

**DRAFT**

**NATIONAL WETLANDS INVENTORY**

**MAP REPORT**

FOR

*South Carolina*

*Southeastern Mixed Forest Province*

**Field Work Conducted Week of April 28, 1997**

The 1:100,000 Map Units of:

Augusta NE, Spartanburg NE, Spartanburg SE

U.S. Fish and Wildlife Services  
Atlanta, Georgia

September, 1997

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## I. INTRODUCTION

The United States Fish and Wildlife Service's National Wetlands Inventory (NWI) is producing maps showing 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 document used by the NWI to define and classify wetlands. Photo interpretation conventions, hydric soils lists, and wetland plant lists are used in concert with the Cowardin classification system.

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. 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 concert with National consistency. Delineations are produced through stereoscopic interpretation of 1:40,000 scale color infrared photography.

Field check sites of areas found within Augusta NE, Spartanburg NE, and Spartanburg SE were made prior to the actual delineation of wetlands. Field check sites were selected to clarify varying signatures found on the photography. These photographic signatures were then identified in the field using vegetation and soil types as well as additional input from field personnel.

Collateral data included USGS topographic maps, SCS soil surveys, USGS water resources data, vegetation, climate, 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 during a particular time and season there may be discrepancies between the maps and current field conditions. 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 photointerpretation, and drafting, was completed by Greenhorne & 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.

### III. 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 presence of hydrophytic vegetation, evidence of prolonged anaerobic soil conditions, and wetland hydrology. Collateral information including upland and wetland vegetative communities, soil types, and topographic settings are further evaluated to aid in the photointerpretation process.

#### A. *Project Area*

The Spartanburg-Augusta project is located in Bailey's southeastern mixed forest province and includes approximately 3.5 miles in North Carolina. Field reconnaissance covered by three (3) 1:100,000 maps. These maps include parts of Spartanburg NE (14 quads), Spartanburg SE (12 quads), and Augusta NE (9 quads) (See Locator Map A, Next Page).

#### B. *Field Personnel*

<u>Personnel</u>		<u>Agency</u>	<u>Dates in the field</u>
Dennis Fowler	-	U.S. Fish and Wildlife Service	April 28-30, 1997
Charlie Storrs	-	U.S. Fish and Wildlife Service	April 30-May 2, 1997
Jeanne Murphy	-	Greenhorne & O'Mara, Inc.	April 28-May 2, 1997
Bridget Lenzie	-	Greenhorne & O'Mara, Inc.	April 28-May 2, 1997

#### C. *Field Dates*

April 28 - May 2, 1997

#### D. *Aerial Photography*

##### Primary Source Data

Type: NAPP ( National Aerial Photography Program), Color Infra-Red, High Altitude  
Scale: 1:40,000

Locations:                      Dates of Photography:  
Augusta NE                      2/7/94, 2/14/94, 2/25/94

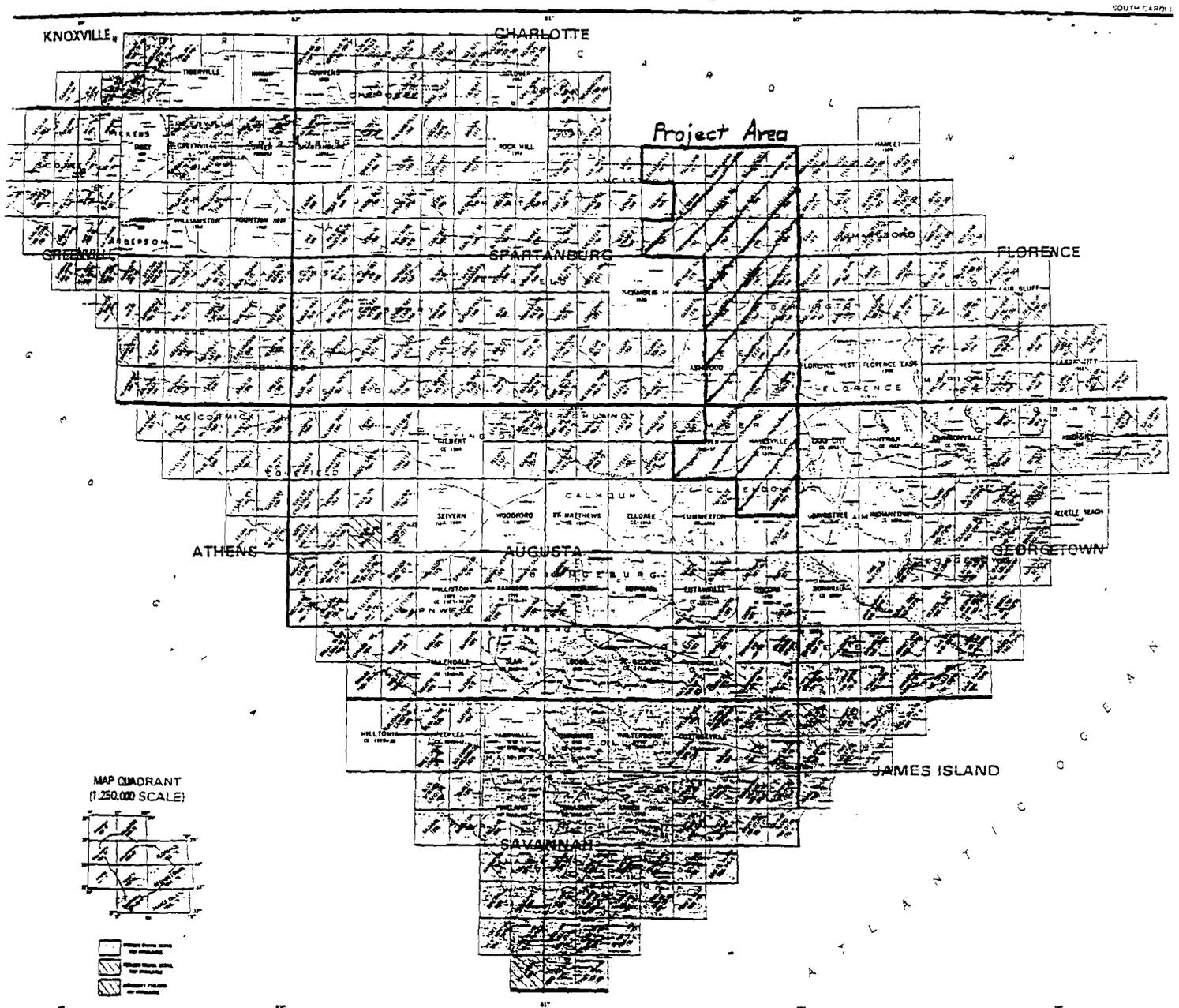
Spartanburg NE                2/4/94, 2/7/94, 2/14/94, 2/26/94, 2/25/95

