC NAME

SALTWEED, ORACHE, FAT HEN
COMMON NAME



Field Characters: The leaves are distinctly triangular or arrowhead shaped, 3 to 8 cm long, and turn from green to reddish to purple in late summer. The flowers are small and non-descript on a terminal spike; they are green, also triangular in shape, and normally 0.5 to 1 cm in length.

Habitats: This widespread salt marsh plant is a common, but rarely dominant, component of high and low salt marshes. It tolerates both inundation and highly saline conditions, and as a result, often occurs in isolated depressions within tidal marshes (salt pannes) where water is trapped and ultimately evaporates rather than drains. The plant also grows in dredge disposal areas where diking prevents runoff of rainwater and salt is concentrated at the surface. In highly saline or alkaline habitats, it is often found in monotypic stands, although brass buttons, saltgrass, and pickleweed may be present. These high salinity conditions are probably not required for survival but may serve to eliminate competitors. Saltweed is also found commonly in alkaline nonwetlands east of the Cascades.

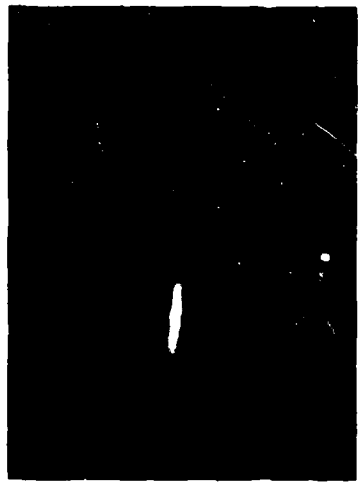
HIGH SALT/BRACKISH MARSHES

Carex lyngbyei; Carex obnupta
SCIENTIFIC NAME

LYNGBY'S SEDGE; SLOUGH SEDGE
COMMON NAME

Field Characters: Growing to 1 m in height, these species are very similar in appearance. They both have flat, deep green leaves, 2 to 6 mm wide and to 3 dm long, with an obvious channel running along the leaf's axis. In tidal situations, that portion of the plant above ground disappears during winter. New growth from the root mass begins in February and floral spikes appear in early spring. Each culm is triangular in cross section and bears three to seven pendulate floral spikes 1.5 to 5 cm long. The two species can be distinguished in the field by the spikes; on slough sedge the spikes are more erect and sessile due to absence of a peduncle.

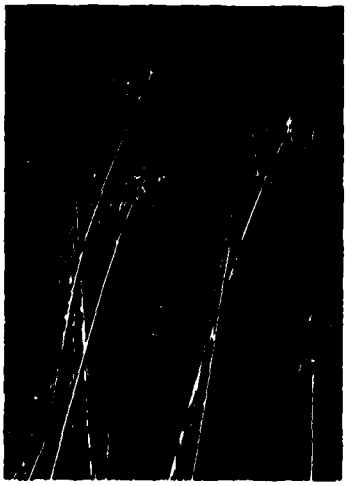
Habitats: These sedges are extremely common wetland plants in the Pacific Northwest. Lyngby's sedge is most frequently associated with low and high brackish marshes in estuaries, although it has been reported in bogs, the understory of swamps, and shallow, freshwater marshes in both tidal and nontidal situations. While the distribution of the two species overlaps, slough sedge is most common in shallow coastal fresh marshes and coastal swamps. True hydrophytes, these species are almost never found in nonwetland habitats, and then only under very unusual conditions.



DEEP FRESHWATER MARSHES

Scirpus acutus
SCIENTIFIC NAME

HARDSTEM BULRUSH
COMMON NAME



Field Characters: One of the tallest herbaceous marsh plants in the Pacific Northwest, hardstem bulrush typically stands at least 2 m high and may grow to 2.5 m. The grey-green, round stems can be as much as 3 cm in diameter at the base. A spike bearing about 10 spikelets on short peduncles at the top of the main stem is a distinctive feature. A narrow bract, 3 to 4 cm in length, extends beyond the spike, appearing to be an extension of the stem. The plant has short linear leaves concentrated near the base. Soft-stem bulrush is not readily distinguishable from hardstem bulrush in the field, but is generally less common in this region.

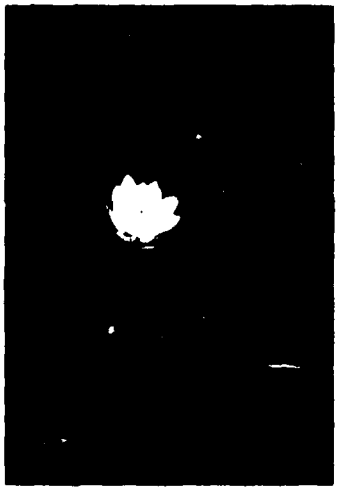
Habitats: This species grows primarily in freshwater marshes, but occasionally occurs in high brackish marshes as well. It is associated most often with cattails in shallow marshes and with white water lilies in deep marshes, though it often forms visually dominant monotypic stands. The species is restricted to wetland habitats and can grow where the water reaches a meter in depth.

Nymphaea odorata
SCIENTIFIC NAME

WHITE WATER LILY
COMMON NAME

Field Characters: One of the more familiar wetland plants, the large, showy white flowers (10 to 15 cm in diameter) and large, roundish leaves (up to 25 cm in diameter) floating on the water surface are easily recognized. It differs from spatterdock in having somewhat flatter and more rounded leaves that float on the water surface and, of course, in its flower color.

Habitats: This common species is limited to sheltered ponds and lakes where water depth varies from a few dm to about 2 m.



DEEP FRESHWATER MARSHES

Nuphar polysepalum
SCIENTIFIC NAME

SPATTERDOCK
COMMON NAME

Field Characters: The yellow, globular flowers about 3 to 6 cm in diameter are unmistakable, though when no flowers are present, the plant can be confused with white water lily which has similarly shaped leaves. The leaves of spatterdock are to 25 cm in diameter and generally have upturned edges. The leaves often protrude as much as one foot above the water surface, giving the plants an untidy appearance. In contrast, the leaves of white water lily lie flat on the water surface.

Habitats: Spatterdock occurs only in deep freshwater marshes, growing in water 1 to 2.5 m deep. As few other plants grow in water this deep (other than submerged aquatics) it often forms monotypic communities in sheltered ponds.

Myriophyllum spicatum
SCIENTIFIC NAME

EURASIAN WATERMILFOIL
COMMON NAME

Field Characters: Eurasian watermilfoil grows to lengths of 2 to 3 m, with reddish to light brown stems 2 to 4 mm in diameter. The featherlike, olive-green leaves occur in whorled groups of three to six between 3 and 6 cm in length. Flowering spikes are emergent, with pink or white flowers in groups of four along the stem.

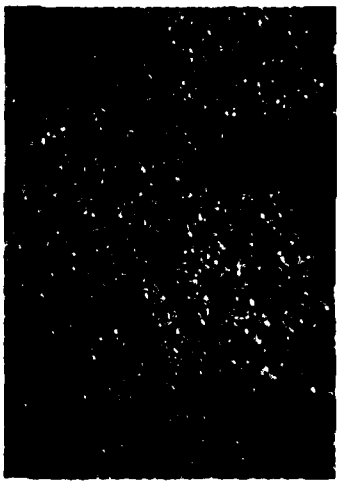
Habitats: This introduced species occurs in deep freshwater marshes or lakes and ponds with silty bottoms and water depth less than 5 m. It grows rapidly and often forms a dense, submerged mass that interferes with swimming and boating. Because it spreads readily from any broken portion of stem, it is often inadvertently dispersed by boaters. It has become a nuisance species in some parts of Washington State (e.g., Lake Washington and portions of the Columbia River), and control programs have been established. Common associates include pond weeds, white water lily, and common duckweed.

DEEP FRESHWATER MARSHES

Lemna minor
SCIENTIFIC NAME

COMMON DUCKWEED
COMMON NAME

Field Characters: Individual plants are minute, consisting of a single leaf (called a "thallus") 2 to 4 mm in diameter. These leaves float and form a mat on the surface. The minute flowers are located in a fold of the leaf. Two or three short, root-like structures hang from the leaf.



