

**DRAFT**

**NATIONAL WETLANDS INVENTORY**

**MAP REPORT**

FOR

*Georgetown, South Carolina*

*Southeastern Mixed Forest Province*

**Field Work Conducted Week of October 20, 1997**

The 1:100,000 Map Units of:

Georgetown SW, Georgetown NW, Georgetown NE

U.S. Fish and Wildlife Services  
Atlanta, Georgia

November, 1997

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## I. INTRODUCTION

The United States Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI) is producing maps illustrating the location and classification of wetlands and deepwater habitats of the United States. Classification of Wetlands and Deepwater Habitats of the United States by Cowardin et al. (1979) is the reference material utilized by the NWI to define and classify wetlands. Photographic interpretation conventions, hydric soils lists, and wetland plant lists are applied in concert with the Cowardin classification system.

### A. PURPOSE

The purpose of this map report is to: (1) provide information on the production of NWI maps, including a discussion of photography and interpretation; (2) provide a descriptive crosswalk from NWI wetland codes used on the map to common terminology, and then to representative plant species found at specific wetland sites; and (3) describe local geography, climate, and wetland communities.

## II. FIELD RECONNAISSANCE

Field reconnaissance is necessary to accurately interpret aerial photography. In the field, photographic signatures are correlated to the actual wetland habitat. Identification is based on the indicator status of hydrophytic vegetation present, evidence of prolonged anaerobic soil conditions, and wetland hydrology conditions. Collateral information including upland and wetland vegetative communities, soil types, and topographic settings are further evaluated to aid in the photographic interpretation process.

### A. *Project Area*

The Georgetown project is located in Bailey's Southeastern Mixed Forest Province. Field reconnaissance covered portions of three 1:100,000-scale maps. The work area was defined by 4 USGS Quadrangles within Georgetown SW and 11 Quadrangles in both Georgetown NE and NW (See Locator Map A, Next Page).

### B. *Field Personnel*

<u>Personnel</u>		<u>Agency</u>	<u>Dates in the field</u>
Charlie Storrs	-	U.S. Fish and Wildlife Service	October 20-24, 1997
Richard Eastlake	-	Greenhorne & O'Mara, Inc.	October 20-24, 1997
Erin McCormick	-	Greenhorne & O'Mara, Inc.	October 20-24, 1997

### C. *Field Dates*

October 20-24, 1997

**D. Aerial Photography**

## Primary Source Data

Type: National Aerial Photography Program (NAPP), Color InfraRed, High Altitude

Scale: 1:40,000

Locations:                      Dates of Photography:  
Georgetown SW                2/4/94, 2/25/94, 2/27/94

Georgetown NW                2/4/94, 2/25/95

Georgetown NE                1/23/94

Percentage Coverage: All 26 USGS Quadrangles of the project area are covered by the NAPP photography except some areas of open ocean.

**E. Collateral Data**

The collateral data utilized for this project consisted of USGS topography maps, SCS soil surveys, 1989 NWI maps for the region, and water level data for date of photography.

**III. PHYSICAL DESCRIPTION OF PROJECT AREA****A. Geography**

The Georgetown work area is located in the Southeastern Mixed Forest Province within the Subtropical Division of the Humid Temperate Domain, according to Bailey's Description of the Ecoregions of the United States (1980). The project area lies within the Gulf Coastal Plains region.

The project area is located in the Gulf Coastal Plains. Some geologists divide the coastal plain into four smaller regions from coast to inland - the lower and upper pine belts, the red hills, and the sand hills. This region is often described as a vast sandy beach overlain by vegetation. This region extends from the Grand Strand Benches west 100 miles inland. The elevation gradually rises from 100 feet to 600 feet above sea level. The land is generally good for agriculture. However, the wetlands that dot the lower areas of the coastal plain are a luxuriant weave of swamps, bottomland hardwoods, and bayheads. A geologic feature found within the project area is the Carolina bay; these areas are oval depressions aligned from northwest to southeast, with a rim of sand on their southeastern ends. Carolina bays are typically wetlands, but some are uplands that contain three types of soils; organic, sand and sandy loam.

The project area has been extensively altered for many years by human influence. Many of the wetlands have been drained or somehow altered from their natural state. One example of the influence from human activity is the vast areas of rice culture along freshwater tidal rivers. These rice fields have been managed for over a hundred years, first as a plantation crop and

later as a waterfowl habitat. The water flow in these areas is controlled through an intricate system of levees and dikes, in order to maintain consistent water levels suitable for rice cutgrass (Leersia oryzoides). When rice fields are left unmanaged they tend to be invaded by bald cypress and water tupelo forest, which is inhospitable to waterfowl game.

### **B. Climate**

This Province has a subtropical climate, with hot and humid summers, and typically mild winters. The work area is temperate, with 40" to 60" annual rainfall (Bailey, 1980). The average temperature is 40° F in the winter months, and mid 80° F in the summer months (Liefermann, 1995). Although summer droughts can occur, the majority of the rainfall occurs in the summer months. For the entire year, precipitation ~~does exceed~~ evaporation (Bailey, 1980). **EXCEEDS**

### **C. Vegetation**

The wetland vegetation for the Georgetown work area is described below.

Tree species within pine plantations include, longleaf pine (Pinus palustris), slash pine (Pinus elliottii) and loblolly pine (Pinus taeda). These plantations are generally found in sandy, upland regions and drained temporarily flooded wetlands.