Spartanburg SE                2/7/94, 2/14/94

Percentage Coverage: All 35 USGS quadrangles of the project area are covered by the NAPP photography.

APPENDIX A  
 LOCATOR MAP  
 SPARTANBURG-AUGUSTA, S.C. PROJECT AREA

U.S. FISH AND WILDLIFE SERVICE  
 NATIONAL WETLANDS INVENTORY



SOUTH CAROLINA

## V. PHYSICAL DESCRIPTION OF PROJECT AREA

### A. *Geography*

The Spartanburg-Augusta work area is located in the Southeastern mixed forest province, according to Bailey's Description of the Ecoregions of the United States (1980). The project area is geographically divided into the Gulf Coastal Plains and Piedmont regions. The fall line, dividing these regions, slants diagonally from Cheraw in the Northeast, to Aiken in the Southwest (this dividing line generally follows South Carolina's Route 1).

These slope saturation areas are limited to the more northern areas of the study area (near the sandhill region). The areas that make up the largest extent are the Carolina bays. Carolina bays are features that are found in both regions. Typical Carolina bays are aligned northwest to southeast, and scientists are unsure how they were formed. Carolina bays can have either upland or wetland features. Carolina bays containing wet organic soils are usually saturated, while other Carolina bays containing wet mineral soils are temporarily, seasonally, or semipermanently flooded.

#### Gulf Coastal Plains

The majority of the project area is in the Gulf Coastal Plains. Some geologists divide the coastal plain into four even 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 to the fall line mark. 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.

#### Piedmont

The Piedmont is composed of gentle rolling hills and steeper drainage. The Piedmont is the smaller portion of the work area, and has an elevation range from 300 feet to 1,000 feet above sea level. Its boundaries are the Appalachian foothills at the Piedmont's mouth, the Blue Ridge to the northwest, and the fall line that marks the southeastern boundary. Just before the 1930's, this region was largely in ruins. Most of the trees had been cut, and the majority of the land was farmed then abandoned, leaving its soil exhausted or eroded. Since the soil is not utilized for farming (with cotton farming being an exception to this area), other land uses dominate this area. Today, a large portion of this area contains sapproite mines, which are found within the Spartanburg NE work area. This area also contains many different wetlands including reservoirs, swamps, and drainages. One example is Lake Robinson (the largest reservoir found within the work area).

## ***B. Climate***

The Southeastern mixed Forest 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).

## ***C. Vegetation***

The vegetation for Spatanburg-Augusta work area is described below for the two regions in the work area.

### Gulf Coastal Plains

In the Gulf Coastal Plains, the tree species include loblolly pine (*Pinus taeda*) and long leaf pine (*Pinus palustris*) are grown in plantations for lumber production in the sandhills and other well drained or upland soils.

Other upland species (besides pines) include: dogwood (*Cornus florida*), Chinese privet (*Ligustrum sinensis*), American holly (*Ilex opaca*), and winged elm (*Ulmus alata*).

### Piedmont

Pine plantations, in the piedmont region, includes longleaf pine (*Pinus palustris*) and loblolly pine (*Pinus taeda*). These plantations are generally found in sandy, upland regions.