Habitats: Duckweed prefers sheltered water between 5 and 50 cm in depth and occurs commonly in standing water of shallow and deep fresh marshes and in slow-flowing drainage ditches and small creeks. It typically forms dense, monotypic mats on the surface of pools, giving the impression that the water is stagnant; however, the presence of this plant usually indicates a healthy aquatic environment. It is often found on mud after the water level has dropped. Associated species include cattails, sedges, and aquatic grasses.

Trifolium wormskjoldii
SCIENTIFIC NAME

SPRINGBANK CLOVER
COMMON NAME

Field Characters: A low-growing, compact plant, springbank clover rarely exceeds 15 cm in height. The red to purple flowers form a spherical head typical of most clovers and bloom throughout the summer. The leaves are compound, with three oblong leaflets 10-25 mm in length.

Habitats: This clover occurs in high salt and brackish marshes that are usually inundated once daily. It also can be found in wet meadows and along streambanks where it inhabits sandy substrates. Common associates include Pacific silverweed, Douglas aster, and other brackish marsh species.

HIGH SALT/BRACKISH MARSHES

Scirpus maritimus (known as Scirpus robustus in California and along the Atlantic Coast)
SCIENTIFIC NAME

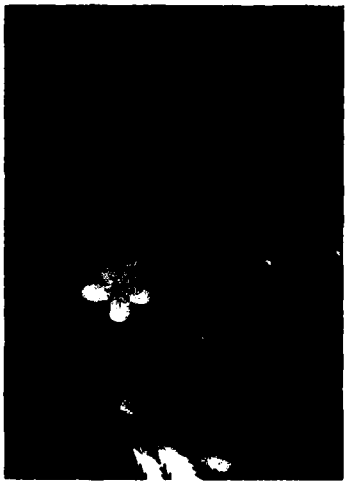
SALTMARSH BULRUSH
COMMON NAME

Field Characters: A sharply triangular stem, 5 to 10 mm in diameter and 0.5 to 1.5 m in height, typifies this bulrush. The leaves (to 0.5 m long) are evenly distributed along the stem. Spikelets are reddish-brown, large (1 to 3 cm long), and numerous. Most are attached closely to the stem, although there are normally two or three short (to 5 cm) stalks emanating from the basal cluster with 5 to 10 spikelets at their ends. Several bracts up to 10 cm long extend from the base of the spikelets.

Habitats: This large bulrush commonly occurs in high brackish or salt marshes that are inundated about once a day. It may also occur infrequently in low salt marshes. It often forms a minor component of high marsh communities containing Pacific silverweed, sedges, and other species. In the Skagit River delta, however, it is one of three bulrushes, (with hardstem bulrush and American threesquare), which dominate most tidal marsh communities. There it is recognized as a major food source for migrating and wintering waterfowl, especially snow geese.

Potentilla pacifica
SCIENTIFIC NAME

PACIFIC SILVERWEED
COMMON NAME



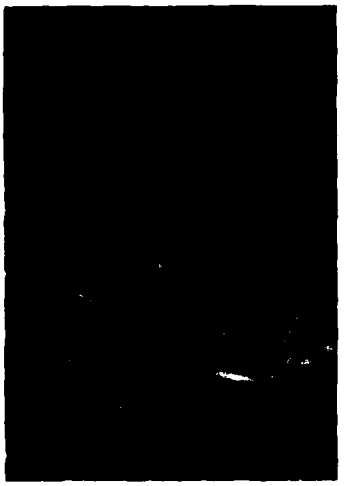
Field Characters: This perennial plant is usually low-growing and "strawberry-like." It spreads by runners and often forms dense tangles. Glossy yellow flowers are 1.5 to 2 cm in diameter with five petals. The flowers are borne singly at the nodes of the runners. Glossy green, compound leaves (to 4 dm long) have distinctive silvery undersides and deeply notched leaflets; they dry out and turn brown, but remain intact and identifiable throughout much of the winter.

Habitats: Pacific silverweed occurs most typically in high salt marshes, at or above mean higher high water where it is often associated with tufted hairgrass and Douglas aster. Pacific silverweed can be found in nontidal fresh meadows with high soil moisture content, a habitat essentially limited to meadows adjacent to salt marshes. In these situations it is often associated with buttercups and several species of grasses and sedges. Historical conditions (e.g., the diking of a salt marsh) may account for the species' occurrence in non-wetland habitats.

HIGH SALT/BRACKISH MARSHES

Plantago maritima
SCIENTIFIC NAME

SEASIDE PLANTAIN
COMMON NAME



Field Characters: This species superficially resembles seaside arrowgrass, but is shorter (only 2 to 3 dm in height). In addition, the leaves are broader, more succulent, and are frequently taller than the flower spikes. The plant is covered with short, woolly hairs, giving it a grayish-green color. Individually the flowers are inconspicuous, but collectively form distinctive dense, elongated spikes. The stamens protrude from these clustered spikes, an identifying feature of the genus.

Habitats: This relatively common salt marsh plant is well adapted to saline conditions, but is seldom a dominant species in the marsh. It occurs at all elevations within the marsh where it is often associated with seaside arrowgrass, Douglas aster, saltgrass, and Lyngby's sedge.

Orthocarpus castillejoides
SCIENTIFIC NAME

PAINTBRUSH OWL-CLOVER
COMMON NAME

Field Characters: Although the flowers are inconspicuous, the plant's colorful white bracts give it a showy appearance. A search between the bracts will expose the tiny, white and yellow, sac-like flowers. The alternate, sessile leaves are multi-lobed and up to 2.5 cm long. Plants range in height from 5 to 20 cm.

Habitats: The species is restricted to high salt marshes, generally in firm, sandy substrate. Associated species include Pacific silverweed, tufted hairgrass, and other high marsh species.

HIGH SALT/BRACKISH MARSHES

Hordeum brachyantherum
SCIENTIFIC NAME

MEADOW BARLEY
COMMON NAME

Field Characters: This tufted, erect grass grows to 7 dm high. The often purplish panicle, to 10 cm long, is erect, and symmetrical.

Habitats: Meadow barley occurs in high brackish or salt marshes where it is tidally inundated about once a day. It also may be found in low, diked pastures. Common associates include bentgrass, Pacific silverweed, and other high marsh species.

Grindelia integrifolia
SCIENTIFIC NAME

GUMWEED
COMMON NAME

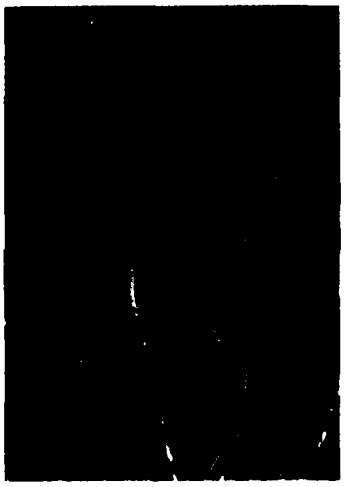
Field Characters: The entire plant, especially the flower head, is sticky to the touch, hence the common name. Plants are up to 8 dm tall and often much branched. Blooming in spring and early summer, unopened flower buds are encased in scaly, gummy coverings. No other salt marsh plant has similar, large (2 to 4 cm in diameter) yellow sunflower-like flowers.

Habitats: Gumweed is a common inhabitant of high salt marshes and occasionally occurs in adjacent nonwetlands as well as wet meadows. At times it will be found on the waterward slope of primary sand dunes, a nonwetland situation. Common associates include saltgrass and tufted hairgrass.

HIGH SALT/BRACKISH MARSHES

Distichlis spicata
SCIENTIFIC NAME

SALTGRASS
COMMON NAME



Field Characters: Saltgrass is short, usually less than 30 cm tall, and often forms mats on the soil surface. The bilateral symmetry of the leaves in a single plane is distinctive. The leaves are relatively short (about 5 cm) and angle sharply from the stem. Salt crystals are often extruded on the surface of the leaves. The robust, flower-bearing panicles, 3 to 8 cm in length, are compressed and terminal on the culms. These floral heads often appear purplish, drying to a straw color.

Habitats: This species is a characteristic component of many Pacific Northwest high and low salt marshes. Saltgrass apparently tolerates extremely high salinities and can be found in evaporated salt pannes high within the marsh. Most frequently associated with high salt marshes, saltgrass will extend into mesophytic and xeric (upland) plant habitats as well as into the lower salt marsh. It is frequently associated with pickleweed and fleshy jaumea.

