

MAP REPORT: COASTAL GEORGIA UPDATES

Draft

I. INTRODUCTION

The U.S. Fish and Wildlife Service's National Wetland Inventory is producing maps showing the location and classification of wetlands and deepwater habitats of the United States. The Classification of Wetlands and Deepwater Habitats of the United States by Cowardin et al is the classification system used to define and classify wetlands. Photointerpretation conventions, hydric soils lists, and wetland plant lists are also available to enhance the use and application of the classifications system.

A. PURPOSE

The purpose of the notes to users is threefold: (1) to provide localized information regarding the production of NWI maps, including specific imagery and interpretation discussion; (2) to provide a descriptive cross-reference from wetland codes on the map to common terminology and representative plant species; and (3) to explain local geography, climate, and wetland communities.

II. FIELD RECONNAISSANCE

A. PROJECT AREA

1:100,000	Quad Name
Savannah SW	Rincon
	Port Wentworth
	Garden City
	Meldrim
	Meldrim SE
	Savannah

B. PERSONNEL

Charles Storrs - U.S. Fish and Wildlife Service, Region IV
Richard Eastlake - Greenhorne & O'Mara, Inc.

C. DATE OF FIELD TRIP

September 4-7, 2001

D. AERIAL PHOTOGRAPHY

Type: Color Infrared Transparencies NAPP

Scale: 1:40,000

Dates

02/13/99

02/16/99

02/22/99

03/07/99

03/22/99

E. COLLATERAL DATA

1. U.S.G.S. 1:24,000 Topographic Quads
2. Soil Surveys of the following counties:

Chatham
Effingham

3. U.S. Fish and Wildlife Service. National List of Plant Species That Occur in Wetlands: Georgia
4. Bailey, Robert G. Descriptions of the Ecoregions of the United States. U.S. Department of Agriculture, Forest Service, 1980.

III. DESCRIPTION OF PROJECT AREA

A. GEOGRAPHY

The project area is on the Atlantic Coastal Plain in Bailey's Southeastern Mixed Forest Province, Subtropical Division (1980). Most of the region is flat with little relief, rising slowly in a series of levels east to west to low rolling sandhills in the northwest section. Streams and rivers are slow and sluggish. The major rivers, the Ogeechee and the Savannah, have broad floodplains with braided diffuse streambeds and many meander scars. These rivers empty into the Atlantic through extensive saltmarsh estuaries formed behind an outer rim of barrier islands.

Unique elliptical depressions called Carolina bays are found in the northwest portion of the project area. These landforms are aligned northwest to southeast and have sandy rims around basins that are wet year round.

B. CLIMATE

The climate is subtropical with long warm humid summers and short mild winters. Precipitation (average 48-50 inches) occurs throughout the year, but is heaviest in July and August, and least from October to December.

C. VEGETATION

The original vegetation was mixed oak-hickory, hardwood forests and pine forests, but most have been cut over before 1900 and now the dominant vegetation is commercially managed, loblolly, longleaf, slash, and pond pine forest and sweetgum, blackgum, and yellow poplar floodplain forest. The estuarine areas are dominated by *Spartina alterniflora* and *J. roemerianus* in the marshes and loblolly pine on upland islands and shores.

D. SOILS

The soils in the project area are derived from marine and fluvial deposits consisting of sand, silt, and clay in various proportions. Most soils are sandy or sandy loam with loamy, clayey or mucky soils in saturated depressional areas and alongside streambeds. The larger rivers and saltmarshes have mineral, alluvial soils.

Human activities have been intensive since the area was settled in the late 17th century. Agriculture is still the dominant activity and the major crops are cotton, soybeans, and corn. Silviculture is also an important land use, especially in the northwestern portions of the project area. Recreation and tourism is important on the Atlantic Coast in Savannah.

IV. DESCRIPTION OF WETLAND HABITATS IN PROJECT AREA

A. MARINE SYSTEM

This consists of the subtidal (M1UBL) and intertidal (M2US,M,N,P) zones seaward of the barrier islands.

B. ESTUARINE SYSTEM

The estuarine system consists of the saltwater brackish habitats from the barrier islands to the inland extent of brackish waters (less than .5% salts). This area contains extensive areas of saltmarsh and open water (E1UBL). The dominant species are smooth cordgrass (*Spartina alterniflora*, E2EM1N) and blackrush (*Juncus roemerianus*, E2EM1P). Occasional shrubs appear near the estuarine-palustrine interface.

C. PALUSTRINE SYSTEM

Freshwater wetlands are extensive in the project area and are primarily forested floodplains, swamps and saturated depressions. Shrub-scrub and emergents occur primarily only where the original forest has been cut and removed.

Temporarily wet forest communities (A) are dominated by a hardwood mixture of sweetgum (Liquidambar styraciflua), laurel oak (Quercus laurifolia), water oak (Quercus nigra), red maple (Acer rubrum), sweet hickory (Arya glabra) and pine plantations, loblolly pine (Pinus Taeda). The temporary hardwood forests have a understory of small shrubs and ferns. The pine forests often have a thick understory of sedges, ground wax myrtle (Myrica cerifera), fetterbush and herbaceous plants.

Seasonally flooded forested wetlands are represented by blackgum (Nyssa sylvatica), sweetgum (Liquidambar styraciflua), red maple (Acer rubrum), willow oak (Quercus phellos), and Chinese Tallow. The understory is sparse and includes red bay (Persea borbonia), sweet bay (Magnolia virginiana), loblolly bay (Gordonia lasianthus) and wax myrtle (Myrica cerifera). Small seasonal gumponds occur throughout the pine forests.