Some plants generally found in Carolina bays includes red bay (*Persea borbonia*), sweet bay (*Magnolia virginiana*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), and green ash (*Fraxinus pennsylvanica*)

Riverbank vegetation may include species such as sycamore (*Platanus occidentalis*) and river birch (*Betula nigra*). 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 inkberry (*Ilex glabra*). In the piedmont, there are many beaver dams giving rise to a large number of black gum (*Nyssa sylvatica*) around the ponds. Still a couple of these dams include dead or logged cypress (*Taxodium distichum*)-tupelo (*Nyssa aquatica*) stands. The lack of cypress (*Taxodium distichum*) stands may be due to the site's permanent standing water which discourages their reproduction.

Central South Carolina floodplains include vegetation which 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).

Following loggings, regeneration on the floodplains, include hollies (Ilex spp.), red bays (Parsea borbonia), sweet bays (Magnolia virginiana), fetter bushes (Leucothoe reaceмоса), willows (Salix spp.), and red maple (Acer rubrum).

#### **D. Soils**

The following paragraphs are the soil descriptions of Gulf Coastal Plains and the Piedmont.

##### Piedmont Soils

The area is mostly flat, rolling farmland with red clay soils. These soils are ill-suited for farming and have been extensively overworked. At the Piedmont's eastern edge are the sand hills which were deposited by ancient oceans.

Some examples of hydric soils often found in this area are: Wehadkee, Chewacla, Chastain, Swamp, Johnston loam, and Doravan muck.

Wehadkee and Chewacla soils generally occur in loamy, alluvial soil along the floodplains of the Piedmont's largest streams and are often subject to frequent flooding. The Chastain soils often occur in clayey, alluvial sediment along floodplains and are also frequently flooded. Unclassified hydric soils, in the Piedmont region, generally covered by 1-3 feet of water at all times are called Swamp soils. Swamp soils also occur along the Piedmont's major rivers. Johnston loam is usually found in depressions and along alluvial floodplains. Dorovan muck, which is high in organic matter, is often found adjacent to impoundments along the Little Lynches River's floodplain.

##### Gulf Coast Plains Soils

Two-thirds of South Carolina, the coastal plains, the low mostly flat sedimentary legacy of ancient oceans. These unconsolidated sediments of the coastal plain stretch westward through the sand hills to the fall line, a lip of hard metamorphic rock that marks the edge of the Piedmont. This coastal plain encompasses more swamps than any other state except Louisiana.

Some examples of hydric soils often found in this area are: Coxville fine sandy loam, Pantego loam, and Grady loam.

The Coxville fine sandy loam is generally found in broad flats and in slight depressions and oval shaped bays. Pantego loam is high in organic matter content and is located in slight depressions along drainageways, in oval shaped bays, and at heads of stream draws. Grady loam is found in level to slight depressional areas. It is normally found under pastures and woodlands.

Both the Piedmont and Coastal soils usually have distinct horizons, are commonly found in old land surfaces, and contain 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).

**Table 5-1.**

Observed Wetland Vegetation  
(grouped according to genus and species )

\*reg. 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>Acer negundo</u>	box elder	FACW
<u>Acer rubrum</u>	red maple	FAC
<u>Alnus serrulata</u>	alder	FACW+
<u>Betula nigra</u>	river birch	FACW
<u>Carpinus caroliniana</u>	ironwood	FAC
<u>Fraxinus pennsylvanica</u>	green ash	FACW
<u>Ilex opaca</u>	American holly	FAC-
<u>Liquidambar styraciflua</u>	sweet gum	FAC+
<u>Liriodendron tulipifera</u>	tulip poplar	FAC
<u>Magnolia virginiana</u>	sweet bay	FACW+
<u>Myrica cerifera</u>	wax myrtle	FAC+
<u>Nyssa aquatica</u>	water tupelo	OBL
<u>Nyssa sylvatica</u>	black gum	FAC
<u>Nyssa sylvatic var. biflora</u>	swamp tupelo	OBL
<u>Persea borbonia</u>	red bay	FACW
<u>Pinus elliottii</u>	slash pine	FACW
<u>Pinus serotina</u>	pond pine	FACW+
<u>Pinus taeda</u>	loblolly pine	FAC
<u>Pinus palustris</u>	longleaf pine	FAC
<u>Populus heterophylla</u>	swamp cottonwood	OBL
<u>Quercus nigra</u>	water oak	FAC
<u>Quercus phellos</u>	willow oak	FACW-
<u>Salix spp.</u>	willow	OBL
<u>Taxodium distichum</u>	bald cypress	OBL

**B. Aquatic Bed**

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

**C. Scrub-Shrub**

SCIENTIFIC NAMES	COMMON NAME	REGIONAL INDICATOR STATUS
<u>Acer rubrum</u>	red maple	FAC
<u>Cyrilla racemiflora</u>	titi	FACW
<u>Ilex glabra</u>	inkberry	FACW
<u>Ilex sp.</u>	holly	FACW
<u>Lyonia lucida</u>	fetterbush	FACW
<u>Nyssa sylvatica</u>	black gum	OBL
<u>Persea borboni</u>	red bay	FACW
<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>Salix spp.</u>	willow	OBL
<u>Sabal minor</u>	dwarf palmetto	FACW
<u>Smilax sp.</u>	greenbriar	FAC