Deschampsia caespitosa
SCIENTIFIC NAME

TUFTED HAIRGRASS
COMMON NAME

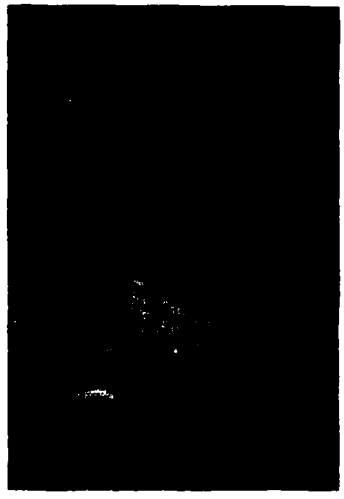
Field Characters: Characteristically the tallest plant of the salt marsh, tufted hairgrass is a perennial, with culms 2 to 12 dm tall. The leaves are very narrow (1.5 to 4 mm) and often folded or rolled. The panicle is 8 to 25 cm long and open rather than compressed. High salt marshes dominated by tufted hairgrass are green in summer, then take on a distinctive golden-brown hue during late summer through fall. The aboveground growth persists through much of the winter.

Habitats: One of the most common components of Pacific Northwest salt marshes, tufted hairgrass occurs in dense stands at or near mean higher high water. These stands become less dense at lower elevations, gradually being replaced by other salt marsh species in the lower marsh. It is commonly associated with Pacific silverweed in high salt marshes. Tufted hairgrass is widely distributed, but not common, in shallow freshwater marshes at all elevations.

SHALLOW FRESHWATER MARSHES

Alisma plantago-aquatica
SCIENTIFIC NAME

AMERICAN WATER PLANTAIN
COMMON NAME



Field Characters: The narrow to oval leaf blades (3 to 15 cm) rise on petioles (10 to 20 cm) from the base of the plant. The small white-to-pink or purple flowers have three distinct petals and are numerous on the whorled branches of the panicle.

Habitats: Generally found in shallow freshwater marshes, this plant is common in protected waters with depths of 5 to 15 cm and a soft muddy substrate. It is widely distributed in the Pacifc Northwest and can be found in deep marshes, wet meadows, and swamps; it is rarely a dominant species and often only solitary plants are seen. It is common along lakeshores and permanently flooded ditches where it may be associated with cattails or rushes.

SHALLOW FRESHWATER MARSHES

Bidens cernua
SCIENTIFIC NAME

BEGGARS-TICK
COMMON NAME

Field Characters: Beggars-tick grows as a low, bushy plant to 30 cm in height. The showy, yellow "sunflowers" (2 to 4 cm in diameter) are borne singly at the tip of individual branches. Leaves are opposite and measure 4 to 20 cm long and 1.0 to 4.5 cm wide.

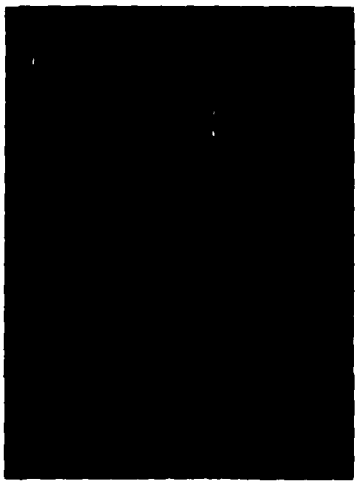
Habitats: Most typically a shallow freshwater marsh species, beggars-tick also occurs near ponds just above high water level in saturated, highly organic soils. Common associates include spike rush, soft rush, sedges, and lady fern.

Eleocharis spp.
SCIENTIFIC NAME

SPIKE RUSH
COMMON NAME

Field Characters: The genus is easily identified by the terminal and solitary floral spikelets. Some species are diminutive, such as *E. parvula* (1 to 10 cm), while others are large and robust, such as *E. palustris* (to 1 m).

Habitats: Several species are represented in the Pacific Northwest; habitats range from brackish marshes *(E. parvula)* to shallow freshwater marshes, wet meadows *(E. palustris)*, and swamps. The species is apparently limited to wetland situations. Spike rush is often found in standing water in roadside ditches or the edges of ponds where it is frequently associated with duckweed, bulrushes and other marsh plants. Spike rush is also common in the wetter portions of meadows dominated by soft rush.



SHALLOW FRESHWATER MARSHES

Epilobium angustifolium
SCIENTIFIC NAME

FIREWEED
COMMON NAME

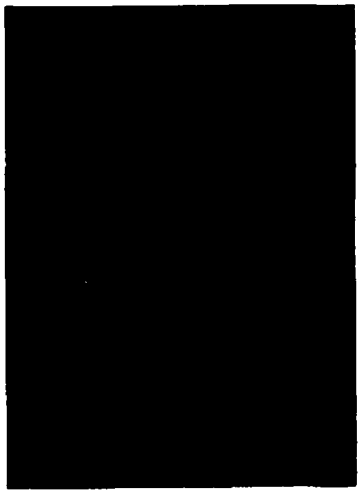
Field Characters: Fireweed is easily recognized by its four-petalled, purple to purplish-pink flowers that are borne on multi-flowered racemes. After blooming in early summer, the seed pods burst, forming downy masses. In wetland situations, the plants grow to 1.5 m in height and have alternate leaves 8 to 15 cm long.

Habitats: Fireweed is common in the drier portions of shallow fresh marshes and occasionally in wet meadows. Fireweed also may occur in high salt marshes. It is common in nonwetlands, especially in disturbed habitats such as along highways and burned over montane habitats. It is a pioneer species which invades immediately after fires, thus the common name. In wetland habitats, the flowers are smaller, more intensely colored, and bloom later in the season than in nonwetland situations. The species has been occasionally cultivated as an ornamental, but can become weedy. Fireweed has some value to beekeepers. It is often associated with lady fern, purple loosestrife, and other freshwater marsh species.

Epilobium watsonii
SCIENTIFIC NAME

MARSH WILLOW-HERB
COMMON NAME

Field Characters: Marsh willow-herb belongs to the same genus as fireweed and is similar in appearance, but smaller (3 to 10 dm in height). The four-petaled flowers are small (5 to 7 mm) and pink-purple in color. Leaves are opposite, strongly veined, glossy green, and linear with minute points along the edges. Flowers and seeds are borne on what appear to be petioles, but are actually elongated ovaries.



Habitats: Found in shallow fresh marshes, this species also occurs in shrub swamps and wet meadows. This plant cannot withstand prolonged periods of inundation (although it rarely occurs in non-wetland habitats) and thus is usually found in higher, drier areas of shallow marshes. It is typically an understory plant associated with common cattails in shallow fresh marshes; willows, Pacific ninebark, and red-osier dogwood in shrub-swamps; and soft rush in wet meadows.

SHALLOW FRESHWATER MARSHES

Impatiens noli-tangere
SCIENTIFIC NAME

TOUCH-ME-NOT
COMMON NAME

Field Characters: The distinctive bright-orange, irregular flowers, flecked with brownish purple, are 2 to 3 cm in length with a tube at the base of the flower stem. Flowers and seeds often drop from the stem when touched, hence the common name. Both stems and leaves are delicate in appearance and the leaves are distinctly edged with prominent points. The plant grows to 1 m or more in height.

Habitats: Touch-me-not occurs in shallow fresh marshes where it may form dense stands, and in the transition zones between wet meadows and forests or swamps, typically those that are only seasonally inundated. The plant tends to grow in the drier portions of such wetlands and within the shade of relatively large trees or shrubs. Common associates include red alder, red elderberry, and cattails.

Iris pseudacorus
SCIENTIFIC NAME

YELLOW IRIS
COMMON NAME

Field Characters: The stems and leaves superficially resemble cattails, but the leaves are generally broader, stiffer, and shorter and the stems are stouter and shorter. The leaves are primarily basal, folding near the base and clasping the plant. The outer leaves are shorter than the inner ones. Flowers are bright yellow, marked with black or purple lines, and consist of three sets of sepals and petals radiating from the stem. The sepals are about 3 to 5 cm in length and the petals about 1 cm shorter, much like the common garden iris. Plants are from 0.5 to 1 m in height.