Saturated (B) forested wetlands, in which the water table stays at or near the surface or the soil rarely dries out, are very common. Such areas include the distinctive Carolina bays, seepage slopes and drainages in the sandhill regions, and areas with slowly permeable clay soils. Common species are sweetgum, blackgum, water oak, loblolly and pond pine. Understory plants include red bay, sweetbay, loblolly bay, pepperbush (Clethra alnifolia), wax myrtle, fetterbush, gallberry (Ilex glabra), netted chain fern (Spaghnum sp.) and dog hobble (Leneoethrae oxillaris).

The dominant species in the semipermanently flooded (F) forests are blackgum, bald cypress (Taxodium distichum), red maple and tupelo (Nyssa aquatica). These swamps occurred mainly in the lower floodplains of the major rivers and the deeper meander scars.

Palustrine emergent areas were rare and usually occurred in powerline cuts, wet pastures or in impounded wetlands. The most extensive areas of freshwater emergents occur in the old abandoned rice fields along the Combahee River. Maidencane (Panicum hemitomon), bulrush (Scirpus sp.), cattail (Typha sp.), alligator flag (Thalia geniculator) and pickerel weed (Pantederia cordata) are found in semipermanently-flooded wetlands. Sedges and rushes are prevalent in seasonal wetlands as well as smartweed (Polygonum sp.), lizard's tail (Saururus cernuus) and arowgum (Pellondra virginica). Although not dominant, pitcher plants (Sarracenis minor) are common in saturated emergent wetlands.

Scrub-shrub areas are not common and usually are an early successional stage of the dominant forest type. Natural shrub communities occur in marsh communities near the palustrine estuarine interface. Common species are Bacchhris halmifolia, wax myrtle, willow and Atlantic white cedar (Charnaecyparis thyroids).

D. RIVERINE SYSTEM

Permanently flowing rivers and streams are labeled R2UBH or if they receive some influence from the tides, R1UBV. Channelized rivers and ditches are indicated with an 'x' modifier.

E. LACUSTRINE SYSTEM

The are no naturally occurring lakes in the project area. Impounded rivers or streams that cover more than 20 acres are labeled L1UBHh.

TABLE 1

WETLAND CLASSIFICATION CODES

NWI CODE (Water Regime)	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/ SUBSTRATE
E1UB (L)	Estuarine, subtidal, unconsolidated bottom including bays, inlets	Intracoastal waterways	Sand, mud
E2US (N)	Estuarine, intertidal, unconsolidated shore	Sand bar	Sand, mud
E2US (P)	Estuarine, intertidal, unconsolidated shore	Salt flat	<u>Salicornia sp.</u> <u>Borrichia frutescens</u>
E2SS1 (P)	Estuarine shrubs	Shrubs	<u>Baccharis sp.</u> <u>Iva frutescens</u> (marsh elder) <u>Chamaecyparis</u> <u>thyroids</u> (Atlantic white cedar) <u>Myrica cerifera</u> (wax myrtle)
E2EM1 (N,P)	Estuarine, intertidal	Salt marsh	<u>S. cynosuroides</u> (big cord grass) <u>Juncus roemerianus</u> (black rush) <u>Distichlis spicata</u> (salt grass) <u>S. alterniflora</u> (smooth cord grass)
R1UB (V)	Riverine, tidal, perennial, unconsolidated bottom	River, canal	Sand, mud
R1US (N)	Riverine, tidal, unconsolidated shore	Sand bar	Sand, gravel
R1AB4 (H)	Riverine, tidal	River, canal	<u>Lemna sp.</u> (duckweed)

WETLAND CLASSIFICATION CODES

NWI CODE (Water Regime)	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/ SUBSTRATE
R2UB (H)	Riverine, lower perennial, unconsolidated bottom	River, canal	Sand, mud
R2AB4 (H)	Riverine, lower perennial, floating aquatic bed	River, canal	<u>Lemna</u> sp. (duckweed)
R2US (A,C)	Riverine, lower perennial, unconsolidated shore	Sand bar	Sand, gravel
R4SB (C,F)	Riverine, intermittent stream bed	Stream, canal	Sand, mud, gravel
L1UB (H,V)	Lacustrine, limnetic, unconsolidated bottom	Lake	Sand, mud
L2AB4 (H,G,V)	Lacustrine, littoral, aquatic bed, floating vascular	Lake	<u>Lemna</u> sp. (duckweed) <u>Azolla caroliniana</u> (mosquito fern)
PUB (G,H,V)	Palustrine, unconsolidated bottom	Pond	Sand, mud
PAB3 (H,G,V)	Palustrine, aquatic bed, rooted vascular	Pond	<u>Nymphaea</u> sp. (water lily)
PAB4 (H,G,V)	Palustrine, aquatic bed, floating vascular	Pond	<u>Lemna</u> sp. (duckweed) <u>Azolla caroliniana</u> (mosquito fern)
PEM1 (A,B)	Palustrine, emergent, persistent, temporarily flooded	Wet prairies	<u>Juncus</u> sp. (rush) <u>Cyperus</u> sp. (flat sedge) <u>Carex</u> sp. (sedges) <u>Setaria</u> sp. (foxtail) <u>Sarracenia minor</u> (hooded pitcher plant) <u>Iris</u> sp. <u>Rhexia</u> sp.(meadow beauty)

WETLAND CLASSIFICATION CODES

NWI CODE (Water Regime)	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/ SUBSTRATE
PEM1 (C,F,G,H,R,T,V)	Palustrine, emergent seasonally to permanently flooded	Wet prairies, marshes	<u>Panicum hemitomon</u> (maidencane) <u>Sagittaria latifolia</u> (duck potato) <u>Typha</u> sp. (cattail) <u>Polygonum</u> sp. (smartweed) <u>Zizaniopsis miliaceae</u> (giant cutgrass) <u>Cladium jamaicense</u> (saw grass) <u>Iris</u> sp. (blue flag) <u>Thalia geniculata</u> (alligator flag) <u>Pontederia cordata</u> (pickeralweed) <u>Carex</u> sp. (sedges)
PSS1A PSS1/4A	Palustrine, scrub shrub, broad-leaved deciduous/mixed broad-leaved deciduous and pine	Scrub, shrubby forest	<u>Baccharis</u> sp. (saltbush) <u>Hypericum</u> sp. (St. Johnswort) <u>Salix</u> sp. (willow) <u>Rubus</u> sp. (blackberry) <u>Pinus elliotii</u> (slash pine) <u>Pinus taeda</u> (loblolly pine) <u>Myrica cerifera</u> (wax myrtle) <u>Rhexia</u> sp.(meadow beauty) <u>Liriodendron</u> <u>tulipifera</u> (yellow poplar) <u>Magnolia virginiana</u> (sweet bay) <u>Nyssa sylvatica</u> (blackgum) <u>Acer rubrum</u> (red maple)

