

NATIONAL WETLANDS INVENTORY

NOTES TO USERS

for the

Kenai 1:63,360 Scale Wetland Maps

INTRODUCTION

In 1974, the U.S. Fish and Wildlife Service directed its Office of Biological Services to conduct an inventory of the Nation's wetlands. This National Wetlands Inventory (NWI) became operational in 1977. One of the primary functions of the NWI is the production of detailed wetland maps. These maps are used by local, State and Federal agencies, as well as by private industry and organizations for many purposes, including comprehensive resource management plans, environmental impact assessments, permit reviews, facility and corridor siting, oil spill contingency plans, natural resource inventories, wildlife surveys and other uses.

Wetlands depicted on the Kenai maps were identified by stereoscopically interpreting high altitude aerial photographs. Wetland delineations on the photographs were transferred with a zoom transfer scope to a map overlay using the U.S. Geological Survey 1:63,360 map series as base information.

Wetlands were identified on the photography by vegetation, visible hydrology and geography and subsequently classified with the U.S. Fish and Wildlife Service's Classification of Wetlands and Deepwater Habitats of the U.S. (Cowardin, et al. 1977). Specific mapping guidelines that are followed during the photointerpretation phase are described in the NWI Mapping Conventions.

Map Preparation

These thirty 1:63,360 scale wetland maps were produced using 1:65,000 and 1:120,000 scale color infrared aerial photographs. The 1:65,000 scale photography was flown in August of 1978. The 1:120,000 scale imagery was flown in June of 1974 and July of 1978. The 1974 imagery was only used to map portions of the Kenai A-2, A-3, and B-2 quads.

Field checking was conducted in August of 1979. Collateral information used in this mapping effort included the Soil Conservation Service's soil survey of the Kenai and Kasilof Area, National Oceanic and Atmospheric Administration coastal charts, and the U.S. Geological Survey topographic maps.

Special Mapping Problems

1. Some of the 1:120,000 scale color infrared aerial photography used in the Kenai mapping was difficult to interpret due to poor image quality. The use of this poor quality photography was restricted to areas in the Kenai Peninsula portion of the Kenai 1:250,000 USGS map area. Some of this photography was characterized by a dark tone which resulted in difficulty

in distinguishing needle-leaved evergreen forest wetlands (black spruce) from the surrounding forested upland areas. Difficulty also occurred in separating wetland vegetation types and in identifying wetland boundaries on portions of the Kenai A-4 quadrangle. This was due to the occurrence of a thin cloud layer on some of the aerial photographs.

2. Kenai maps A-3, A-4, and D-1 contain small areas where wetlands have not been mapped. Aerial photo coverage was not available for these areas on A-3 and D-1, and the unmapped area on A-4 is due to dense cloud cover. The term "holiday" is used on the maps to designate the areas where wetlands have not been identified.
3. The small diameter of black spruce crowns results in their being difficult to discern in many cases on the 1:120,000 scale aerial photography. Some muskeg areas initially mapped as a mix of broad-leaved deciduous shrubs and narrow-leaved persistent emergents (PSSI/EM5B) were found during field verification to have a 30-35% aerial coverage of black spruce. This is especially a problem in areas where the poor quality dark photography was used. Map users should be aware that some areas designated as PSSI/EM5B may actually contain a greater than 30% cover of black spruce (SS4 and F04).

GENERAL AREA DESCRIPTION

Geography

The Kenai 1:250,000 map area is located in southcentral Alaska and includes portions of Cook Inlet, the Kenai Peninsula, the Aleutian Mountain Range, and the coastal lowlands on the west side of Cook Inlet. The Kenai Mountains extend into the southeast corner of the map area.

Major natural lakes in the study area include Tustumena Lake and Skilak Lake, both located on the Kenai Peninsula. There is also an extensive distribution of smaller lakes occurring in the northwest part of the Kenai Peninsula.

Major rivers flowing into the west side of Cook Inlet include the Tuxedni River, Drift River, and McArthur River. The Kenai River is an important outdoor recreational focal point that flows from Skilak Lake on the Kenai Peninsula to Cook Inlet. The city of Kenai is located at the mouth of the Kenai River.