Shrubs generally found in Carolina bays includes, red bay (Persea borbonia), sweet bay (Magnolia virginiana), titi (Cyrilla racemiflora), fetterbush (Lyonia lucida), gallberry (Ilex glabra), and wax myrtle (Myrica cerifera). These typical shrubs are commonly mixed with either deciduous trees; red maple (Acer rubrum), sweetgum (Liquidambar styraciflua), water oak (Quercus nigra), and green ash (Fraxinus pennsylvanica), or evergreen pines; longleaf pine (Pinus palustris) and loblolly pine (Pinus taeda).

Riverbank vegetation may include such species as; river birch (Betula nigra), sweet gum (Liquidambar styraciflua), water oak (Quercus nigra), willow oak (Quercus phellos), sycamore (Platanus occidentalis), and black gum (Nyssa sylvatica). Other wetland plants found on river flood plains are; red bay (Persea borbonia), sweet bay (Magnolia virginiana), tulip poplar (Liriodendron tulipifera), wax myrtle (Myrica cerifera), red maple (Acer rubrum), cinnamon fern (Osmunda cinnamomea), royal fern (Osmunda regalis), alders (Alnus spp.), and gallberry (Ilex glabra). Broad level flood plains sometimes have a forest consisting of bald cypress (Taxodium distichum) and water tupelo (Nyssa aquatica).

South Carolina floodplains include vegetation that experiences spring and winter flooding. These species include water oak (Quercus nigra), green ash (Fraxinus pennsylvanica), sweetgum (Liquidambar styraciflua), ironwood (Carpinus caroliniana), and black gum (Nyssa sylvatica).

Tidal marshes within the coastal plains region of South Carolina are primarily comprised of persistent emergent vegetation. The dominant vegetation types within salt marshes are the

black needle rush (Juncus roemerianus) within the irregularly flooded areas and salt marsh cordgrass (Spartina alterniflora) in the regularly flooded estuaries. Freshwater tidal marshes are predominantly vegetated with rice cutgrass (Leersia oryzoides) which has been thriving in the rice fields for over a hundred years.

#### **D. Soils**

The coastal plains comprise roughly two-thirds of South Carolina, the low mostly flat sedimentary legacy of ancient oceans. These unconsolidated sediments of the coastal plain stretch westward through the sand hills to the Piedmont region, a lip of hard metamorphic rock. The coastal plain of South Carolina encompasses more swamps than any other state except Louisiana.

The project area has been extensively altered for many years due to human activity. Many wetland areas have been drained for agriculture, logging, and urban uses. Areas containing hydric soils may be classified under the Anderson upland classifications due to human influence. Although these soils retain hydric indicators, they are being used for upland purposes and are not exposed to the same amount of water inundation as typically associated with hydric soils.

Some examples of hydric soils often found throughout the work area are: Bladen fine sandy loam, Bohicket silty clay loam, Levy silty clay loam, Hobonny muck, Johnston loam, Meggett loam, Ogeechee loamy fine sand, Coxville fine sandy loam, Brookman loam, Osier loamy sand, Rutledge loamy sand, Yonges fine sandy loam, and the Grifton loamy fine sand.

The Bohicket, Levy and Hobonny soils are generally in their natural state and managed for wetland wild life. These soils encompass most of the broad tidal floodplains, often associated with rice cutgrass (Leersia oryzoides). They also are found in frequently flooded forests.

The Coxville, Grifton and Bladen loamy sand/sandy loam are found in broad flat plains, depressional areas, and in poorly defined drainageways. They are categorized as having a sandy top layer and a clayey subsoil. These soils have a high water table during the spring and very low permeability. These sandy loams/ loamy sands are well suited to support wetland vegetation species. These soils are also capable of supporting pine trees if properly drained.

The Osier, Johnston and Rutledge soils occur within river flood plains and Carolina bays. They are subject to frequent ponding and flooding, and possess a high water table. These soils are very poorly drained and have low permeability.

The Yonges, Meggett, Brookman and Ogeechee soils are poorly drained, and, like other sandy loams, these soils have a sandy/loamy topsoil, and a clayey subsoil. The low permeability clayey subsoil causes water to perch on top of it resulting in frequent ponding and a shallow water table. The Brookman and the Ogeechee are found primarily on broad, nearly level areas. The Yonges and Meggett soils, on the other hand, are located on nearly level flood plains and within drainageways.

Coastal soils usually have distinct horizons. They are commonly found in old land surfaces, and contain a clay enriched B horizon with low base saturation. Also, soil oxidation - reduction is often evident by the red (oxidized) and blue (reduced) clay colors in the soil's B horizon (discovered through field investigation).

#### IV. DESCRIPTION OF WETLAND HABITATS

The following paragraphs are a description of the classification of various land and wetland features classified in the work area (See also Soils and Vegetation sections (p.6&7) as well as Tables I and II).

##### A. Riverine System

Permanent rivers in the project area are classified R2UBH. Two examples of the R2UBH rivers are the Pee Dee River and the Waccamaw River. Riverine bars and flats will be classified R2USC and R2USA. Intermittent streams (larger than pen width on the photo) connecting larger wetland areas will be classified R4SBC. As a R2UBH nears the Atlantic Ocean and becomes tidally influenced, it is then classified as R1UBV. This tidal boundary is arbitrary considering that it fluctuates on a daily basis.