WETLAND CLASSIFICATION CODES

NWI CODE (Water Regime)	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/ SUBSTRATE
PSS1B PSS1/3B PSS3B	Palustrine, scrub shrub, broad-leaved deciduous/mixed broad-leaved deciduous and broad-leaved evergreen	Seeps, bays, bottomland	<u>Nyssa sylvatica</u> (blackgum) <u>Acer rubrum</u> (red maple) <u>Liquidambar styraciflua</u> (sweetgum) <u>Persea borbonia</u> (red bay) <u>Pinus taeda</u> (loblolly pine) <u>Magnolia virginiana</u> (sweet bay) <u>Ilex glabra</u> (inkberry) <u>Clethera alnifolia</u> (pepperbush) <u>Cyrilla racemiflora</u> (titi) <u>Osmundia cinnomonea</u> (cinnamon fern) <u>Liriodendron tulipifera</u> (yellow poplar) <u>Myrica cerifera</u> (wax myrtle) <u>Arundinaria gigantea</u> (giant cane)
PSS1C (F)	Palustrine, scrub shrub, broad-leaved deciduous, seasonally or semi-permanently flooded	Thicket, swamp	<u>Salix</u> sp. (willow) <u>Myrica cerifera</u> (wax myrtle) <u>Baccharis</u> sp. (saltbush) <u>Acer rubrum</u> (red maple) <u>Nyssa sylvatica</u> (blackgum) <u>Forestiera acuminata</u> (swamp privet) <u>Cephalanthus occidentalis</u> (buttonbush) <u>Taxodium distichum</u> (baldcypress)

WETLAND CLASSIFICATION CODES

NWI CODE (Water Regime)	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/ SUBSTRATE
PFO1A	Palustrine, forested	Bottom-land	<u>Quercus nigra</u> (water oak) <u>Q. phellos</u> (willow oak) <u>Liquidambar styraciflua</u> (sweetgum) <u>Fraxinus pennsylvanicus</u> (green ash) <u>Q. falcata</u> (S. red oak) <u>Salix</u> sp. (willow) <u>Celtus laevigata</u> (sugarberry) <u>Sapium sebiferum</u> (Chinese tallow) <u>Carya glabra</u> (pignut hickory) <u>Acer rubrum</u> (red maple) <u>Ulnus</u> sp. (elm) <u>Ostrya virginiana</u> (ironwood) <u>Serenoa repens</u> (palmetto) <u>Nyssa sylvatica</u> (blackgum) <u>Liriodendron tulipifera</u> (yellow poplar) <u>Q. laurifolia</u> (laurel oak) <u>Vaccinlum</u> sp. (blueberry) <u>Q. michauxi</u> (sw chestnut oak) <u>Q. prinus</u> (chestnut oak) <u>Vitis</u> sp. (grapevine) <u>Ilex opaca</u> (American holly)

WETLAND CLASSIFICATION CODES

NWI CODE (Water Regime)	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/ SUBSTRATE
PFO1B PFO1/3B PFO4B PFO3B	Palustrine, forested, saturated	Seeps, Carolina bays, bottomland	<u>Quercus nigra</u> (water oak) <u>Persea borbonia</u> (red bay) <u>Clethera alnifolia</u> (pepperbush) <u>Osmundia cinnomonea</u> (cinnamon fern) <u>Liquidamber styraciflua</u> (sweetgum) <u>Acer rubrum</u> (red maple) <u>Nyssa sylvatica</u> (blackgum) <u>Woodwardia virginica</u> (virginia chain fern) <u>Leucothoe axillaris</u> (dog hobble) <u>Pinus taeda</u> (loblolly pine) <u>Pinus elliotii</u> (slash pine) <u>Liriodendron tulipifera</u> (yellow poplar) <u>Quercus laurifolia</u> (laurel oak) <u>Spagnum</u> sp. <u>Gordonia lasianthus</u> (loblolly bay) <u>Lyonia lucida</u> (fetterbush) <u>Ostrya virginiana</u> (ironwood) <u>Ilex opaca</u> (American holly)
PFO4A PFO1/4A(S) PFO4/1A(S)	Palustrine, forested, broad-leaved deciduous/broad- leaved deciduous-pine mixed, temporarily flooded	Pine forests, pine plantation	<u>Nyssa sylvatica</u> (blackgum) <u>Pinus taeda</u> (loblolly pine) <u>Pinus elliotii</u> (slash pine) <u>Clethera alnifolia</u> (pepperbush)

WETLAND CLASSIFICATION CODES

NWI CODE (Water Regime)	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/ SUBSTRATE
PFO1C (R)	Palustrine, forested, broad-leaved deciduous, seasonally flooded	Swamp	<u>Quercus nigra</u> (water oak) <u>Q. phellos</u> (willow oak) <u>Nyssa sylvatica</u> (blackgum) <u>Persea borbonia</u> (red bay) <u>Q. falcata</u> (s. red oak) <u>Salix</u> sp. (willow) <u>Clethera alnifolia</u> (pepperbush) <u>Sapium sebiferum</u> (chinese tallow) <u>Acer rubrum</u> (red maple) <u>Taxodium distichum</u> (baldcypress) <u>Quercus laurifolia</u> (laurel oak) <u>Woodwardia areolata</u> (netted chain fern) <u>Saururus cernuas</u> (lizardtail) <u>Peltandra virginica</u> (arrow arum) <u>Myrica cerifera</u> (wax myrtle) <u>Osmunda regalis</u> (royal fern)

