NATIONAL WETLANDS INVENTORY
NOTES TO USERS FOR
JUNEAU 1:63,360 SCALE MAPS

INTRODUCTION

The U.S. Fish and Wildlife Service (FWS) has major responsibility for the protection and proper management of fish, wildlife and their habitats. The Fish and Wildlife Coordination Act authorizes the Secretary of the Interior "to make surveys and investigations of the wildlife of the public domain including lands and waters or interests therein acquired or controlled by any agency of the United States" (16 U.S.C. 669). This Act expands the concept of wildlife and wildlife resources to include not only animal life but also all types of "aquatic and land vegetation upon which wildlife is dependent." Within the last thirty years, a large amount of wetland modification has occurred. Increased emphasis on wetland preservation and management has been expressed through presidential executive orders and recent legislation. Amendments to the Clean Water Act of 1977 (33 U.S.C. 466) specify a major role for the National Wetlands Inventory (NWI) in the administration of that act.

The FWS has always recognized the importance of wetlands to waterfowl and other migratory birds. Consequently, the FWS has a direct interest in protecting wetlands, especially the breeding and overwintering wetlands. Wetlands, however, also provide a wealth of other values for the public including:

(1) Fish and shellfish protection.

(2) Furbearer and other wildlife production.

(3) Habitats for threatened or endangered plants and animals.

(4) Flood control through temporary storage of flood waters.

(5) Water quality maintenance by removing silt load, filtering pollution and absorbing water-borne chemicals and nutrients.

(6) Erosion buffers to protect upland areas.

(7) Groundwater recharge and stream flow maintenance.

(8) Saltwater intrusion control.

(9) Coastal storm damage reduction.

(10) Open space for aesthetic appreciation and recreational activities.

Because of their public values, wetlands represent one of the Nation's most important natural resources.

NATIONAL WETLANDS INVENTORY PROGRAM

The National Wetlands Inventory (NWI) was initiated in 1975 and made operational in 1977. The primary goal of the NWI is to generate and disseminate scientific information on the characteristics, extent, and trends of the Nation's wetlands. The purpose of this information is to foster wise use of wetlands, and to provide data for making responsible resource decisions.

Two types of information are produced through the NWI: detailed wetlands maps and status and trends reports. Detailed wetlands maps are produced for geographic areas of critical concern for impact assessments of site-specific projects. The maps may be utilized by local, state and federal agencies as well as by private industry and organizations for comprehensive resource management planning, environmental impact assessments, permit reviews, facility and corridor siting, oil spill contingency plans, natural resource inventories, wildlife surveys and other uses. Estimates of the current status and trends (i.e., losses and gains) of wetlands provide information for reviewing the effectiveness of existing programs and policies, for identifying national or regional land-use problems and allocation, and for general public awareness. A summary of the major objectives of the NWI project is as follows:

(1) Develop wetlands maps and a computer data base on the extent and type of wetlands.

(2) Reproduce and disseminate wetlands map products and reports.

(3) Develop reports on the utility of NWI maps for wetlands management decisions.

(4) Assist all potential users in evaluating the value of NWI products in meeting their needs.

(5) Development of wetlands status/trends reports.

(6) Develop and implement a capability for updating of inventory data to meet changing user needs.

(7) Continue development and implementation of the U.S. Fish and Wildlife Service's wetlands classification system.

(8) Correlate existing wetlands values information to the wetlands classification system.

(9) Provide expert technical assistance in the areas of wetland ecology, botany, soils, and hydrology.

User notes also compiled for each completed 1:250,000 scale map area. These notes describe the general landform features and vegetation communities, and serve to familiarize the user with the various mapping conventions.

DEVELOPMENT OF WETLANDS CLASSIFICATION SYSTEM

The FWS's wetlands classification system was developed by Cowardin, et al. and is titled Classification of Wetlands and Deepwater Habitats of the United States (FWS/OBS - 79/31). The purposes of the classification system are: (1) to describe ecological units having certain common natural attributes; (2) to arrange these units in a system that will facilitate resource management decisions; (3) to furnish units for inventory and mapping; and (4) to provide uniformity in wetlands concepts and terminology throughout the United States.

The classification system defines the limits of wetlands according to ecological characteristics and not according to administrative or regulatory programs. Three key attributes define the term "wetland": (1) the presence of wetland plants (hydrophytes) or (2) the presence of wet soils (hydric soils) or (3) soil saturation or flooding. Wetlands are naturally extremely diverse and complex. The classification system presents a method for grouping ecologically similar wetlands.

The classification system is hierarchical with wetlands divided among five major systems at the broadest level: Marine, Estuarine, Riverine, Lacustrine and Palustrine. Each System is further subdivided into Subsystems which reflect hydrologic conditions, (e.g., subtidal vs. intertidal in the Marine and Estuarine Systems). Below Subsystem is the Class level, which describes the appearance of the wetland in terms of vegetation (e.g. Emergent, Aquatic Bed, Forested) or substrate where vegetation is inconspicuous or absent (e.g. Unconsolidated Shore, Rocky Shore, Streambed). Each Class is further subdivided into Subclasses. The classification also includes modifiers to describe hydrology (water regime), water chemistry (pH, salinity and halinity) and special modifiers relating to man's activities (e.g. impounded, partly drained, farmed, artificial).

MAP PREPARATION

The FWS participates with other Federal and state agencies in the Alaska High-Altitude Photography Program. The NWI uses the 1:60,000 color-infrared photography that is obtained by this program. With this imagery, the NWI is capable of detailed wetland mapping with a minimum mapping size of 1-3 acres. When the aerial photography is viewed through a stereoscope, the photointerpreter has the ability to see wetlands in three dimensions. The photointerpreter analyzes the vegetation, landforms, slope, and drainage patterns when identifying and classifying wetlands. This photo information is used in conjunction with ancillary data (e.g., soil surveys, topographic maps, etc.), and data obtained during field investigations.

The primary map product is a large-scale map (1:63,360) which shows the location, shape, and characteristics of wetlands and deep-water habitats on a USGS base map.

These 1:63,360 scale Juneau wetlands maps were produced using color infrared aerial photographs at the scale 1:65,000 (quads B-2, 3, 5, 6; C-3, 4, 6; and D-3). The 1:65,000 scale photography was flown in August of 1979.

Field checking was conducted in September of 1982. Collateral information used in this mapping effort included the Soil Conservation Service's soil survey of the Juneau area, National Oceanic and Atmospheric Administration coastal charts, and the U.S. Geological Survey's topographic maps as well as those referenced in the bibliography section.

To produce final NWI maps, seven steps must be completed: (1) preliminary field investigations, (2) photointerpretation of high-altitude photographs, (3) review of existing wetlands information, (4) quality control of interpreted photos, (5) draft map production, (6) interagency review of draft maps, and (7) final map production. A recent evaluation of NWI maps in Massachusetts by the University of Massachusetts (1982) determined that these maps had accuracies above 95%. This high accuracy was achieved due to NWI techniques which involve a combination of field studies, photointerpretation, use of existing information and interagency review of draft maps.

MAPPING PRIORITIES

Mapping priorities are based principally on the needs of the FWS and other Federal and state agencies. The priority areas for mapping in Alaska include North Slope oil and gas development areas, population centers, transportation corridors, agriculture development areas, and the coastal zone. As of November 1984, the NWI has produced wetland maps for approximately 8% of Alaska. The NWI plans to map wetlands in Alaska at a rate of 2% annually (16% of Alaska by 1988). This would encompass one-half of the FWS's top priorities for Alaska.

MAPPING CONVENTIONS AND SPECIAL MAPPING PROBLEMS

- Wetlands are classified according to the FWS's Classification of Wetlands and Deepwater Habitats of the U.S. (Cowardin et al. 1979).

- All wetlands three acres in size or greater have been delineated and classified.

- Some classes or subclasses within a classified polygon have not been delineated if the amount of detail was deemed excessive. Therefore, some classes became undelineated inclusions within another class. These polygons are labelled with a mixed class alpha-numeric. A maximum of two classes are used in each wetland label.

- The higher vegetation life form is always listed first. The second cover type of a mixed class alpha-numeric is a lower level of vegetation, substrate, or water which comprises at least 30% or more area of the unit mapped. On the B-2 map, species exhibiting spatial dominance, regardless of life form, are listed first.

- An attempt was made to covertype wetlands according to their state at maximum vegetation development and at the average low water level.

- All emergent plants visible on the aerial photography are considered to be persistent emergents and are mapped as such unless field or collateral data is available.

- The aerial photography prevails as the data source for mapping except where reliable collateral data is available. Changes which have taken place since the time of the photography (wetland gains or losses) were not included in the mapping effort.

- Substrate subclass divisions are made on the basis of material which represents more than 50% of the total area of the unit delineated.

- All wetlands are labeled using an alpha-numeric code which corresponds to the appropriate covertype listed in the FWS classification system. All upland (non-wetland) areas on the photos are labeled with an inverted omega symbol ( ).

- All linear wetlands and deep-water habitats are indicated by a dashed line. Linears are not included if they would result in crowding of polygons and code symbols. Changes in classification along a linear are indicated by a perpendicular solid line drawn across the linear.

- Areas obscured by shadow or light cloud cover have been approximated from the USGS topographic quad sheets or other collateral information. Areas totally obscured and consequently not mapped are labeled as a "holiday."

- Special modifiers are used to indicate wetlands and deep-water habitats modified by man or beaver.

STUDY AREA

The Juneau 1:250,000 quad area is located in the northern portion of southeast Alaska. The study area is bordered by the Coast Mountains, extending from the northeast section of the quad south along the eastern edge of the study area, which are comprised of mostly glaciers fed by an extensive icefield, the northern tips of Admiralty Island and Chichagof Islands to the south, and Glacier Bay National Park to the west. Lynn Canal and Icy Strait trisect the study area. It is an area of high mountainous terrain bisected with numerous deep fjords and inland waterways. The marine-terrestrial interface includes an intricate maze of coastal features such as islands, sounds, straits, channels, narrows, arms, bluffs, coves, beaches, flats, bays, fjords, inlets, and estuaries. Terrestrial areas, both on the mainland and on the islands, are predominantly mountainous, heavily vegetated, and frequently indented with stream- or lake-bearing valleys and canyons. Several major glaciers descend through the mountains to the sea, adding yet another influential variable to the overall diversity of this extremely complex ecosystem.

