NATIONAL WETLANDS INVENTORY
NOTES TO THE USER FOR
NORTH SLOPE 1:63,360 SCALE MAPS

INTRODUCTION

The U.S. Fish and Wildlife Service (Service) 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 an 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 (Inventory) in the administration of that Act. The Emergency Wetlands Act of 1986 (16 U.S.C. 3901) directs the Service to continue the inventory of wetlands through 1998.

The Service has always recognized the importance of wetlands to waterfowl and other migratory birds. Consequently, the Service has a direct interest in protecting wetlands, especially the waterfowl 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 the temporary storage of flood waters.

(5) Water quality maintenance by removing silt load, filtering pollutents 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 (Inventory) Program was initiated in 1975 and made operational in 1977. The primary goal of the Inventory 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 Inventory: 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 Inventory project is as follows:

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

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

(3) Develop wetland status and trends reports.

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

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

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

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

User reports are generally prepared 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.

Due to the homogeneity of the North Slope coastal plain, only one user report has been produced for the area. This report incorporates the indicated 1:63,360 scale wetlands maps within each of the following 1:250,000 scale quadrangle areas:

Barrow
- A (1, 2, 3, 4 5)
- B (3, 4)

Barter Island
- A (3, 4, 5)

Beechey Point
- A (1, 2, 3, 4, 5)
- B (1, 2, 3, 4, 5)
- C (4,5)

Demarcation Point
- C (1, 2, 3, 4, 5)
- D (2, 3, 4, 5)

Flaxman Island
- A (1, 3, 4, 5)
- B (5)

Harrison Bay
- A (1, 2, 3, 4, 5)
- B (1, 2, 3, 4, 5)
- C (1, 3, 4, 5)
- D (4, 5)

Mt. Michelson
- C (1, 2, 3, 4, 5)
- D (1, 2, 3, 4, 5)

Sagavanirktok
- C (3, 4, 5)
- D (1, 2, 3, 4, 5)

Teshekpuk
- C (1, 2)
- D (1, 2, 3, 4, 5)

Umiat
- C (1, 2, 3)
- D (1, 2, 3, 4, 5)

DEVELOPMENT OF THE WETLANDS CLASSIFICATION SYSTEM

The Service'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 major purposes of the wetlands 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 wetland concepts and terminology throughout the United States.

The wetlands 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 wetlands classification system presents a method for grouping ecologically similar wetlands.

The wetlands classification system is heirarchical with wetlands divided among five major Systems at the broadest level: Marine, Estuarine, Riverine, Lacustrine and Palustrine. Each System is further subdivided by 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, Scrub-Shrub, 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 system 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, excavated, artificial).

MAP PREPARATION

The Service participates with other Federal and State agencies in the Alaska High-Altitude Aerial Photography Program. The Inventory uses the 1:60,000 scale color-infrared photography that is obtained by this program. With the high-altitude photography, the Inventory is capable of detailed wetlands 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 United States Geological Survey base map.

All photographs used for compiling these North Slope wetlands maps are color-infrared vertical aerial photographs at scales of 1:60,000, 1:63,000 and 1:65,000. All photography was flown during periods of peak vegetative cover (July and August) from 1977 through 1982. Field investigations were conducted from 1980 through 1987 except for the summers of 1981 and 1986.

To produce final Inventory 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.

MAPPING PRIORITIES

Mapping priorities are based principally on the needs of the Service 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, waterfowl habitat areas, and the coastal zone. As of November 1987, the Inventory has produced wetlands maps for approximately 16 percent of Alaska. The Inventory is currently mapping map wetlands in Alaska at the rate of 2 percent annually.

MAPPING CONVENTIONS AND SPECIAL MAPPING PROBLEMS

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

- 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 vegetative class which is spacially dominant is always listed first. The second cover type of a mixed class alpha-numeric comprises at least 30 percent or more of the unit mapped but not more than 50 percent (e.g., PEM1/SS1B).

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

- 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 percent 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 Service's wetlands classification system. All upland (non-wetland) areas are labeled with an inverted omega symbol ( ).

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

- Small areas obscured by shadow or light cloud cover have been approximated from the U.S. Geological Survey topographic maps or other collateral information. Areas totally obscured and consequently not mapped are labeled "photography unavailable."

- Special modifiers are used to indicate wetlands and deepwater habitats modified by man.

STUDY AREA

The study area extends from just west of Point Barrow to the Canadian border and inland from the Beaufort Sea about 30 to 70 miles. Portions of the study area are located in the National Petroleum Reserve-Alaska (NPRA) and the Arctic National Wildlife Refuge. Four distinct physiographic regions exist in the study area: marine waters, the coastal plain, foothills, and the Sadlerochit Mountains.

The marine environment, which extends from about Point Barrow to Demarcation Bay on the Beaufort Sea, includes five habitat types, which are as follows: (1) shallow, coastal marshes along the Beaufort Sea coastline; (2) estuaries where freshwater streams and rivers enter the Beaufort Sea (i.e., the Colville River Delta); (3) brackish lagoons, protected bays and inlets (i.e., Dease Inlet and Elson Lagoon). The remaining two types include the (4) shallow, nearshore shelf area, which is subject to ice scouring, and (5) the offshore Beaufort and Chukchi Seas.

The coastal plain extends about 500 miles east/west. It is as much as 100 miles wide and ranges from the Beaufort Sea to about 500 feet in elevation. The plain is extremely flat, poorly drained, and entirely underlain by permafrost. Frost polygons are well developed, giving a paddy-field appearance. Numerous rivers and streams with headwaters in the Brooks Range flow north into the Beaufort Sea and bisect the coastal plain. Streams thaw in June and lakes remain frozen until early July. The coastal plain is within the Arctic Tundra Province of the Polar Domain. The land-surface form is flat with smooth plains, with more than 80 percent of the area gently sloping, and local relief between 0 and 300 feet.

The coastal plain is essentially a mosaic of small lakes and wet-sedge meadows. *Carex* is the dominant genus in the wet-sedge meadows; secondary species include grasses, other sedges, cottongrass, rushes, small heath shrubs, small willows, various herbs, and horsetails. The largest lake is Teshekpuk Lake which is over 25 miles long. Freshwater lakes in the coastal plain are primarily thaw lakes. Thaw lakes are typically less that 10 square miles in surface area and about 6 to 8 feet deep. Thaw lake topography occurs east of the Colville River, in a narrow coastal strip between the Colville and Canning Rivers, at the confluence of the Canning and Tamayariak Rivers, and in a narrow zone between the delta of the Hulahula River and a point a few miles east of the Jago River.