Habitats: Yellow iris occurs on both sides of the Cascades, typically occurring along rather steeply sloped sandy banks in sheltered freshwater ponds, swamps, or marshes where the water is about 4 to 7 dm deep. It often grows along the edge of cattail marshes where the water deepens and may form a fringe around ponds or deep fresh marshes.

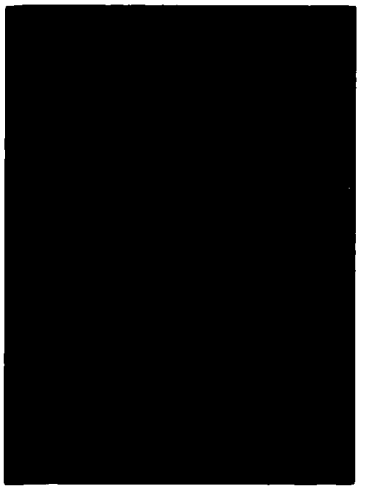
SHALLOW FRESHWATER MARSHES

Lythrum salicaria
SCIENTIFIC NAME

PURPLE LOOSESTRIFE
COMMON NAME

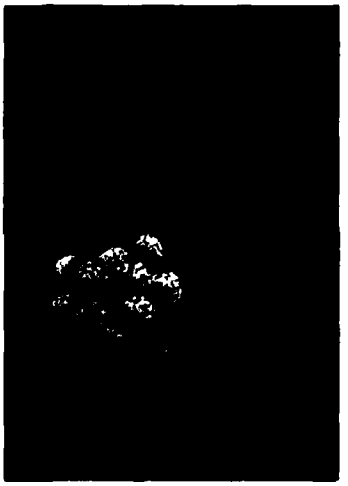
Field Characters: Loosestrife is a tall plant (1 to 2 m in height) with spectacular spikes of bright pink-purple flowers (1 to 2 cm across) consisting of five to seven petals. Flowering occurs from late spring throughout the summer. Leaves are opposite, linear, up to 1 dm in length, and often have a distinct reddish tinge. The plant can be confused with fireweed during nonflowering seasons.

Habitats: This introduced species has rapidly become established in shallow fresh marshes, typically those dominated by cattails. In some parts of the country it has been identified as a pest since it often displaces native wetland species. Loosestrife also occurs commonly at the edges of shrub-swamps. To date, it has been found in lowlands on both sides of the Cascades. Associates are Douglas spiraea, willows, and cattails.



Oenanthe sarmentosa
SCIENTIFIC NAME

WATER PARSLEY
COMMON NAME



Field Characters: The umbels of tiny white flowers in water parsley are borne laterally on the stems and are set off by narrow leafy bracts. The compound leaves, 10 to 30 cm long, have a distinctive arrangement of toothed leaflets. The lax, succulent stems often exceed a meter in length, are viney, and are often reddish colored. The flowers are replaced by hard, maroon seeds in late summer and fall. The plant dies back to roots in winter.

Habitats: Water parsley is limited to shallow fresh marshes that are near saturation, are inundated year round, or are inundated during the growing season. It may occur as an understory component of swamps, although it is typically a component of a diverse community in lushly vegetated marshes. Common associates include purple loosestrife, fireweed, and burreed.

SHALLOW FRESHWATER MARSHES

Phragmites communis
SCIENTIFIC NAME

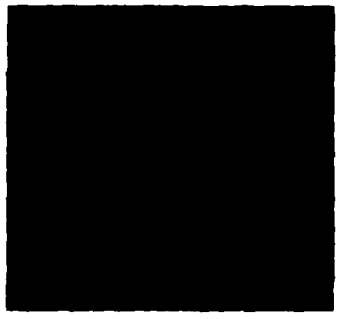
REEDGRASS, COMMON REED
COMMON NAME

Field Characters: Dense monotypic stands of reedgrass consist of stout (up to 1 cm diameter) stems *generally 2 to 3 meters in height.* The leaves are 1 to 4 cm wide and can be 50 cm long. The dense brush-like floral spike is about 15 to 35 cm long and purplish, fading to straw color later in the season.

Habitats: This large grass occurs throughout the temperate regions of the world. It is often found in disturbed areas where inundation is erratic; it will flourish in dredged material disposal sites, roadside ditches, and diked flats. In the Pacific Northwest, it is typically found in shallow fresh marshes, although it can apparently tolerate high salinity (or alkalinity). In tidal areas it is usually found in the high marsh and marsh-upland transition zones where salinity is low. Due to its large size and tolerance of salinity and inundation extremes, reedgrass readily outcompetes most other species where it is established and forms dense, monotypic stands. Along the Atlantic Coast it is often identified as a pest, quickly choking out other wetland species of greater habitat value. It does not appear to be as prolific or intrusive in the Pacific Northwest.

Polygonum spp.
SCIENTIFIC NAME

SMARTWEED, KNOTWEED
COMMON NAME



Field Characters: Most knotweeds are characterized by *swollen nodes where* the leaf joins the stem. There is also a distinctive *sheath which surrounds* the node and leaf junction and may extend up the stem as much as 1 cm. The stems are generally round, smooth, shiny, and often reddish. Water smartweeds have long (5 to 15 cm), narrow leaves with very distinctive veins. The pink or pink and white flowers form dense elongated clusters at the tip of the stem as well as from the leaf axils. In deep fresh marshes, these clusters stand erect above the water surface, *while most* of the leaves remain submerged.

Habitats: Over 30 species of smartweed occur in the Pacific Northwest. Most of those west of the Cascades are found in moist to wet freshwater areas. Two species of water smartweed *(P. persicaria* and *P. punctatum),* are most common along lakeshores and in shallow and deep fresh marshes.

SHALLOW FRESHWATER MARSHES

Sagittaria spp.
SCIENTIFIC NAME

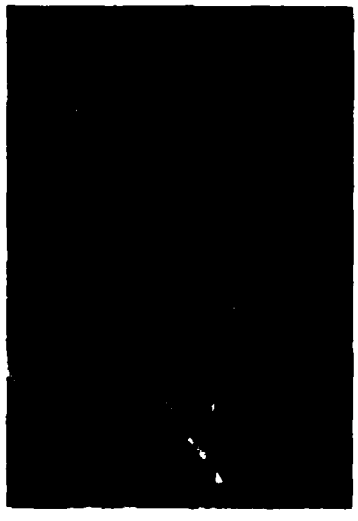
ARROWHEAD, WAPATO
COMMON NAME

Field Characters: The distinctive, arrowhead-shaped leaves readily identify this plant. Leaves are tufted from a rhizome which also bears a starchy, edible tuber. The small (2 cm) white flowers are borne singly in the summer on whorled branches of the open flower spike.

Habitats: This plant is found commonly in shallow fresh marshes and occurs in deep marshes. It readily grows in soft, mucky substrate in quiet water. The tuber is a favorite food of ducks and was commonly harvested by native Americans.

Scirpus microcarpus
SCIENTIFIC NAME

SMALL-FRUITED BULRUSH
COMMON NAME



Field Characters: The blackish flower spikelets are borne on several, long, green peduncles which arch loosely from the main stem. The spikelets of this species are small relative to others in the genus, hence the name. The stems are distinctly triangular and the species can be easily mistaken for a sedge *(Carex spp.)*. A single stem between several, broad (1 to 2 cm wide), channeled, grass-green, basal leaves distinguishes the plant. Narrow, linear, alternate leaves are also borne on the main stem.

Habitats: This bulrush grows in shallow fresh marshes, wet meadows, and occasionally bogs, from sea level to middle elevations (1,200 m). It is adapted to saturated soil conditions, but does not appear to tolerate prolonged inundation. It will grow in relatively dry swamps in association with soft rush and red alder and also may be found along streambanks and roadsides.

SHALLOW FRESHWATER MARSHES

Sparganium spp.
SCIENTIFIC NAME

BURREED
COMMON NAME

Field Characters: The genus is characterized by one to several spherical flower heads which grow on the sides of the stem, one above, and usually separated from, another. The genus has separate female and male flowers which are easily distinguished as the smaller (0.3 to 1.5 cm) male flower heads are always located above the larger (0.5 to 3 cm) female heads on the stems. At each point of attachment, the stem angles away from the flower head, giving the plant a bent appearance. Leaves are typically strap-like, from 2 to 8 dm long and 3 to 15 mm wide, and are often thick and fleshy.