Bailey (1977) describes this area as an inclusion within the Pacific Forest Province, Hemlock-Spruce Forest section, of the Humid Maritime Regime Highlands, within the Humid Maritime Division of the Humid Temperate Domain. Hammond (1977) describes two major land-surface forms within this area (both within the Pacific Mountain Division): 1) Low mountain area with local relief of 1,000 to 3,000 feet and with less than 20% of the area gently

sloping. This includes the Lynn Canal area north of Funter Bay to and including Ralston Island, and the northern portion of Chichagof Island from Mud Bay east through the Neka Mountain area and Elephant Mountain area to Chatham Strait. 2) The other major land-surface form is high mountain with local relief exceeding 3,000 feet and with less than 20% of the area gently sloping. Peaks exceeding 6,000 feet are not uncommon in the coast mountain range.

The dense, old-growth forests occupying coastal regions and mountain slopes are a critical component of the entire terrestrial-freshwater-marine ecosystem. They not only provide key habitat for wildlife but also regulate the flow and quality of freshwater streams and lakes. These in turn control the quality of estuarine areas.

Descriptive Legend of Terrestrial Vegetation

Coastal Western Hemlock-Sitka Spruce Forest

In order to better define the diversity within the coastal forest, three plant communities are listed separately - true forest, grass-sedge meadows, and muskeg. The true forest is the matrix. Within its lower reaches it is often interspersed with grass-sedge meadow. At higher elevations, muskegs often occur in openings. Grass-sedge meadows and muskegs occur in considerable abundance and may cover large areas.

True Forest

The forest of southeast Alaska is a portion of a cool, very moist rain forest that extends along the Pacific coast from northern California to Cook Inlet. Most of the forest is old growth, undisturbed by man, and capable of producing trees in excess of 200 feet tall and 14 feet in diameter that live to be more than 800 years old. From a distance, the mature stands have a ragged appearance, largely due to their composition of various ages, sizes, and degrees of vigor with many dead tops and gray lifeless snags intermixed with healthy trees. The forest usually extends from sea level to an elevation of about 2,500 feet in the northern part of the region.

The dominant tree species in the non-wetland areas are western hemlock and Sitka spruce with smaller amounts of Alaska cedar and red cedar. Black cottonwood, which dominates the forested wetland areas, usually invades newly deposited alluvium and glacial material. Stunted lodgepole pine and western hemlock can occur in muskegs and peat bogs. Understory vegetation includes shrubs and young conifers. Moss covers the ground, and lichens drape from many trees.

Trees -

Western hemlock	Tsuga heterophylla
Sitka spruce	Picea sitchensis
Alaska cedar	Chamaecyparis nootkatensis
Western red cedar	Thuja plicata
Lodgepole pine	Pinus contorta
Shore pine	Pinus contorta
Black cottonwood	Populus balsamifera

Paper birch	Betula papyrifera
Quaking aspen	Populus tremuloides
Western yew	Taxus brevifolia
Mountain hemlock	Tsuga mertensiana
Pacific silver fir	Abies amabilis
Alpine fir	Abies lasiocarpa

Shrubs -

Red alder	Alnus oregona
Sitka alder	Alnus crispa
Thinleaf alder	Alnus incana
Devil's club	Echinopanax horridum
Rusty menziesia	Menziesia ferruginea
Salmonberry	Rubus spectabilis
Blueberry and huckleberry	Vaccinium spp.
Currant	Ribes spp.
Elder	Sambucus racemosa
Thimbleberry	Rubus parviflorus

Herbs, Mosses, and Others -

Bunchberry	Cornus canadensis
Deer cabbage	Fauria crista-galli
Licorice ferns	Polypodiaceae
Horsetail	Equisetum spp.
Sedge	Carex spp.
Yellow skunk cabbage	Lysichiton americanum
Twisted stalk	Streptopus amplexifolius
Lichens	
Liverworts	
Mushrooms	
Other fungi	

Grass-Sedge Meadows

Grass-sedge meadows usually lie at low elevations, often along the coast in glacial outwash plains dissected by numerous stream channels. The vegetation consists mainly of grasses, sedges, and other herbaceous vegetation. Many of the stream channels are bordered by willows. Meadows also occur extensively in the vicinity of Gustavus.

Shrubs -

Willows	Salix spp.

Grass and Sedges -

Beach ryegrass	Elymus arenarius
Fescue grass	Festuca spp.
Bluejoint	Calamagrostis canadensis
Large-flowered spear grass	Poa eminens
Reed bent grass	Calamagrostis nutkaensis
Bent grass	Agrostis spp.

Manna grass	Glyceria pauciflora
Meadow barley	Hordeum brachyantherum
Arrow grass	Triglochin maritimum
Sedge	Carex spp.

Herbs -

Beach pea	Lathyrus maritimus
Beach lovage	Ligusticum scoticum
Nootka lupine	Lupinus nootkatensis
Goose tongue	Plantago maritima
Sea beach sandwort	Honckenya peploides
Sea milkwort	Glaux maritima
Small bedstraw	Galium trifidum
Cleavers	Galium aparine
Western buttercup	Ranunculus occidentalis
Yellow monkey flower	Mimulus guttatus

Muskeg

Interspersed throughout the forest are openings occupied by muskeg or bog plant communities and dominated by sphagnum mosses and sedges, but also including low shrubs, forbs, and a few scattered trees. Such areas are usually very wet and standing water is common. Examples of this type vary greatly in areal extent, ranging from small pockets where drainage has been retarded to such broad expanses as portions of the Yakutat Forelands (not within study area). They even exist on fairly steep slopes. Underlying substrate is highly organic and usually ranges from less than two feet to more than 40 feet in thickness. Gray, dead trees commonly ring these bogs.

Trees -

Lodgepole pine	Pinus contorta
Alaska cedar	Chamaecyparis nootkatensis
Mountain hemlock	Tsuga mertensiana
Western hemlock	Tsuga heterophylla
Sitka spruce	Picea sitchensis

Shrubs -

Crowberry	Empetrum nigrum
Labrador tea	Ledum palustre
Bog rosemary	Andromeda polifolia
Bog laurel	Kalmia polifolia

Herbs, Mosses and Others -

Sphagnum	Sphagnum spp.
Sedge	Carex spp.
Bulrush	Scirpus spp.
Yellow skunk cabbage	Lysichiton americanum
Bracken fern	Pteridium aquilinum

Alpine Tundra

This community usually lies above 2,500 to 3,000 feet. It occupies the region above the coastal forest and is separated from it by a subalpine or transition zone. Low, mat-forming vegetation covers much of the area and cushionlike plants occupy crevices on exposed outcrops and talus slopes. Although soils are generally thin, gravelly, and stony, organic soils may form locally in depressions. Snowpack and wind abrasion are considerable in this zone, and resident plants have adopted low growth habits to survive. Snow remains in some glacial basins year-round, particularly on north-facing slopes. The combination of all these features produces a magnificent landscape.

Shrubs -

Crowberry	Empetrum nigrum
Aleutian heather	Phyllodoce aleutica
Mertens mountain heather	Cassiope mertensiana
Blueberry	Vaccinium alaskensis
Arctic willow	Salix arctica
Nagoonberry	Rubus arcticus
Salmonberry	Rubus spectabilis
Alpine azalea	Loiseleuria procumbens

Herbs, Mosses and Others -

Nootka lupine	Lupinus nootkatensis
Spotted saxifrage	Saxifraga bronchialis
Coast saxifrage	Saxifraga ferruginea
Purple mountain saxifrage	Saxifraga oppositfolia
Prickly saxifrage	Saxifraga tricuspidata
Caltha-leaved avens	Geum calthifolium
Stiff club moss	Lycopodium annotinum
Sedge	Carex ssp.
Deer cabbage	Fauria crista-galli
Coastal fleabane	Erigeron peregrinus
Bunchberry	Cornus canadensis
Alpine bluegrass	Poa alpina
Holy grass	Hierochloe alpina
Broad-petaled gentian	Gentiana platypetala
Sibbaldia	Sibbaldia procumbens
Narcissus-flowered anemone	Anemone narcissiflora
Arctic wormwood	Artemisia arctica
Luetkea	Luetkea pectinata

Marine Flora

Marine plants provide the fundamental energy for all marine life by transforming solar energy into complex organic molecules. Marine animals consume these plants and prey on each other.

Marine flora can be divided into three categories - 1) drifting microscopic cells or colonies termed phytoplankton, 2) algae and seed plants that attach themselves to a bottom substrate (benthic) or grow in the intertidal zone, and 3) seed plants in salt marshes along low-lying coastlines and at the head of inlets and fjords.

Species composition varies markedly west of Yakutat. The brown algae of southeast Alaska most closely resembles that of British Columbia. Rockweed blankets the tideline all along the coast. Offshore the kelps, primarily species of Macrocystis and Nereocystis, form large underwater forests beneath masses of floating, leaflike branches. Although less evident, many smaller forms of green algae, such as Ulva, and red algae, including coralline red algae, vegetate the marine landscape in the same way that trees, shrubs, herbs, and grasses cover the land. Eelgrass, a seed plant, grows intertidally throughout the region.

Green algae	Chaetomorpha cannabina
	Cladophora sp.
	Codium ritteri
	Enteromorpha clathrata
	Enteromorpha crinita
	Enteromorpha interstinalis
	Enteromorpha linza
	Enteromorpha micrococca
	Lola lubrica
	Monostroma fuscum
	Ulva sp.
	Ulva fenestrata
Brown algae	Agarum cribrosum
	Alaria sp.
	Alaria nana
	Chordaria flagelliformis
	Colpomenia sinuosa
	Costaria costata
	Cymathere triplicata
	Desmarestia intermedia
	Elachistea fucicola
	Fucus distichus
	Laminaria sp.
	Laminaria dentigera
	Laminaria groenlandica
	Laminaria saccharina
	Macrocystis integrifolia
	Myelophycus intestinale
	Nereocystis luetkeana
	Petalonia debilis
	Pilayella littoralis
	Ralfsia fungiformis
	Scytosiphon lomentaria
	Soranthera ulvoidea
Red algae	Antithamnion subulatum
	Bangia fuscopurpurea
	Callophyllis flabellulata
	Constantinea sp.
	Constantinea rosa-marina
	Corallina sp.
	Endocladia muricata
	Gigartina sp.