##### B. Lacustrine System

Lakes and reservoirs larger than 20 acres in size will be classified L1UBH. Reservoirs will carry the impounded (h) modifier. The occasional aquatic bed that is over 20 acres in size, will be classified L2AB3H and L2AB4H. Unvegetated flats adjacent to L1UBH lakes will be classified L2USA and L2USC. Abandoned mining pits will be classified as LIUBHx.

##### C. Palustrine System

The majority of wetlands within the work area are in the palustrine system.

One wetland habitat within the Palustrine system is the Carolina bay. Typically these areas contain saturated wetland types and some temporary, predominantly PFO1A, PFO1B, PFO4A PFO4B, PSS1A, PSS1B, PSS4A, PSS4B and PSS3B. Occasionally these habitats are drained in order to plant pine. These areas are classified with the d modifier.

Another frequently seen wetland within the work area is the abandoned rice field. These areas were diked and levied during active cultivation, but now they are not managed for rice culture. This wetland habitat is classified as PEM1N.

If a rice field is left unmanaged in certain areas it will revert to a bald cypress/water tupelo forest. When this occurs, the area is classified as PFO1/IN. Most of the cypress/tupelo forests, however, fall within river flood plains and are labeled PFO1/2F or PFO1/2C.

Along with the cypress/tupelo forest, river flood plains encompass several types of wetland habitats. Sloughs and oxbow lakes tend to have semi-permanently flooded wetland habitats such as; PFO1F, PFO2F, PFO1/2F, PSS1F, PEM1F and their tidal counterparts (PFO1T, etc.). The majority of the flood plain will be classified as seasonally flooded; PFO1C, PFO1/2C, PSS1C, PEM1C and their tidal counterparts (PFO1R, etc.). The levees and other high areas within the flood plain will fall mainly under the temporarily flooded classification; PFO1A, PSS1A, PEM1A and their tidal equivalents (PFO1S, etc.). Occasionally one finds areas of saturation such as PFO1B, PSS1B, PFO4B and PEM1B.

Smaller rivers and streams are found throughout the work area and are classified similarly to larger river flood plains, although they tend to have less cypress present and are generally dominated by deciduous forests. Primarily the classifications include PFO1A, PFO1B, PFO1C, PFO1F, PFO1/2F, PSS1A, PSS1C, PSS1F, PEM1C and PEM1F. Occasionally one finds areas of saturation such as PFO1B, PSS1B, PFO4B and PEM1B.

Another wetland habitat that covers portions of the project area is broad level areas. These areas are not necessarily connected with riverine systems, but they do tend to have smaller streams and sloughs that flow through them. This habitat is predominantly covered by saturated and temporarily flooded wetlands, including PFO1A, PFO1B, PFO4A, PFO4B, PSS1A, PSS1B, PSS3B, PSS4A and PSS4B. Within the sloughs that criss-cross these areas, there are wetlands that are typically associated with streams. Many of these wetlands are drained in order to plant pine and are classified using the d modifier during delineation.

maybe low flat woods would be better

Small depressions on the land surface are also found throughout the work area. These depressional areas tend to not be associated with rivers or streams, but are merely topographic depressions. These areas typically are either saturated or seasonally flooded. Some wetlands found in this habitat are: PFO1B, PFO1C, PFO4B, PSS1B, PSS1C, PSS4B, PEM1B and PEM1C. Occasionally one can also find semi-permanently and temporarily flooded areas such as: PFO1A, PFO1F, PFO4A, PSS1A, PSS1F, PSS4A and PEM1F.

#### ***D. Estuarine System***

Wetlands within or adjacent to estuaries comprised part of the Georgetown work area. The majority of the vegetative cover in estuaries is persistent emergents, E2EM1P and E2EM1N. Along the fringes of estuaries, evergreen shrubs are typically found at the palustrine-estuarine boundary. Forested estuaries are usually labeled E2FO4P, while shrub-scrub estuaries tend to be dominated by broad-leaved evergreens labeled E2SS3P. Sand bars, dunes and mud flats, which are influenced by tidal fluctuation, are classified as E2USP and E2USN. Open water within lagoons, and tidal inlets are labeled E1UBL.

#### ***E. Marine System***

This system refers to the ocean, beaches and sandbars. The classification for open-ocean is M1UBL. Beaches and sandbars along the coast, up to and including the spring high water mark, are labeled M2USN or M2USP depending upon tidal inundation.

