

**Vegetation Monitoring at Four Northwest Florida Water
Management District Mitigation Sites
Fall 2014**

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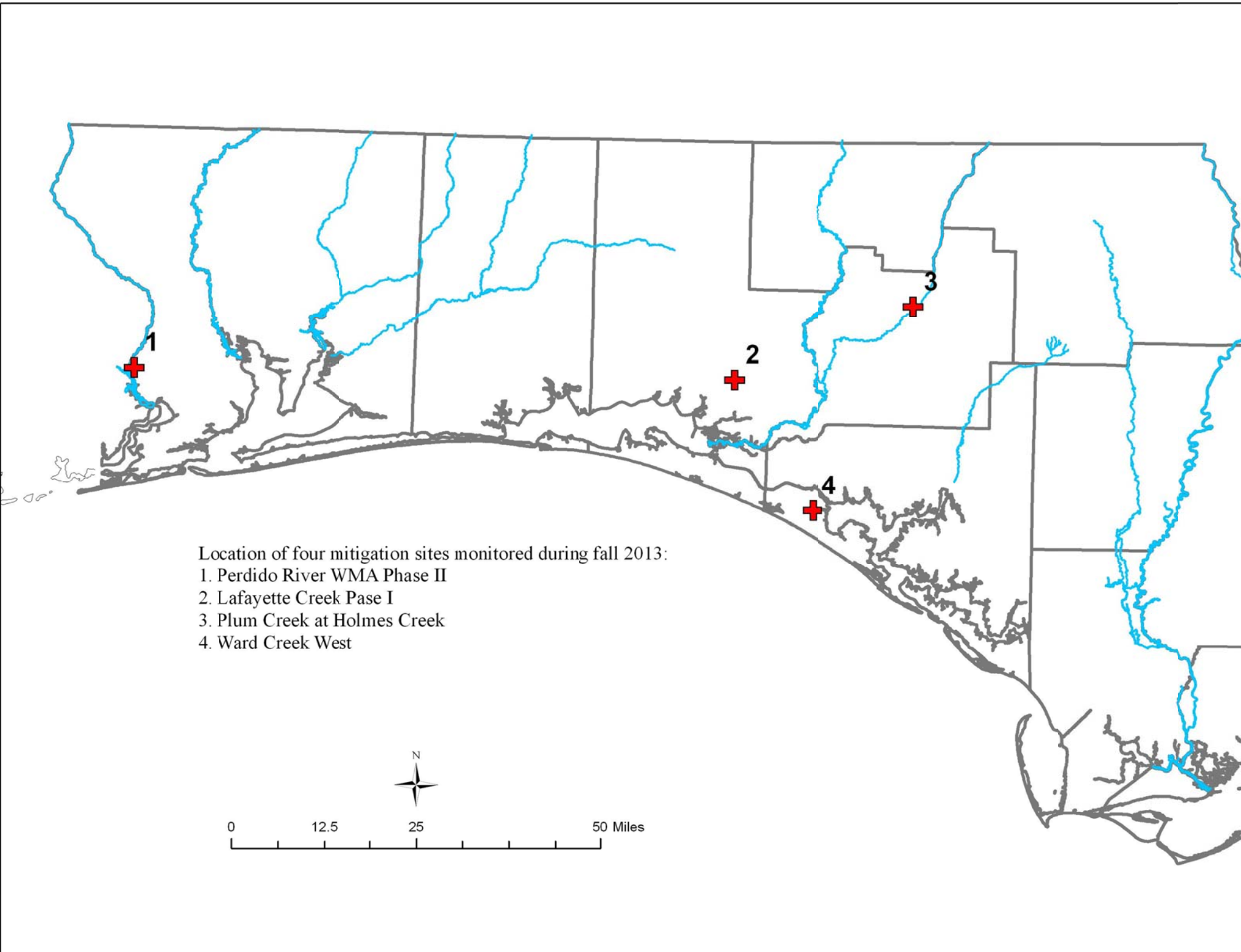
December 2014

Florida Natural Area Inventory
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This document contains separate qualitative and quantitative vegetation monitoring reports for four mitigation sites managed by the Northwest Florida Water Management District:

- 1) Perdido River Water Management Area – Phase II in Escambia County
- 2) Lafayette Creek – Phase I in Walton County
- 3) Plum Creek at Holmes Creek in Washington County
- 4) Ward Creek West in Bay County.