Habitats: These plants are most commonly found in shallow fresh marshes, but occur in deep fresh marshes, up to 1,000 m elevation. Some species are aquatic and grow in standing water with their leaves floating on the surface. Others are erect and grow in saturated soil. Associated species include bulrushes, smartweed, and sedges.

SWAMPS

Salix spp.
SCIENTIFIC NAME

WILLOW
COMMON NAME

Field Characters: More than 30 species of willow with a variety of characteristics are recognized in the Pacific Northwest. Leaves are generally elongated, but vary from extremely narrow to almost round; most have a pointed tip. Length varies from 2 to 10 cm. For some species, the furry catkins which emerge in late winter to spring, often before the leaves, are a distinctive feature. Willows are generally tall shrubs or short trees (4 to 8 m) but can reach 20 m in height. In swamp situations, willows may be mistaken for red alder, but can be distinguished by their smaller leaves with smooth edges and indistinct veins.

Habitats: Willows are common in swamps and along streams and river banks, but may also be found in moist upland settings. They tolerate temporary inundation, but not prolonged flooding during the growing season. Along rivers, they often grow on sand and gravel bars which are inundated during high water. In this setting they trap sediments, ultimately raising the bar's elevation sufficiently to allow cottonwoods and other less water-tolerant species to establish. In this way, the willow often establishes new riparian communities. In more bog-like situations they are often associated with Douglas spiraea. Cattails, Pacific ninebark, and red osier dogwood are common associates in swamps.

Pyrus fusca
SCIENTIFIC NAME

WESTERN CRABAPPLE
COMMON NAME

Field Characters: Crabapple is normally less than 5 m in height though it sometimes grows to 12 m and is more tree-like. Rather untidy in appearance, it is often covered with lichens. Flowers (2 to 3 cm) are white to pink-purple and occur in clusters. Fruits are likewise borne in clusters, are smaller than cherries, and are usually yellowish or dull red when ripe (about the color of ripe Gravenstein apples). The fruiting stalks are short, stout, and although not sharp, can easily puncture flesh. Leaves are similar to domestic apple leaves, though more deeply toothed.

Habitats: A relatively common component of shrub swamps from coastal lowlands to elevations up to 1,500 m, the species may also be found bordering streambanks, in bogs, and occasionally in fresh meadows. Associated wetland species include willows, red alder, Pacific ninebark, and Labrador tea.

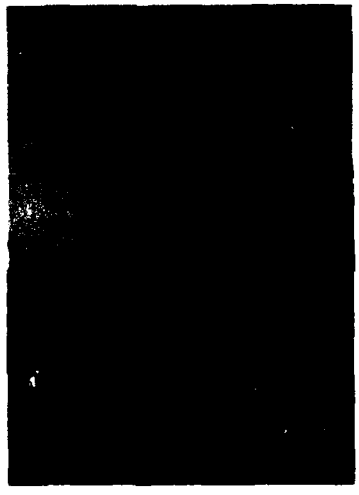
SWAMPS

Picea sitchensis
SCIENTIFIC NAME

SITKA SPRUCE
COMMON NAME

Field Characters: Sitka spruce dominates our spruce swamps. It is the only spruce, (in fact, the only needled tree) commonly found in Pacific Northwest wetlands. Cones and needles are distinctive. Female cones have cornflake-like scales; male cones appear to be extensions of upper branches giving the impression the branch tips are dying. Needles are stiff and uncomfortably sharp.

Habitats: In nonwetlands, Sitka spruce is a very large tree, especially on the Olympic Peninsula where it grows to 70 m in height with a diameter to 5 m at the base. Under very wet conditions, the trees do not achieve this great stature but are short and often scrubby in appearance with gangly lower branches and a broad based trunk. Sitka spruce can tolerate standing water throughout much of the year. Common understory plants are red alder, sedges, and skunk cabbage. The higher and dryer hummocks at the base of the tree often are populated by normally nonwetland species such as sword fern, lily-of-the valley, and salal. It is a useful and valuable lumber tree.



Physocarpus capitatus
SCIENTIFIC NAME

PACIFIC NINEBARK
COMMON NAME

Field Characters: The alternate, palmately lobed leaves are generally about 3 to 6 cm long, and turn to a distinctive, bright yellow in the fall. The shrub may be up to 5 m tall with shredded bark on most of the branches. The showy, white flowers form a dense hemispherical head 5 to 10 cm in diameter.

Habitats: This woody shrub is found in both swamps and upland situations. It is common in the tidal swamps of the Snohomish and Chehalis Rivers, where inundation probably occurs no more than once a day, but saturation is almost continuous. It may also be found along streams or on wet banks. Associated species include red osier dogwood, Sitka spruce, and cattails.

SWAMPS

Lysichitum americanum
SCIENTIFIC NAME

SKUNK CABBAGE
COMMON NAME

Field Characters: The very large, shiny green leaves (up to 1 m long and 40 cm wide) and fleshy, greenish-yellow spikes of tiny flowers surrounded by a yellow spathe are unmistakable. The flowers exude a fetid aroma, hence the common name. The plants appear in very early spring as large (2 to 5 cm in diameter) yellowish protrusions on the ground surface; leaves appear after the flowers. The plants are perennials with fleshy roots and die back to the ground in early to late summer.

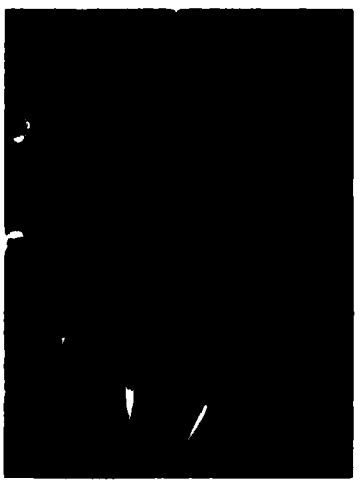
Habitats: Skunk cabbage occurs in a variety of freshwater wetland habitats, but seems to achieve its most lush and robust stature as an understory species of relatively open swamps. The species also occurs in low depressions of fresh meadows, in shallow fresh meadows, and in boggy situations. Its overriding habitat requirement is standing water and/or saturated soil conditions throughout much or most of the year. Skunk cabbage is not so successful in lushly vegetated marsh situations where there is keen competition for available space. In swamps, associated understory plants include sedges; in marshes many species may be associated.

Fraxinus latifolia
SCIENTIFIC NAME

OREGON ASH
COMMON NAME

Field Characters: This deciduous tree grows 10 to 20 m in height and to 1 m in diameter. It is easily distinguished from other trees by its compound leaves which have five to seven leaflets; winged fruits 3 to 5 cm long and 3 to 9 mm broad; and bark that becomes deeply ridged as the tree attains maturity.

Habitats: Oregon ash is typically a component of swamps adjacent to lakes and lowland streams. Its habitat is similar to that of red alder, in that soils are usually wet in all seasons and saturated or nearly so for much of the growing season; generally these areas are not flooded for lengthy periods. Common associates are red alder and woody shrubs such as red osier dogwood and ninebark.



SWAMPS

Cornus stolonifera
SCIENTIFIC NAME

RED—OSIER DOGWOOD
COMMON NAME

Field Characters: The glossy, red bark of the shrub's younger branches is a conspicuous feature during all seasons. This species typically has many branches up to several meters in length. Leaves are 6 to 15 cm long and half as wide with pointed tips. Veins curve prominently toward the leaf tips, a *a distinctive characteristic of all* dogwood species. Round, whitish flower heads (4 to 7 cm in diameter) appear in spring and summer. Individual flowers are tiny (5 mm in diameter) and have four petals. Eventually, white berries replace the flowers and some of the leaves turn deep red.