	Gigartina cristata
	Gloiopeltis furcata
	Halosaccion glandiforme
	Iridaea sp.
	Lithothamnion sp.
	Membranoptera weeksiae
	Odoathalia floccosa
	Odoathalia washingtoniensis
	Phycodrys riggii
	Polysiphonia sp.
	Polysiphonia pacifica
	Porphyra sp.
	Porphyra perforata
	Ptilota densa
	Ptilota filicina
	Rhodomela larix
	Rhodomenia sp.
	Rhodemenia palmata
	Schizymenia sp.
	Tokidadendron bullata
	Turnerella mertensiana
Seed plants (eelgrass)	Zostera marina

Various zones of vegetation, grading from marine to terrestrial, occur in the tidal marshes at the heads of inlets and fjords and along low-lying coasts. In the lowest portions of the marsh, sedges and algae, commonly rockweed, are flooded twice daily by high tides. Slightly higher, although still flooded twice daily, is a zone characterized by alkali grass. This zone often extends inland along major waterways entering salt water. A plantain community occurs slightly landward where flooding is light during higher high tide. Only the highest high tides flood the lyme grass zone occurring next. The rear of the marsh and the transition to a terrestrial environment contain a mixed sedge-spike rush association. Silverweed, hairgrass, and yarrow also occur in a zone between sedges and lyme grass in some tidal meadows. These marshes provide significant habitat for waterfowl and other coastal fauna.

Salt Marshes -

Yarrow	Achillea sp.
Sedge	Carex lyngbyaei
Hairgrass	Deschampsia sp.
Spike rush	Eleocharis kamtschatica
Ryegrass	Elymus arenarius
Lyme grass	Elymus mollis
Fescue grass	Festuca rubra
Rockweed	Fucus sp.
Sea milkwort	Glaux maritima
Plantain	Plantago maritima
Common silverweed	Potentilla anserina
Pacific silverweed	Potentilla pacifica
Alkali grass	Puccinellia nutkaensis
Spergularia	Spergularia canadensis
Arrow grass	Triglochin maritimum

Freshwater Flora

Little information is available concerning freshwater aquatic vegetation in this region. Phytoplankton from lakes and periphyton (algae which grow attached to submerged surfaces) from streams have not been studied, and little is known about them or their abundance.

Larger aquatic macrophytes are only slightly better known. The two most common species are the yellow pond lily and pondweed. Also present are bur reed, stonewort, quillwort, water milfoil, and mare's tail. Numerous grasses and sedges form the marsny borders of freshwater ponds and lakes.

Macrophytes -

Quillwort	Isoetes muricata
Horsetail	Equisetum fluviatile
Bur reed	Sparganium angustifolium
	Sparganium hyperboreum
Pondweed	Potamogeton natans
	Potamogeton gramineus
Rush	Juncus sp.
Sedge	Carex sp.
Yellow pond lily	Nuphar polysepalum
Stonewort	Chara sp.
Water milfoil	Myriophyllum spicatum
Mare's tail	Hippuris vulgaris
White water crowfoot	Ranunculus trichophyllus

CLIMATE

The climate of southeast Alaska is maritime, which means small temperature variations, high humidity, high precipitation, considerable cloudiness, little freezing weather (along the marine influenced areas), and an average temperature of around 40°F. Average precipitation exceeds 100 incnes over much of the region. These cool, moist conditions produce a lush forest growth.

The climatic data for the Juneau area is as follows:

Temperature
- Summer 44° to 64°, extreme 89°(F)
- Winter 18° to 34°, extreme -22°(F)

Precipitation
- 55 inches including 107 inches of snow

Wind
- Average ESE at 7.4 knots
- Extreme ESE at 50 knots

The Juneau area has a tidal range of 13.8 feet with a maximum high tide of +20.6 feet and a maximum low tide of -4.0 feet.

HYDRIC SOILS

The list of hydric or wetland soils for the Juneau, Alaska 1:250,000 scale quad area has been taken from two Soil Conservation Service reference manuals: National Bulletin No. 430-3-10 (Soils - List of Soils With Actual or High Potential For Hydric Conditions; June 3, 1983) and Soils of the Juneau Area (1974). Ten hydric soil types and three land types which support hydrophytes have been identified within the study area.

Hydric soils have been defined by the U.S. Soil Conservation Service as soil that is either: 1) saturated at or near the soil surface with water that is virtually lacking free oxygen for significant periods during the growing season or 2) flooded frequently for long periods during the growing season. This definition attempts to identify soils that support the growth and reproduction of hydrophytes or wetland vegetation. These soils are either saturated and/or flooded long enough to produce anaerobic (no oxygen) conditions in the soil, thereby affecting the reproduction, growth and survival of plants.

Soils that were formerly wet, but are now completely drained are not considered hydric soils. This condition must be determined on a site-specific basis. Also excluded from the definition of hydric soils are soils that were not naturally wet but are now subject to periodic flooding or saturation for specific management purposes (e.g. waterfowl impoundments) or flooded by accident (e.g. highway-created impoundments). Moreover, soils that are frequently flooded for short intervals not long enough to support hydrophytes, do not represent hydric soils.

Detailed soils information is lacking for most of the Juneau 1:250,000 scale quad area. The only published soil survey is for the Juneau city area (USDA, 1974). Generalized soils information for the remainder of the study area can be obtained from the publication Exploratory Soil Survey of Alaska (USDA, 1979).

Hydric soils may be separated into two major categories on the basis of soil composition: 1) organic soils (histosols) and 2) mineral soils. In general, organic soils have more than 18% organic content, while mineral soils have less than 18% organic matter. For a technical definition, the reader is referred to the publication Soil Taxonomy (1975).

Buildup of organic matter results from prolonged anaerobic soil conditions associated with long periods of flooding and/or soil saturation during the growing season. These saturated conditions impede aerobic decomposition (or oxidation) of the bulk organic materials such as leaves, stems and roots, and encourage their accumulation as peat or muck over time. Consequently, most organic soils are characterized as very poorly drained soils. Organic soils typically form in water logged depressions where peat or muck deposits range from one foot to more than thirty feet in depth. Organic soils can be further subdivided into three groups based on the percentage of identifiable plant material in the soil: 1) muck (saprist) where two-thirds of the material is decomposed beyond recognition and one-third is identifiable plant remains; 2) peat (fibrist) with one-third decomposed and two-thirds identifiable; and 3) mucky peat or peaty muck (hemist) where between one-third and two-thirds is both decomposed and identifiable.

In other wetlands, organic matter does not accumulate in the soil as peat or muck and here mineral soils have developed. These soils have standing water for significant periods and/or are saturated within three feet of the surface from two to twelve months of the year. Saturation may result from low-lying topographic position, groundwater seepage, or the presence of a slowly permeable layer (e.g. clay, confining bed, fragipan or hardpan). Poor aeration of these soils produces mottling characteristics associated with reduced iron. Mottling occurs where the water table fluctuates during the growing season. Poorly drained mineral soils have distinct mottles within six to ten inches of the surface, while mottling occurs immediately below the surface in very poorly drained mineral soils.

The major factors of soil formation are parent material, climate, vegetation, relief, and the passage of time.

Climate, apart from its influence on soil properties, determines to a large extent the kind of vegetation that grows in a particular area. The vegetation, in turn, has a profound influence on soil characteristics. The degree of modification of the parent material or rock by climatic and biologic forces and the degree of soil development depend largely on the length of time the soil-forming processes have been active. Local variations in relief also affect the nature and intensity of soil development.

The Juneau soil survey area contains 35,440 acres, and includes most of the likely sites for urban development in the Borough. It extends from a northern boundary near Berners Bay along Lynn Canal and Gastineau Channel to a point about 3 miles southeast of Thane, and covers a strip one-half to one mile wide on most of the circumference of Douglas Island. Elevations within the survey area range from sea level to about 1,000 feet. Parts of the area lie within the boundaries of the Tongass National Forest, and within lands recently conveyed to various Native corporations.

Broad areas of nearly level soils occur on the floodplains of major streams. Most of these soils are formed in waterlaid sandy and silty sediments underlain by coarse sandy and gravelly materials. The depth to gravel ranges from only a few inches to many feet. Many of the soils have high seasonal water tables and are subject to flooding. The depth and frequency of flooding varies with the elevation and location of the soils in the valleys.

On the uplands, most of the soils are formed in glacial stony till which ranges from a few inches to many feet in thickness over bedrock. Generally, the steeper soils are very shallow and areas of these soils usually include rock outcrops. On benches and footslopes, where deposits of till are commonly thicker, many of the soils are poorly drained. The wet conditions are caused primarily by firm, compact, slowly permeable or impervious subsoil and substratum materials, which impede adequate percolation of water added to the soil by rains and by seepage from higher areas. On moraines and slopes that are not subject to seepage or runoff from higher areas, there are tracts of well drained soils.

Areas of very poorly drained peat soils occur both on the uplands and in the valleys. These soils have high water tables and are from about two feet to many feet thick over mineral materials. The peat materials, which are in various stages of decomposition, are derived from sedges, mosses, and woody vegetation.

Soils are made up of a series of nearly horizontal layers, or horizons. A soil profile is the sequence of these horizons from the surface down to the underlying material which has not been altered by weathering or plant roots. Soils that have profiles almost alike make up a soil series. All soils of one series have major horizons that are similar in important characteristics. These include 1) color; 2) texture, or relative proportions of gravel, sand, silt, and clay; 3) structure, or arrangement of soil particles into aggregates or clusters; 4) consistence, or degree of compaction and plasticity; 5) aeration and drainage conditions; 6) reaction, or degree of acidity or basicity; 7) thickness; and 8) arrangement in the profile. Each soil series is either named or identified by a two-letter symbol. Those identified by symbols are not named because they have been observed in too limited an area to adequately define the series. They are described as they occur in the Juneau area, but are subject to review and possible correlation with soil series mapped elsewhere.