**Table I****LIST OF OBSERVED WETLAND PLANT SPECIES WITH INDICATOR STATUS**

(grouped according to genus and species )

*\*regional indicator status referenced from the National List of Plant Species that occur in Wetlands:  
South Carolina***A. *Forested***

SCIENTIFIC NAMES	COMMON NAME	REGIONAL INDICATOR STATUS*
<u><i>Acer negundo</i></u>	box elder	FACW
<u><i>Acer rubrum</i></u>	red maple	FAC
<u><i>Alnus serrulata</i></u>	alder	FACW+
<u><i>Betula nigra</i></u>	river birch	FACW
<u><i>Carpinus caroliniana</i></u>	ironwood	FAC
<u><i>Fraxinus pennsylvanica</i></u>	green ash	FACW
<u><i>Fraxinus caroliniana</i></u>	carolina ash	FACW
<u><i>Gordonia lasianthus</i></u>	loblolly bay	FACW
<u><i>Ilex opaca</i></u>	American holly	FAC-
<u><i>Liquidambar styraciflua</i></u>	sweet gum	FAC+
<u><i>Liriodendron tulipifera</i></u>	tulip poplar	FAC
<u><i>Magnolia virginiana</i></u>	sweet bay	FACW+
<u><i>Myrica cerifera</i></u>	wax myrtle	FAC+
<u><i>Nyssa aquatica</i></u>	water tupelo	OBL
<u><i>Nyssa sylvatica</i></u>	black gum	FAC
<u><i>Nyssa sylvatica var. biflora</i></u>	swamp tupelo	OBL
<u><i>Persea borbonia</i></u>	red bay	FACW
<u><i>Pinus elliottii</i></u>	slash pine	FACW
<u><i>Pinus serotina</i></u>	pond pine	FACW+
<u><i>Pinus taeda</i></u>	loblolly pine	FAC
<u><i>Pinus palustris</i></u>	longleaf pine	FAC
<u><i>Plantanus occidentalis</i></u>	sycamore	FACW-
<u><i>Populus heterophylla</i></u>	swamp cottonwood	OBL
<u><i>Quercus nigra</i></u>	water oak	FAC
<u><i>Quercus phellos</i></u>	willow oak	FACW-
<u><i>Quercus laurifolia</i></u>	laurel oak	FACW
<u><i>Quercus michauxii</i></u>	water chestnut oak	FACW-
<u><i>Taxodium distichum</i></u>	bald cypress	OBL

**B. Aquatic Bed**

SCIENTIFIC NAMES      COMMON NAME      REGIONAL INDICATOR STATUS

<u>Lemna spp.</u>	duck weed	OBL
<u>Myriophyllum aquaticum</u>	parrot feather	OBL
<u>Nymphaea spp.</u>	waterlily	OBL

↙  
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↓

**C. Scrub-Shrub**

SCIENTIFIC NAMES      COMMON NAME      REGIONAL INDICATOR STATUS

<u>Acer rubrum</u>	red maple	FAC
<u>Baccharis halimifolia</u>	false willow	OBL
<u>Betula nigra</u>	river birch	FACW
<u>Cornus spp.</u>	dogwood	FACW
<u>Cyrilla racemiflora</u>	titi	FACW
<u>Gordonia lasianthus</u>	loblolly bay	FACW
<u>Ilex glabra</u>	gallberry	FACW
<u>Ilex spp.</u>	holly	FACW
<u>Iva frutescens</u>	marsh elder	FACW+
<u>Juniperus silicicola</u>	southern red cedar	FAC
<u>Lyonia lucida</u>	fetterbush	FACW
<u>Magnolia virginiana</u>	sweet bay	FACW+
<u>Myrica cerifera</u>	wax myrtle	FAC+
<u>Nyssa sylvatica</u> var. <i>biflora</i>	<del>black gum</del> <sup>swamp tupelo</sup>	OBL
<u>Persea borboni</u>	red bay <sup>or</sup> <sub>add both</sub>	FACW
<u>Pinus palustris</u>	longleaf pine	FACU+
<u>Pinus elliottii</u>	slash pine	FACW
<u>Pinus serotina</u>	pond pine	FACW+
<u>Pinus taeda</u>	loblolly pine	FAC
<u>Quercus phellos</u>	willow oak	FACW-
<u>Quercus laurifolia</u>	laurel oak	FACW
<u>Salix spp.</u>	willow	OBL
<u>Sabal minor</u>	dwarf palmetto	FACW
<u>Sabal palmetto</u>	cabbage palm	FAC
<u>Smilax spp.</u>	greenbriar	FAC

Check it out ←  
I looked in the regional list and it is listed as swampcyrilla

Black gum is FAC  
The OBL is  
Nyssa sylvatica  
var. *Biflora*  
Swamp tupelo

Smilax is a shrub?

**D. Emergent**

SCIENTIFIC NAMES	COMMON NAME	REGIONAL INDICATOR STATUS
<u>Andropogon virginicus</u>	broomsedge	FAC-
<u>Arundinaria gigantea</u>	giant cane	FACW
<u>Athyrium spp.</u>	lady fern	FAC
<u>Campsis radicans</u>	trumpet creeper	FAC
<u>Carex spp.</u>	sedges	FACW
<u>Iris spp.</u>	iris	OBL
<u>Juncus effusus</u>	soft rush	FACW+
<u>Juncus roemerianus</u>	black needle rush	OBL
<u>Leersia oryzoides</u>	rice cutgrass	OBL
<u>Ludwigia palustris</u>	marsh seedbox	OBL
<u>Nuphar luteum</u>	spatterdock	OBL
<u>Osmunda cinnamomea</u>	cinnamon fern	FACW+
<u>Osmunda regalis</u>	royal fern	OBL
<u>Panicum hemitomon</u>	maidencane	OBL
<u>Parthenocissus quinquefolia</u>	Virginia creeper	FAC
<u>Polygonum punctatum</u>	smartweed	FACW+
<u>Sagittaria spp.</u>	arrowhead	OBL
<u>Sarracenia spp.</u>	pitcher plant	OBL
<u>Saururus cernuus</u>	lizard tail	OBL
<u>Scirpus spp.</u>	bulrush	OBL
<u>Spartina alterniflora</u>	saltmarsh cordgrass	OBL
<u>Toxicodendron radicans</u>	poison ivy	FAC
<u>Typha latifolia</u>	broad-leaf cattail	OBL
<u>Woodwardia areolata</u>	net chain fern	OBL
<u>Zizanopsis miliacea</u>	giant cutgrass	OBL