The foothills rise from Camden Bay and extend to the base of the Sadlerochit Mountains, 18 to 34 miles from the coast. East and west of the Sadlerochit River, the foothills are farther from the coast. Hills in the region are as high as 1,250 feet, with several hill crests having barren gravel outcrops.

The foothills are within the Tundra Province, Watersedge and Cottonsedge Section of the Tundra Division, Polar Domain. The land-surface form is plains with high hills, with 50 to 80 percent gently sloping, and local relief between 100 and 300 feet.

Vegetation is primarily tussock tundra with a high percentage of cottongrass tussock and dwarf shrubs. The dominant plant is the tussock-forming cottongrass *Eriophorum vaginatum*. Secondary species scattered throughout the

tussocks include grasses, sedges, small shrubs, and herbs. Mosses and lichens are also common in tussock tundra. Frost scars, small mounds or patches of soil between tussocks, are often a component of this vegetation type.

The Sadlerochit Mountains, which run east/west, are located about 30 miles south of Camden Bay and west of Sadlerochit Spring. The mountains begin primarily above the 1,970 foot elevation level. Mountain peaks over 4,000 feet are common, with the highest peak reaching 4,870 feet. The Sadlerochit Mountains belong to the Brooks Range Province of the Tundra Regime Highlands, Polar Domain. The area is open with low mountains and 20 to 50 percent of the area gently sloping with local relief between 1,000 and 3,000 feet.

Mountain vegetation consists of extensive moss mats with numerous shrubs such as mountain avens, prostrate willow, and small forbs. These communities are interspersed with rocks and talus slopes.

Sadlerochit Spring, one of the largest perennial springs in the North Slope region, flows year-round. This spring - with a discharge rate of 35 to 53 cubic feet per second and water temperature of 50 to 58 degrees - maintains an open channel for nearly 5 miles downstream during the coldest parts of the winter. This area has been nominated as a National Natural Landmark.

The entire study area is in a continuous permafrost zone, excpet for a small area at Sadlerochit Spring. At Prudhoe Bay, the greatest permafrost depth in Alaska has been recorded (2,250 feet). Permafrost depth decreases in all directions from Prudhoe Bay. In the NPRA, inland from Barrow, the maximum thickness is 1,330 feet, while the thickness at Umiat ranges from 700 to 800 feet. At Exxon's Canning River well, permafrost thickness is 928 feet. In the Flaxman Island, Prudhoe Bay, Harrison Bay, and Barrow areas, subsea permafrost exists in nearshore areas of the Beaufort Sea and probably extends to water depths of about 500 feet.

Lakes and rivers influence the shape of the permafrost table. Deep lakes typically do not freeze to the bottom. Shallow lakes and rivers freeze to the bottom, and the permafrost table is a few inches to a few feet below. Deep rivers, such as the Canning, do not freeze completely and have unfrozen pockets in deeper areas (7 feet or more). As a result, the permafrost table below a river or lake may be very irregular.

Polygonal ground is common in the study area. Polygons range in size from 30 to 200 feet in diameter. Polygons are usually separated by ice wedges a few inches to several feet wide. Polygons are easily recognized on the surface but may be masked by tussock-type tundra.

The climate in the study area is arctic marine, with extremely low winter temperatures and short, cool summers. Persistent winds occur throughout the year. Frequent blizzards occur in the winter and fog occurs frequently along the coast during the summer. At Barter Island, the sun is continuously above the horizon from May 15 to July 27 and continuously below the horizon from November 24 to January 17. Freezeup usually begins in September, and nearshore areas are usually iced over by mid-October. The following table identifies temperature, precipitation, and wind speed for selected areas in the study area.

	Barrow	Lonely	Oliktok	Barter Island
Temperature (°F)				
Extremes	-56 to 78	-54 to 78	-49 to 75	-59 to 78
Precipitation (in.)				
Average Annual	4.89	5.83	5.39	7.05
Snow	28.90	12.70	18.80	44.30
Wind Speed (knots)				
Average Annual	11.8	N/A	N/A	13.1
Fastest	55.0	N/A	N/A	81.0

N/A = Not Available

PERMAFROST

Permafrost is a condition of the Earth's surface in which a temperature below 32°F has existed for two or more years. It is not implicit in this definition that ice be present although it commonly is. The amount of ice depends on topographic position, material type, its porosity and permeability, and the past geomorphic history. At Prudhoe Bay permafrost extends to a depth of about 2000 feet. This is the greatest known depth in Alaska.

In portions of northern Alaska not covered by Quaternary glaciers, permafrost formed and was modified perhaps several times during the glacial and interglacial ages of the Pleistocene. Increasing glacier ice during the last major glaciation (the Wisconsinan) caused a lowering of sea level and its retreat several miles north of the present coastline. The sediments exposed by the regression of the sea then froze to form permafrost on what is now the continental shelf. Ice wedges formed in the tundra while it was somewhat colder and drier than at present. It is reasonable to assume that thaw lakes were present and that surface modifications as a result of these lakes (the thaw lake cycle) were taking place. Thus far, the oldest radiocarbon date from a lake basin on the Barrow tundra is 12,600 years old. A date obtained from the basin of the lake drained for Pump Station Number 1 indicates that thaw lakes could have been actively reworking the surface in the Prudhoe Bay region at least 9,330 years before present. Several younger dates from peat sections in river cuts and coastal bluffs have been obtained from the Prudhoe Bay region.

Permafrost that formed on the exposed continental shelf is today still found in the subsea environment where it has persisted since marine inundation began at the close of the last glaciation. At present the coastline in the Prudhoe Bay region is retreating at an average rate of approximately 5 feet per year, largely as a result of thermal erosion. As the newly eroded landbased permafrost is inundated, it becomes part of the subsea permafrost.

The perennially frozen sediments of the coastal tundra have relatively large volumes of ice, mostly in the upper 20 feet. The ice occurs as segregations and wedge-shaped bodies related to contraction crack polygons that are characteristic of the entire coastal plain.