Soil series are further subdivided on the basis of external features which are important to use and management of the soil. The subdivisions are called phases. Areas that have little plant cover, or that are frequently inundated by tides are called miscellaneous land types rather than soils.

Mapping units on the soil map of the area are slope phases of soil series, miscellaneous land types, and in one case, a complex of two soil series that occur in such close association that they could not be separated on the map. Because it is not possible, even on a detailed map, to show very small areas of soil, most mapping units contain patches of soil of some other kind that are too small to delineate separately.

Each of the hydric soils and land types in the area is described below.

Am Series

The Am series consists of somewhat poorly and poorly drained soils that occur on broad, nearly level valley bottoms of major streams which are occasionally flooded for short periods of time and gently sloping alluvial fans. These soils are made up of gray silty and sandy waterlaid sediments 40 inches to many feet deep over gravel and coarse sand. Included in this series are small streams, sloughs, wet sandy and gravelly spots, springs, seepage spots, and numerous small areas of poorly drained fine sandy loam soils that are shallow over gravel and coarse sand. Most soils within this series are subject to overflow during periods of snow melt or heavy rainstorms.

Two main types of vegetation occur on the Am soils. One type is dominated by tall willows and generally occurs on slightly lower portions of the floodplain where the water table is at times near the surface. The other type, on higher parts of the floodplain, is a forest of stunted western hemlock and Sitka spruce.

The texture of the mineral surface ranges from silt loam to sandy loam. In places, pebbles and cobblestones make up to 35 percent by volume of the mineral materials. Thin discontinuous layers of iron cemented materials and strata of very coarse sand as much as three inches thick may occur at any depth. The water table fluctuates from the surface to a depth of four feet but is generally less than two feet below the surface.

Co Series

The Co series consists of poorly drained soils on very low-lying, nearly level alluvial plains near the coast. The soils consist of deep gray silty waterlaid sediments that commonly contain thin strata of sandy materials and seams of peat. The dominant vegetation consists of sedge and grasses, but in a few places the soils support stands of Sitka spruce and western hemlock.

A few thin strata of fine sand and occasional seams or pockets of buried organic matter may occur at any depth. The water table is usually within two feet of the surface. In most places it is susceptible to occasional overflow from freshwater streams, and in a few places it may be inundated by exceptionally high tides.

Fu Series

The Fu series consists of very poorly drained moderately deep peat soils that occur on nearly level valley bottoms near the coast. The peat materials are derived chiefly from sphagnum moss and are underlain by silty tidal deposits or alluvial sediments. The peat materials range from 20 to 50 inches in thickness. Depth to the water table is usually less than one foot. This series also includes spots of deep very poorly drained peat, small ponds, and small areas of Am soils.

The vegetation is mainly sphagnum moss and cottonsedge.

Gravelly Beaches

This land type consists mainly of coarse gravel, sand, and cobblestones in narrow strips along the coast. These areas are inundated by higher than normal tides. They are usually nearly free of vegetation, but in places there are stands of grasses and other low growing plants.

Kaikli Series

The Kaikli series consists of very poorly drained mucky peat soils that are shallow over bedrock. These soils occur on slopes that receive seepage from higher areas. They support a forest dominated by western hemlock.

The mucky peat materials range from about 16 to 30 inches in thickness. Depth to bedrock ranges from 16 to 40 inches; in many places the loamy materials are absent. The water table is commonly within one foot of the surface.

Karheen Series

The Karheen series consists of poorly drained very gravelly muck soils that occur on nearly level to moderately sloping uplifted beaches in coastal areas. These soils support a forest of Sitka spruce and western hemlock.

The depth to till or bedrock ranges from 60 inches to many feet. Pebbles and cobblestones make up 60 to 80 percent of the soil volume. The seasonally high water table is within two feet of the surface.

Kina Series

The Kina series consists of very poorly drained deep peat soils that occur on benches and footslopes. The peat materials are derived chiefly from sedges. The vegetation consists of scattered lodgepole pine and a ground cover of sedges and mosses.

The peat materials are commonly between 4 1/2 and 6 feet in depth over mineral materials, but in places they are deeper. The underlying material may be rock or glacial till. The water table is usually near the surface.

Kogish Series

The Kogish series consists of very poorly drained nearly level to strongly sloping peat soils that occur in valleys and on broad benches. The peat materials are derived chiefly from sphagnum moss, which is the dominant vegetation.

The peat materials are more than 5 feet thick. They may be underlain by till, bedrock, or alluvial sediments. The water table is usually near the surface.

Le Series

The Le series consists of very poorly drained soils that occur in slight depressions on nearly level floodplains. It is susceptible to occasional flooding. These soils are formed in dark gray silty sediments and have a thick mat of partially decomposed organic material on the surface. The dominant vegetation consists of sedges, grasses, and patches of willow and alder brush.

The mat of organic materials on the surface ranges from about 5 to 15 inches in thickness. The sediments are dominantly silty but may contain thin strata of fine sand. They range from 40 inches to many feet in thickness over a gravelly substratum. Depth to the water table is usually less than one foot.

Maybeso Series

The Maybeso series consists of very poorly drained soils of nearly level to strongly sloping seepage areas, drainageways, and benches. These soils are made up of mucky peat 16 to 50 inches thick over glacial till. They support a forest of western hemlock and scattered Sitka spruce.

The mineral substratum is loamy compact till with slow to moderately slow permeability. Coarse fragments make up 40 to 60 percent by volume of the till. In places, the mineral materials are weakly cemented. The water table is usually less than two feet below the surface. Stones and boulders are common.

Riverwash

This land type consists of recent waterlaid sediments in gravel and sand bars bordering major rivers and streams. These sediments are usually very gravelly or stony. Many areas have no vegetation, but in places there are clumps of willow brush or a sparse cover of grasses and herbs. The mapped areas are frequently flooded.

Tidal Flats

This land type consists of nearly level areas bordering the coast. These areas are frequently inundated by tides that are higher than normal. They commonly consist of medium textured sediments, but in places they may be gravelly. Most areas support sedges, rushes, grasses, and other plants of coastal meadows, but a few areas are nearly bare.

Wadleigh Series

The Wadleigh series consists of somewhat poorly drained soils that occur on lower slopes of hills and mountains. These soils are formed in very gravelly loamy materials underlain by firm glacial till that impedes internal drainage. They have a mat of forest litter, a thin grayish brown layer, and dark reddish brown to dark yellowish brown layers above the firm substratum. The vegetation is a forest of western hemlock and scattered Sitka spruce.

The surface texture ranges from silt loam to very gravelly sandy loam. Below 10 inches coarse fragments, including cobblestones, make up 35 to 65 percent of the soil volume. Depth to the firm substratum ranges from 15 to 25 inches. Seepage water from adjacent higher areas is commonly perched above the very slowly permeable compact substratum.

Wetlands and Aquatic Habitats

The following section describes the map codes used on the Juneau 1:63,360 scale wetlands maps. A general description and/or community type, including dominant vegetation, is provided for each code. For vegetated wetland types, the corresponding classification according to the Classification System for Vegetation of Alaska (Viereck et al. 1982) is provided.

Marine System

There are no wetlands or deepwater habitats within the Marine system in the Juneau 1:250,000 scale quad area. The salt water areas within this region do not exhibit full sea strength salinity, shorelines are not exposed to the full

force or impact of waves originating in the open ocean, and vegetation occurring along these shorelines are more similar to that found in the more "typical" estuarine situation than found along ocean shorelines. Although the depth of many canals and fjords is extremely deep (exceeding 600 feet), this factor alone is not sufficient for classifying these areas as marine.

Estuarine System

The Estuarine system is confined to bays, tidal marshes, some fjords, and brackish river channels. Estuarine areas exhibit a salinity lower than that found in the Marine system. Estuarine coastlines are considered low-energy since they are protected from the full force of wave action from the open ocean.

E1OWL — Subtidal, low-energy, brackish open water. Includes the permanently flooded portion of bays, fjords, and adjacent river channels. Also includes small brackish ponds (silt bottomed) which are inundated by high spring tides.

E1AB1L — Subtidal, low-energy, brackish open water with aquatic bed (algae). Macrophytes present would most likely be Macrocystis sp., Nereocystis sp., or Laminaria sp.

E2BBM — Intertidal, low-energy, brackish water area of unvegetated beaches and/or bars. Typically composed of silt and sand-sized particles. This area is exposed by the tides less often than daily (irregularly exposed).

E2BBN
E2USN — Regularly flooded, unvegetated beaches and bars along low-energy shorelines. Typically composed of silt and sand-sized particles.

E2BBP
E2USP — Irregularly flooded, unvegetated beaches and bars along low-energy shorelines. Typically composed of sand-sized particles.

E2FLM — Intertidal, low-energy, irregularly exposed area of sand and mud flats.

E2FLN
E2USN — Regularly flooded mud and sand flats in low-energy, brackish environments. Some of the higher elevation areas along the shore may have a sparse vegetative cover of herbaceous plants and algae. (See description for the E2EM5N wetland type.)

This code was also used to designate tidal ponds and pools that are frequently found at the higher elevations of brackish marsh areas. Although these ponds are generally only inundated by tidal water irregularly (once a year to a few times per month), the water often remains standing in the basins because they are not drained by tidal guts. Precipitation has a significant effect on the water levels during periods between tidal flooding. The regularly flooded water regime modifier (N) was used in mapping to describe the wetter condition of these potholes.

E2FLP
E2USP — Irregularly flooded, unvegetated mud and sand flats in low-energy, brackish environments.

E2SBN — Regularly flooded, small channels in brackish salt marshes and mud flats that are completely dewatered at low tide. Due to the stronger ebb flow within these channels and the dewatered condition at low tide, vegetation is sparse to non-existent, but may include species described for E2FLN and E2EM5N wetland types, especially Carex lyngbye, Calamagrostis canadensis, and Eleocharis sp.

E2RSN — Intertidal, low-energy, regularly flooded area of bedrock, boulders, or stone.

E2AB1N — Intertidal, low-energy, regularly flooded area containing aquatic bed (algae). This area is flooded and exposed by the tides on a daily basis. Fucus distichens would most likely dominate this area with Zostera marina and Ulva sp.