WETLAND CLASSIFICATION CODES

NWI CODE (Water Regime)	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/ SUBSTRATE
PFO2F (C,R,T) PFO2/1F (C,R,T) PFO1/2F (C,R,T) PFO1F	Palustrine, forested, needle-leaved deciduous/needle- leaved-deciduous and broad-leaved deciduous mixed	Cypress swamp, Cypress-tupelo swamp, slough	<u>Taxodium distichum</u> (baldcypress) <u>Nyssa aquatica</u> (water tupelo) <u>Nyssa sylvatica</u> (blackgum) <u>Salix</u> sp. (willow) <u>Acer rubrum</u> (red maple) <u>Liquidamber styraciflua</u> (sweetgum) <u>Cephalanthus occidentalis</u> (buttonbush)
PFO1/3 (A,C) PFO3/1 (A,C)	Palustrine, forested, broad-leaved deciduous/broad- leaved evergreen mixed	Bottomland hardwoods, bayhead	<u>Nyssa sylvatica</u> (blackgum) <u>Persea borbonia</u> (red bay) <u>Cyrilla racemiflora</u> (titi) <u>Acer rubrum</u> (red maple) <u>Q. nigra</u> (water oak)

V. WATER REGIME DESCRIPTION

TIDAL

Salt and Brackish Areas – Marine and Estuarine Systems

- (L) Subtidal – The substrate is permanently flooded with tidal water.
- (M) Irregularly Exposed – Land surface is exposed by tides less often than daily. This corresponds to the area on NOS charts from seaward edge of light green tone (mean low water) to depth contour approximating extreme low water.
- (N) Regularly Flooded – Tidal water alternately floods and exposes the land surface at least once daily.
- (P) Irregularly Flooded – Tidal water floods land surface less often than daily. The area must flood by tide at least once yearly as a result of extreme high spring tide.

Freshwater Tidal Areas – Lacustrine, Palustrine and Riverine Systems

- (N) Regularly Flooded – Fresh tidal water alternately floods and exposes the land surface at least once daily.
- (R) Seasonally Flooded – Tidal
- (S) Temporarily Flooded – Tidal
- (T) Semi-permanently Flooded – Tidal
- (V) Permanently Flooded – Tidal

NON-TIDAL

- (A) Temporarily Flooded – Surface water present for brief periods during growing season, but water table usually lies well below soil surface. Plants that grow both in uplands and wetlands are characteristic of this water regime.
- (B) Saturated – The substrate is saturated to surface for extended periods during the growing season, but surface water is seldom present.
- (C) Seasonally Flooded – Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is

extremely variable, extending from saturated to a water table well below the ground surface.

- (F) Semi-permanently Flooded – Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land's surface.
- (G) Intermittently Exposed – Surface water is present throughout the year except in years of extreme drought.
- (H) Permanently Flooded – Water covers land surface throughout the year in all years.
- (K) Artificially Flooded – The amount and duration of flooding is controlled by means of pumps or siphons in combination with dikes or dams.

SPECIAL MODIFIERS

- (x) Excavated – Water lies in or flows through a basin or channel dug by man.
- (h) Impounded – The normal flow of water is impeded by a manmade dike or barrier.
- (s) Spoil – Formed from sediments deposited by dredging operations.

Coastal Georgia Update

Photographic Interpretation Conventions

Draft

I. Riverine System

The Riverine system categorizes all wetlands that fall within a channel, either naturally or artificially created, except those dominated by vegetative cover or habitats containing more than .05% ocean derived salts. This environment nearly always entails flowing water. This classification encompasses most all of the rivers, streams, and ditches in the work area, except near their terminal ends in the Atlantic Ocean. This system also incorporates all freshwater rivers under tidal influence.

A) R2UBH:

Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded.

The R2UBH classification is used for permanent rivers in the work area that are unaffected by tidal influence, these areas show an open water photo signature. Most of the rivers in this area have a low gradient, slow water velocity, and well-developed floodplains. However, a few rivers in the work area have a slightly steeper gradient with less developed floodplains, but still fall into the R2 Subsystem. Portions of perennial and intermittent streams obscured by tree canopy will be classified under the Palustrine System.

B) R1UBV:

Riverine, Tidal, Unconsolidated Bottom, Permanently Flooded.

Most of the rivers in the work area can be classified as R2UBH, but as they near the Atlantic Ocean, these rivers are influenced by tidal action and are classified as R1UBV. These tidal influences are reflected in the plant communities and the sediment deposition that occurs in these areas. The photo signature is of open water.

C) R2USC/R2USA:

Riverine, Lower Perennial, Unconsolidated Shore, Seasonally/Temp-orarily Flooded.

Sand and mud flats along the R2UBH rivers will be classified R2USC and R2USA. Their signatures will vary from bluish-gray to white.

D) R1USR:

Riverine, Tidal, Unconsolidated Shore, Seasonally Flooded.

Sand and mud flats along the R1UBV rivers will be classified R1USR. The signatures will vary from bluish-gray to white.

E) R4SBC:

Riverine, Intermittent, Streambed, Seasonally Flooded.

Intermittent streams with little or no water visible, will be classified R4SBC. These wetlands must have a clearly discernable streambed, of at least pen-width in size on the aerial photo in order to be delineated. The signature may be blue, blue-gray, or white. R4SBC will not be utilized often within the work area, and mainly it will be used as a connector from wetland polygon to wetland polygon.