Tides

Cook Inlet experiences an ocean tidal range that is one of the largest in the world. A mean tidal range of approximately 27 feet occurs near the upper reaches of Cook Inlet at Anchorage. The mean tidal range measured at Kenai is approximately 18 feet.

Climate

The Kenai 1:250,000 scale map area is located in a transitional zone influenced by both maritime and continental climates. The area is protected from the extreme temperatures of interior Alaska by the Alaska Mountain Range

to the north. Precipitation is fairly low, although it increases markedly in areas near the east slope of the Aleutian Range. Average annual precipitation measured at the city of Kenai is approximately 19 inches. The highest amount of precipitation falls in late summer and autumn. The lightest fall occurs in February and March. Light amounts of precipitation in the early part of the growing season are offset by soil moisture from snow melt. The highest average monthly temperature measured at Kenai is approximately 54°F (July). The lowest average monthly temperature is approximately 11°F (December and January).

The length of the growing season in the area covered by the Kenai-Kasilof Area Soil Survey is less than 100 days as a whole, although the length varies considerably from one location to the next. Over a 16-year period, the length has ranged from 67 and 133 days at Kenai and from 90 to 140 days at Kasilof. Freezing temperatures have been measured in every month in some years at Kenai.

Ecoregions and Landforms

Bailey's Ecoregion Classification (1978) identifies the following ecoregion units occurring in the Kenai map area:

- Unit 1 Division: Subarctic
 Province: Coastal Trough Forest

- Unit 2 Division: Subarctic
 Province: Yukon Forest
 Section: Black Spruce Forest

- Unit 3 Division: Humid Maritime Regime Highlands
 Province: Pacific Forest
 Section: Hemlock Spruce Forest

Hammond (1969) identifies the following physical subdivision and land surface forms in the area:

- Division: Pacific Mountain
- Land Surface Forms: High Mountains, Smooth Plains

Land Use

The Kenai Peninsula portion of the study area has been receiving increased pressure to develop land for recreational and commercial purposes. The Kenai River is the focal point of recreational activities for the major population centers in the region. Onshore oil and gas production has been present in the area since 1961. Transportation facilities, refineries and other processing facilities related to the petroleum and natural gas production have been extensively developed on the Kenai Peninsula. These facilities also support the offshore oil production that has been established in the Cook Inlet area. The potential exists for development of coal resources in some areas, especially the Beluga coal field which is located just north of the Kenai 1:250,000 map area.

Farming in the study area occurs on a very limited basis on the Kenai Peninsula. Suitable crops include hardy vegetables and hay.

Approximately 65% of the Kenai National Wildlife Refuge (formerly Kenai National Moose Range) falls within the boundaries of the Kenai 1:250,000 scale map area. The refuge lands consist of approximately 2,000,000 acres extending from the Kenai lowlands into the Kenai Mountains. Large areas of the lowlands support dense thickets of willow and aspen which are an important source of browse for moose, the best known game species on the refuge.

Soils

The large lowland portion of the study area occurring between the Kenai Mountains to the east and the Aleutian Range to the west is characterized by a surface consisting primarily of glacial deposits interspersed with many lakes, bogs and broad outwash plains. The glacial deposits are overlain by well to poorly drained silt loams. Peat soils occur in the depressions that contain bog or muskeg vegetation communities. Areas of gravelly till and outwash are overlain by shallow to moderately deep silty soils throughout the lowlands of the Kenai Peninsula and on the adjoining lower mountain slopes. The higher mountain slopes have shallow, gravelly and loamy deposits with extensive bedrock outcrops.

The soils in the lowland portion of the study area on the east side of Cook Inlet primarily consist of the Typic Cryorthods soil subgroup in the well drained upland areas, and the Sphagnic Borofibrists soil subgroup in the depressions (muskegs and bogs) between moraine hills.

The soils in the coastal plain lowlands on the west side of Cook Inlet are mostly in the Typic Cryoquents subgroup. These lowlands are known as the Bachatna and McArthur Flats, and they consist of nearly level, poorly drained outwash plains with extensive areas of wet sedges and shrubs. Large areas of these "flats" adjacent to Cook Inlet are influenced by tidal inundation.

Most of the well drained soils in the Kenai 1:250,000 map area are in the Typic Cryandepts and Dystric Cryandepts subgroups. The Fluvaquentic Borohemists subgroup occupies depressions on high benches and drainageways in this steeper terrain.