E2AB1/BBN
E2AB1/USN — Intertidal, low-energy, regularly flooded area of beaches and bars containing at least 30% aquatic bed (algae). Substrate material is typically composed of silt and sand-sized particles. (See E2AB1N and E2BBN wetland types.)

E2AB1/FLN
E2AB1/USN — Intertidal, low-energy, regularly flooded area of sand and mud flats containing at least 30% aquatic bed (algae). (See E2AB1N and E2FLN wetland types.)

E2EM1/OWL — Low elevation brackish marsh comprised of a mixture of irregularly flooded salt marsh (E2EM1P) with numerous small isolated pockets of standing brackish water (E1OWL).

E2EM1M — Generally the most seaward portion of a brackish marsh that is exposed by the tides less often than daily (irregularly exposed).

E2EM5N
E2EM1N — Lower elevation areas of brackish marshes that are flooded regularly by tidal water. Also includes complexes of low brackish marshes which are regularly flooded and high brackish marshes which are irregularly flooded (this complex represents an area where conditions pertinent to E2EM5N and E2EM5P exist in close proximity to one another, making it difficult to delineate).

The E2EM5N marsh exists in areas exhibiting estuarine features, particularly at the heads of fjords and sheltered embayments.

Areas inundated for extended periods (several days per month for up to six hours at a time) are generally sparsely vegetated by species dominant in the higher marsh areas. Carex lyngbye dominates the emergent flats areas, particularly along tidal channels which are inundated for short durations. Lyngby sedge may form a dense peaty turf along these tidal guts. The higher areas (primarily vegetated levees) may also contain a sparse to dense vegetative cover of Calamagrostis canadensis, Deschampsia beringensis, Potentilla egedii, and Elymus arenarius.

The lower, more regularly flooded areas may be dominated by Carex lyngbye, Triglochin maritima, Glaux maritima, and Plantago sp.

Shrub thickets may occur along the highest shoreward portions which are still subjected to regular, but for short duration, inundation. Species subjected to irregular flooding, particularly those areas where water drains off rapidly and the surface mud dries somewhat, include various species described for the E2EM5P wetland type.

Viereck et al. types - Halophytic grass wet meadow
- Halophytic sedge wet meadow

E2EM5/BBN
E2EM1/USN

Similar to E2EM5/FLN except that the brackish marsh is underlain by either beach or bar materials composed of silt and/or sand-sized particles (see descriptions for E2EM5/FLN, E2EM5N, and E2BBN wetland types).

E2EM5/FLN
E2EM1/USN

Brackish marshes mixed with mud flats and/or tidal ponds (see descriptions for E2EM5N, E2EM5P, and E2FLN wetland types). Typically found at the mouths of larger rivers. It is one of the most seaward vegetation types. The area is inundated daily, however, water drains off rapidly after flooding and the surface dries somewhat.

Dominant species include those described for the E2EM5N wetland type (see also the description for the E2EM5P wetland type).

Viereck et al. types - Halophytic grass wet meadow.
- Halophytic sedge wet meadow.
- Halophytic sedge marsh.

E2EM5P
E2EM1P

Higher elevation areas of brackish marsh that are flooded irregularly by tidal water. Surface drainage is good in these areas.

Dominant species include Carex lyngbye, Potentilla egedii, Elymus arenarius, Puccinellia sp., Glaux maritima, Atriplex alaskans, Trichophorum sp., and Plantago sp. Carex lyngbye and Elymus arenarius may occur in pure stands. Additional species of importance include Deschampsia beringensis (grows in tufts in the high tide margin), Triglochin maritima, Calamagrostis canadensis, Festuca rubra, Parnassia palustris, Lupinus nootkaensis, Astragalus sp., Heracleum lanatum, Hordeium brachyantherum, Achillea borealis, Rumex sp., Castelleja miniata, Angellica lucida, and most species described for the E2EM5N wetland type.

The higher upper parts of coastal marshes, which are inundated by extremely high tides, and are fairly well-drained, may produce dense cover of Deschampsia beringensis (often in pure stands), Festuca rubra, Potentilla egedii, Elymus arenarius, and various herbs. This classification type often represents a transitional zone dividing typical salt marsh areas from freshwater marsh.

Viereck et al. types - Halophytic grass wet meadow.
- Halophytic sedge wet meadow.

E2EM5/FLP
E2EM1/USP — Irregularly flooded, higher elevation brackish marsh with areas of open or sparsely vegetated mud or sand flats (see descriptions for E2EM5P, E2FLP, E2EM5N, and E2EM5/FLN wetland types).

Lacustrine System

This system includes all lakes greater than 20 acres in size.

L1OWH — Permanently flooded, open water areas of lakes. Generally the water depth exceeds 2 meters. Vegetation (aquatic, floating-leaved) is lacking or sparse (less than 30% areal coverage).

L2FLC
L2USC — Seasonally flooded mud and sand flats along lake shorelines. Typically devoid of vegetation.

L2AB4H — Permanently flooded, floating-leaved aquatics growing in shallow water of lakes. Dominant plant is Nymphaea tetragona. Potamogeton sp. and Nuphar polysepalum are also common in some areas (see description for the PAB4H wetland type).

Viereck et al. type - Aquatic vegetation (floating and submerged).
- Freshwater lakes, pondlily and fresh pondweed.

Riverine System

All rivers and stream channels upstream from the influence of ocean-derived salinity are included in the riverine system.

R1OWV — Permanently flooded, tidal, open water channels of rivers and streams. These channels are subject to tidal flux, but are upstream from the influence of ocean derived salinity.

R1FLT — Semipermanently flooded, tidal, open water channels of rivers and streams. These channels are subject to tidal fluctuation, but are upstream from the influence of ocean derived salinity.

R1FLR
R1USR — Seasonally flooded, tidal river flats and bars. These areas are not directly inundated by estuarine water but are flooded by fresh water which backs up into riverine channels during high tides.

R2OWH — Permanently flooded, open water channels of lower perennial rivers and streams.

R2FLC — Seasonally flooded flats of lower perennial rivers and streams. This type may be extensive in major river channels. Typically unvegetated or sparsely vegetated by grasses and/or broad-leaved deciduous shrubs. Vegetative cover is less than 30% of the flats area.

R2US/OW — Mixture of seasonally flooded river flats and bars and small open water channels. This code is used when it is difficult to delineate the main water course because of the numerous flats and bars which occur (note the absence of a water regime for this code which is a combination of R2USC and R2OWH).

R3OWH — Permanently flooded, open water channels of upper perennial rivers and streams.

R3FLC
R3USC — Seasonally flooded river flats and bars. This type is extensive in major river channels. Typically unvegetated or sparsely vegetated by broad-leaved deciduous shrubs. Shrub cover is less than 30% of the flats area (see descriptions for PSS1C and PSS1/FLC wetland types).

R3FLA
R3USA — Temporarily flooded river flats and bars. Typically unvegetated or sparsely vegetated by broad-leaved deciduous shrubs. Shrub cover is less than 30% of the flats area (see description for the PSS1A wetland type).

R3US/OW — Mixture of seasonally flooded river flats and bars and small open water channels. This code is used when it is difficult to delineate the main water course because of the numerous flats and bars which occur (note the absence of a water regime for this code which is a combination of R3USC and R3OWH).

R4SBC — A complex of river flats, bars, and small open water pools of seasonally flooded intermittent streams. These streams do not carry water throughout the year, but do have a moving water flow for short to extended periods each year. Sparse to dense vegetative cover of broad-leaved deciduous shrubs may occur along the intermittent stream banks (see descriptions for PSS1C and PSS1/FLC wetland types).

Palustrine System

The palustrine system includes all wetlands dominated by trees, shrubs, persistent emergents, emergent moss, and lichens that are not influenced by ocean-derived salinity. Wetlands types commonly referred to as bogs, muskegs, fens, marshes, and swamps are grouped in the palustrine system. Lakes and ponds less than 20 acres in size are also a part of the palustrine system.

POWH — Permanently flooded, small open water bodies (ponds). Vegetation is generally lacking within the open water area, but aquatic beds or persistent emergents may provide sparse cover less than 30% along the pond edge (see descriptions for PAB4H, PAB4/OWH, PEM5F, and PEM5H wetland types).

POWF — Semipermanently flooded, small open water bodies (ponds) where sparse vegetative cover may occur, but is generally less than 30% (see descriptions for PAB4H, PAB4/OWH, PEM5F, and PEM5H wetland types).

PFLC
PUSC

Seasonally flooded, small basins that typically contain standing water only during the early part of the growing season. When surface water is absent, the exposed substrate will either remain unvegetated or will be colonized by herbaceous annuals.

PFLA

Temporarily flooded, small basins that typically contain standing water only briefly during the early part of the growing season. When surface water is absent, the exposed substrate will either remain unvegetated or will be colonized by herbaceous annuals.

PAB4H

Permanently flooded, floating-leaved aquatics growing in ponds. Dominant plants include Potamogeton filiformis, Ruppia spiralis, and Sparganium hyperboreum in pools on recently deglaciated terrain with mineral substrates while the smaller sedge ponds formed in the forested bog areas generally support Nymphaea tetragona, Potamogeton sp., and Myriophyllum sp. Deeper waters of many forest and bog ponds contain Nuphar polysepalum. Emergent plants growing about the margins of these ponds may include Hippuris vulgaris, Menyanthes trifoliata, various species of Equisetum sp. and an assortment of graminoids (for a complete description of associated emergents, refer to the PEM5H and PEM5F wetland types).

Eventually, these smaller ponds will be taken over by mat-forming (peat-producing) sedges (see descriptions for PEM5/AB4H, PEM5H, and PEM5F wetland types). Once these sedges become firmly established (PEM5C wetland) the buildup of peat is rapid (PEM5? wetland) and these areas are rapidly transformed to young bogs (PEM1/SS1B wetland) which in turn are often colonized by tall shrubs (PSS1/EM5B wetland).

Viereck et al. types - Aquatic vegetation (floating and submerged).
- Freshwater ponds, pondlily and fresh pondweed.

PAB4/OWH

Permanently flooded ponds supporting aquatic (floating-leaved) vegetation. This designation is used for complexes of PAB4H and POWH when it is not practicable to delineate the types separately. Vegetation for this type is described for the PAB4H wetland type.