The initial polygonal outline develops in resonse to rapid, intense winter cooling and subsequent contraction of the fine-grained coastal plain sediments. The narrow thermal contraction cracks thus formed are subsequently filled by ice in the form of winter hoarfrost or water produced from melting of the snow cover. The process of cracking and filling, repeated over many centuries, results in the growth of vertical wedge-shaped masses of ice that penetrate many meters and may attain widths up to 100 feet. The increase in volume caused by the expanding ice wedges commonly produces a buckling or heaving of the tundra on either side and parallel with them. The ridges or rims so produced, together with melting of the wedge tops, cause linear depressions or troughs to form immediately above the ice wedges that commonly define the polygonal surface pattern.

In the seasonally thawed soil or active layer of the tundra, horizontal ice segregations (ice lenses) develop each fall as water moves by capillary action along a moisture gradient to the freezing plane. The amount of soil moisture below the freezing front and the rate at which freezing occurs govern the thickness of the individual segregations. A freezing front may also move up from the top of the permafrost table as the soil cools, especially in coarser-textured materials. The position of the segregated ice is determined to a considerable extent by the structure of mineral soil, e.g., the platy structure inherent in silty soils provides physical boundaries toward which water moves. Segregated ice below the active layer dates to an earlier time when the saturated sediments were thawed. Segregations of nearly pure ice up to 15 feet thick have been recorded in the Prudhoe Bay region but such thicknesses are rare and lenses a few inches thick are more common. Below a depth of about 30 feet ice lenses are uncommon, and the ice that does occur is mostly intergranular, cementing sand and gravel fragments.

Maximum depth of seasonal soil thaw is approximately 3 feet on the well-drained sandy and gravelly sites, and up to 15 inches in the areas of wet tundra. It is within the seasonally thawed soil or active layer that the processes of soil formation, frost churning and plant-soil interaction (i.e., nutrient cycling) take place. Summer temperatures in the active layer are generally low, although at the air/soil or air/vegetation interfaces they may reach 90°F or higher on clear, sunny days. Even these high temperatures are quickly attenuated by the poor conductivity of the vegetation and the near-surface organic soil horizons. In the low-centered polygon areas typical of the Prudhoe Bay region, mean summer temperatures (21 June - 15 August) at 3 inches depth range between 32 and 38°F. This depth generally marks the lower boundary of maximum biological activity.

The permafrost layer forms an impenetrable barrier to water percolation. During the non-frozen season, the seasonally thawed soil of the active layer remains saturated with water because of the permafrost barrier which traps the water above. The active layer may only be a few inches thick, but the soil will remain saturated throughout the growing season because of the extremely low evapo-transporation rate at that latitude. Even with little or no moisture input from precipitation, the evaporation rate is not sufficient to completely dry out this active layer. The Fish and Wildlife Service recognizes these saturated "moist tundra" areas which are underlain by shallow permafrost as scrub-shrub wetlands.

HYDRIC SOILS

A hydric soil is a soil that in its undrained condition is saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation.

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 percent organic content, while mineral soils have less than 18 percent organic matter.

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, like 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 percent 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 (permafrost). 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.

Four soil orders are represented within the North Slope region: Entisols, Inceptisols, Mollisols and Histosols. Soil orders are differentiated from one another by the presence or absence of diagnostic features (horizons) that show major differences in the types of processes used in forming a particular kind of soil.

The Entisols include soils that show little or no evidence of the influence of the factors that affect soil development. They occupy very recent and often unstable landforms such as river floodplains and partially stabilized sand dunes.

Inceptisols are mineral soils that show some effect of the soil-forming processes in the development of horizons with distinctive chemical and physical characteristics. In the North Slope region they commonly have a thick organic or organic-rich horizon.

The order Mollisols includes dark, highly base-saturated soils. Soils belonging to this order are not usually associated with the tundra landscape.

Soils whose upper 40 cm is composed of organic materials are included within the order Histosols.

The Soil Conservation Service has mapped the soils of both the Arctic coastal plain and the Arctic foothills regions as part of the Exploratory Soil Survey of Alaska. The map units used by the Soil Conservation Service actually consist of associations of phases of soil types. Each soil association consists of segments of the landscape with a distinctive topographic and soil pattern. All of these landscape segments contain soils representative of several types and include soils of several topographic phases (slope gradients) and textural phases (clay, loam, sand, gravel). Each soil association is named for the one or two most extensive phases of the soil type. The principal hydric soil types found within these associations are described below.

Histic Pergelic Cryaquepts:

This soil type is extensive and widespread in all areas of the Arctic Region. They are very shallow, poorly drained soils under a thick accumulation of partially decomposed organic matter (mosses, sedges and forbs). Because this organic mat is effective insulation against summer heat, the permafrost table in these soils is normally very shallow (three to fifteen inches below the surface).

The upper portion of the soil that thaws each summer, known as the "active layer," is almost constantly saturated due to water which remains perched above the permafrost. This layer refreezes each winter. Cryostatic pressure during the refreezing period along with solifluction and other frost processes results in mixing or churning of the soil material so that any textural layers in the soil are disrupted and pieces of the organic mat are displaced downward. A common phenomenon is a layer of humus-rich material at the permafrost table.

The soil surface is commonly irregular, with many low mounds, solifluction lobes, polygons and other patterned ground features which show evidence of seasonal soil movement. When associated with gently sloping valleys, the soil land surface may have a striped hummocky surface pattern. The polygonal pattern occurs within level valley bottoms and inland basins within the coastal plain. Circular frost scars, high and low centered polygons, and pingos are typical surface features. Around lake basins or other topographic breaks, mounds may have coalesced to form a continuous low ridge.

This soil type may occupy broad sloping valleys, level basins, terraces, river deltas and the coastal plain. The vegetation is typical tundra dominated by sedge tussocks, mosses, lichens, forbs, and low shrubs in both moist and wet tundra areas. Soil texture ranges from very gravelly sand to silt loam or silty clay loam and parent material includes alluvium, loess, lacustrine and colluvial deposits. The soils are generally alkaline or calcareous, depending on the nature of the parent material, although they may occur under acidic conditions. Colors are generally dark gray or olive gray. Many of the soils are mottled, but those in the lowest and wettest positions have uniform

colors. In areas of severe frost-churning, the subsoil may contain black streaks of organic material. The perennially frozen material may contain thick masses of clear ice. This soil type has severe limitations for any intensive use or development largely because of the underlying permafrost. They are not suitable for common agricultural crops and are not forested. This soil type primarily provides habitat for wildlife.