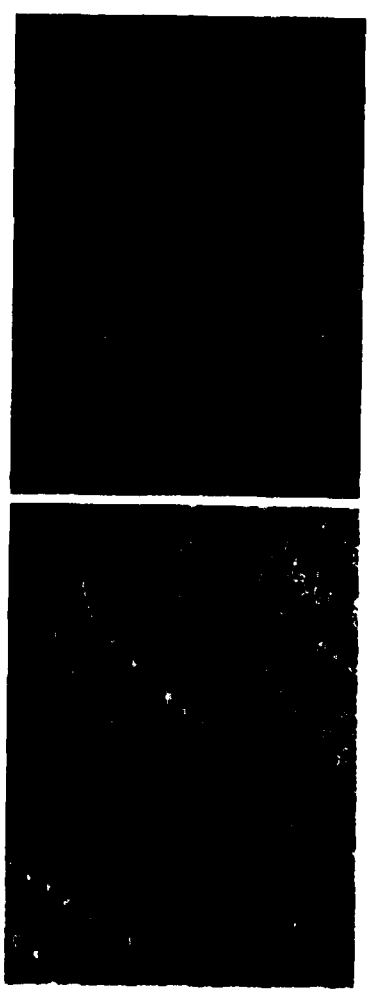
Habitats: This deciduous shrub is extremely common in riparian situations along creeks, rivers, and other low, swampy areas and in *nonwetland forests where shade or* other conditions prevent excessive drying of the soil. Common associates include red alder, willows, and other swamp species.

Athyrium filix-femina
SCIENTIFIC NAME

LADY FERN
COMMON NAME

Field Characters: This is the only species of fern that commonly occurs in Pacific Northwest wetlands. The spreading fronds grow to 1 m in height, dying back to the root mass each fall. Each frond is composed of twice-compound, lance-shaped leaves, 6 to 12 dm long and 2 to 3 dm wide. The brownish spore-producing structures on the underside of the leaves distinguish this as a fern rather than a flowering plant.

Habitats: Lady fern occurs most typically in swamp understories, but is a frequent component of shallow fresh marshes and less often found in wet meadows. It commonly occurs in nonwetland situations where shading allows cool conditions and wet soils to persist throughout most of the year. Most frequently associated species include red alder, water hemlock, skunk cabbage, and reed canarygrass.



SWAMPS

Alnus rubra
SCIENTIFIC NAME

RED ALDER
COMMON NAME

Field Characters: Under saturated soil conditions, red alder appears shrubby and stunted. Under drier conditions, alder grows to 25 m tall and over 35 cm in diameter. The bark is normally smooth and dirty gray in color, often appearing mottled with light patches. Leaves are 5 to 15 cm long and half as wide, usually dark green, heavily veined, alternate, and distinctively toothed or notched. Separate male and female catkins are produced in the spring prior to the appearance of the leaves. At first the catkins are green. Male catkins are cylindrical, about 5 mm in diameter and 2 to 5 cm long. Female catkins are more "conelike" and shorter, to 2.5 cm. Later in summer, these clustered cones turn brown and are an obvious feature. Similar appearing species of alder occur in the Pacific Northwest; however, red alder is the most common.

Habitats: Red alder is a very common, deciduous tree throughout lower elevations of the Pacific Northwest and occurs in both wetland and nonwetland situations. In wetlands, the species is typical of river-bottomlands, especially those west of the Cascades. These areas normally flood for short periods one or more times per year and the soils remain saturated or nearly so for much of the growing season. In its stunted, "shrubby" form, alder often dominates in the shrub-swamps of Pacific Northwest flood plains. Red alder is not considered to be tolerant of saline conditions, but does occur in tidally-influenced freshwater situations. It frequently is a component of the understory of spruce-dominated swamps. Common understory plants in red alder swamps include lady fern, sedges, and skunk cabbage.

Rumex spp.
SCIENTIFIC NAME

DOCK
COMMON NAME

Field Characters: In the Pacific Northwest, curly dock *(R. crispus)* will be the species most frequently encountered in wetlands, although other dock species do occur. Curly dock is distinguished by its overall deep reddish-brown coloration throughout most of the year, appearing dried out or dead. The species grows erect from 3 to 8 dm in height and stands above most plants in fresh meadows where it is one of the most distinctive species. Prior to and during flowering, the plant is yellowish green, often with a reddish tinge. Flowers are greenish white and individually inconspicuous though forming dense, branched spikes. The minute seeds are sharply three-angled and sometimes appear to be winged. Leaves, stems, and flowers turn reddish-brown soon after initial flowering. The leaves are 1 to 3 dm in length and wrinkled along the edges.

Habitats: Dock is an adaptable plant found in wet meadows, shallow fresh marshes, and in nonwetland habitats throughout low elevations. It is occasionally found in high salt or brackish marshes. Associated species are numerous and diverse, including reed canarygrass, various grasses, and sedges.

WET MEADOWS

Ranunculus spp.
SCIENTIFIC NAME

BUTTERCUP
COMMON NAME

Field Characters: Buttercups are easily recognized by the combination of bright, glossy yellow flowers with five petals (some plants have double flowers) and numerous stamens and strongly dissected leaves. The leaves normally have three lobes, though some species have simple, unlobed leaves. Plants typically form lush masses about 5 to 15 cm in height. Some species can be erect and occur singly and, if so, are usually between 2 and 6 dm in height. Flowers can be minute (5 mm) or up to about 4 cm depending on the species. A few species have white petals, which are usually yellow at the base. Fruits are usually distinctive globular structures.

Habitats: Several species of buttercups are considered to be wetland plants in the Pacific Northwest and occur in many hydrologic regimes, from continuous inundation to no inundation. Most occur in meadows or shallow marshes, but a few species are truly aquatic, growing in standing water. A wide variety of plants are associated with buttercups since they are common in a variety of habitats including pastures, roadside ditches, streambanks, and bogs.

Phalaris arundinacea
SCIENTIFIC NAME

REED CANARYGRASS
COMMON NAME

Field Characters: Reed canarygrass is a tall, perennial grass, normally exceeding 1 m, and under ideal conditions, exceeding 2 m in height. The sturdy, often hollow, stems can be 1 cm in diameter and have a reddish tinge at the top during the growing season. Individual leaves measure up to 2 cm wide and 3 dm long. Flowers and seeds are borne on culms which stand high above the leaves. The panicles measure to 2 dm in length.

Habitats: Reed canarygrass is one of the most broadly ranging and, therefore, commonly encountered freshwater wetland plants. The species typically occurs where soils remain saturated or nearly saturated during most of the growing season, but where standing water does not persist for extended times. Once established, the species can tolerate extended inundation. Reed canarygrass can dominate where irregular or fluctuating water regimes inhibit the success of other wetland species (e.g., cattails). It commonly grows in roadside ditches, rights-of-way, and on river dikes and levees where the soils would appear to be well-drained and only rarely saturated, as well as in shallow marshes and meadows. Under the dryer conditions, the plant is shorter, has smaller flowering spikes and flowers earlier in the season. Common associates include lady fern, sedges, and rushes. When in flower, canarygrass meadows produce abundant pollen and chaff, aggravating hay fever and allergies.

WET MEADOWS

Juncus effusus
SCIENTIFIC NAME

SOFT RUSH
COMMON NAME

Field Characters: *This rush has* a strongly tufted appearance. Individual culms are round and hollow, can be 1 cm thick and grow to 1 m in height. Its floral panicles are borne laterally on the culms. Late in the season the stems often take on a brown or grayish color. The tufts of culms are evident throughout the year.

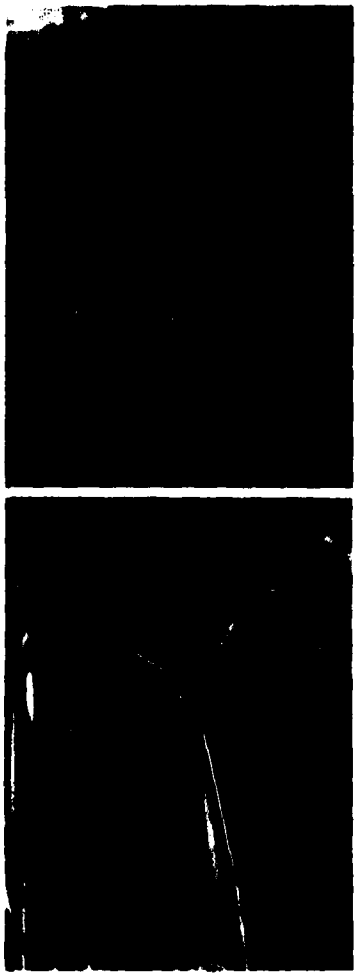
Habitats: Soft rush is a very common indicator of wet meadows (also wet pastures) in the Pacific Northwest. In pastures, it often dominates the wettest areas where water stands in winter and part of the spring. It is also common in shallow fresh marshes, but only as isolated (albeit robust) plants rather than as a dominant. Apparently soft rush can exist in nonwetland situations when spared from competition by other species. Soft rush is very common in wet pastures because it is tolerant of trampling and not palatable for grazing. Under dryer conditions in wet meadows, it is associated with species of grasses. In slightly wetter situations, buttercups are common associates. In the wettest parts of the meadow, it is associated with spike rush.