Viereck et al. types - Aquatic vegetation (floating and submerged).
- Freshwater ponds, pondlily and fresh pondweed.

PEM5H
PEM1H

Permanently flooded, emergent freshwater marsh. These are marshes that exhibit standing water throughout the entire year in all years. The dominant vegetation includes Menyanthes trifoliata, Hippuris vulgaris, Sparganium hyperboreum, Eleocharis palustris, two species of Equisetum (E. arvense and E. variegatum), and numerous sedges (see PEM5F wetland type). Bog ponds generally lack Eleocharis and Equisetum and uniquely contain Juncus organus, Carex saxatilis, and Callitriche verna.

Fringes of PEM5F and PEM5C wetland types may occur adjacent to the PEM5H wetland type, although they may not have been mapped due to minimum mapping size (approximately 3 acres).

Viereck et al. types - Fresh herb/grass marsh.
- Subarctic lowland, sedge/herb wet meadow.

PEM5/OWH
PEM1/OWH

Typically a PEM5H (or PEM5F) wetland type mixed with areas of permanently flooded open water (see descriptions for the PEM5H and PEM5F wetland types). This type may occupy an area within the brackish water/freshwater ecotone. Vegetation may be very dense and composed primarily of sedges and those species described for the PEM5H wetland type.

Viereck et al. types - Fresh herb/grass marsh
- Subarctic lowland, sedge/herb wet meadow.

PEM5/AB4H

Permanently flooded emergent marsh with aquatic bed. Both emergent and aquatic bed vegetation exceed 30% of the ponded area (see descriptions for the PEM5H and PAB4H wetland types).

PEM5F
PEM1F

Semipermanently flooded, emergent marshes. These marsh areas usually exhibit standing water throughout the growing season.

This wetland type occurs frequently in patterned bog pools. Patterned bogs (string bogs, senescent string bogs, and reticulate bogs) typically consist of a complex of elevated peat ridges and/or mounds interspersed with pools of standing water. The pools contain areas of open water and aquatic beds in addition to the stands of emergents. This wetland type also occurs in depressions and pools not associated with patterned bogs, and along the periphery of ponds and lakes.

Dominant vegetation consists primarily of graminoids including Eriophorum scheuchzeri, Carex vulgaris, Juncus sp., Triglochin palustris, Scirpus sp., and various forbs including Ranunculus cymbalaria, Potentilla palustris, and Cicuta douglasii. Species included within the PEM5H wetland type may also be found in these semipermanently flooded areas.

The PEM5F wetland type generally contains small elevated areas of PEM5C and/or PSS1/EM5C wetland types (see these designated wetland types for a more complete listing of associated species).

Viereck et al. types - Fresh herb/grass marsh
- Subarctic lowland, sedge/herb wet meadow.

PEM5/OWF

Typically a PEM5F wetland type mixed with areas of semipermanently flooded open water (see species description for the PEM5F wetland type).

Viereck et al. types - Fresh herb/grass marsh
- Subarctic lowland, sedge/herb wet meadow.

PEM5/6F — Semipermanently flooded emergent marsh consisting of both persistent and non-persistent emergent vegetation. The non-persistent vegetation dies back to below the water surface by the end of the growing season, while the persistent vegetation will remain erect throughout the non-growing season. The non-persistent vegetation is Arctophylla fulva (see description for the PEM5F wetland type).

PEM5E — Seasonally flooded, persistent emergent marsh. The soil will remain saturated throughout the growing season after the standing water has dissipated (see description for the PEM5F wetland type).

PEM5C
PEM51C — Seasonally flooded, persistent emergent marshes. This emergent wetland type usually occurs on the floodplain of small streams and creeks. Standing water resulting from stream overflow is present early in the growing season. This type is also found in the margins of ponds and oxbow lakes. Species of primary importance along low-gradient streams may include Equisetum variegatum, Equisetum palustre, Scirpus microcarpus, and Carex lyngbyaei. Arctophylla fulva occasionally forms dense stands in a narrow band at the water's edge.

Within and around sedge/sphagnum bog pools may be found Calamagrostis canadensis, various species of Carex (C. lyngbyaei, C. saxatilis, C. aquatilis, C. limosa, and C. pluriflora), Menyanthes trifoliata, two species of Eriophorum (E. Scheuchzeri and E. russeolum) and those species described for the PEM5F wetland type.

Eleocharis palustris, Equisetum variegatum, and Equisetum palustre are associated more with emergent wetlands within deglaciated areas.

Associated species may include Drosera rotundifolia, Fritillaria camschatcensis, Tofieldia sp., Platanthera dilatata, Parnassia palustris, Mimulus guttatus, Pedicularis sudetica, Polygonum bistorta, Tricophorum caespitosum, Poa arctica, Equisetum arvense, and Lysichiton americanum.

A dense mat of Sphagnum moss may underlie the herbaceous plants. Drepanocladus revolvens and Philonotis fontana may also occur.

Various shrub species such as Vaccinium uliginosum and Salix barclayi may also occur within the PEM5C wetland type (shrub communities are described under the PSS1C and PSS1B wetland types).

Alpine meadows support lush growths of sedges and grasses (described above) as well as succulent forbs such as Fauria crista-galli and Caltha biflora.

Freshwater marshes develop from lakes, ponds, sloughs, or rivers and may persist as they are for some time, but many probably develop into bogs (PEM5B wetland type). Some marshes are invaded by shrubs and develop into deciduous shrublands (PSS1/EM5B wetland type), further succeeding to various forest types (PF04B wetland type).

An increase in the prevalence of sedges is the primary characteristic that distinguishes this wetland type from the PEM5A wetland type.

Viereck et al. type - Subarctic lowland, sedge wet meadow.

PEM1/USC — Seasonally flooded, persistent emergent marsh with areas of unvegetated flats. Emergent vegetation covers at least 30% of the area but does not exceed 70% (see descriptions for the PEM1C and PUSC wetland types).

PEM5B
PEM1B — Saturated, emergent, bog-type marshes. These areas are generally on saturated peat soils with a Sphagnum mat covering the soil surface. This particular type of wetland contains the greatest variety and abundance of wetland plant species of any wetland category.

Several phases of bogs occur in the process of development, beginning with the formation of a floating mat (moss and sedge) which eventually covers the underlying water body. In time, peat accumulation will increase until the shallow pond beneath is completely filled with saturated peat. The bog will then take on a meadow-like appearance. At maturity, the bog will have progressed to a less wet phase, becoming thicket-like with abundant willows and ericaceous shrubs (see description for the PSS1/EM5B wetland type).

Principal species throughout the various bog development phases may include the following: Carex limosa, Carex spectabilis, Eriophorum chamissonis, Sphagnum squarrosum, Calamagrostis scabra, Equisetum fluviatile, Hippuris vulgaris, Menyanthes trifoliata, Carex aquatilis, Carex rostrata, Equisetum variegatum, Agrostis hiemalis, Spiranthes romanzoffiana, Galium trifidum, Tofieldia glutinosa, Polygonum viviparum, Parnassia palustris, Epilobium palustre, Epilobium adenocaulon, Potentilla palustris, Eriophorum russeolum, Trientalis europea, Platanthera dilatata, Sanguisorba stipulata, and an assemblage of other graminoids and forbs.

As the bog progresses towards maturity, shrubs begin to invade the higher mounds within the bog complex. Such species as Rubus chamemorus, Rubus arcticus, Vaccinium oxycoccus, Empetrum nigrum, Vaccinium vitis-idaea, Ledum groenlandicum, Vaccinium uliginosum, Andromeda polifolia, and various species of Salix (most notably S. commutata and S. barclayi) may commonly occur.

Saturated, emergent bogs occurring at higher elevations and on slopes have a similar flora; however, shrubs may appear at an earlier stage than that which occurs in similar bogs at lower elevations. Slope muskegs are usually mixed communities of sedge and moss. Especially prominent are: Scirpus caespitosus, Eriophorum angustifolium, Eriophorum vaginatum, Rhynchospora alba, and Sphagnum sp.

Bogs are dominated by either sedges or Sphagnum, and this dominance is probably partially controlled by pH (affected by water supply, mineral concentration, etc.). Many of the peat profiles taken show sedge peat at the bottom and through much of the profile and often contain one or two layers of stumps of spruce or pine below the surface, presumably representing previously forested conditions during drier intervals.

Viereck et al. type - Subarctic lowland, sedge bog meadow.

PEM5/ML1B Saturated, emergent, bog-type marsh with a more or less continuous ground-cover mat of moss. This wetland code occurs very infrequently throughout the Juneau 1:250,000 quad area.

PEM1/SS1B Same as PSS1/EM1B, except that there is a greater aerial cover of persistent emergent vegetation than broad-leaved deciduous scrub-shrub vegetation. Both vegetation types, however, exceed 30% aerial cover (see description for the PSS1/EM1B wetland type).

PEM1/SS4B Same as PSS4/EM1B, except that there is a greater aerial cover of persistent emergent vegetation than needle-leaved evergreen vegetation. Both vegetation types, however, exceed 30% aerial cover (see description for the PSS4/EM1B wetland type).

PEM1/FO4B Same as PFO4/EM1B, except that there is a greater aerial cover of persistent emergent vegetation than needle-leaved evergreen tree species. Both vegetation types, however, exceed 30% aerial cover (see description for the PFO4/EM1B wetland type).

PEM5A
PEM1A Temporarily flooded, persistent emergent wetlands. Where it occurs it is generally restricted to small depressions or on the floodplains of streams. Standing water is present for only brief periods during the growing season. Calamagrostis canadensis is usually the dominant emergent. Associated species may include Carex sitchensis, Scirpus macrocarpus, Heracleum lanatum, Sphagnum sp., and various shrubs. Iris setosa, Stellaria crispa, Aster sp., Bromus sitchensis, Sanguisorba stipulata, Galium trifidum, and various shrubs including Salix barclayi, Alnus sinuata, Rubus

chamemorous, Rubus spectabilis and several ericaceous shrubs may also occur (see description for the PSS1/EM5A and PSS1/EM5C wetland types). For a more complete listing of plants able to withstand periods of freshwater inundation, see the description for the PEM5C wetland type.