Vegetation

The Kenai Peninsula portion of the study area is predominantly forested with an interspersion of many ponds, lakes, and peatlands, or bogs. Most of the upland forest area supports a mixed evergreen-deciduous forest composed of white spruce, black spruce, Alaska paper birch, quaking aspen and balsam poplar. More poorly drained sites are characterized by an increase in the occurrence of black spruce.

A forested zone dominated by western hemlock and Sitka spruce occurs along the base of the Kenai Mountain Range. This community is an extension of the rain-belt forest of the Pacific Coast. A forest type containing white spruce, cottonwood and balsam poplar commonly occurs in floodplain areas.

Fire has had a significant effect on the species composition of the lowland forests on the Kenai Peninsula. Large areas that have been burned consist of dense thickets of aspen, alder willow and birch. These deciduous species represent various transitional stages toward the climax forests dominated by white spruce on the well drained sites and black spruce on the poorly drained sites.

Alpine tundra mixed with unvegetated rocky areas occurs above 2,500 feet in the Kenai Mountains. Alpine tundra is typically composed of low mat plants, both herbaceous and shrubby. Resin birch, dwarf arctic birch, arctic willow and labrador tea are among the plants that occur frequently in this vegetation type. Below the alpine tundra areas, and above treeline, there is generally a tall shrub zone consisting primarily of alder.

Alpine tundra comprises a large portion of the vegetation cover on the land area to the west of Cook Inlet. This western section of the Kenai map area is mostly mountainous terrain within the Aleutian Range. The higher elevation areas are unvegetated, consisting of glaciers, ice fields, rock and rubble.

Unlike the Kenai Peninsula shoreline along Cook Inlet which is characterized by cliffs except at river mouths, the western shoreline has large areas of salt marsh that form a fringe on the seaward edge of several broad outwash plains. Bachatna Flats, the largest of these outwash plains, extends inland for 15 miles. The salt marsh zone in this area is approximately 1 1/2 miles wide. The nontidal portions of Bachatna Flats and the other large outwash plain area known as McArthur Flats consist of an intersperion of wetland types including willow and alder shrub swamp, herbaceous marsh, and bog (see Wetland and Aquatic Habitat section).

As in the Kenai Mountains on the east side of Cook Inlet, the area above treeline and below the alpine tundra community on the Aleutian Range slopes is primarily vegetated with alder. Forest communities on the west side of Cook Inlet are generally restricted to a narrow band along the base of the sharply rising mountains.

WETLANDS AND AQUATIC HABITATS

The following are the map codes used on the Kenai 1:63,360 scale 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 Viereck et al. Classification System for Vegetation of Alaska is provided.

Marine System

The Marine System in the Kenai map area is restricted to the open water of lower Cook Inlet and the associated high-energy shoreline. Cook Inlet, above the natural constriction between East Foreland and West Foreland, is classified in the Estuarine System.

M1OWL- Subtidal, high energy, and high salinity open water of lower Cook Inlet.

- M2BBP- Irregularly flooded, unvegetated beaches and bars exposed to high-energy wave action along the shoreline of lower Cook Inlet. Typically composed of sand and gravel-size particles.
- M2BBN- Regularly flooded, unvegetated beaches and bars exposed to high-energy wave action along the shoreline of lower Cook Inlet. Typically composed of sand-size particles.
- M2FLN- Regularly flooded mud and sand flats exposed to high-energy wave action along the shoreline of lower Cook Inlet.

Estuarine System

The open water of upper Cook Inlet and adjacent mud flats, tidal marshes and brackish river channels are classified in the Estuarine System. Brackish tidal marshes and brackish river channels adjacent to the marine open water area of lower Cook Inlet are also a component of the Estuarine System.

- E1OWL- Subtidal, low-energy, brackish open water of upper Cook Inlet and adjacent river channels.
 - E2BBP- Irregularly flooded, unvegetated beaches and bars along the low-energy shoreline of upper Cook Inlet. Typically composed of sand-size particles.
 - E2BBN- Regularly flooded, unvegetated beaches and bars along the low-energy shoreline of upper Cook Inlet. Typically composed of silt and sand-sized particles.
 - E2FLP- Irregularly flooded, unvegetated mud and sand flats in low-energy, brackish environments. This is an uncommon type in the Kenai map area.
 - E2FLN- 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. Species include scurvy grass (Cochlearia officinalis), rockweed (Fucus spp.), goose tongue (Plantago maritima), and alkali grass (Puccinellia spp.).
- 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 the mapping to describe the wetter condition of these potholes.
- E2SBN- Regularly flooded, small channels in brackish salt marshes and mud flats that are completely dewatered at low tide.