Pergelic Cryaquepts:

These are poorly drained soils that have permafrost at some depth but do not have thick peaty accumulations on the surface. The depth of summer thaw in these soils is greater than in the Histic Pergelic Cryaquepts, and some have a permanently unfrozen zone between the bottom of the seasonally frozen soil and the permafrost table. This occurs particularly where the vegetative cover and any thin organic mat have been removed by fire or clearing.

Pergelic Cryaquepts have many characteristics in common with the Histic Pergelic Cryaquepts, but they normally have somewhat longer periods during which the soil is not completely saturated. Nearly all are strongly mottled with dark gray silt loam or silty clay loam. Within floodplains and dune swales the soil may also be a gravelly or sandy silt loam. In the Arctic, where the rate of accumulation of organic matter is low, they occur in many positions and on a wide variety of parent material. Most of the soils in the Arctic have patterned ground features. In many areas unvegetated frost scars are common. Overlying vegetation consists of sedges, mosses, dwarf shrubs and other tundra plants.

Stratified soils may occur in the beds of naturally drained lakes, within flood plains, and on rolling tundra hills. These soils will, in time, accumulate enough peaty material on the surface to be classified as Histic Pergelic Cryaquepts. Pergelic Cryaquepts may be frequently flooded. In areas of flooding, the permafrost is generally 10 to 30 inches below the surface.

Pergelic Ruptic - Histic Cryaquepts:

This poorly drained soil type has been subjected to frost-stirring processes to the extent that much of the surface is barren or covered only with lichens and a few other pioneer tundra plants. Commonly these soils have polygonal surface patterns. Thick organic mats occur in the troughs between polygons. Pressure from expanding ice wedges beneath the troughs cause upwelling of mineral material in the centers of the polygons and resulting bare patches. In some places coarser particles have been displaced to the edges of raised polygon centers. On steeper gradients, pebbles and stones are concentrated in regularly spaced stripes running vertically down the slopes. The permafrost table is normally shallow under the organic mat in the troughs and is much deeper under the bare surfaces of the polygon centers. Depth to permafrost is generally 6 to 12 inches.

The proportion of the surface area occupied by bare frost scars ranges from 25 to 75 percent. Vegetation between frost scars consists of mosses, lichens, forbs, sedges and low shrubs. The complex soils are generally a dark grayish brown silty clay loam. They are more commonly fine-grained than sandy. The continual frost-churning results in streaks of black organic material at the

upper permafrost layer. Thick masses of clear ice may exist in the perennially frozen material.

Pergelic Cryofibrists:

These are very poorly drained fibrous organic soils that have mean annual soil temperatures below freezing. The permafrost table is approximately 6 inches below the organic layer so the soils always remain wet. Ponding may occur in low lying areas. The soils are composed of layered fibrous moss and dark brown sedge peat, but in many places the upper part of the soil consists of sphagnum moss peat. The soils are usually very strongly acid. The soils occupy broad shallow depressions in the lowlands, along lake borders and in drainageways. The vegetation is dominantly dense sedge tussocks consisting of mosses, lichens, sedges, and forbs. Polygonal patterns are normally evident on the surface, as are ice-core mounds and pingos. Areas subject to inundation by spring flooding contain thin layers of silty material. Near the coast, the sedge peat may contain lenses of sandy material.

Pergelic Cryaquolls:

These are poorly drained soils with a shallow permafrost table that occur in swales and broad valley bottoms and on terraces and level coastal plains. Most of the soils have a surface mat of peaty material, ranging in thickness from a few inches to more than 12 inches. In many places, especially where the organic mat is thin, the mat is not continuous but is interrupted by frost-scar patches in which the mineral soil is exposed. These soils commonly have a weakly striped or polygonal surface pattern. Pergelic Cryaquolls are common on calcareous material. Vegetation is sedges, mosses, lichens, forbs and low shrubs. Beneath the mat of vegetation, the soils have 6 to 10 inches of black or very dark gray, nonacid mucky silt loam over a mottled dark gray silt loam or gravelly loam. Due to frost churning, the subsoil may include dark streaks of organic material.

WETLANDS AND DEEPWATER HABITATS

The following section describes the map codes used in preparing the North Slope 1:63,360 scale wetlands maps. A general description of each plant community type is provided for each code. Vegetation and substrate codes used within the described systems are arranged alphabetically at the class level.

Marine System

The Marine System is restricted to areas offshore of the coastal bars, flats and associated channels. Wetlands and deepwater habitats within the Marine System generally exhibit full sea strength salinity, the shorelines are exposed to the full impact of waves or sea ice originating in the open ocean, and vegetation occurring along these shorelines reflects that found in and around open ocean areas.

M1OWL Subtidal, open water areas with direct exposure to the waves and ice of the Arctic Ocean. Salinity is higher than in adjacent estuarine habitats.

M2USN Intertidal, regularly flooded unvegetated flats with direct exposure to the waves and ice of the Arctic Ocean. The substrate is typically composed of gravel- and sand-sized particles.

M2USP Intertidal, irregularly flooded unvegetated flats with direct exposure to the waves and ice of the Arctic Ocean. The substrate is typically composed of gravel- and sand-sized particles.

Estuarine System

The Estuarine System is confined to bays, lagoons, inlets, channels, flats and adjacent tidal marshes which are partially obstructed or have sporadic access to the open ocean. The salinity in estuarine areas is generally less than that found in the adjacent marine habitats. Estuarine habitats are considered low-energy since they are protected from the full force of wave and ice action of the open ocean.

E1OWL Subtidal, low-energy brackish open water. This includes portions of bays, tidal channels and coastal lagoons where ocean derived salinity exceeds 0.5 ppt. This also includes tidal ponds on flats and in coastal marshes where brackish water becomes trapped at higher tides.

E2EM1/OW Intertidal, irregularly-flooded brackish marsh mixed with small, permanent pools of brackish water. These areas are predominantly polygonal tundra that is occasionally inundated by brackish water during storms. Since the polygon centers are usually closed basins, brackish water persists following tidal inundation. Water levels are maintained by precipitation during periods between tidal flooding. The vegetation on the polygon ridges includes grasses such as Dupontia fisheri, Alopecurus alpinus and Arctagrostis latifolia. Sedges include Carex ursina, C. subspathacea, C. rariflora, and C. ramenskii. Other species present include Cochlearia officinalis, Stellaria humifusa, and Salix ovalifolia.