Viereck et al. type - Mesic graminoid herbaceous, bluejoint-mixed herbs.

PEM5T — Semipermanently flooded, tidal, persistent emergent marshes. This wetland type is similar to the PEM5F wetland type but occurs closer to the mouth of streams entering estuarine waters. See descriptions for the PEM5F and PEM5/OWF wetland types.

Viereck et al. types - Fresh herb/grass marsh.
- Subarctic lowland, sedge/herb wet meadow.

PEM5R
PEM1R — Seasonally flooded, tidal, persistent emergent marshes. These marshes occur on terraces along the banks of freshwater tidal channels (R1OWV wetland type). This wetland type is similar to the PEM5C wetland type but occurs closer to the mouth of streams entering estuarine waters (see descriptions for the PEM5C and PSS1/EM5C wetland types).

Viereck et al. type - Subarctic lowland, sedge wet meadow.

PEM1/USR — Seasonally flooded, tidal, persistent emergent marsh containing areas of unvegetated flats (see descriptions for the PEM1R and PUSC wetland types).

PEM1S — Temporarily flooded, tidal, persistent emergent marsh. These areas are similar to the PEM1R wetland type but generally occur at a slightly higher elevation along freshwater tidal channels (see descriptions for the PEM1R and PEM1A wetland types).

PSS1/EM5F — This designation is used primarily to indicate patterned bogs (string bogs and reticulate bogs). Patterned bogs are composed of bog ridge (strangs) and wet hollows (flarks). The string bog type has roughly parallel strangs separated by the wet flarks. The strangs are oriented perpendicular to water movement within the bog complex. The ridges in the reticulate bog type form a net-like pattern. Small ponds may exist and are irregularly sized, spaced, and shaped. Larger ponds, if any, may contain peat islands.

The ridges and islands in a patterned bog are dominated by broad-leaved deciduous shrubs. Important species include various species of Salix (particularly S. barclayi), Vaccinium uliginosum, Rubus spectabilis, Empetrum nigrum, Ledum palustre, and those species described for the PSS1B and PSS1C wetland types.

The flarks (ponds) are typically dominated by emergent vegetation and are characterized by a semipermanently flooded water regime. Sphagnum moss may form around flarks and on the bog strangs. Other shrub and emergent species which may be present include those described for the PSS1/EM5B and PEM5F wetland types.

Viereck et al. types - Ridges (strangs): Dwarf birch - ericaceous shrub - sphagnum bog.
- Pools (flarks): Fresh herb/grass marsh.
- Subarctic lowland, sedge/herb wet meadow.

PSS1E Seasonally flooded dense shrub area. The soil remains saturated after the standing water has dissipated (see description for the PSS1C wetland type).

PSS1C Seasonally flooded dense shrub areas on river and stream floodplains consisting of willow and alder. Terrain may be hummocky with flooded depressions. Alnus sinuata is generally the dominant tall shrub species along with Salix barclayi and Salix alaxensis. Emergent vegetation, dominated by Calamagrostis canadensis, may be present in some areas. This wetland type often occurs on river bars that have become stable enough to support persistent woody vegetation. The alder and willow combined may exceed 75% cover in this type of wetland. Other common species occurring in the understory include those species described for the PEM5C wetland type.

Viereck et al. type - Closed tall shrub scrub, alder-willow.

PSS1/FLC Seasonally flooded areas on river and stream floodplains consisting
PSS1/USC of a mix of shrubs and non-vegetated riverine flats. Shrub species are primarily willow and alder. The flats are typically composed of sand and gravel-sized particles, and are situated at a slightly lower elevation than the shrub areas (see descriptions for the PSS1/FLA, PSSIC, and PSS1A wetland types).

Viereck et al. type - Open tall shrub scrub, alder-willow.

PSS1/EM5C Seasonally flooded areas occurring on floodplains in stream and
PSS1/EM1C creek corridors. These wetlands are characterized by a mixture of broad-leaved deciduous shrubs and emergent vegetation. Surface water resulting from stream overflow is present during the early growing season. The substrate consists of an interspersion of raised mounds (hummocks) and lower basins and drainageways. Willow and alder dominate the hummock areas with emergent vegetation dominating the lower elevation areas. This is one of the most extensive shrub vegetation types. It occurs in some elongated depressions (flarks) between raised bog ridges (strangs), as a floating bog mat along large ponds, and in drained beaver meadows. It is a species-rich area and may include most of the species described for the PSS1C and PEM5C wetland types.

This type also occurs in seepage areas on flats at the base of bluffs along the coast where it forms a hummocky surface beneath alder. Rivulets and slow moving water occur between hummocks. A continuous canopy of alder occurs with an understory of Calamagrostis canadensis, Equisetum sp., and various shrubs and herb (see description for the PEM5C wetland type).

Viereck et al. type - Open tall shrub scrub, alder-willow.

PSS1B Saturated shrub bog with greater than 70% of the canopy consisting of broad-leaved deciduous shrubs. Emergent vegetation comprises less than 30% of the cover. Typical tall shrub vegetation may include Alnus rubra, Alnus sinuata, Salix barclayi, and Salix alaxensis. Low mat-type shrub vegetation may include those species identified for saturated shrub/emergent wetlands (see description for the PSS1/EM5B wetland type). Associated emergent vegetation is most likely to include Calamagrostis canadensis and Carex pauciflora. A dense mat of sphagnum moss may cover the soil surface in some areas. Additional species may include scattered Pinus contorta, Ledum palustre, Empetrum nigrum, Kalmia polifolia, Vaccinium oxycoccus, Vaccinium vitis-idaea, Vaccinium uliginosum, Rubus arcticus, and those emergent species described for the PEM5B wetland type.

Viereck et al. type - Dwarf birch - ericaceous shrub-sphagnum bog.

PSS1/EM5B
PSS1/EM1B Saturated shrub bog with a 30% or greater canopy coverage consisting of broad-leaved deciduous shrubs. The remaining portion of the vegetative cover consists of persistent emergents. This is one of the more common wetland types. Common shrub species include stunted Pinus contorta, Vaccinium uliginosum, Kalmia polifolia, Ledum palustre, Empetrum nigrum, Juniperus communis, Vaccinium vitis-idaea, Andromeda polifolia, and various species of Salix.

Dominant emergent species include Carex pauciflora, Scirpus caespitosus, Eriophorum angustifolium, Tofieldia sp., Drosera rotundifolia, Coptis trifolia, Potentilla palustris, Sanguisorba menziesii, Cornus canadensis, Rubus chamaemorus, Sphagnum sp., Lycopodium sp., as well as other species described for the PEM5B wetland type.

Viereck et al. type - Dwarf birch - ericaceous shrub-sphagnum bog.

PSS1/4B Saturated deciduous shrub bog mixed with stunted Pinus contorta (see descriptions for the PSS1B, PSS4/1B, PSS4B, and PSS1/EM5B wetland types).

Viereck et al. type - Dwarf birch - ericaceous shrub spnagnum bog.

PSS1A Temporarily flooded dense shrub areas on river and stream floodplains consisting primarily of Salix (S. barclayi, S. alaxensis, S. sitchensis), Viburnum edule, Aruncus sylvester, and Alnus sinuata. This wetland type often occurs on river bars that have become stable enough to support persistent woody vegetation. Understory vegetation is generally sparse, but may contain Carex sitchensis, Calamagrostis canadensis, Equisetum arvense, Ranunculus macounii, Cicuta douglasii, Osmorhiza sp., and those species listed for the PEM5A wetland type. Peat development is usually lacking.

PSS1/FLA Temporarily flooded areas on river and stream floodplains consisting of a mix of shrubs and non-vegetated riverine flats. Shrub species are primarily willow and alder. The flats are typically composed of sand and gravel-size particles, and are situated at a slightly lower elevation than the shrub areas (see description for the PSS1A wetland type.

Viereck et al. type - Open tall shrub scrub, alder-willow.

PSS1/EM5A
PSS1/EM1A Temporarily flooded areas occurring on stream and creek floodplains. These wetlands are characterized by a mixture of broad-leaved deciduous shrubs and emergent vegetation. Species are described for the PSS1A and PEM5A wetland types.

Viereck et al. type - Open tall shrub scrub, alder-willow.

PSS1T Semipermanently flooded, tidal areas of dense broad-leaved deciduous shrubs. This wetland type occurs in low-lying areas near the mouth of streams which are inundated by fresh water which becomes backed up due to tidal action.

PSS1R Seasonally flooded, tidal areas of dense broad-leaved shrubs. Vegetation is periodically inundated by fresh water which becomes backed up due to tidal action. This wetland type is similar to the PSS1C wetland type (see descriptions for the PSS1C, PEM5C, and PSS1/EM5C wetland types).

Viereck et al. type - Closed tall shrub scrub, alder-willow.

PSS1/EM5R Seasonally flooded, tidal areas of open broad-leaved deciduous shrubs. Open areas support persistent emergent vegetation with scattered deciduous shrubs. Vegetation is periodically inundated by tidally influenced fresh water (see description for the PSS1/EM5C wetland type.

Viereck et al. type - Open tall shrub scrub, alder-willow.

PSS1S Temporarily flooded, tidal areas of dense broad-leaved deciduous shrubs. Vegetation is inundated for brief periods by fresh water which becomes backed up due to tidal action. This wetland type is similar to the PSS1A wetland type.

PSS1/FLS Temporarily flooded, tidal areas of broad-leaved deciduous shrubs with areas of unvegetated flats. Vegetation is inundated for brief periods by tidally influenced fresh water (see description for the PSS1/FLA wetland type.

PSS1/EM5S Temporarily flooded, tidal areas of broad-leaved deciduous shrubs with areas of persistent emergents. Vegetation is inundated for brief periods by tidally influenced fresh water. Both shrubs and emergents attain at least 30% aerial cover with the coverage of shrubs exceeding that of emergents (see descriptions for the PSS1A, PEM5A, and PSS1/EM5A wetland types).

PSS4/EM5F Semipermanently flooded, open spruce bog. This area supports two relatively distinct plant communities; stunted Pinus contorta on low string bog ridges interspersed with open areas of persistent emergent vegetation. Standing water is evident throughout the growing season. See descriptions for the PEM5F and PSS1/EM5F wetland types.