II. Lacustrine System

Lakes and reservoirs larger than 20 acres within the work area will be classified under the lacustrine system. When a beaver dam impedes water flow and creates a pond, it will carry the b modifier. If a road, natural feature, or manmade object impounds a lake or otherwise impedes water flow, it will carry the h modifier. Excavated pits, such as mining pits, containing water will have the x modifier attached.

A) L1UBH

Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded.

Limnetic areas include all deep-water habitats within the lacustrine system. The signature of L1UBH is that of open water which has a smooth appearance and a color range from shades of blue to black. Excavated lakes are often surrounded by a white signature, which represents the materials removed from the ground.

B) L2USC/L2USA

Lacustrine, Littoral, Unconsolidated Shore, Seasonally/Temporarily Flooded.

Littoral environments include all wetland habitats in the lacustrine system less than 2 meters in depth or to the extent of aquatic vegetation. This classification refers to flat non-vegetated areas along the edges of L1UBH water bodies that are able to be flooded. The signature can range from white to light blue (L2USA) to medium blue-gray (L2USC).

C) L2AB3H

Lacustrine, Littoral, Aquatic Bed, Rooted Vascular, Semipermanently/Permanently Flooded. The main species within this classification include water lilies (Nymphaea spp.) and parrot feather (Myriophyllum aquaticum).

This community is usually found in oxbow lakes and impounded lakes. The vegetation returns a smooth textured whitish-pink to pinkish-red signature.

D) L2AB4F/L2AB4H:

Lacustrine, Littoral, Aquatic Bed, Floating Vascular, Semipermanently/Permanently Flooded. Duckweed (Lemna spp.) is the vegetation that is dominate.

This community is usually found in oxbow lakes, impounded lakes or in beaver ponds. The vegetation signature is a shiny pink.

III. Palustrine System

Palustrine wetlands comprise the majority of wetland acreage in the study area. The palustrine system includes all non-tidal wetlands dominated by trees, shrubs, and persistent emergents. This system also encompasses all wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 percent. Open water and aquatic bed areas smaller than 20 acres and less than 2 meters in depth are also included in this system. When a beaver dam impedes water flow and creates a pond, it will carry the b modifier. If a road, natural feature, or manmade object impounds a pond or otherwise impedes water flow, it will carry the h modifier. Excavated pits, such as mining pits, containing water will have the x modifier attached. Many palustrine wetlands in the work area have been drained for agricultural, logging or urban purposes; these areas will be labeled with a d modifier. Typically the d modifier is associated with saturated pine forests that have been drained in an attempt to create a pine plantation.

A) PFO1A:

Palustrine, Forested, Broad-Leaved Deciduous, Temporarily Flooded. These areas consist mainly of: red maple (*Acer rubrum*), box elder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), willow oak (*Quercus phellos*), sycamore (*Platanus occidentalis*), and elm (*Ulmus spp.*).

This classification is usually used for river floodplains, along natural drainages and occasionally in small shallow depressions on upland flats. In leaf-off photography, the deciduous trees have a gray-green overstory signature, which is typically mottled with a rust red understory attributed to the evergreen shrub chinese privet.

B) PFO1B:

Palustrine, Forested, Broad-Leaved Deciduous, Saturated. This classification includes mostly these species: tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), swamp tupelo (*Nyssa sylvatica var. biflora*) and water oak (*Quercus nigra*).

This community type is usually found on slopes, in Carolina bays, and along many of the study area's natural drainages. The saturated deciduous forest has no specific signature. The saturated water regime is derived by landscape position, soils, and general knowledge of the area. Many times PFO1B is associated with a saturated evergreen shrub-scrub understory (PSS3B) which returns a scarlet red signature. These areas often are labeled with a split class, PFO1/SS3B.

C) PFO1C:

Palustrine, Forested, Broad-Leaved Deciduous, Seasonally Flooded. These areas are dominated by: sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), black gum (*Nyssa sylvatica*), ironwood (*Carpinus caroliniana*) and swamp cottonwood (*Populus heterophylla*).

This community is usually found along natural drainages with well-developed floodplains. The winter photography usually captures these areas with standing water, which gives them a darker gray-green return than the PFO1A with no evident evergreen understory present.

D) PFO1F:

Palustrine, Forested, Broad-Leaved Deciduous, Semipermanently Flooded. The trees in these areas mainly consist of: red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), alder (*Alnus serrulata*), water tupelo (*Nyssa aquatica*), and black gum (*Nyssa sylvatica*).

This wetland type usually occurs in river floodplains, oxbows, sloughs, and ponds impounded by beaver dams. Standing water is usually present underneath the tree canopy. This deciduous vegetation returns a dark gray-blue to dark black signature. At these sites, little to no understory is visible due to the presence of standing water.

E) PFO1R:

Palustrine, Forested, Broad-Leaved Deciduous, Seasonal-Tidal. The trees in this classification include, but are not limited to: sweet gum (Liquidambar styraciflua), red maple (Acer rubrum), river birch (Betula nigra), black gum (Nyssa sylvatica), ironwood (Carpinus caroliniana), green ash (Fraxinus pennsylvanica), and swamp cottonwood (Populus heterophylla).

This classification only occurs within river flood plains that are affected by the tides. The photo signature and species type is similar to that of PFO1C, the difference being tidal influence. The signature is a blue-green to gray-green.

F) PFO1T:

Palustrine, Forested, Broad-Leaved Deciduous, Semipermanent-Tidal. The dominant species in this community are: red maple (Acer rubrum), sweet gum (Liquidambar styraciflua), Alder (Alnus serrulata), water tupelo (Nyssa aquatica), and black gum (Nyssa sylvatica).

This wetland type also occurs only within river flood plains that are affected by the tidal range. The water levels in these flooded areas fluctuate due to tidal influence, rainfall and drainage patterns. The photo signature and species type is similar to that of PFO1F, the difference being tidal influence. The signature appears as an even blue-green to dark blue signature with standing water present in the understory.