**D. Emergent**

<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>Leersia oryzoides</u>	rice cutgrass	OBL
<u>Nuphar luteum</u>	spadderdock	OBL
<u>Osmunda cinnamomea</u>	cinnamon fern	FACW+
<u>Osmunda regalis</u>	royal fern	OBL
<u>Parthenocissus quinquefolia</u>	Virginia creeper	FAC
<u>Sagittaria spp.</u>	arrowhead	OBL
<u>Saururus cernuus</u>	lizard tail	OBL
<u>Scirpus sp.</u>	bulrush	OBL
<u>Toxicodendron radicans</u>	poison ivy	FAC
<u>Typha latifolia</u>	broad-leaf cattail	OBL
<u>Woodwardia areolata</u>	net chain fern	OBL

## 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.

## VII. DESCRIPTION OF WETLAND HABITATS (reference table 7-1)

The following paragraphs are a description of the classification of various land and wetland features classified in the work area (See also Table 7-1).

### A. *Riverine System*

Permanent rivers in the project area are classified R2UBH. Two examples of the R2UBH rivers are the Lynches River and the Black 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.

**B. *Lacustrine System***

Lakes and reservoirs larger than 20 acres in size will be classified L1UBH. Reservoirs will carry the impounded (h) modifier. Lake Robinson is an example of a L1UBHh. The occasional aquatic bed will be classified L2AB3Hh and L2AB4Hh.

Unvegetated flats will be classified L2USAh and L2USCh

Large mining pits, such as those in Spartanburg NE, will be classified as LIUBHx.

**C. *Palustrine System***

The majority of wetland within the work area in the palustrine system. Forested (ex. PF01A, PF01C, PF01B, PF02C, PF02F, PF03B, PF04A, PFO4B, PF04C) are the dominant cover types. In addition to these cover types, areas with mixed forest canopy are represented using split subclass labels ( ex. PFO1/4B and PFO1/3B).

Areas of scrub-shrub are classified PSS1A, PSS1C, PSS1F, and PSS1B. In addition to these cover types, areas with mixed forest canopy are represented using split subclass labels ( ex. PSS1/4B and PSS1/3B). Emergent vegetation (ex. PEM1A, PEM1C, PEM1F, PEM1B) and aquatic beds (ex. PAB3F and PAB4F) are also commonly found in the work area.

Often these areas of forested, scrub-shrub, and emergent wetlands are influenced by beaver activity. The vegetation will be classified PF01, PSS1, PEM1 respectively and the correct water regime with the beaver ("b") modifier. The open water ponds are classified PUBFb, PUBHb, and PUBGb. The extent of beaver influence will be estimated along a contour equal to the height of the spillway of the beaver dam.

Field check sites are documented at representative sites, within the work area. Some of the Palustrine, Forested, Broad-Leaved, Saturated (PF01B) signatures were not easily recognizable on the photography. These sites (ex. areas in Spartanburg NE) were important to verify by field inspection (see special mapping problems).

**Table 7-1  
NWI WETLAND CLASSIFICATION CODES, COWARDIN DESCRIPTION AND  
COMMON TERMINOLOGY**

<b>NWI CODE WATER REGIME</b>	<b>COWARDIN DESCRIPTION</b>	<b>COMMON DESCRIPTION</b>	<b>VEGETATION</b>
R2UB (H)	Riverine, lower perennial, un- consolidated bottom	Meandering rivers, low gradient	None
R2US (A,C)	Riverine, lower perennial, un- consolidated bottom	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>Carex spp</u> (sedges) <u>Leersia oryzoides</u> (rice cut grass) <u>Nymphaea spp</u> (water lilies) <u>Scirpus spp.</u> (bulrushes)
L2AB4 (F,H)	Lacustrine, littoral, floating vascular aquatic bed	Permanent or semi- permanent lakes	<u>Lemna spp.</u> (duckweed)
PAB3 (F,G,H)	Palustrine, aquatic bed root-vascular	Deep basins, im- poundments, beaver ponds, sewage treatment ponds	<u>Myriophyllies aquaticum</u> (parrot feather) <u>Nymphaea spp.</u> (waterlily)
PAB4 (F,G,H)	Palustrine, Floating vascular, aquatic bed	Deep basins, im- poundments, beaver ponds, sewage treatment	<u>Lemna spp.</u> (duckweed)