E2EM1P Intertidal, irregularly-flooded brackish marshes occurring near the outer edge of major river deltas, within small embayments and along the shoreline of tidal channels. The areal cover of vegetation exceeds 70 percent of the mapped units. Dominant species include Puccinellia phryganodes, Carex subspathacea, Stellaria humifusa, and Cochlearia officinalis. Other species common in this wetland type are described for the E2US/EM1P wetland type.

E2EM1/USN Intertidal, regularly flooded brackish marshes mixed with unvegetated mud and sand flats. The emergent marsh vegetation occupies 50 - 70 percent of the mapped units. Common species for this wetland type are the same as those described for the E2US/EM1P wetland type.

E2EM1/USP Intertidal, irregularly-flooded brackish marshes mixed with unvegetated mud and sand flats. The emergent marsh vegetation occupies 50 - 70 percent of the mapped units. Common species for this type are the same as those described for the E2US/EM1P wetland type.

E2US/EM1P Intertidal, irregularly-flooded unvegetated flats mixed with estuarine marsh vegetation. The emergent vegetation occupies 30 - 50 percent of the substrate. Dominant vegetation in higher salinity areas includes Puccinellia phryganodes, Carex subspathacea, C. rariflora and C. ramenskii. Areas flooded less often and characterized by lower salinities are dominated by Stellaria humifusa, Cochlearia officinalis, Dupontia fisheri and various bryophytes. Other species include Alopecurus alpinus, Arctagrostis latifolia and Poa spp.

E2USN Intertidal, regularly-flooded unvegetated mud and sand flats in low-energy, brackish water environments.

E2US/OW Intertidal complex of mud and/or sand flats with shallow pools of open water. The water regime may be either regularly or irregularly flooded. This code is also used for areas where numerous estuarine channels cut through the tide flats and which consequently becomes too complex to delineate the features separately.

E2USP Intertidal, irregularly-flooded unvegetated mud and sand flats in low-energy, brackish water environments.

Riverine System

All river and stream channels upstream from the influence of ocean-derived salinity are included in the Riverine System. Unvegetated (less than 30 percent vegetative cover) flats and bars contained within the outer banks of riverine channels are also part of the Riverine System.

Due to the extremely limited tidal ranges at the mouths of most freshwater channels, the lower portions of some channels may not be designated as a freshwater Tidal (R1) Subsystem.

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

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

R2EM2/OWH Series of small ponds connected by a permanently flooded open water channel. Typically called a "beaded stream," this channel (and associated ponds) is often heavily vegetated by Arctophyla fulva, Carex aquatilis, and Hippuris sp.

R2OWH Permanently flooded open water channels of lower perennial rivers and streams. These channels are upstream from the influence of ocean-derived salinity. Brackish channels are mapped as E1OWL.

R2OW/US This code is used to designate complexes of open water channels and river bars/flats in lower perennial Riverine Systems. The channels occupy 50 - 70 percent of the mapped units.

R2USA Temporarily flooded river bars and flats (unconsolidated shore). These areas are flooded for a shorter duration than the seasonally flooded bars and flats (R2USD). Sparse pioneer vegetation often becomes established on the more stable areas of the R2USA wetland type.

R2USD Seasonally flooded river bars and flats (unconsolidated shore). These riverine features are usually flooded only during spring melt. The well drained substrate is exposed in June after flood waters recede.

R2US/OW This code is used to designate complexes of river bars/flats and open water channels. The river bars/flats occupy 50 - 70 percent of the mapped units.

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

R3USA Temporarily flooded river flats and bars in upper perennial Riverine Systems. Typically unvegetated, or sparsely vegetated (less than 30 percent of the flats area) with broad-leaved deciduous shrubs and herbaceous plants. If the area is sparsely vegetated, the plants will be similar to those described for the PSS1A and PEM1A wetland types.

R3USD Seasonally flooded, well-drained unvegetated river bars and flats of upper perennial rivers and streams. These riverine features are usually flooded only during spring melt. The well drained substrate is exposed after flood waters recede.

R3US/OW This code is used to designate complexes of river bars/flats and upper perennial open water channels. The river bars/flats cover 50 - 70 percent of the mapped units.

R4SBA A complex of river flats, bars and small open water pools of temporarily flooded intermittent streams. These streams do not carry water throughout the year, but do have a moving water flow for short periods each year. A sparse vegetative cover (less than 30 percent of area) of broad-leaved deciduous shrubs may occur. Vegetation is described for the PSS1A and PEM1A wetland types.

R4SBD 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 extended periods each year. When not flooded, the substrate becomes well drained. A sparse vegetative cover (less than 30

percent of area) of broad-leaved deciduous shrubs may occur. Vegetation is described for the PSS1A and PEM1A wetland types.

Lacustrine System

This system includes all freshwater lakes greater than 20 acres in size. Bodies of water less than 20 acres in size are included in the Palustrine System.

L1OWH — Permanently flooded open water areas of lakes. As a mapping convention, most lacustrine open water is classified in the Limnetic Subsystem (L1). This convention is used because the depth of the lacustrine water bodies cannot be determined from the aerial photography.

L2EM2H — Permanently flooded grass marsh occurring in shallow zones of lacustrine basins. The non-persistent emergent vegetation consists primarily of Arctophila fulva. This species generally grows in water that is 8 - 40 inches deep. Other non-persistent species sometimes found with Arctophila include Hippuris vulgaris and Caltha palustris.

L2EM2/OWH — Permanently flooded grass marsh with areas of open water. See the description for the L2EM2H wetland type. The grass marsh areas occupy 50 - 70 percent of the mapped units.

L2OW/EM2H — Permanently flooded open water basin with areas of flooded grass marsh covering 30 - 50 percent of the mapped units. See the description for the L2EM2H wetland type.

L2OWH — Permanently flooded, shallow open water areas of lakes (littoral zone). These shallow areas are usually 1-4 feet in depth. The littoral zone could not be identified on the aerial photography for most lakes in the study area.

L2USA — Temporarily flooded mud and sand flats occurring along lake shorelines. These areas are flooded for a shorter duration than the seasonally flooded flats (L2USD). Surface water persists for approximately two to three weeks at the beginning of the growing season. Pioneer vegetation may become established in these areas.