G) PFO2C:

Palustrine, Forested, Needle-Leaved Deciduous, Seasonally Flooded. In the Southeastern United States this classification is bald cypress (Taxodium distichum) stands.

Bald cypress is usually found in river floodplains and certain depressional areas in the work area. In leaf-off photography, dense stands of bald cypress usually appear white-gray with a fluffy texture, or conical shaped white dots. In open stands or mixed stands, this is very difficult to consistently identify.

H) PFO2F:

Palustrine, Forested, Needle-Leaved Deciduous, Semipermanently Flooded. This classification primarily refers to bald cypress (Taxodium distichum).

Bald cypress found in semipermanently flooded areas are usually associated with oxbows and sloughs. They also have a tendency to cover large, flat riverbanks in association with water tupelo (Nyssa Aquatica). Cypress crowns usually have a white-gray return, due to dead leaves, with a fluffy texture in winter photography. Unlike the PFO2C, the PFO2F may have standing water at the time of the photography and exhibit a very dark signature. Experience in the southeast flood plains leads one to infer that river scars will have cypress as a dominant tree species.

I) PFO3B:

Palustrine, Forested, Broad-Leaved Evergreen, Saturated. The dominant trees found in this community include, but are not limited to, sweet bay (Magnolia virginiana) and red bay (Persea borbonia). Associated shrubs include: titi (Cyrilla racemiflora), wax myrtle (Myrica cerifera), and holly/gallberry (Ilex spp.).

These areas will be found in saturated areas of river flood plains and in Carolina bays. In leaf-off photography, the broad-leaved evergreen trees will return a dark pink to red signature with large, fluffy crowns. Not many of these areas are large enough to map as individual polygons.

J) PFO4A:

Palustrine, Forested, Needle-Leaved Evergreen, Temporarily Flooded. The cover type that dominates these areas is usually loblolly pine (Pinus taeda) and rarely long leaf pine (Pinus palustris).

The loblolly pine trees are usually planted in rows in upland sites for timber purposes. Pine often grows naturally in clear-cut areas or on spoil piles near shipping channels. Pines produce a reddish-brown conical signature in open strands of river floodplains. Many of these areas are drained wetland soils.

K) PFO4B:

Palustrine, Forested, Needle-Leaved Evergreen, Saturated. The dominant species found in this classification are pond pine (Pinus serotina) and loblolly pine (Pinus taeda).

This community is found in river floodplains, Carolina bays, large flat areas and small depressions. The saturated pine returns a reddish-gray to brownish-gray conical signature. Pines growing in hydric soils often result in stunted growth, which produces a rough crown signature with uneven tree height. This uneven growth is due to varying conditions of soil, water and nutrients.

L) PSS1A:

Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Temporarily Flooded. This classification consists mainly of juvenile species less than 20 feet in height such as: willow oak (Quercus phellos), red maple (Acer rubrum), and willows (Salex spp.).

This wetland type is often found in river floodplains or along riverbanks. In leaf-off photography, the deciduous vegetation usually generates a rough textured gray-green or brownish-green signature. Often small amounts of evergreen or semi-evergreen vegetation are found in the area, which return a few mottled patches of rough textured, pinkish-red crowns.

M) PSS1B:

Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Saturated. This classification mostly consists of juvenile species such as: black gum (Nyssa sylvatica), red maple (Acer rubrum), and alder (Alnus serrulata).

This vegetation type is usually found near beaver dams, Carolina bays, and saturated river flood plains. In leaf-off photography, this rare community type generates a rough textured, bluish-green signature. These areas are generally in a transitional phase to forestation following a logging event.

N) PSS1C:

Palustrine, Scrub-Shrub, Broad-Leaved, Deciduous, Seasonally Flooded. Some of the juvenile species encountered here include: sweet gum (Liquidambar styraciflua), red maple (Acer rubrum), willows (Salex spp.), river birch (Betula nigra), tulip poplar (Liriodendron tulipifera) and swamp cottonwood (Populus heterophylla).

This community type is found within river flood plains and Carolina bays. In leaf-off photography, the deciduous vegetation usually generates a slightly rough textured, gray-green or brownish-green signature, darker than PSS1A.

O) PSS1F:

Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Semipermanently Flooded. Juvenile species in this classification mainly include: red maple (*Acer rubrum*), alder (*Alnus serrulata*), water tupelo (*Nyssa aquatica*), and willow (*Salix spp.*).

This community type usually occurs on vegetated riverbanks within oxbows and sloughs, and is also found near vegetated lakes impounded by small beaver dams. This deciduous vegetation appears rough textured, with a dark gray-blue to dark black signature in leaf-off photography. Usually small standing water pockets generate dark gray to black signatures visible through the vegetation canopy.

P) PSS1R:

Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Seasonal-Tidal. This community primarily contains juvenile species such as: sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), willows (*Salix spp.*), river birch (*Betula nigra*), tulip poplar (*Liriodendron tulipifera*) and swamp cottonwood (*Populus heterophylla*).

This community type is found within river flood plains that are influenced by the tides. In leaf-off photography, the deciduous vegetation usually generates a slightly rough textured, gray-green or brownish-green signature, similar to PSSIC.

Q) PSS1T:

Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Semipermanent-Tidal. The most common juvenile species found in this classification are red maple (*Acer rubrum*), alder (*Alnus serrulata*), water tupelo (*Nyssa aquatica*), and willow (*Salix spp.*).

This classification usually occurs along tidal rivers, mainly within oxbows and sloughs. This deciduous vegetation appears rough textured, with a dark gray-blue to dark black signature in leaf-off photography, similar to PFO1F. Usually small standing water pockets generate dark gray to black signatures visible through the vegetation canopy.