Perdido River Water Management Area - Phase II Mitigation Site
Qualitative and Quantitative Monitoring
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INTRODUCTION

The Perdido River WMA Phase II mitigation project compensates for the loss of wetland function of bottomland hardwood forest resulting from the 2007 replacement of the US 90 Perdido River Bridge in Escambia County, Florida. The mitigation area of 67 acres in the Perdido River Water Management Area is located along the south side of US 90 (Nine Mile Road) and 6.4 miles west of Interstate Highway 10 (Figure 1). The mitigation project aims to restore areas of mixed forested wetlands (MFW), hydric savanna (HS), hydric pine flatwoods (HPF) and pine flatwoods (PF) which were converted to loblolly pine plantation in 2002 (Figure 1). Quantitative and qualitative monitoring was used to document the current plant species composition and vegetation structure of these targeted communities. The site vegetation was previously monitored by FNAI biologists in the fall of 2012 and 2013.

METHODS

The quantitative monitoring utilized 150 foot long permanent transect lines previously marked at each end with metal t-posts during the 2012 survey. Two transects were in each targeted natural community type: hydric savanna, mixed forested wetland, and hydric pine flatwoods (Figure 2). Data recorded consisted of the visually estimated percent cover of each plant species in eight separate meter square quadrats. The quadrats were located at 0, 20, 40, 60, 80, 100, 120, and 140 feet along the left side of the transect line. The qualitative monitoring consisted of recording the species and vegetation structure observed along meandering pedestrian transects through each of the three target communities plus the pine flatwoods area. The field surveys were performed by FNAI botanist Gary Schultz on November 18 and 19, 2014.