E2EM5N- Lower elevation areas of brackish marshes that are flooded regularly by tidal water. Also includes complexes of high and low brackish marshes where regularly flooded and irregularly flooded zones are present (especially maps C-5, C-6, and D-5). Carex Lyngbyaei is often present along tidal guts and the leading edge of marshes where it is flooded regularly by the tide. Carex Lyngbyaei also frequently occurs in the higher elevation areas near the upland edge. Several species of alkali grass (Puccinellia spp.) colonize the landward edge of regularly flooded mud flats. The same species are found on the irregularly flooded high marsh in association with pannes.

In addition to Lyngbye sedge and alkali grass, other common grasses of the salt marshes in Cook Inlet are dunegrass (Elymus mallis), hairgrass (Deschampsia spp.), and Ramenski sedge (C. Ramenski). Dunegrass tends to occur on higher, irregularly flooded sites such as elevated banks bordering tidal guts and sloughs. Various forbs are present in the brackish marsh areas, with a greater variety occurring in the higher, irregularly flooded zone. Species include Pacific silverweed (Potentilla egedii), Arctic daisy (Chrysanthemum arcticum), sparscale (Atriplex patula), seaside arrowgrass (Triglochin maritimum), goose-tongue (Plantago maritima), and sea milkwort (Glaux maritima).

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

E2EM5P- Higher elevation areas of brackish marshes that are flooded irregularly by tidal water. Dominant species include Carex Lyngbyaei, C. pluriflora, C. ramenski, bluegrass (Poa eminens), bluejoint (Calamagrostis canadensis), and various forbs (see E2EM5N description). 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/FLN- Brackish marshes mixed with mud flats and/or tidal ponds (see descriptions of E2EM5N, E2EM5P, and E2FLN).

Lacustrine System

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

- L10WH- Permanently flooded, open water areas of lakes. Generally the water depth exceeds 2 meters.
- L20WF- Semipermanently flooded, shallow areas of lakes. Lake substrate will occasionally be exposed during low water periods.
- L2FLC- 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 pondlily (Nuphar polysepalum). Pondweed (Potamogeton spp.) and dwarf water lily (Nymphaea tetragona) are also common in some areas.

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

Riverine System

All river and stream channels upstream from the influence of ocean-derived salinity are included in the Riverine System.

R30WH- Permanently flooded, open water channels of rivers and streams.

R3FLC- Seasonally flooded river flats and bars.

R3SBC- Complexes of river flats and open water channels. Braided streams are included in this mapping category.

R10WV- 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.

R1FLR- Seasonally flooded, tidal river flats and bars.

R1SBR- Complexes of tidal river flats and open water channels.

Palustrine System

The Palustrine System includes all wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, and lichens that are not influenced by ocean-derived salinity. Wetland 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

POWF- Permanently and semipermanently flooded, small open water bodies (ponds).

PFLC- 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.

PAB4H- Permanently flooded, floating-leaved aquatics growing in ponds (see L2AB4H for species description).

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

PEM5A- Temporarily flooded, persistent emergents. This is an uncommon type in the Kenai map area, generally occurring in small depressions

or on the floodplains of streams. Standing water is present for only brief periods during the growing season. Bluejoint (Calamagrostis canadensis) is usually the dominant emergent. Secondary species include Jacob's ladder (Polemonium acutiflorum), dock (Rumex sp.), meadow horsetail (Equisetum arvense), wild-pea (Lathyrus palustris) and sedge (Carex spp.).

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

PEM5B- Saturated, emergent, bog-type marshes. These areas are generally on saturated peat soils with a Sphagnum (Sphagnum spp.) mat covering the soil surface. Sedges (Carex spp.) and cottongrass (Eriophorum spp.) dominate this wetland type. The common sedge species are C. rotundata, C. pluriflora, and C. spectabilis. Eriophorum russeolum is the most prevalent cottongrass species. Associated vegetation includes whitebeaked rush (Rynchospora alba) and sundew (Drosera rotundifolia).