Typha latifolia; Typha angustifolia
SCIENTIFIC NAME

NARROW-LEAVED CATTAIL ; COMMON CATTAIL
COMMON NAME

Field Characters: Cattails have separate female and male flowers. The female flowers are borne on the familiar large, brown cylinder atop each stem. The male flowers are borne above the female flowers, becoming a withered spike shortly after flowering. In the narrow-leaved cattail *(T. angustifolia)*, approximately 0.5 to 8 cm separates the male from the female flowers, whereas there is no separation in common cattail. Leaves are strap-like, sheathing and nearly as tall as the flower stems. Cattails stand between 1 and 2 m in height.

Habitats: One of the most abundant and commonly encountered marsh plants, the common cattail is restricted to shallow marshes, usually growing in standing water. It often forms vast monotypic stands, but scattered individuals commonly grow in roadside ditches and wet disturbed areas. Generally a lowland species, it occurs up to about 1,000 m elevation. Numerous shallow marsh species are associated with this plant; it is also a common codominant with Douglas spiraea in shrub-swamps. Narrow-leaved cattail occurs in similar habitats but is much less common.

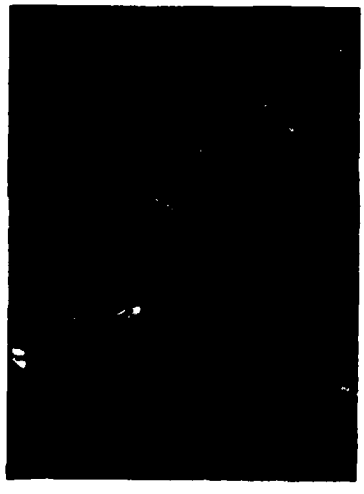


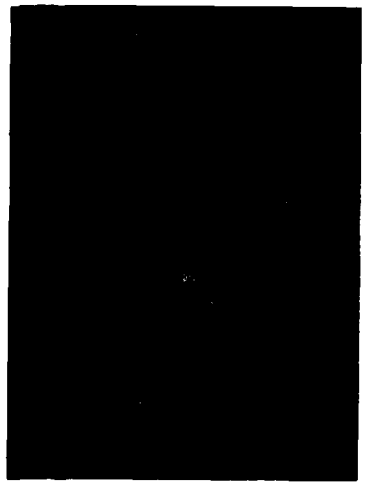
Spiraea douglasii
SCIENTIFIC NAME

DOUGLAS SPIRAEA
COMMON NAME

Field Characters: The plants stand 1.5 to 2.5 m in height with alternate leaves 3 to 8 cm long; the notches on the terminal portions of the leaves are distinctive. When in bloom, the shrub is readily identified by plumes of soft pink flowers (between 1 and 2 dm in height) rising above the leaves. At other times, it appears rather untidy. The flower spikes turn brown soon after flowering and may persist throughout the winter.

Habitats: Spiraea is a common component of shrub-swamps and often dominates such habitats. This species appears to become established in old marshes that are begining to "fill in" or dry up, but can withstand inundation for prolonged periods. It is also common in tidal fresh swamps of Puget Sound estuaries. It frequently grows along roadside ditches, wet meadows, and streambanks. Associated species include willows, purple loosestrife, and cattails.





GLOSSARY

Alkaline — Refers to soils having high concentrations of soluble mineral salts. Such soils often occur in arid regions.

Alternate Leaves — Leaves attached at different levels on opposite sides of a stem.

Annual — A plant which completes its life cycle in less than a year.

Appressed — Pressed flat against another organ or surface.

Association — A group of plant species which are consistently found growing together.

Basal — At the base, especially leaves originating from ground level such as those of the iris.

Bilateral Symmetry — Identical structures of a plant having one plane of symmetry, such as the leaves of salt grass.

Bract — A specialized leaf (often a different size, shape, or color than foliage leaves) which is borne near the flower or flower cluster.

Bulrush — A large rush, often referring to a plant of the genus *Scirpus*.

Catkin — An erect or lax spike consisting of unisexual, apetalous flowers. Examples include the flowers of willows and alders.

Community — A group of plants and animals which are found in association and interaction, forming a distinct system.

Composite — Belonging to the family Asteraceae, having numerous small individual flowers arranged compactly in a flower head resembling a single complex flower.

Compound Leaf — A leaf composed of two or more leaflets.

Cone — A woody, reproductive structure composed of seed or pollen-bearing scales usually associated with evergreens but also a characteristic of alder.

Culm — The aboveground stem of grasses or grasslike plants.

Deciduous Plant — A plant that sheds its leaves at the end of the growing season.

Dominant — A species which comprises the greatest part of the vegetation in a given community.

Emergent Plant — An aquatic plant which extends partially above the water surface.

Extreme High Water — The highest elevation reached during a storm or rising tide, including tides affected by meteorological events.

Flower — A complex specialized reproductive structure which produces fruits and seeds.

Forb — A broad leaved herb or herbaceous plant other than a grass.

Frond — The leaf-like structure of a fern.

Fruit — A mature ovary with its enclosed seed.

Glume — A bract which encloses the spikelet of grasses.

Habitat — The set of environmental conditions in which a plant or animal occurs.

Herbaceous — A seed-producing plant without persistent woody tissue, usually refers to grasses and forbs.

Hydrophytic — Refers to plants which typically grow in water or on a substrate that is periodically deficient in oxygen as a result of excessive water; a hydrophyte.

Inflorescence — The specific arrangement of the flowers on flowering plants.

Inundation — Flooding or covering with water, usually on a periodic basis.

Leaf — Functionally, the major photosynthetic organ of most plants.

Leaflet — A discrete segment of a compound leaf.

Lobe — A projection from the margin of a leaf, usually with the margin indented on either side of the projection.

Mean High Water — A tidal datum derived from the arithmetic mean of the daily high tide over a specific 19-year metonic cycle.

Mean Higher High Water — A tidal datum derived from the arithmetic mean of the daily higher high tide over a specific 19-year metonic cycle.

Mean Lower Low Water — A tidal datum derived from the arithmetic mean of the daily lower low tide over a specific 19-year metonic cycle.

Mesophytic — Refers to plants which typically grow where moisture conditions are moderate; a mesophyte.

Monotypic — Refers to a community consisting of only one species.

Needle — A specialized leaf having a slender compressed form, usually characteristic of evergreens.

Node — An enlarged joint of a stem, often where a leaf is attached to the stem.

Opposite Leaves — Leaves which occur two at a node on opposite sides of the stem.

Ovary — The part of the pistil bearing the ovules, and maturing to form at least part of the fruit.

Overstory — The highest layer of vegetation in a given habitat.

Ovule — An unfertilized egg contained within the ovary of flowering plants.

Palmate Leaf — A leaf having several lobes radiating from a common base like the fingers from the palm of the hand.

Panicle — A compound flower head in which the axis is branched one or more times; usually referring to grasses.

Panne — An isolated, unvegetated depression within a tidal marsh.

Peduncle — The stem of a solitary flower, or the main stem of a flower cluster.

Perennial —A plant living three or more seasons, e.g., cattail.

Petals — Modified leaves, usually colorful, surrounding the reproductive organs of a flower.

Petiole — The stem or stalk of a leaf.

Pistil — The female part of a flower which consists of the ovary and its appendages.

Raceme — An unbranched inflorescence with the flowers borne on short stalks.

Rhizome A horizontal underground stem which may bear roots, shoots, and leaves.

Rush — Usually a member of the genus *Juncus* and often characterized by cylindrical hollow stems.