PEM1 (A,B,C,F)	Palustrine emergent	Basins, depressions, floodplains, small beaver ponds, seeps, oxbows or drainage areas	<u>Arundinaria gigantea</u> (giant cane) <u>Athyrium sp.</u> (lady fern) <u>Campsis radicans</u> (poison ivy) <u>Carex spp.</u> (sedges) <u>Iris spp.</u> (Iris) <u>Juncus effuses</u> (soft rush) <u>Leersia oryroides</u> (rice cutgrass) <u>Nuphor luteum</u> (spadder dock) <u>Osmunda cinnamomea</u> (cinnamon fern) <u>Osmunda regalis</u> (royal fern) <u>Parthenocissus quinquefolia</u> (Virginia creeper) <u>Sagittaria sp.</u> (arrowhead) <u>Saururus cernuus</u> (lizard tail) <u>Scirpus spp.</u> (bulrush) <u>Toxicodendron radicans</u> (poison ivy) <u>Typha latifolia</u> <u>Woodwardia Areolata</u> (net chain fern)
PSS1 (A,B,C,F)	Palustrine Scrub-Shrub, broad-leaved deciduous	Riverbanks, agricultural drainage, Carolina bays, Oxbows, sloughs	<u>Acer rubrum</u> (red maple) <u>Betula nigra</u> (river birch) <u>Fraxinus pennsylvanica</u> (green ash) <u>Ilex glabra</u> (gallberry) <u>Liriodendron tulipifera</u> (tulip tree) <u>Liquidamber styraciflua</u> (sweetgum) <u>Platanus occidentalis</u> (sycamore)

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>Magnolia virginiana</u> (sweet bay) <u>Persea</u> spp. (red bay) <u>Quercus laurifolia</u> (laurel oak)
PSS4 (A,B)	Palustrine, scrub-shrub, 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)
PFO1 (A,B,C,F)	Palustrine, forested broad-leaved deciduous	Riverbanks, agricultural or natural drainage's, Carolina bays, oxbows, sloughs	<u>Acer rubrum</u> (red maple) <u>Betula nigra</u> (river birch) <u>Fraxinus pennsylvanica</u> (green ash) <u>Ilex glabra</u> (gallberry) <u>Liriodendron tulipifera</u> (tulip poplar) <u>Liquidambar styraciflua</u> (sweet gum) <u>Platanus occidentalis</u> (sycamore)
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 evergreen	Riverbanks, Carolina bays	<u>Magnolia virginiana</u> (sweet bay) <u>Persea borbonia</u> (red bay) <u>Quercus laurifolia</u> (laurel oak)
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)

## VIII. Photographic Interpretation Conventions (See also Table 7-1 and 8-1).

### A. Riverine System

The R2UBH classification is used for permanent rivers in the work area. The photo signature is open water. 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 R2UBH classification. Two examples of rivers in this work area are the Lynches River and the Nasty Branch River. Portions of perennial and intermittent streams obscured by the tree canopy will be classified in the Palustrine System. Sand and mud flats along the R2UBH rivers will be classified R2USC and R2USA. Their signatures will vary from bluish-gray to white. Intermittent streams with little or no water visible will be classified R4SBC if they meet the size requirement. The stream bed may be blue, blue-gray, or white. These R4SBC wetlands must be clearly visible( at least pen-width in size on photo) to be delineated. R4SBC will not be a common classification used in this area.

### B. Lacustrine System

Lakes and reservoirs larger than 20 acres in the work area will be classified as L1UBH. One example is Lake Robinson. This is the largest lake in the work area. If a lake is impounded it will carry one of two modifiers. 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 otherwise impounds the lake or impedes water flow, it will carry the h modifier.

- 1) The signature of L1UBH, L1UBHh, or L1UBHb is open water (signature color ranges from various shades of blue to black).
- 2) Flats, non-vegetated associated with reservoirs over 20 acres will be classified as a L2USAh and L2USCh. The signature can range from white to light blue (L2USAh) to medium blue-gray (L2USCh).
- 3) Water filled large mining pits will be classified as L1UBHx. Signatures are light blue to medium blue polygons surrounded by white, excavated areas.
- 4) Aquatic beds will be classified as L1AB3Hh or L1AB4Hh. The signature shows grayish-green, brownish-green, or bluish-green. The community includes parrot feather (Myriophyllum aquaticum) and water lilies (Nymphaea spp.). The signature for floating vascular beds (L1AB4H) is a whitish-pink to pinkish-red and is usually duckweed (Lemna spp.).

### C. *Palustrine System*

Palustrine wetlands comprise the majority of wetland acreage in the study area. The Palustrine System includes wetlands dominated by trees, shrubs, persistent emergents, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.05 parts per thousand. As a mapping convention, wetlands lacking such vegetation, which are less than 20 acres are included in the Palustrine system.

#### *PFO1A:*

**Palustrine, Forested, Broad-Leaved Deciduous, Temporarily Flooded.** Common species are (but not limited to): red maple (*Acer rubrum*), box elder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), willow oak (*Quercus phellos*), and elm (*Ulmus spp.*)

This community type is usually found in river floodplains and along natural drainages. In leaf off photography, the deciduous trees generally generate a gray-green signature. Sometimes when the deciduous trees have an evergreen understory the signature may have a reddish return.

#### *PFO1B:*

**Palustrine, Forested, Broad-Leaved Deciduous, Saturated.** Common species are (but not limited to): tulip poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), swamp tupelo (*Nyssa sylvatica 'biflora'*) and willow oak (*Quercus phellos*).

This community type is usually found on slopes, in Carolina bays, and along many of the study area's natural drainages. This community, with both the deciduous and evergreen species, generates a bluish-green, pinkish-red, or brownish-red signature. The deciduous vegetation generates a bluish-green to brownish signature. The evergreen or semi evergreen tree crowns generate pinkish-red signature. The varying species composition found in this vegetative community generates a diversity of signature tones.