R) PSS3A:

Palustrine, Scrub-Shrub, Broad-Leaved Evergreen, Temporarily Flooded. The dominant cover types in this classification are: red bay (*Persea borbonia*), sweet bay, fetterbush (*Lyonia lucida*), (*Magnolia virginiana*), titi (*Cyrilla racemiflora*), wax myrtle (*Myrica cerifera*), and holly/gallberry (*Ilex spp.*).

This community type typically occurs on the fringes of estuaries (within freshwater), and atop spoil piles in saline channels and waterways. In leaf-off photography, this community type generates a pinkish-red signature with a rough texture.

S) PSS3B:

Palustrine, Scrub-Shrub, Broad-Leaved Evergreen, Saturated. The dominant cover types in this classification are: red bay (Persea borbonia), fetterbush (Lyonia lucida), sweet bay (Magnolia virginiana), titi (Cyrilla racemiflora), wax myrtle (Myrica cerifera), and holly/gallberry (Ilex spp.).

This wetland type is found mainly inside the confines of a typical Carolina bay, as well as in saturated areas of river flood plains that are devoid of draining and ditching practices. In leaf-off photography, this community type generates a pinkish-red to deep red signature with a rough texture. The understory will appear darker and wetter than PSS3A.

T) PSS4A:

Palustrine, Scrub-Shrub, Needle-Leaved Evergreen, Temporarily Flooded. The tree canopy mostly consists of juvenile loblolly pine (Pinus taeda) and longleaf pine (Pinus palustris).

Loblolly and longleaf pines are usually found in upland plantations. This community type is very uncommon and many times is associated with drained or ditched areas to reduce water levels (classified with a "d" modifier). Juvenile loblolly or longleaf pine plantations generate a green background signature with small red rows or dots. As they mature, loblolly and longleaf pine generate a rough-textured, brownish-red signature.

U) PSS4B:

Palustrine, Scrub-Shrub, Needle-Leaved Evergreen, Saturated. The dominant trees in this community are juvenile pond pine (Pinus serotina) and loblolly pine (Pinus taeda).

This wetland type is often found in organic soils in Carolina Bays, along riverbanks, and within other isolated depressional areas. The saturated juvenile pines produce reddish gray-green signatures, with a fluffy texture.

V) PEM1A:

Palustrine, Emergent, Persistent, Temporarily Flooded. The vegetation consists mainly of: wool grass (Scirpus cyperanus), soft rushes (Juncus effuses), Virginia creeper (Parthenocissus quinquefolia), trumpet creeper (Campsis radicans), and broomsedge (Andropogon virginicus).

This vegetation is found in river floodplains and around lakes with fluctuating seasonal water elevation. This plant community generates a smooth textured, brownish-green to grayish-green signature.

W) PEMIB:

Palustrine, Emergent, Persistent, Saturated. The emergent vegetation that occurs most frequently here is: wool grass (Scirpus cyperanus), soft rushes (Juncus effuses), giant cane (Arundinaria gigantea), lady fern (Athyrium spp.), netted chain fern (Woodwardia areolata), cinnamon fern (Osmunda cinnamomea), royal fern (Osmunda regalis) and broad leaf cattail (Typha latifolia)

This wetland community is associated with lakes, ponds, depressional areas, and slopes. The signature will be smooth textured, and have a dark bluish-green to grayish-green color. Some signatures also have a white appearance, which is indicative of dead vegetation or deteriorating terminal ends.

X) PEMIC:

Palustrine, Emergent, Persistent, Seasonally Flooded. The dominant vegetation mainly consists of: Virginia creeper (Parthenocissus quinquefolia), net veined chain fern (Woodwardia areolata), maidencane (Panicum hemitomon), marsh seedbox (Ludwigia palustris), smartweed (Polygonum punctatum), woolgrass (Scirpus cyperinus), lizard tail (Saururus cernuus) and various rushes (Juncus spp.).

This vegetation is found around or in lakes with seasonal water elevation fluctuations, as well as within river floodplains. The signature will be smooth textured, and have a dark bluish-green to grayish-green color. Some signatures also have a white appearance, which is indicative of dead vegetation or deteriorating terminal ends.

Y) PEMIF:

Palustrine, Emergent, Persistent, Semipermanently Flooded. This community consists mainly of: cattail (Typha latifolia), giant cutgrass (Zizania miliacea), marsh seedbox (Ludwigia palustris), sedges (Carex spp.), iris (Iris spp.), spatterdock (Nuphar luteum), royal fern (Osmunda regalis), arrowhead (Sagittaria spp.), bulrushes (Scirpus spp.), and various rushes (Juncus spp.).

This wetland type is associated with oxbow lakes, stagnant sloughs and ponds. The vegetative cover is found near the edges, and within bodies of water. This vegetation usually produces a smooth, dark gray-green signature with patches of open water. Some signatures also have a white appearance, which is indicative of dead vegetation or deteriorating terminal ends.

Z) PEMIN:

Palustrine, Emergent, Persistent, Regularly Flooded Tidal. The dominant vegetation primarily consists of rice cutgrass (Leersia oryzoides).

The remains of rice plantations are evident in these areas due to the dikes that remain in trellis drainage patterns. This vegetation is found within low-lying, flat floodplains along rivers affected by tidal fluctuations. The signature will be smooth textured, and have a brownish-green to grayish-green color, similar to PEM1C. Some signatures also have a white appearance, which is indicative of dead vegetation or deteriorating terminal ends.

AA) PEM1T:

Palustrine, Emergent, Persistent, Semipermanent-Tidal. This community consists mainly of rice cutgrass (Leersia oryzoides).

This community is associated with oxbow lakes and sloughs along tidally influenced rivers. This vegetation usually produces a smooth, dark gray-green signature with patches of open water. Some signatures also have a white appearance, which is indicative of dead vegetation or deteriorating terminal ends.