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

PEM5C- 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 for approximately 1 month during the growing season. Sedges (Carex spp.), bluejoint (Calamagrostis canadensis), and marsh cinquefoil (Potentilla palustris) are the dominant plants in this wetland type. Common sedges are C. sitchensis and C. rostrata. Associated species include meadow horsetail (Equisetum arvense), Jacob's ladder (Polemonium acutiflorum), and wild-pea (Lathyrus palustris). Willow (Salix spp.) shrubs often occur as a sparse cover.

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

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

PEM5F- Semipermanently flooded, emergent marshes. These are deep marshes that exhibit standing water usually throughout the entire growing season. The dominant emergent vegetation consists of water horsetail (Equisetum fluviatile), sedges (Carex livida, C. aquatilis, and C. rostrata), cottongrass (Eriophorum angustifolium), buckbean (Menyanthes trifoliata), spikerush (Eleocharis palustris), and rush (Juncus oreganus) 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. The PEM5F wetland type also occurs in depressions and pools not associated with patterned bogs, and along the periphery of ponds and lakes.

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

PEM5/OWF- Above PEM5F type mixed with areas of semipermanently flooded open water.

PEM5/OWH- Above PEM5F type mixed with areas of permanently flooded open water.

PEM5/AB4H- Above PEM5F type mixed with areas of aquatic beds (see L2AB4H for aquatic bed species).

PEM5R- Seasonally flooded, tidal, persistent emergent marshes. These marshes occur on terraces along the banks of freshwater tidal channels (R10WV). Lyngbye sedge (Carex Lyngbyei) is the dominant species in this type. Pacific silverweed (Potentilla egedii) frequently occurs in the understory. Other species include vetchling (Lathyrus palustris), arctic daisy (Chrysanthemum arcticum), red fescue (Festuca rubra), reed bent grass (Calamagrostis descampoides) and dock (Rumex sp.).

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

PF04B- Saturated, black spruce bog. These areas are dominated by black spruce (Picea mariana) greater than 20 feet in height. This wetland type often occurs as a fringe bordering the upland edge of muskegs, or as "islands" within a patterned bog complex.

Low shrubs form an understory, and the ground is usually composed of a moss (Sphagnum spp.) mat. The shrub species include dwarf arctic birch (Betula nana), labrador tea (Ledum palustre), bog cranberry (V. oxycoccus), mountain cranberry (V. vitis-idaea), leatherleaf (Chamaedaphne calyculata), and crowberry (Empetrum nigrum).

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

PF04/SS1B- Same as PF04B type, but black spruce canopy cover is less (approximately 30-50%).

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

PF04/EM5B- Saturated black spruce bog with an emergent ground layer. Emergent species are listed under PEM5B.

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

PF04/SS1C- Seasonally flooded areas adjacent to streams and small rivers that are a complex of black spruce on higher terraces, and deciduous shrubs on lower terraces. Willow (Salix spp.) and alder (Alnus spp.) are the common shrub species.

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

PF01A
PF01C-

Temporarily flooded to seasonally flooded deciduous forest wetland occurring on river floodplains. Balsam poplar (Populus balsamifera) and black cottonwood (Populus trichocarpa) are the common trees on these sites.

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

PF01/SS1A
PF01/SS1C-

Temporarily flooded to 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 are balsam poplar (Populus balsamifera) and black cottonwood (Populus trichocarpa). Willow (Salix spp.) and alder (Alnus spp.) are the dominant species in the shrub areas. The shrubs often occur in bands along the river channel, and at a slightly lower elevation than the forested areas.

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

PF05/EM5F- Semipermanently flooded dead tree swamps often created by beaver activity. Emergent vegetation is present below the dead trees. Emergent species are described under PEM5F.

PSS4B- Saturated, black spruce bog. The black spruce in these areas is shrub height (less than 20 ft). Additional descriptions and understory species of this wetland type are listed under PF04B.

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

PSS4/EM5B- Saturated black spruce bog with an emergent ground layer. The black spruce in these areas is shrub height (less than 20 ft). Emergent species are described under PEM5B.