#### *PFO1C:*

**Palustrine, Forested, Broad-Leaved, Deciduous, Seasonally Flooded.** Common species are (but not limited to): sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), willows (*Salix spp.*), river birch (*Betula nigra*), tulip poplar (*Liriodendron tulipifera*), and swamp cottonwood (*Populus heterophylla*).

This community is usually found along natural drainages with developed floodplains. These deciduous trees yield a darker gray-green signature than the PFO1A with no evident evergreen understory signature.

*PFO1F:*

**Palustrine, Forested, Broad-Leaved Deciduous, Semipermanently Flooded.**

Common species are (but not limited to): red maple (*Acer rubrum*), willow (*Salix spp.*), bald cypress (*Taxodium distichum*), sweetgum (*Liquidambar styraciflua*), Alder (*Alnus serrulata*), water tupelo (*Nyssa aquatica*), and black gum (*Nyssa sylvatica*).

This community type usually occurs along 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.

*PFO2C:*

**Palustrine, Forested, Needle-Leaved Deciduous, Seasonally Flooded.** Common species is (but not limited to): bald cypress (*Taxodium distichum*) stands that are seasonally flooded.

Bald cypress in seasonally flooded areas are usually found in rivers, floodplains and certain depressional areas in the work area. In leaf-off photography, the bald cypress crown signatures are usually white-gray with a fluffy texture.

*PFO2F:*

**Palustrine, Forested, Needle-Leaved Deciduous, Semipermanently Flooded.**

Common species is (but not limited to): bald cypress (*Taxodium distichum*). Bald cypress is found in semi permanently flooded areas that are usually found in oxbows and sloughs. Their crown signatures that are usually white-gray signatures with fluffy texture in leaf-off photography. Unlike the PFO2C, the PFO2F may have standing water in the signature.

*PFO3B:*

**Palustrine, Forested, Broad-Leaved, Evergreen, Saturated.** Common species are (but not limited to): sweet bay (*Magnolia virginiana*), red bay (*Persea borbonia*), and laurel oak (*Quercus laurifolia*).

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 light pink signature with large, fluffy crowns.

*PFO4A:*

**Palustrine, Forested, Needle-Leaved Evergreen, Temporarily Flooded.** Common species are (but not limited to): loblolly pine (*Pinus taeda*) and long leaf pine (*Pinus palustris*). The loblolly pine and longleaf pine are usually planted in rows in upland sites for timber purposes. The pines produce a reddish-brown, conical signature in open stands of river floodplains.

*PFO4B:*

**Palustrine, Forested, Needle-Leaved Evergreen, Saturated.** Common species are (but not limited to): pond pine (*Pinus serotina*) and loblolly pine (*Pinus taeda*). This community is found in organic soils in river floodplains or in Carolina bays. The pines produce a reddish-gray to brownish-gray conical signatures. Pines grown in wetter areas often exhibit stunted growth. The unevening of the crown signature aids in wetland recognition within pine plantations.

*PSS1A:*

**Palustrine, Scrub-Shrub, Broad-Leaved, Deciduous, Temporarily Flooded.** Common juvenile tree species (less than 20 feet in height) or true shrubs are (but not limited to): willow oaks (*Quercus phellos*), red maple (*Acer rubrum*), and willows (*Salix spp.*).

This signature is often found in river floodplains or along river banks. In leaf off photography, the deciduous vegetation usually generates a slightly rough textured gray-green or brownish-green signature. Minority evergreen or semi-evergreen vegetation in the area generates a few rough textured, pinkish-red crowns.

*PSS1B:*

**Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Saturated.** Common juvenile tree species (less than 20 feet in height) or true shrubs are (but not limited to): black gum (*Nyssa sylvatica*), red maple (*Acer rubrum*), and greenbriar (*Smilax spp.*). This vegetation type usually occurs near beaver dams, in Carolina bays, and on saturated river flood plains. In leaf off photography, this community type generates a rough textured, bluish-green, pinkish-red, or brownish-red signature.

*PSS1C:*

**Palustrine, Scrub-Shrub, Broad-Leaved, Deciduous, Seasonally Flooded.** . Common juvenile tree species (less than 20 feet in height) or true shrubs are (but not limited to): sweet gum (Liquidambar styraciflua), red maple (Acer rubrum), willows (salix spp.), river birch (Betula nigra), tulip poplar (Liriodendron tulipifera), swamp cottonwood (Populus heterophylla), alder (Alnus spp.), titi (Cyrilla racemiflora), and buttonbush (Cephalanthus occidentalis). This community type is found in rivers and in Carolina bays. In leaf off photography, the higher percentage of deciduous vegetation usually generates a slightly rough textured, gray-green or brownish-green signature, slightly darker than PSS1A. The minority evergreen and semi-evergreen vegetation yields slightly rough textured, pinkish-red crown signatures.

*PSS1F:*

**Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Semipermanently Flooded.** Common juvenile tree species (less than 20 feet in height) or true shrubs are (but not limited to): red maple (Acer rubrum), alder (Alnus spp.) and willow (Salix spp.). This community type usually occurs on vegetated river banks with standing water. For example these species are usually found along oxbows, sloughs, and 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 signature visible through the vegetation canopy.