BB) PAB3F/PAB3H:

Palustrine, Aquatic Bed, Rooted Vascular, Semipermanently/Perm-anently Flooded. The main species within this classification include water lilies (Nymphaea spp.) and parrot feather (Myriophyllum aquaticum).

This community is usually found in oxbow lakes, impounded lakes or in beaver ponds. The vegetation generates a smooth textured, blackish-green or whitish-pink signature.

CC) PAB4F/PAB4H:

Palustrine Aquatic Bed, Floating Vascular, Semipermanently/Perm-anently Flooded. Duckweed (Lemna spp.) is the vegetation that dominates these areas.

This community is usually found in oxbow lakes, impounded lakes or in beaver ponds. The vegetation signature is a shiny pink.

DD) PUSC/PUSA

Palustrine, Unconsolidated Shore, Seasonally/Temporarily Flooded.

This classification refers to flat non-vegetated areas smaller than 20 acres, or non-vegetated areas along the edges of ponds and rivers. The signature can range from white to light blue (PUSA) to medium blue-gray (PUSC).

EE) PUSR/PUSS

Palustrine, Unconsolidated Shore, Seasonally/Temporarily Flooded Tidal.

This classification refers to flat non-vegetated areas smaller than 20 acres along the edges of tidal rivers. The signature can range from white to light blue (PUSS) to medium blue-gray (PUSR).

FF) PUBH:

Palustrine, Unconsolidated Bottom, Permanently Flooded.

This classification refers to open bodies of water smaller than 20 acres and less than two meters in depth. These areas are often diked or impounded through man-made structures and carry the “h” modifier. Many small ponds are formed along freshwater rivers through beaver activity and these areas bear the “b” modifier. The open water signature is a smooth light blue to black.

IV. Estuarine System

This system not only encompasses coastal estuaries and lagoons, but also areas that extend upstream and land-ward to where ocean-derived salts measure less than 0.5% during the period of average annual low flow. This boundary between riverine and estuarine is an arbitrary boundary because daily salinity levels fluctuate due to the tidal range. This system also incorporates the limits of wetland emergents, trees and shrubs to their seaward boundary. Estuarine systems derive most of their characteristics from land associations, rather than from marine influences. These areas may vary from relatively stable to highly variable salinity levels, depending upon tidal range and ability to exchange ocean water due to natural or man-made obstructions.

A) E2FO4P:

Estuarine, Intertidal, Forested, Needle-Leaved Evergreen, Irregularly Flooded.

The dominant tree species in this community are: slash pine (*Pinus elliotti*) and loblolly pine (*Pinus taeda*).

This wetland type occurs mainly on the fringes of tidal estuaries and atop spoil islands and other low islands in saline channels and waterways. In leaf-off photography, this community type generates a pinkish-red to red signature with fluffy tree crowns.

B) E2SS3P:

Estuarine, Intertidal, Scrub-Shrub, Broad-Leaved Evergreen, Irregularly Flooded.

The dominant plant species in this community are: wax myrtle (Myrica cerifera), marsh elder (Iva frutescens), and false willow (Baccharis halimifolia).

This wetland type occurs mainly on the fringes of tidal estuaries and atop spoil piles in saline channels and waterways. In leaf-off photography, this community type generates a pinkish-red to red signature with a rough texture.

C) E2EM1P:

Estuarine, Intertidal, Emergent, Persistent, Irregularly Flooded.

The dominant species in these areas is black needle rush (Juncus roemarianus), although rice cutgrass (Leersia oryzoides) can be found along the saltwater/freshwater boundaries.

This vegetation is found within what is known as, “high salt marsh,” which is the fringe domain of a tidally influenced brackish estuary. These areas are high enough above mean high water not to be flooded daily with the tidal cycle, but rather are only flooded during times of extreme high water, as from a storm surge for example. The signature is smooth textured, and have a brownish-green to grayish-green color, similar to PEM1C. Some signatures also have a white appearance, which is indicative of dead vegetation or deteriorating terminal ends.

D) E2EMIN:

Estuarine, Intertidal, Emergent, Persistent, Regularly Flooded.

The vegetation in these areas mainly consists of salt marsh cordgrass (Spartina alterniflora), although rice cutgrass (Leersia oryzoides) can be found along the saltwater/freshwater boundaries.

This vegetation is found within what is known as, “low salt marsh,” which is the portion of a tidally influenced brackish estuary that is flooded and exposed by the tidal range. This vegetation usually produces a smooth, dark gray-green signature with occasional patches of open water. Some signatures also have a white appearance, which is indicative of dead vegetation or deteriorating terminal ends.

E) E2USP/E2USN:

Estuarine, Intertidal, Unconsolidated Shore, Irregularly/Regularly Flooded.

Sandbars, mud flats and portions of dunes adjacent to estuaries will be classified E2USP or E2USN depending upon how they are affected by the tidal range. Signatures vary from bluish-gray to white.

F) E1UBL:

Estuarine, Subtidal, Unconsolidated Bottom.

Bays, inlets and the intercoastal waterway will fall under this classification. The signatures are of open water and will range in color from light blue to black.

V. Marine System

The marine system encompasses the open ocean, and its associated high-energy coastline, as well as all water bodies with salinity in excess of 3% dilution. The tidal range, ocean currents, and wave action control the habitats in this System. Within the work area the marine system refers almost exclusively to the open ocean and the beaches and sandbars along the coastline.

A) M2USP/M2USN:

Marine, Intertidal, Unconsolidated Shore, Irregularly/Regularly Flooded.

Beach sections seaward of the dune, including all areas affected by the high water of spring tides, will be included in these classifications. These sections will be grouped according to how they are affected by tidal fluctuations. The photo signatures will vary from bluish-gray to white.

B) M1UBL:

Marine, Subtidal, Unconsolidated Bottom.

This classification contains the open ocean and all other water bodies exceeding 30% saline dilution. The signature for M1UBL is open water and will range in color from light blue to black.