Salinity — A measurement of the concentration of dissolved salts in seawater.

Sedge — Usually a member of the genus *Carex*, often having edged or winged stems.

Sepals — The outermost circle of specialized leaves on a flower.

Sessile — Attached directly by the base; lacking a stem or stalk.

Sheath — The tubular portion of a grass leaf which wraps around the stem.

Shrub — A woody plant less than 7 meters tall and usually having several stems.

Spathe — A sheathing, lateral organ or pair of organs usually open on one side and enclosing an inflorescence.

Spike — A type of unbranched inflorescence in which the axis is somewhat elongated and the flowers are numerous and sessile.

Spikelets — The segment of the inflorescence, generally of grasses, enclosed by a pair of bracts.

Spore — A simple, one-celled reproductive unit; the reproductive structures for ferns and mosses.

Stamen — The male, pollen-producing structure of a flower.

Submergent Plant — A plant which normally grows underwater, such as watermilfoil or pondweed.

Swale — An area of land lower than the surrounding vicinity which is often lower than the water table, thus tending to retain water.

Toothed Leaf — A leaf with minor projections and indentions emanating along the leaf margin.

Tree — A large woody plant usually over 7 meters tall with a single trunk.

Tuber — An enlarged, fleshy, reproductive structure produced on an underground stem, such as the potato.

Tufted — A dense cluster of elongated structures, generally leaves and stems, which spread from a common point.

Umbel — A flower head of a few to many flowers on stalks of approximately equal length arising from a single point; usually resembling the structure of an umbrella.

Understory — A layer of vegetation which occurs beneath a higher layer or layers.

Whorled — Arranged in a circle, i.e., several leaves which emerge from around a node on a stem.

Xerophytic — Refers to plants which typically grow in conditions that are frequently dry; a xerophyte.

BIBLIOGRAPHY

Representative technical and nontechnical publications that will assist in understanding wetland plants and their ecology are listed in the Bibliography. Other published information exists that can be accessed via library research.

Adamus, Paul R. and Lauren T. Stockwell, 1982. *A Method For Wetland Functional Assessment, Volume I. Critical Review And Evaluation Concepts.* 164 pp. U.S. Department of Transportation. Federal Highway Administration. Provides an excellent technical survey and evaluation of the functional values of wetlands.

Clark, Lewis J., 1974. *Lewis Clark's Field Guide To Wild Flowers of The Sea Coast In The Pacific Northwest* and 1974, *Lewis Clark's Field Guide To Wild Flowers Of Marsh And Waterway In The Pacific Northwest.* Grays Publishing Limited. These field guides provide descriptions and color photographs of many wetland plant species.

Cowardin, Lewis M., Virginia Carter, Francis C. Golet, and Edward T. LaRue, 1979. *Classification Of Wetlands And Deepwater Habitats Of The United States.* 103 pp. U.S. Fish and Wildlife Service. FWS/OBS-79/31. This report describes the wetland classification system being used by the U.S. Fish and Wildlife Service to inventory all wetlands of the United States.

Crawford, Victoria, 1982. *Wetland Plants Of King County And The Puget Sound Lowlands.* King County. 80 pp. Contains excellent descriptions and line drawings of many common freshwater wetland plants.

Franklin, Jerry F., and C.T. Dyrness, 1973. *Natural Vegetation Of Oregon And Washington. 417 pp.* U.S. Department of Agriculture. Forest Service General Technical Report, PNW-8. Describes the vegetational characteristics of habitats including wetlands in Oregon and Washington.

Frayer, W.E., T.J. Monahan, D.C. Bowden, and F.A. Graybill, 1983. *Status And Trends Of Wetlands And Deepwater Habitats In The Conterminous United States, 1950's to 1970's.* 30 pp. Describes changes in acreage of wetlands by wetland type.

Good, Ralph E., Dennis F. Whigham, Robert L. Simpson, and Crawford G. Jackson Jr., editors, 1978. *Freshwater Wetlands: Ecological Processes And Management Potential.* 378 pp. Academic Press. A technical volume treating freshwater wetland ecology and functional values.

Greeson, Phillip E., John R. Clark and Judith E. Clark, editors, 1979. *Wetland Functions And Values: The State Of Our Understanding.* Proceedings of the National Symposium on Wetlands. 674 pp. The American Water Resources Association. A thorough technical treatment of wetland functional values.

Hitchcock, C. Leo, Arthur Cronquist, Marion Ownbey and J.W. Thompson, 1969. *Vascular Plants Of The Pacific Northwest.* Five Volumes. University of Washington Press. A comprehensive flora of the Pacific Northwest. Nomenclature used in this guide is from this treatise.

Hitchcock, C. Leo and Arthur Cronquist, 1973. *Flora Of The Pacific Northwest.* University of Washington Press. 730 pp. A condensed version of the five-volume treatise.

Hitchcock, A.S., 1971. *Manual Of The Grasses Of The United States. Volumes I and II.* Dover Publications Inc. An exhaustive flora of the grasses.

Horowitz, Elinor Lander, 1978. *Our Nations Wetlands. An Interagency Task Force Report.* 70 pp. U.S. Government Printing Office. An excellent nontechnical discussion of wetland resources and values in the United States.

Hotchkiss, Neil, 1972. *Common Marsh, Underwater And Floating — Leaved Plants Of The United States And Canada.* 208 pp. Dover Publications Inc. A classic field guide to wetland plants.

Mason, Herbert L., 1957. *A Flora Of The Marshes Of California.* 897 pp. University of California Press. A technical treatise of plants occurring in California wetland habitats.

Munz, Phillip A., 1964. *Shore Wildflowers Of California, Oregon, And Washington.* University of California Press. A nontechnical guide book with color photographs illustrating many wetland species.

Peck, Morton E., 1961. *A Manual Of The Higher Plants Of Oregon.* 936 pp. Oregon State University Press. A technical flora.

Pomeroy, L.R. and R.G. Wiegert, editors, 1981. *The Ecology Of A Salt Marsh.* 271 pp. Springer-Verlog. A state-of-the-art series of technical articles.

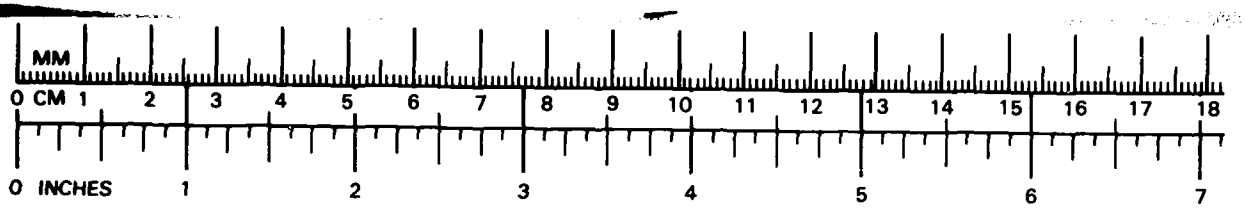
Reinhold, Robert J. and William H. Queen, editors, 1974. *Ecology Of Halophytes.* 605 pp. Academic Press Inc. A series of technical articles.

Reppert, R.T., Wayne Sigleo, Eugene Stakhiv, Larry Messman, and Caldwell Meyers, 1979. *Concepts And Methods For Wetland Evaluation.* 110 pp. U.S. Army Corps of Engineers. Institute for Water Resources. A reasonably easy to use wetland assessment methodology.

Shaw, Samuel P. and C. Gordon Fredine, 1956. *Wetlands Of The United States, Their Extent And Their Value To Waterfowl And Other Wildlife.* 67 pp. U.S. Fish and Wildlife Service Circular 39. Documents the original classification and inventory of the Fish and Wildlife Service in the 1950's. The report has been utilized extensively by Federal agencies for their wetland evaluations over the last 30 years.

INDEX

* U.S. GOVERNMENT PRINTING OFFICE: 1985 - 595-045



1 meter ..... 1 meter ..... 39.37 inches

1 decimeter ..... 1/10 meter ..... 3.937 inches

1 centimeter ..... 1/100 meter ..... 0.3937 inch

1 millimeter ..... 1/1000 meter ..... 0.0394 inch


DATE
ILMED
-8