**TABLE II**

**NWI WETLAND CLASSIFICATION CODES, COWARDIN DESCRIPTION AND COMMON TERMINOLOGY**

NWI CODE WATER REGIME	COWARDIN DESCRIPTION	COMMON DESCRIPTION	VEGETATION
R1UB (V)	Riverine, Tidal, unconsolidated bottom	Meandering rivers, low gradient, tidally influenced	None
R2UB (H)	Riverine, lower perennial, un- consolidated bottom	Meandering rivers, low gradient	None
R1US (R)	Riverine, Tidal, unconsolidated shore	Mud or sand bars, tidally influenced	None
R2US (A,C)	Riverine, lower perennial, un- consolidated shore	Mud or sand bars	None
L1UB (F,G,H)	Lacustrine, limnetic, unconsolidated bottom	Open water-large lakes or reservoirs	None
L2US (A,C)	Lacustrine, littoral, unconsolidated shore	Mud or sand flats	None
L2AB3 (F,H)	Lacustrine, littoral, rooted vascular aquatic bed	Permanent or semi- permanent lakes	<u>Nymphaea spp.</u> (water lily) <u>Myriophyllies aquaticum</u> (parrot feather)
L2AB4 (F,H)	Lacustrine, littoral, floating vascular aquatic bed	Permanent or semi- permanent lakes	<u>Lemna spp.</u> (duckweed)
PUB (F,G,H)	Palustrine, unconsolidated bottom	Open water lakes, reservoirs or ponds	None
PUS (A,C)	Palustrine, unconsolidated shore	Mud or sand flats, basins	None
PAB3 (F,G,H)	Palustrine, aquatic bed root-vascular	Deep basins, im- poundments, beaver ponds, sewage	<u>Myriophyllies aquaticum</u> (parrot feather) <u>Nymphaea spp.</u> (waterlily)

um

check on this one  
my regional list says that parrot feathers

~~Myriophyllum brasiliense~~



PSS1 (A,B,C,F)	Palustrine Scrub-Shrub, broad-leaved deciduous	Riverbanks, agricultural drainage, Carolina bays, Oxbows, and sloughs	<u>Acer rubrum</u> (red maple) <u>Betula nigra</u> (river birch) <u>Cornus foemina</u> (swamp dogwood) <u>Fraxinus pennsylvanica</u> (green ash) <u>Iva frutescens</u> (marsh elder) <u>Liriodendron tulipifera</u> (tulip poplar) <u>Liquidambar styraciflua</u> (sweetgum) <u>Lyonia lucida</u> (fetterbush) <u>Nyssa sylvatica</u> (black gum) <u>Platanus occidentalis</u> (sycamore) <u>Populus heterophylla</u> (swamp cottonwood) <u>Quercus phellos</u> (willow oak) <del><u>Salix</u> spp.</del> (willows) <del><u>Smilax</u> spp.</del> (greenbrier)
PSS2 (C,F)	Palustrine, scrub- shrub, needle- leaved deciduous	Riverbanks, agricultural or natural drainage, oxbows, sloughs	<u>Taxodium distichum</u> (bald cypress)
PSS3 (A,B)	Palustrine, scrub- shrub, broad-leaved evergreen	Riverbanks, Carolina bays	<u>Cyrilla racemiflora</u> (titi) <u>Gordonia lasianthus</u> (loblolly bay) <u>Ilex glabra</u> (gallberry) <u>Ilex</u> spp. (holly) <u>Magnolia virginiana</u> (sweet bay) <u>Myrica cerifera</u> (wax myrtle) <u>Persea borbonia</u> (red bay)
PSS4 (A,B)	Palustrine, scrub- shrub, needle- leaved evergreen	Pine plantations, riverbanks, Carolina bays	<u>Juniperus silicicola</u> (southern red cedar) <u>Pinus palustris</u> (longleaf pine) <u>Pinus serotina</u> (pond pine) <u>Pinus taeda</u> (loblolly pine) <u>Pinus elliotii</u> (slash pine)
PFO1 (A,B,C,F)	Palustrine, forested broad-leaved deciduous	Riverbanks, agricultural or natural drainage's, Carolina bays,	<u>Acer negundo</u> (box elder) <u>Acer rubrum</u> (red maple) <u>Alnus serrulata</u> (alder) <u>Betula nigra</u> (river birch)