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

PSS4/1C
PSS1/4C-

Seasonally flooded areas adjacent to streams and small rivers that are a complex of shrub height black spruce on higher terraces, and deciduous shrubs on lower terraces. Willow and alder are the common deciduous shrub species.

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

PSS4/1B
PSS1/4B-

Saturated, open canopy black spruce bog. The spruce in these wetlands is shrub height (less than 20 ft.). A dense deciduous shrub understory is present, and is dominated by dwarf arctic birch (Betula nana), labrador tea (Ledum palustre), bog blueberry (Vaccinium uliginosum), bog cranberry (V. oxycoccos), mountain

cranberry (V. vitis-idaea), leatherleaf (Chamodaphne calyculata) and crowberry (Empetrum nigrum).

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

PSS4/EM5C- Seasonally flooded areas on floodplains and in drainageways that are a mixture of scrub black spruce and emergent covertypes. The emergent vegetation occurs in the lower elevation areas corresponding to historic river channels. The common emergent species are listed under PEM5C.

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

PSS1/EM5B- Saturated shrub bog with a 30% or more of the canopy consisting of broad-leaved deciduous shrubs. The remaining portion of the canopy consists of persistent emergent vegetation. This is the most common wetland type in the Kenai map area. Dominant shrubs include dwarf birch (Betula nana), bog blueberry (Vaccinium uliginosum) mountain cranberry (V. vitis-idaea), labrador tea (Ledum palustre), leatherleaf (Chamodaphne calyculata), cloudberry (Rubus chamaemorus), crowberry (Empetrum nigrum), bog rosemary (Andromeda polifolia) and sweet gale (Myrica gale).

Dominant emergent species include cottongrass (Eriophorum russeolum, E. angustifolium), sedge (Carex livida, C. rotunda), bluejoint (Calamagrostis canadensis) and horsetail (Equisetum spp.). The saturated, peaty soils in this wetland type are covered with a dense mat of moss (Sphagnum spp.).

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

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. Shrub and emergent species are the same as listed under PSS1/EM5B. A dense mat of moss (Sphagnum spp.) covers the soil surface.

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

PSS1A
PSS1C-

Temporarily flooded to seasonally flooded dense shrub areas on river and stream floodplains consisting of willow (Salix spp.) and alder (Alnus spp.). This wetland type often occurs on river bars that have become stable enough to support persistent woody vegetation.

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

PSS1/FLA
PSS1/FLC- Temporarily flooded to seasonally flooded areas on river and stream floodplains consisting of a mix of shrubs and nonvegetated riverine

flats. Shrub species are willow (Salix spp.) and alder (Alnus spp.). The flats are typically composed of sand and gravel-size particles, and are situated at a slightly lower elevation than the shrub areas.

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

PSS1/EM5C- Seasonally flooded areas occurring on floodplains in stream and 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 for approximately 1 month during the growing season. The substrate consists of an interspersed of raised mounds (hummocks) and lower basins and drainageways. Willow (Salix spp.) and alder (Alnus spp.) dominate the high spots, and emergent vegetation dominates the lower elevation areas. Sedges (Carex spp.), bluejoint (Calamagrostis canadensis), and marsh cinquefoil (Potentilla palustris) are the common emergents in this wetland type.

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

PSS1/EM5F
PSS1/OWF-

These designations were used primarily to indicate patterned bogs (string bogs and reticulate bogs). Patterned bogs are composed of bog ridges (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. The ponds are irregularly sized, spaced, and shaped. Larger ponds may contain peat islands.

The ridges and islands in a patterned bog are dominated by broad-leaved deciduous shrubs. Important species include dwarf birch (Betula nana), bog blueberry (Vaccinium uliginosum), mountain cranberry (V. vitis-idaea) and Labrador tea (Ledum palustre). Other shrub species are described under PSS1/EM5B.

The flarks (ponds) are typically dominated by emergent vegetation, and are characterized by semipermanently and permanently flooded water regimes. The emergent species are described under PEMEF. In some patterned bogs, the pools are too deep to support emergent vegetation. The pools consist of open water and aquatic bed areas. The patterned bogs containing these deeper pools are labeled PSS1/OWF on the NWI wetland maps.

Viereck et al types

ridges (strangs)

Dwarf birch - ericaceous shrub - Sphagnum bog

pools (flarks)

Fresh herb/grass marsh

Subarctic lowland sedge/herb wet meadow

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