*PSS3A:*

**Palustrine, Scrub-Shrub, Broad-Leaved Evergreen, Temporarily Flooded.** Common juvenile tree species (less than 20 feet in height) or true shrubs are (but not limited to): red bay (Persea borbonia), sweet bay (Magnolia virginiana), laurel oak (Quercus laurifolia), fetterbush (Leucothoe racemosa), and gallberry (Ilex glabra). This community type is uncommon and is often associated with drained or ditched areas (classified with a “d” modifier). In leaf-off photography, this community type generates a pinkish-red signature with a rough texture.

*PSS3B:*

**Palustrine, Scrub-Shrub, Broad-Leaved, Evergreen, Saturated.** The dominant cover type in this classification is the same as PSS3A. This community type is found in saturated areas of river flood plains and is usually undrained. In leaf-off photography, the dominant signature will be lighter pink than PF03A. Again, the signature will be rough in texture.

*PSS4A:*

**Palustrine, Scrub-Shrub, Needle-Leaved Evergreen, Temporarily Flooded.** 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 (classified with a “d” modifier). Juvenile loblolly or longleaf pine plantations generate a green background signature with small red rows or dots. As they get older, loblolly and longleaf pine generate a rough-textured brownish-red signature.

*PSS4B:*

**Palustrine, Scrub-Shrub, Needle-Leaved Evergreen, Saturated.** Common species is (but not limited to): pond pine (*Pinus serotina*). The community type is often found in organic soils along rivers. The juvenile pines produce a reddish, gray-green to brownish-gray green. Pond pines (*Pinus serotina*) generate a lighter orange-pink signature with rough texture.

*PEM1A:*

**Palustrine, Emergent, Persistent, Temporarily Flooded.** The common emergents consists of (but are not limited to): wool grass (*Scirpus cyperanus*) and soft rushes (*Juncus effuses*). This vegetation is found around or in lakes with fluctuating seasonal water elevation. This plant community generates a smooth textured, brownish-green to grayish-green signature.

*PEM1C:*

**Palustrine, Emergent, Persistent, Seasonally Flooded.** The common emergents consists of (but are not limited to): giant cane (*Arundinaria gigantea*), bulrushes (*Scirpus spp*), maiden cane (*Panicum hemitoman*), and rushes (*Juncus spp.*). This vegetation is found around or in lakes with seasonal water elevation fluctuations. The signature will be a smooth textured, and a darker brownish-green to grayish-green. Some signatures also have white signatures which is indicative of dead emergents.

*PEM1F:*

**Palustrine, Emergent, Persistent, Semipermanently Flooded.** The common emergents consists of (but are not limited to): sedges (*Carix spp.*), iris (*Iris spp.*), spatterdock (*Nuphar luteum*), royal fern (*Osmunda regalis*), arrowhead (*Sagitaria spp.*), cattails (*Typha latifolia*), and bulrushes (*Scirpus spp.*). This community is found near ponds. This vegetation usually produces a smooth dark, gray-green signature with open water.

*PAB3F/ PAB3H:*

**Aquatic Bed, Rooted Vascular, Semipermanently/Permanently Flooded.** The common aquatic species consists of (but are not limited to): water lilies (Nymphaea spp.) and parrot feather (Myriophyllum aquaticum). This community is usually found in impounded lakes or in beaver ponds. The vegetation generates a smooth textured, blackish-green or whitish-pink signature.

*PAB4F/PAB4H:*

**Aquatic Bed, Floating Vascular, Semipermanently/Permanently Flooded.** Duckweed (Lemna spp.) is the vegetation usually dominating these sites. This community is usually found in impounded lakes or in beaver ponds. The vegetation signature is a shiny pink.

***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).
- 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).

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

<b>Level I</b>		<b>Level II</b>	
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

***SOUTH CAROLINA UPLAND******PI CONVENTIONS******AUGUSTA(NE) AND SPARTANBURG (NE AND SE)***

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 NWI 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.
7. Wetland mapping will adhere to existing NWI mapping conventions.

**Table 8-1**

The following plant species (scientific and common name) were identified at 32 check sites and represent wetland plant species occurring in the project areas.

*(PFO1A) Palustrine Forested Broad Leaved Deciduous Temporary*

<u>Acer rubrum</u>	red maple
<u>Acer negundo</u>	box elder
<u>Fraxinus pennsylvanica</u>	green ash
<u>Quercus phellos</u>	willow oak
<u>Ulmus spp.</u>	elm

*(PF01B) Palustrine Forested Broad Leaved Deciduous Saturated*

<u>Acer rubrum</u>	red maple
<u>Liquidambar styraciflua</u>	sweet gum
<u>Liriodendron tulipifera</u>	tulip poplar
<u>Nyssa sylvatica</u>	black gum
<u>Nyssa sylvatica 'biflora'</u>	swamp tupelo
<u>Quercus phellos</u>	willow oak