Viereck et al. type - Open dwarf tree scrub.

PSS4/EM5C Seasonally flooded areas on floodplains and in drainageways that are a mixture of scrub Pinus contorta and emergent covertypes. The emergent vegetation occurs in the lower elevation areas corresponding to historic river channels. The common emergent species are listed for the PEM5C wetland type.

Viereck et al. type - Open conifer forest, spruce, mixed with subarctic lowland, sedge wet meadow.

PSS4/1C Seasonally flooded areas adjacent to streams and small rivers that are a shrub complex dominated by Pinus contorta. The shrub-height Pinus contorta generally occurs on somewhat higher terraces than the deciduous shrub vegetation. Willow and alder are the common deciduous shrub species (see description for the PSS1C wetland type).

Viereck et al. type - Open conifer forest, spruce, mixed with closed tall shrub, alder-willow.

PSS4B Saturated shrub bog. The Pinus contorta in these areas is shrub height (less than 6 meters) and generally exceeds 50% areal coverage (see descriptions for the PSS4/1B, PSS1B, and PF04B wetland types).

Viereck et al. type - Closed conifer forest, spruce.

PSS4/EM5B
PSS4/EM1B

Saturated shrub bog with an emergent vegetative layer. The Pinus contorta in these areas is shrub height (less than 6 meters). Emergent species are those described for the PEM5B wetland type (see also description for the PSS4/1B wetland type).

Viereck et al. type - Open conifer forest, spruce.

PSS4/1B

Saturated, open canopy shrub bog. The Pinus contorta in these wetlands is shrub height (less than 6 meters). A dense deciduous shrub understory is present and is dominated by those species described for the PSS1B and PSS1/EM5B wetland types. This type also occurs adjacent to coastal wetlands below bluffs which provide groundwater seepage.

Viereck et al. type - Open conifer forest, spruce.

PSS5H

Permanently flooded dead shrub swamp. The area is essentially an open water type (POWH) wetland with scattered dead shrub covering at least 30% of the open water area.

PF01C

Seasonally flooded deciduous forested wetland occurring on river floodplains. Populus tricocarpa is the dominant tree species. Understory vegetation may be sparse to lacking (see description for the PSS1C wetland type.

Viereck et al. type - Closed deciduous forest, black cottonwood and balsam poplar.

PF01/SS1C

Seasonally flooded areas on river and stream floodplains consisting of a mix of broad-leaved deciduous forest and broad-leaved deciduous shrubs. Dominant tree species is Populus tricocarpa. Willow and alder are the dominant species in the shrub areas. The shrubs often occur in bands along the river channels and at a slightly lower elevation than the forested areas. Other understory vegetation includes those species described for the PSS1C and PSS1/EM5C wetland types.

Viereck et al. type - Open deciduous forest.

PF01B

An area with saturated soil conditions and a dense canopy of deciduous trees. Contains little or no shrub and/or emergent understory vegetation. Dominant tree species may include Populus tricocarpa and tree-size willow and alder.

Viereck et al. type - Closed deciduous forest, black cottonwood.

PF01/SS1B

An area with saturated soil conditions and an open canopy of deciduous trees. Broad-leaved deciduous shrubs comprise the dominant understory vegetation (see descriptions for the PF01B, PSS1B and PSS1/EM5B wetland type).

Viereck et al. type - Open deciduous forest.

PF01A Temporarily flooded deciduous forested wetland occurring on river floodplains. Populus tricocarpa is the dominant tree species. It may occur in relatively pure stands or in mixed stands with tree-size alder. Understory vegetation is usually lacking or sparse consisting of various graminoid species (see description for the PEM5A wetland type for understory vegetation).

Viereck et al. type - Closed deciduous forest, black cottonwood and balsam poplar.

PF01/SS1A Temporarily flooded areas on river and stream floodplains consisting of a mix of broad-leaved deciduous forest and broad-leaved deciduous shrubs. Dominant tree species is Populus tricocarpa. Willow and alder (Alnus sinuata) are the dominant species in the shrub areas. The shrubs often occur in bands along the river channels and at a slightly lower elevation than the forested areas.

This community may also occupy exposed peaty, sandy soil around partially dewatered lakes. The present vegetation is primarily alder. The understory is generally sparse, consisting of Salix sp. Calamagrostis canadensis, Equisetum sp. and those species described for the PSS1A wetland type.

Viereck et al. type - Open deciduous forest.

PF01/4A Temporarily flooded mixed forested wetland occurring on river floodplains. Populus tricocarpa is the dominant tree species but contains at least 30% Picea sitchensis (see descriptions for the PF01A and PF04A wetland types.

PF01/SS1R An open canopy deciduous forested wetland which is seasonally inundated by tidally influenced fresh water systems. Broad-leaved deciduous shrubs are the dominant understory vegetation. Similar to the PF01/SS1C wetland type.

Viereck et al. type - Open deciduous forest.

PF01/SS1S An open canopy deciduous forested wetland which is temporarily inundated by tidally influenced fresh water systems. Broad-leaved deciduous shrubs are the dominant understory vegetation (see description for the PF01/SS1A wetland type).

PF04/SS4F A semipermanently flooded open canopy forested wetland. Needle-leaved evergreen trees comprises the open canopy with needle-leaved evergreen shrubs (scrub spruce less than 6 meters in height) dominating the understory vegetation.

PF04/5F A semipermanently flooded forested wetland with scattered dead trees. Flooding most likely is due to beaver activity or a permanent change in the natural drainage pattern.

PF04/EM5C A seasonally flooded open canopy forested wetland with an understory of persistent emergents. Shrub vegetation is sparse (less than 30%) to non-existent.

PF04/SS1C Seasonally flooded areas adjacent to streams and small rivers that are a complex of Pinus contorta and Tsuga heterophylla on higher terraces and deciduous shrubs on lower terraces. Willow and alder are the common shrub species (see description for the PSS1C wetland type).

Viereck et al. type - Open conifer forest.

PF04/5C Seasonally flooded forested wetland with scattered dead trees.

PF04B Saturated spruce bog. These areas are dominated by Picea sitchensis greater than 6 meters in height. Stunted Tsuga heterophylla may also occur. This wetland type often occurs as a fringe (slightly elevated margin) bordering the upland edge of muskegs, or as "islands" within a patterned bog complex.

Dominant shrubby understory vegetation includes Alnus rubra, Alnus sinuata, and Vaccinium uliginosum, as well as others described for the PSS1B, PEM5B, and PSS1/EM5B wetland types. Herbaceous vegetation may include Cornus canadensis, Calamagrostis canadensis, Carex sp., and those species listed for the PEM5B wetland type. Sphagnum moss may provide a very dense ground cover.

PF04/EM5B Saturated, forested bog with an emergent ground layer. Emergent
PF04/EM1B species for this type are described for the PEM5B wetland type (see also description for the PF04B wetland type).

Viereck et al. type - Open conifer forest.

PF04/SS1B Same as PF04B wetland type, but Pinus contorta canopy cover is generally less than the PF04B wetland type. The understory scrub-shrub vegetation in this wetland type exceeds 30% areal coverage. Typical scrub-shrub vegetation would include those dominant species described for the PSS1B wetland type. Standing water may occur between frost-heaved hummocks. Peat is saturated year round and may exceed 1 meter in depth. See description for the PF04B and PSS1B wetland types.

Viereck et al. type - Open conifer forest.

PF04/SS4B Same as the PF04/SS1B wetland type with a greater understory of stunted Pinus contorta (occupying at least 30% of the understory cover). Dominant vegetation is similar to that described for the PF04B, PF04/SS1B, and PSS1B wetland types.

Viereck et al. type - Open conifer forest.

PF04/SS1A Temporarily flooded areas with an open canopy of needle-leaved evergreen trees. Open areas or areas under a semi-open tree canopy support broad-leaved deciduous shrub vegetation. Dominant tree species include Pinus contorta and Tsuga heterophylla. Understory vegetation is described for the PSS1A wetland type (see also description for the PF01/SS1A wetland type).

Viereck et al. type - Open conifer forest.

PF05H Permanently flooded dead tree swamp. Area is essentially an open water type wetland with scattered dead trees (either deciduous or evergreen) covering at least 30% of the open water area.

PF05/OWH Permanently flooded dead tree forested wetland with open water bodies. This situation may occur as a result of damming by beavers, a rise in pond water elevation, or by major (permanent) flooding of a stream or river channel (see description for the PF05H wetland type).

PF05/SS1H A permanently flooded dead tree swamp. Understory vegetation of broad-leaved deciduous shrubs occurs in standing water. Shrub vegetation exceeds 30% of the permanently flooded area.

PF05F Semipermanently flooded dead tree swamp (see description for the PF05H wetland type).

PF05/OWF Semipermanently flooded dead tree swamp with open areas of standing water.

PF05/EM5F Semipermanently flooded dead tree swamp often created by beaver activity. Emergent vegetation is present below the dead trees. Emergent species are described for the PEM5F wetland type.

PF05/SS1F Semipermanently flooded dead tree swamp often created by beaver activity. Broad-leaved deciduous shrub vegetation occupies the higher, better drained hummocks. A dense layer of persistent emergent vegetation may also occur.

PF05C Seasonally flooded dead tree forested wetland generally found along streams and small river deltas where divergence of water from the main channel has occurred. Little or no understory vegetation is present.

PF05/EM5C Seasonally flooded dead tree areas generally found along streams and small river deltas where divergence of water from the main stream channel has occurred. The understory is dominated by persistent emergent vegetation. See description for the PEM5C wetland type.

PF05/SS1C Seasonally flooded dead tree areas generally found along streams and small river deltas wnere divergence of water from the main channel has occurred. Broad-leaved deciduous shrubs comprise the dominant understory vegetation. Willow and alder are the dominant shrub species.

PF05/4C A seasonally flooded dead tree swamp. The dead trees are interspersed with live needle-leaved evergreen trees (see description for the PF05C wetland type).

PF05/SS1B A dead tree swamp with an understory of live broad-leaved deciduous scrub-shrub. The soil is saturated, but does not contain standing water. A change in ground water movement over a long period of time may account for this situation.