L2USD — Seasonally flooded, well-drained mud and sand flats occurring along lake shorelines. Water covers the substrate for approximately one month at the beginning of the growing season.

L2US/OW — Complex of mud and sand flats and open water areas. The basin complex is greater than 20 acres in size. Water may remain in some portions of the basin throughout the growing season, however, 50 - 70 percent of the area will become exposed at some point during the growing season. The basin is typically devoid of vegetation.

Palustrine System

The Palustrine System includes all North Slope wetlands dominated by shrubs, persistent emergents, mosses, and lichens that are not influenced by ocean-derived salinity. Wetland types commonly referred to as moist tundra, wet tundra, tussock tundra, meadows and marshes are grouped in the Palustrine System. Lakes and ponds less than 20 acres in size are also part of the Palustrine System.

PEM1A Temporarily flooded areas on river floodplains and in recently drained lake basins consisting primarily of persistent emergents. The emergent vegetation covers at least 70 percent of the mapped unit. Dominant plant species may include Carex aquatilis, Dryas integrifolia, Carex bigelowii, Arctagrostis latifolia, Poa lanata, Deschampsia caespitosa and Senecio congestus. Other species associated with the PEM1A wetland type include Pedicularis langsdorffii, Pedicularis capitata, Petasites frigidus, Saxifraga hirculus, Papaver lapponicum, Astragalus alpinus, Eriophorum vaginatum, Arctostaphylus rubra, Lupinus arcticus, Pedicularis sudetica, Cassiope tetragona, Oxytropis borealis, Valeriana capitata, Astragalus umbellatus, Luzula tundricola, Erigeron sp., Papaver macounii, and Alopecuris alpinus. Associated shrub species may include Salix lanata, Salix planifolia, Salix glauca, Salix alaxensis, Salix reticulata, and Vaccinium vitis-idaea.

PEM1B Saturated sedge meadow occurring primarily in drier portions of old drained lake basins. Standing water is seldom present, but the soil remains saturated throughout the growing season. This classification was also used for moist tundra areas dominated by graminoid tussocks. Areas of moist tundra mapped as PEM1B have a shrub cover that is less than 30 percent. If the areal coverage of shrub species exceeds 30 percent, but is less than 50 percent, the PEM1/SS1B classification was applied. Eriophorum vaginatum is the dominant species in the sedge tussock areas. Additional species associated with the sedge tussock areas include Carex Bigelowii and Carex aquatilis. Dominant species in the PEM1B portions of old drained lake basins include Carex bigelowii, C. rariflora, Eriophorum angustifolium, E. Scheuchzeri, Senecio congestus and Deschampsia caespitosa. Species described for the PEM1A wetland type may also occur in old drained lake basins.

PEM1D Seasonally flooded, well-drained areas on river floodplains and in recently drained lake basins consisting primarily of persistent emergents. The soil in these wetlands does not remain saturated following periods of flooding. The dominant emergent species are similar to those described for the PEM1A wetland type.

PEM1E Seasonally flooded sedge meadow occurring in low centered polygons, in large depressioons such as old river channels and old oxbow lakes, and in drained lake basins. Seasonally flooded polygonal tundra is only mapped as PEM1E if the shrub dominated polygonal ridges cover less than 30 percent of the mapped units.

There is shallow standing water in PEM1E wetlands in early summer, but the water is seldom present late in the growing season. Eriophorum angustifolium, E. russeolum, and Carex aquatilis are the dominant species. Other species present incude Eriophorum Scheuchzeri, Pedicularis sudetica and Salix spp.

PEM1F — Semipermanently flooded sedge marsh occurring in low tundra areas, such as drained lake basins and pond and lake shorelines. Standing water is present throughout the ice-free season in most years. In dry years, the soil may become exposed by August. Carex aquatilis, Eriophorum angustifolium, and Eriophorum russeolum are the dominant species in areas mapped as PEMIF. Additional species which may occur include Eriophorum Scheuchzeri, Potentilla palustris, Caltha palustris and Ranunculus pallasii.

PEM1H — Permanently flooded sedge marsh occurring in sites where shallow water persists throughout the ice-free season in all years. This type was mapped along the margins of lakes and ponds and in small basins. Carex aquatilis is the dominant species. Associated species may include Caltha palustris, Eriophorum angustifolium, Eriophorum Scheuchzeri, Ranunculus pallasii and Utricularia vulgaris. Plants described for the PEM1F wetland type may also be found in the PEM1H wetland type.

PEM1/OWF — Semipermanently flooded sedge marsh containing areas of open water covering 30 - 50 percent of the mapped unit. This wetland type occurs in low tundra areas such as drained lake basins and pond and lake shorelines. For a description of associated plant species, see those listed for the PEM1F wetland type.

PEM1/OWH — Areas of low-centered polygons with permanent standing water occurring in the polygonal basins. The moist polygon ridges are dominated by emergent species including Dryas integrifolia, Pedicularis spp., Petasites frigidus, Saxifraga hirculus, Eriophorum angustifolium, and Carex spp. Low shrubs are also found on the polygon ridges. Shrub species include Salix reticulata, S. arctica, and S. rotundifolia. Most of the deeper polygonal basins remain as unvegetated open water throughout the growing season. Shallower basins are vegetated with those emergent species described for the PEM1F and PEM1H wetland types.

PEM1/SS1A — Temporarily flooded areas on river floodplains consisting of a mix of herbaceous emergent vegetation and broad-leaved deciduous shrubs. Emergent species occupy 50 - 70 percent of the mapped units, and include Arctogrostis latifolia, Carex spp., Juncus sp., Equisetum spp., and Epilobium latifolium. The most commonly found shrub species include Salix glauca, S. lanata, and S. alaxensis. Plants described for the PEM1A and PSS1A wetland types will generally occur in this wetland type.

PEM1/SS1B — Saturated graminoid-dwarf shrub tundra. Although the soil remains saturated in these areas throughout the growing season, standing water is seldom present. This wetland type includes sedge tussock tundra areas where the dwarf shrub component has an areal coverage

of 30 - 50 percent. Herbaceous species commonly found in this wetland type include Eriophorum vaginatum, Carex aquatilis, C. Bigelowii, C. rariflora, Pedicularis langsdorffii, Arctogrostis latifolia, Petasites frigidus, Saxifraga hirculus, and Papaver lapponicum. The shrub component consists primarily of willow species including Salix lanata, S. planifolia, S. reticulata, S. rotundifolia and S. glauca. Additional species which may be present include Dryas integrifolia, Pedicularis capitata, Andromeda polifolia, Ledum palustre, Cassiope tetragona, Arctostaphylos rubra, Betula nana, and Astragalus alpinus. Plants described for the PEM1B and PSS1B wetland types will generally occur in this wetland type.