*(PFO1C) Palustrine Forested Broad Leaved Deciduous Seasonal*

<u>Acer rubrum</u>	red maple
<u>Betula nigra</u>	river birch
<u>Liriodendron tulipifera</u>	tulip poplar
<u>Populus heterophylla</u>	swamp cottonwood
<u>Salix spp.</u>	willow
<u>Liquidambar styraciflua</u>	sweet gum

*(PFO1F) Palustrine Forested Broad Leaved Deciduous Semi-Permanent*

<u>Acer rubrum</u>	red maple
<u>Carpinus caroliniana</u>	ironwood
<u>Liquidambar styraciflua</u>	sweet gum
<u>Nyssa sylvatica</u>	black gum
<u>Nyssa aquatica</u>	water tupelo
<u>Quercus phellos</u>	willow oak
<u>Salix spp.</u>	willow
<u>Taxodium distichum</u>	bald cypress

*(PFO4B) Palustrine Forested Needle-Leaved Evergreen Saturated*

<u>Pinus serotina</u>	pond pine
<u>Pinus spp.</u>	pine

*(PSS1A) Palustrine Scrub-Shrub Broad Leaved Deciduous Temporary*

<u>Acer rubrum</u>	red maple
<u>Ligustrum sinense</u>	Chinese privet
<u>Quercus phellos</u>	willow oak
<u>Rubus betulifolius</u>	blackberry
<u>Salix spp.</u>	willow

*(PSS1B) Palustrine Scrub-Shrub Broad Leaved Deciduous Saturated*

<u>Acer rubrum</u>	red maple
<u>Nyssa sylvatica</u>	black gum
<u>Smilax spp.</u>	greenbriar

*(PSS1C) Palustrine Scrub-Shrub Leaved Deciduous Seasonal*

<u>Acer rubrum</u>	red maple
<u>Betula nigra</u>	river birch
<u>Liriodendron tulipifera</u>	tulip popular
<u>Populus heterophylla</u>	swamp cottonwood
<u>Salix spp.</u>	willow
<u>Liquidambar styraciflua</u>	sweet gum

*(PSS1F) Palustrine Scrub-Shrub Broad Leaved Deciduous Semi-Permanent*

<u>Acer rubrum</u>	red maple
<u>Salix spp.</u>	willow

*(PSS4B) Palustrine Scrub-Shrub Needle-Leaved Evergreen Saturated*

<u>Pinus spp.</u>	pine
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*(PEM1A) Palustrine Emergent Persistent Temporary*

<u>Scirpus cyperanus</u>	wool grass (bulrush)
<u>Juncus effusus</u>	soft rush
<u>Parthenocissus quinquefolia</u>	Virginia creeper
<u>Camptocarpus radicans</u>	trumpet creeper

(PEM1B) Palustrine Emergent Persistent Saturated

<u>Arundinaria gigantea</u>	giant cane
<u>Athyrium spp.</u>	lady fern
<u>Juncus effusus</u>	soft rush
<u>Leersia oryzoides</u>	rice cutgrass
<u>Osmunda cinnamomea</u>	cinnamon fern
<u>Osmunda regalis</u>	royal fern
<u>Scirpus cyperanus</u>	wool grass (bulrush)
<u>Toxicodendron radicans</u>	poison ivy
<u>Typha latifolia</u>	cattail, broad leaf

(PEM1C) Palustrine Emergent Persistent Seasonal

<u>Parthenocissus quinquefolia</u>	Virginia creeper
<u>Woodwardia areolata</u>	net chain fern

(PEM1F) Palustrine Emergent Persistent Semi-Permanent

<u>Carex spp.</u>	sedges
<u>Iris spp.</u>	iris
<u>Nuphar luteum</u>	spadderdock
<u>Osmunda regalis</u>	royal fern
<u>Sagittaria spp.</u>	arrowhead
<u>Scirpus spp.</u>	bulrush

## **IX. IMAGERY**

Overall the emulsion of the NAPP (1994 and 1995) 1:40,000 color infrared photography is of high quality. However, some areas in Augusta NE have a brown toned emulsion. Some areas in Spartanberg SE are dark, which make upland and wetland delineation difficult. Also, Spartanberg NE and Spartanberg SE have models and stereopairs with different emulsions which also makes signature identification difficult. In these photos, delineation will rely more on collateral data to classify wetlands from uplands.

## **X. SPECIAL MAPPING PROBLEMS**

### *A. Signatures*

Some of the Palustrine, Forested, Broad-Leaved, Saturated (PFO1B) signatures were not easily recognizable on the photography. These sites (ex. Spartanburg NE, Kenshaw Quad) were important to verify by field inspection. These signatures displayed a wide range of color variation and could easily be mistaken for drier water regimes (ex. PFO1A).

### *B. Lynches River Floodplain*

Photo signatures in Spartanburg NE and Spartanburg SE have many upland and wetland breaks. Due to different emulsions between the model and stereopairs, these breaks are often difficult to delineate. When field checked several times, these photo signatures proved deceptive. Therefore, we agreed emphasize collateral data, especially the USGS topographical maps and soil surveys, to help distinguish the breaks between wetland and uplands.

## **XI. Literature Cited**

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