maybe add -  
on  
Nyssa sylvatica  
var. biflora  
swamp  
tupelo - OBL

		oxbows, sloughs	<u>Carpinus caroliniana</u> (ironwood) <u>Fraxinus pennsylvanica</u> (green ash) <u>Fraxinus caroliniana</u> (carolina ash) <u>Liquidambar styraciflua</u> (sweet gum) <u>Liriodendron tulipifera</u> (tulip poplar) <u>Nyssa aquatica</u> (water tupelo) <u>Nyssa sylvatica</u> (black gum) <u>Nyssa sylvatica var. biflora</u> (swamp tupelo) <u>Platanus occidentalis</u> (sycamore) <u>Populus heterophylla</u> (swamp cottonwood) <u>Quercus nigra</u> (water oak) <u>Quercus phellos</u> (willow oak) <u>Quercus laurifolia</u> (laurel oak) <u>Quercus michauxii</u> (water chestnut oak)
PFO2 (C,F)	Palustrine, forested needle-leaved deciduous	Riverbanks, agricultural or natural drainage, oxbows, sloughs	<u>Taxodium distichum</u> (bald cypress)
PFO3 (A,B)	Palustrine, forested broad-leaved	Riverbanks, Carolina bays	<u>Gordonia lasianthus</u> (loblolly bay) <u>Ilex opaca</u> (American holly) <u>Magnolia virginiana</u> (sweet bay) <u>Persea borbonia</u> (red bay)
PFO4 (A,B)	Palustrine, forested needle-leaved evergreen	Pine plantations, riverbanks, Carolina bays	<u>Pinus palustris</u> (longleaf pine) <u>Pinus serotina</u> (pond pine) <u>Pinus taeda</u> (loblolly pine) <u>Pinus elliotii</u> (slash pine)
E1UB (L)	Estuarine, subtidal, unconsolidated bottom	bays, ocean inlets, waterways	None
E2US (N,P)	Estuarine, intertidal unconsolidated shore	sandbars, mud flats, dunes	None
E2EM1	Estuarine, inter-	salt marshes,	<u>Juncus roemerianus</u>

(N,P)	tidal, emergents	ocean inlets, estuarine river tidal floodplains	(black needle rush) <u>Leersia oryoides</u> (rice cutgrass) <u>Spartina alterniflora</u> (saltmarsh cordgrass)
E2SS3 (N,P)	Estuarine, intertidal, scrub-shrub, broad-leaved evergreen	salt marshes, ocean inlets, estuarine river tidal floodplains	<u>Myrica cerifera</u> (wax myrtle) <u>Iva frutescens</u> (marsh elder) <u>Baccharis halimifolia</u> (false willow)
E2SS4 (N,P)	Estuarine, intertidal, scrub-shrub, needle-leaved evergreen	salt marshes, ocean inlets, estuarine river tidal floodplains	<u>Juniperus silicicola</u> (southern red cedar) <u>Sabal minor</u> (dwarf palmetto) <u>Sabal palmetto</u> (cabbage palm) <u>Pinus serotina</u> (pond pine) <u>Pinus palustris</u> (longleaf pine)
E2FO4 (P)	Estuarine, intertidal forested, needle- leaved, evergreen	salt marshes estuarine river tidal floodplains	<u>Pinus serotina</u> (pond pine) <u>Pinus palustris</u> (longleaf pine)
M2US (N,P)	Marine, intertidal unconsolidated shore	beaches	None
M1UB (L)	Marine, subtidal, unconsolidated bottom	open ocean	None

## V. NATIONAL LIST OF WETLAND PLANT SPECIES

The USFWS has prepared a National List of Plant Species that Occur in Wetlands: South Carolina (Reed 1988) which assigns an indicator to each plant species found in wetlands. This wetland indicator describes the frequency of occurrence of an individual plant species in wetlands versus non-wetlands within the State (similar plant lists are available for other Regions and States in the United States). Table I lists both the common name and scientific name, as well as the wetland indicator, for common wetland plants that occur in the Southeastern Mixed Forest Ecoregion. The following wetland indicators have been assigned to plants which occur in wetlands:

Obligate (OBL): Almost always occur (estimated probability >99%) under natural conditions in wetlands.

Facultative Wetland (FACW): Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.

Facultative (FAC): Equally likely to occur in wetlands or non-wetlands (estimated Probability 34%-66%).

Facultative Upland (FACU): Usually occur in uplands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%).

Non-wetland (UPL): Occur in wetlands in another region, but occur almost always (estimated probability >99%) under natural conditions in uplands in the region specified. If a species does not occur in wetlands in any region, it is not on the National List.

## VI. WATER REGIME DESCRIPTION

- (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 the 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. When surface water is absent, the water table is often near the land 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 the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes.
- (J) Intermittently Flooded - Substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity. Weeks, months, or even years may intervene between periods of inundation.
- (K) Artificially Flooded - The amount and duration of flooding is controlled by means of pumps or siphons in combination with dikes or dams.
- (L) Subtidal – The substrate is permanently flooded with tidal water.
- (N) Regularly Flooded-Tidal – Tidal water alternately floods and exposes the land surface at least once daily.
- (P) Irregularly Flooded-Tidal – The land surface is exposed by tides less often than daily.
- (R) Seasonal-Tidal - 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. When surface water is absent, the water table is often near the land surface. Surface water and water table elevations are affected by tidal fluctuations.
- (S) Temporary-Tidal - 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. Surface water and water table elevations are affected by tidal fluctuations
- (T) Semipermanent-Tidal – 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. Surface water and water table elevations are affected by tidal fluctuations.
- (V) Permanent-Tidal - Water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes. Surface water levels are influenced by tidal fluctuations.