PEM1/SS1E Seasonally flooded, saturated polygonal tundra consisting of a mix of herbaceous emergent vegetation in basins and dwarf shrub vegetation on ridges. The basins contain standing water for approximately half of the growing season and the soil remains saturated following flooding. The basins are dominated by emergent species including Eriophorum angustifolium, E. russeolum, and Carex aquatilis. The drier polygon ridges are dominated by dwarf shrub species including Salix lanata, S. reticulata, S. rotundifolia, S. arctica and S. planifolia. Emergent species on the polygon ridges include Dryas integrifolia, Pedicularis langsdorffii, Petasites frigidus, Eriophorum spp., and Carex spp. Additional species which may occur within polygon basins and upon the mesic polygon ridges include Eriophorum Scheuchzeri, Pedicularis sedetica, Salix glauca, Arctogrostis latifolia, Saxifraga hirculus, Papaver lapponicum, Astragalus alpinus, Carex Bigelowii, Eriophorum vaginatum, Lupinus arcticus, Cassiope tetragona, Vaccinium vitis-idaea, Valeriana capitata and Luzula tundricola. The PEM1/SS1E code was also used to designate non-polygonal tundra areas consisting of a mosaic of seasonally flooded sedge meadow (PEM1E) and saturated graminoid-dwarf shrub tundra (PEM1/SS1B).

PEM1/SS1F Polygonal tundra areas consisting of semipermanently flooded basins and saturated polygon ridges. Carex aquatilis is the dominant species in the polygon basins. The drier ridges support a mix of dwarf shrubs and herbaceous emergents. The dominant species on the elevated ridges are the same as those species described for the PEM1/SS1E wetland type. Plants described for the PEM1F and PSS1E wetland types will generally occur in this wetland type.

PEM1/USA Temporarily flooded areas on river floodplains and in recently drained lake basins consisting of a mix of emergent vegetation and unconsolidated shore (bars or flats). Plant species include Carex spp., Juncus spp., Dupontia fisheri, Deschampsia caespitosa and Epilobium latifolium. Plants described for the PEM1A wetland type will generally occur in this wetland type. The emergent vegetation covers 50 - 70 percent of the mapped unit.

PEM1/USD Seasonally flooded, well drained areas on river floodplains and in recently drained lake basins consisting of a mix of emergent vegetation and unconsolidated shore (bars or flats). The soil in these wetland areas does not remain saturated following periods of flooding. The dominant emergent species are similar to those listed for the PEM1/USA wetland type. Plants described for the PEM1D and PEM1A wetland types will also generally occur in this wetland type.

PEM1/USE Seasonally flooded, saturated areas primarily in recently drained lake basins. These wetlands consist of a mix of emergent vegetation and unconsolidated shore (flats). The soil remains saturated following periods of flooding. The dominant emergent species are similar to those listed for the PEM1/USA wetland type. Plants described for the PEMIE, PEMID and PEMIA wetland types will also generally occur in this wetland type.

PEM1/2F Semipermanently flooded sedge-grass marsh occurring in shallow portions of ponds or lake basins. This wetland type is characterized by a mix of persistent and non-persistent emergent vegetation. Carex aquatilis is the dominant persistent sedge and Arctophila fulva is the dominant non-persistent grass. Plants described for the PEM1F, PEM2F, PEM1H and PEM2H wetland types will generally occur in this wetland type.

PEM1/2H Permanently flooded sedge-grass marsh occurring in shallow portions of ponds or lake basins. This wetland type is characterized by a mix of persistent and non-persistent emergent vegetation. Carex aquatilis is the dominant persistent species, and Arctophila fulva is the dominant non-persistent species. Plants described for the PEM1H, PEM2H, PEM1F and PEM2F wetland types will generally occur in this wetland type.

PEM2F Semipermanently flooded grass marsh occurring in shallow portions of pond basins. The non-persistent emergent vegetation consists primarily of Arctophila fulva. Associated species may include Hippuris vulgaris and Caltha palustris. Those species associated with the PEM1F and PEM1H wetland types may also occur, however, they will occupy less than 30 percent of the mapped unit.

PEM2H Permanently flooded grass marsh occurring in shallow portions of pond basins. The non-persistent emergent vegetation consists primarily of Arctophila fulva. This species generally grows in water that is 8-40 inches deep. Other non-persistent species sometimes found with Arctophila include Hippuris vulgaris and Caltha palustris. Those species associated with the PEM1F and PEM1H wetland types may also occur, however, they will occupy less than 30 percent of the mapped unit.

PEM2/OWH Permanently flooded grass marsh with areas of open water covering 30 - 50 percent of the mapped units. This wetland type occurs in shallow portions of pond basins. See the description for the PEM2H wetland type.

PEM2/1F Semipermanently flooded grass-sedge marsh occurring in shallow portions of ponds or lake basins. See the description for the PEM1F, PEM2F and PEM1/2F and wetland types.

PEM2/1H Permanently flooded grass-sedge marsh occurring in shallow portions of ponds or lake basins. See the description for the PEM1H, PEM2H and PEM1/2H wetland types.

POW/EM1F Semipermanently flooded sedge marsh containing large areas of open water. The vegetated areas occupies 30 - 50 percent of the mapped units. See the description for the PEM1H, PEM1F and PEM1/OWF wetland types.

POW/EM1H Permanently flooded ponded basins and areas of low-centered polygons with 30 - 50 percent of the mapped units covered by persistent emergent vegetation. See descriptions for the PEM1H and PEM1/OWH wetland types.

POW/EM2H Permanently flooded ponded basins with 30 - 50 percent of the mapped units covered by non-persistent emergent vegetation. See the description for the PEM2H wetland type.

POWF Semipermanently flooded, small open water bodies (ponds). This wetland type is typically devoid of vegetation. If vegetation occurs, it will occupy less than 30 percent of the open water area.

POWH Permanently flooded, small open water bodies (ponds). This wetland habitat is typically devoid of vegetation.