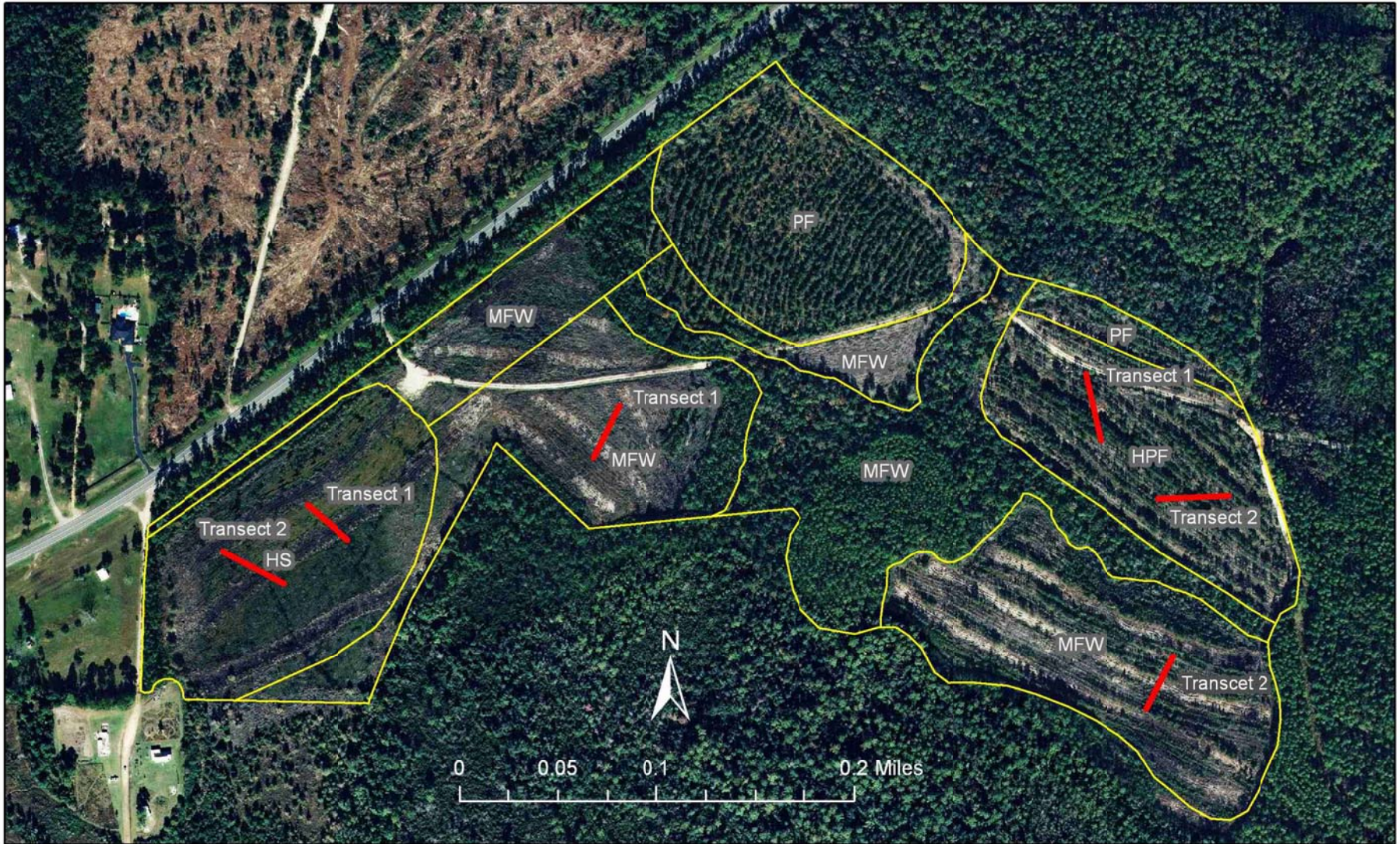


Figure 1. Location of permanent transects at Perdido Phase II Mitigation Site. HS=Hydric Savanna, HPF=Hydric Pine Flatwoods, MFW=Mixed Forested Wetlands, PF=Pine Flatwoods.

RESULTS AND DISCUSSION

A total of 89 plant species were observed during the 2014 monitoring of the target communities at Perdido Phase II (Table 1).

Hydric Savanna

Qualitative sampling. The disturbed hydric savanna restoration area was dominated by sphagnum moss, purple bluestem, pinebarren goldenrod, and viviparous spikerush. Shrubs were primarily coastalplain St. John’s wort, sawtooth blackberry, and swamp bay growing along the slightly elevated windrows formed when the land was cleared for silviculture. Occasional slash pine and red maple saplings were widely scattered. The soil was generally saturated, but not inundated. Table 1 provides a comprehensive list of the 38 plant species identified in this targeted community.

Quantitative sampling. Transect 1 (Table 2, Figure 2) had a total of 17 species which covered more than 100% of the ground surface when sphagnum moss is included. The dominant species were sphagnum moss, pine barren goldenrod, smallfruit beggarticks, and purple bluestem. Transect 2 (Table 3, Figure 3) had a total of 15 species which also covered more than 100% of the ground surface when sphagnum moss is included. The dominant species were the same.

Table 1. Species observed in target communities at Perdido River WMA – Phase II Mitigation Site on November 18 and 19, 2014.

Scientific Name	Common Name	hydric pine flatwoods	hydric savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Acalypha gracilens</i>	slender threeseed mercury	X				1
<i>Acer rubrum</i>	red maple	X	X	X	X	4
<i>Andropogon glomeratus</i>	bushy bluestem			X		1
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	X	X	X	X	4
<i>Andropogon ternarius</i>	splitbeard bluestem	X				1
<i>Andropogon virginicus</i>	broomsedge bluestem	X	X	X	X	4
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	X		X		2
<i>Baccharis halimifolia</i>	groundsel tree	X				1
<i>Bidens mitis</i>	smallfruit beggarticks	X	X		X	3
<i>Carex albolutescens</i>	greenwhite sedge	X	X		X	3
<i>Carex bromoides</i>	bromelike sedge	X				1
<i>Carex glaucescens</i>	clustered sedge		X	X	X	3
<i>Carex</i> sp.	sedge	X				1
<i>Centella asiatica</i>	spadeleaf	X				1
<i>Chamaecyparis thyooides</i>	Atlantic white cedar				X	1
<i>Chamaecyparis thyooides</i>	Atlantic white cedar	X			X	2