VII. IMAGERY

Overall the emulsion of the NAPP (1994 and 1995) 1:40,000-scale color infrared photography is of consistent tones and good clarity. However, some photography has a brown toned emulsion or a darker emulsion, which make upland and wetland delineation difficult, as well as creating problems distinguishing water regimes especially temporary/saturated demarcations and temporary/seasonal distinctions. There are a few models and stereopairs with different emulsions, which makes signature identification difficult. In addition, there are adjacent models with varying emulsions that create difficulty in correctly tying the photographs to one another. For these types of photography, delineation will tend to rely more heavily upon collateral data to classify wetlands than in photography with good consistent tones and colors. The collateral data mainly utilized consists of USGS topography maps, SCS soil surveys, and 1989 NWI maps for the region.

are you sure the maps are 1989? or are they the old early 80's bluelines?

A. WETLAND PHOTOGRAPHIC INTERPRETATION CONVENTIONS

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.

Check Cowardin on page 7. I don't really see this as a prerequisite to be in riverine. It says periodically or continuously.

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.

Was the extent discussed in field or was the old map (B)'s going to be used?

C) R2USC/R2USA:

**Riverine, Lower Perennial, Unconsolidated Shore, Seasonally/Temporarily 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.

*NO RIUSS?*

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.

*AS most of these smaller drainages are revegetated and thus fall within the Palustrine system*

**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.

*what natural feature are you talking about? + Is it a road a man-made object?*

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.

*How many excavated lakes are there?*

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 dominant.

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.~~

lower the water table in order to facilitate silviculture.

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).

what species  
Ligustrum sinense

? on all slopes?

- This uses the understory of evergreen shrubs as a clue to the saturated situation

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.

*In the study area, bald cypress is most commonly found on river floodplains and in depressional areas.*

(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:

*you should explain why this is  
Cypress holds on to its dead leaves  
for most of the dormant season  
thus showing up white. Similar  
to how dead em (cattails) show  
up as white.*

**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 perifera), 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, *but will be used as a clue to the saturation of the area.*

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).

Actually in S.C. they use several methods of planting of pines. 1. General broadcast - thus looking a lot like a natural forest except that the trees are generally the same age and height. 2. Seed tree - looks similar to broadcast. Not always in rows.

← 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). *what?*

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 (Salex 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.

*or  
it could  
be a man-  
made  
dam*

P) PSSIR:

**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) PSSIT:

**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) PEMIA:

**Palustrine, Emergent, Persistent, Temporarily Flooded.** The vegetation consists mainly of: wool grass (Scirpus cyperanus), soft rushes (Juncus effusus), 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 cyperinus), 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)

How is it associated with lakes + ponds?

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.).

It could just as easily be out in the middle of a pasture.

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 (Zizaniopsis 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).

You might want to say something about the regular inundation of tidal waters thus the "N" water regime.

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) PEMIT:

**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).

kind of clumsy (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.

If my memory serves me, most of the pines have a brick red signature not just red-

**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~~ <sup>has</sup> a brownish-green to grayish-green color, ~~similar to E2M1C~~. 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.

**B. GENERAL CONVENTIONS**

- 1) Special modifiers for our work area include (b) beaver, (d) partially drained/ditched, (h) diked/impounded, and (x) excavated.
- 2) Sewage treatment facilities, without an aquatic bed present, will be labeled PUBKx. When an aquatic bed is present, sewage treatment plants will be labeled PAB3Kx or PAB4Kx.
- 3) Water drainages, such as drainage ditches and small streams, will be classified as linear wetlands (must be pen-width in size). Unvegetated waterways will be labeled R4SBC. Small waterways concealed in the photography by vegetation will be classified under the appropriate palustrine vegetation type.

- 4) The photography will have its uplands mapped according to the Anderson's A Land Use and Land Cover Classification System for use with Remote Sensor Data (See next two pages).
- 5) Collateral data used during photographic interpretation includes, SCS Soil Surveys, USGS Topographic Maps, previous USFWS National Wetlands Inventory Maps and prior aerial photography.

**C. SOUTH CAROLINA UPLAND PI CONVENTIONS**

- 1) Upland classification will utilize the system put forth in, A Land Use and Land Cover Classification System For Use With Remote Sensing Data, by James R. Anderson, Ernest E. Hardy, John T. Roach, and Richard E. Witmer.
- 2) Level I and Level II will be used for all classes except for Water (5), and Wetland (6). The Cowardin (1979) classifications will be used for these classes. Other portions of the system, Tundra (8), and Perennial Snow or Ice (9), will not be utilized.
- 3) The minimum mapping unit for uplands will be 10 acres.
- 4) Transportation Corridors (14) will not be delineated except where they bisect a wetland. The section of the roadway that splits wetland will be delineated and classified. Primary state roads and interstate highways (indicated as red on topographic maps) will be included, however, there will be no attempt to delineate breaks for smaller roads. If the polygons were not classified, the surrounding upland classification would automatically be assumed to have caused the wetland break resulting in substantial false wetland acreage.
- 5) Long distance powerline cuts will not be included in the transportation, communications, and utilities section of the upland classification system states that "Long distance gas, oil, electric, telephone, water, or other transmission facilities rarely constitute the dominant use of the lands with which they are associated.
- 6) Soil surveys and topographic maps will be used as collateral data. Split classes will be used sparingly.