PSS1A Temporarily flooded deciduous shrub areas on river floodplains. This wetland type often occurs on river bars that have become stable enough to support persistent woody vegetation. Salix spp. is the dominant vegetation and includes S. glauca, S. lanata and S. alaxensis. Graminoid species present may include Arctogrostis latifolia, Carex spp., Juncus sp., Equisetum spp., and Dryas sp. Plants described for PEM1A areas will generally occur in this wetland type. Herbaceous species cover less than 30 percent of the mapped units.

PSS1B Saturated dwarf shrub tundra. Salix spp. is the dominant vegetation and includes S. ovalifolia, S. arctica and S. lanata. Associated shrub species may also include Betula glandulosa, Ledum groenlandicum, Vaccinium uliginosum, Empetrum nigrum and Cassiope tetragona. Herbaceous emergent vegetation covers less than 30 percent of the areas mapped as PSS1B. Herbaceous species present, however, will be described for the PSS1/EM1B and PEM1/SS1B wetland types.

PSS1D Seasonally flooded deciduous shrub community occurring on well drained shores and bars of active river channels. Salix alaxensis and S. glauca are the most common species. Herbaceous emergent vegetation covers less than 30 percent of the area. The dominant emergent species are the same as those listed for the PSS1A wetland type.

PSS1E Seasonally flooded polygon tundra areas characterized by extremely wide polygon ridges surrounding small seasonally-flooded basins. The shrub dominated ridges have an areal coverage exceeding 70 percent of the mapped unit. Shrub species of importance include Salix arctica and Salix lanata. Salix reticulata and Salix rotundifolia may be found in the more well drained portions of the PSS1E wetland type. Associated shrub species may include Betula glandulosa, Rubus chamemorous, Ledum palustre and Vaccinium vitis-idaea. A sparse cover of emergent vegetation may be evident within this wetland type, however, the persistent emergent plants will constitute less than 30 percent of the mapped unit. Persistent emergent vegetation is described for the PEM1E, PEM1/SS1E and PSS1/EM1E wetland types.

PSS1/EM1A Temporarily flooded areas on river floodplains consisting of a mix of broad-leaved deciduous shrubs and emergent vegetation. Shrub species occupy 50 - 70 percent of the areas. For a complete listing of the shrub and emergent species, see the descriptions for the PEM1A, PSS1A and PEM1/SS1A wetland types.

PSS1/EM1B Saturated, dwarf shrub-graminoid tussock tundra. The dwarf shrub component has an areal coverage of 50 - 70 percent. Commonly referred to as "moist tundra," this is one of the most common wetland types to be found on the North Slope. The dominant species in this wetland type are similar to those described for the PEM1/SS1B wetland type. Homogeneous areas of PSS1B and PEM1B may also be found within this wetland type.

PSS1/EM1D Seasonally flooded, well drained areas on river floodplains consisting of a mix of broad-leaved deciduous shrubs and emergent vegetation. See the descriptions for the PEM1/SS1A, PSS1A and PEM1A wetland types for a listing of common species associated with the PSS1/EM1D wetland type.

PSS1/EM1E Seasonally flooded, saturated polygonal tundra areas consisting of a mix of dwarf shrubs and herbaceous emergent vegetation. The areas are characterized by wide, well developed polygon ridges and small, seasonally flooded basins. The shrub dominated ridges have a greater areal coverage than the emergent dominated basins. The most common species found in this wetland type are the same as those listed for the PEM1/SS1E wetland type. Homogeneous areas of PSS1E and PEM1E may occur within this wetland type.

PSS1/EM1F Polygonal tundra areas consisting of saturated polygon ridges and semipermanently flooded basins. The wide, well-developed ridges have a greater areal coverage than the small, semipermanently flooded basins. Carex aquatilis is the dominant species in the polygon basins. The shrub and emergent species on the drier ridges are the same as those described for the PEM1/SS1E wetland type. See also the descriptions for the PEM1F and PSS1E wetland types.

PSS1/OWH Polygonal tundra areas consisting of saturated polygon ridges and permanently flooded, unvegetated basins. The wide, well-developed shrubby ridges have a greater areal coverage than the ponded basins. The shrub species on the drier ridges are the same as those described for the PSS1E, PSS1B and PEM1/SS1E wetland types.

PSS1/USA Temporarily flooded areas on active river floodplains consisting of a mix of deciduous shrubs and unvegetated substrate. The shrub areas are dominated by willow and cover between 50 - 70 percent of the mapped units. Salix alaxensis and S. glauca are the most common shrub species. See the description for the PSS1A wetland type.

PSS1/USD Seasonally flooded areas on active river floodplains consisting of a mix of deciduous shrubs and unvegetated substrate. The shrub areas cover between 50 - 70 percent of the mapped units and are dominated by Salix alaxensis and S. glauca. This wetland type is similar to the PSS1/USA wetland type.

PUSA Temporarily flooded unvegetated sand and gravel bars within the active floodplains of streams and rivers. If persistent emergent or shrubby vegetation is present, it will cover less than 30 percent of the mapped units.

PUSD Seasonally flooded small basins (less than 20 acres in size) that typically contain standing water only during the early part of the growing season. When surface water is absent, the exposed substrate usually remains unvegetated.

PUS/EM1A This wetland code is the inverse of the PEM1/USA designation. The unconsolidated shore (bars or flats) component has a greater areal coverage than the herbaceous emergents. These wetlands are temporarily-flooded areas on river floodplains and in recently drained lake basins. Common plant species include Carex spp., Dupontia fisheri, Deschampsia caespitosa, and Epilobium latifolium. See the description for the PEM1A wetland type.

PUS/EM1E Seasonally flooded, saturated areas primarily in recently drained lake basins. These wetlands consist of a mix of unconsolidated shore (flats) and emergent vegetation. The substrate remains saturated following periods of flooding. The dominant species are similar to those listed for the PEM1/USA and PEM1A wetland types.

PUS/SS1A Sparsely vegetated gravel bars within the active floodplains of rivers and streams. Vegetation covers 30 - 50 percent of the mapped units and consists mainly of broad-leaved deciduous shrubs. See the description for the PSS1A wetland type.

PUS/SS1E Seasonally flooded, saturated areas along the periphery of recently drained lake basins. These wetlands consist of a sparse cover of broad-leaved deciduous shrubs. The substrate remains saturated following periods of flooding. See the description for the PSS1E wetland type.