**Table III**  
**South Carolina Land Use and Land Cover Classification System (Anderson et.al.1976)**

Level I		Level II
1 Urban or Built-up Land	11	Residential
	12	Commercial and Services
	13	Industrial
	14	Transportation, Communications, and Utilities
	15	Industrial and Commercial Complex
	16	Mixed Urban or Built-Up Land
	17	Other Urban or Built-Up Land
2 Agricultural Land	21	Cropland and Pasture
	22	Orchards, Groves, Vineyards, Nurseries, and Ornamental
	23	Confined Feeding Operations
3 Rangeland	31	Herbaceous Rangeland
	32	Shrub and Brush Rangeland
4 Forest Land	41	Deciduous Forest Land
	42	Evergreen Forest Land
	42p	Plantation Pine
	43	Mixed Forest Land
5 Water	NWI	Classification System
6 Wetland	NWI	Classification System
7 Barren Land	71	Dry Salt Flats
	72	Beaches
	73	Sandy Areas other than Beaches
	74	Bare Exposed Rock
	75	Strip Mines, Quarries, and Gravel Pits
	76	Transitional Areas
	77	Mixed Barren Land
8 Tundra	81	Shrub and Brush Tundra
	82	Herbaceous Tundra
	83	Bare Ground Tundra
	84	Wet Tundra
	85	Mixed Tundra

## VIII. MAP PREPARATION

Wetland delineation and classification is in accordance with Cowardin et. al. (1979). Further wetland mapping guidance is provided by NWI photographic and cartographic conventions in compliance with national consistency. Delineations are produced through stereoscopic interpretation of 1:40,000-scale color infrared photography.

Field check sites of areas found within Georgetown SW, NW and NE were made prior to wetland delineation. Field check sites were selected to clarify obscure signatures found on the photography and also to verify common signatures encountered throughout the work area. These photographic signatures were then identified in the field using vegetation and soil types, as well as additional input from USFWS field personnel.

Collateral data employed for wetland delineations are: USGS topographic maps, SCS soil surveys, USGS water resources data, vegetation present, regional climate reports, and ecoregional information.

The user of the map is cautioned that, due to the minimum mapping unit a small percentage of wetlands may be unidentified. Since the photography was taken mainly during January and February of 1994, there may be discrepancies between the maps and more recent field conditions in October of 1997. Changes in landscape, which occurred after the photography was taken, would result in such discrepancies. One example is scrub-shrub (PSS...) photo signatures which has since grown into forested areas (PFO...).

Aerial photographic interpretation, and compilation of photographic interpretation overlays, was completed by Greenhome & O'Mara, Inc. at the Government owned Contractor operated (GOCO) facility in Pinellas Park, Florida. Quality control conducted by the United States Fish and Wildlife Service.

## **IX. SPECIAL MAPPING PROBLEMS**

The Georgetown South Carolina work area presented many difficult challenges for wetland delineations.

- The project area has been extensively altered from human intervention, and many of the wetland areas have been drained or altered from their natural state.
- Some of the Palustrine, Forested, Broad-Leaved Deciduous, Saturated (PFO1B) signatures were not easily recognizable on the photography. These signatures displayed a wide range of color variation, partially due to emulsion differences, and could easily be mistaken for drier water regimes (ex. PFO1A). In these cases interpreters must depend upon the understory vegetation and whether or not the wetland is on a slope. PFO1B wetlands tend to have a broad-leaved evergreen understory, which has a red fuzzy signature. PFO1A wetlands tend to be on a broad level area, while PFO1B areas can be sloping.

- Using photographic interpretation techniques it is difficult to separate saturated pine forests (PFO4B) from upland pine plantations (42p) in some sections. It will be important for photographic interpreters to rely on the soil surveys to delineate these areas.
- Interpretation difficulties can occur between fallow cornfields (21) and areas that are being planted for pine. Commonly these practices take place adjacent to one another and return a similar dark mottled signature.

Certain sections of the project area presented especially difficult delineation decisions. In order to establish consistency throughout the work area and Region 4, G & O photographic interpreters relied on the USFWS Regional Wetlands Coordinator (RWC), to help us ~~arrive to a~~ <sup>with one</sup> consistent interpretation.

- Areas within floodplains presented problems in distinguishing the amount of cypress trees present within forested wetlands. Cypress trees generally tend to give off a silvery fluffy crowned signature, which is easily detectable when it is found by itself, as in a cypress head. When cypress trees are found with other deciduous trees it becomes increasingly difficult to separate them from tupelo trees. During field reconnaissance it was decided to use a PFO1/2 split class only if the cypress is easily distinguishable, and covers a large portion (30%) of the forested wetland or if otherwise annotated during field reconnaissance.
- Another issue within river floodplains was the difference between forested temporarily or seasonally flooded photographic signatures. Several areas that seemed to be seasonal on the photography appeared temporary upon field reconnaissance of the area. Within these questionable areas the RWC tended to favor the temporary classification due to the elevation of the levee or floodplain above the water level of the nearby river. An attempt will be made to extrapolate this signature onto the rest of the field area in conjuncture with the check sites and the corresponding collateral data.

**X. Literature Cited**

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- U.S.G.S. Water Resources Data South Carolina
- United States Geological Survey (U.S.G.S.) 7'5" Topographic Quadrangles

### Appendix A Project Area Map Georgetown, SC

#### COUNTY MAP SERIES 1:50 000 SCALE