Scientific Name	Common Name	hydic pine flatwoods	hydic savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Cliftonia monophylla</i>	black titi	X			X	2
<i>Dichantheium scabriusculum</i>	woolly witchgrass	X				1
<i>Dichantheium sp.</i>	witchgrass	X			X	2
<i>Drosera brevifolia</i>	dwarf sundew				X	1
<i>Eleocharis vivipara</i>	viviparous spikerush	X	X			2
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	X				1
<i>Eriocaulon decangulare</i>	tenangle pipewort	X		X	X	3
<i>Eupatorium capillifolium</i>	dogfennel	X		X		2
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	X	X	X	X	4
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort	X			X	2
<i>Euthamia caroliniana</i>	slender flattop goldenrod	X	X	X	X	4
<i>Gaylussacia mosieri</i>	woolly huckleberry	X			X	2
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort		X			1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort		X		X	2
<i>Hypericum cistifolium</i>	roundpod St. John's wort	X		X	x	3
<i>Hypericum hypericoides</i>	St. Andrew's cross	X				1
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	X			X	2
<i>Ilex coriacea</i>	large gallberry	X			X	2
<i>Ilex glabra</i>	gallberry	X	X	X	X	4
<i>Ilex vomitoria</i>	yaupon	X		X		1
<i>Lachnanthes caroliniana</i>	Carolina redroot	X	X	X	X	4
<i>Lachnocaulon anceps</i>	whitehead bogbutton	X				1
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow		X			1
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	X	X		X	3
<i>Lyonia lucida</i>	fetterbush	X			X	2
<i>Magnolia grandiflora</i>	southern magnolia	X				1
<i>Magnolia virginiana</i>	sweetbay	X	X	X	X	4
<i>Myrica cerifera</i>	wax myrtle	X	X	X	X	4
<i>Oldenlandia uniflora</i>	clustered mille grains	X	X		X	3
<i>Osmunda cinnamomea</i>	cinnamon fern	X				1
<i>Osmunda regalis var. spectabilis</i>	royal fern	X		X		2
<i>Panicum anceps</i>	beaked panicum	X	X	X	X	4
<i>Panicum verrucosum</i>	warty panicgrass	X	X	X	X	4
<i>Panicum virgatum</i>	switchgrass	X				1
<i>Persea borbonia</i>	red bay	X		X		2
<i>Persea palustris</i>	swamp bay	X	X	X	X	4
<i>Photinia pyrifolia</i>	red chokeberry	X	X	X	x	4

Scientific Name	Common Name	hydric pine flatwoods	hydric savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Pinus elliotii</i>	slash pine	X	X		X	3
<i>Pinus glabra</i>	spruce pine				X	1
<i>Pinus taeda</i>	loblolly pine	X	X	X	X	4
<i>Pluchea longifolia</i>	longleaf camphorweed	X				1
<i>Pluchea rosea</i>	rosy camphorweed	X				1
<i>Pteridium aquilinum</i>	bracken fern			X		1
<i>Quercus nigra</i>	water oak	X		X		2
<i>Rhexia</i> sp.	meadowbeauty	X				1
<i>Rhexia virginica</i>	handsome harry	X	X		X	3
<i>Rhynchospora cephalantha</i>	bunched beaksedge		X		X	2
<i>Rhynchospora plumosa</i>	plumed beaksedge				X	1
<i>Rubus argutus</i>	sawtooth blackberry	X	X	X	X	4
<i>Rubus trivialis</i>	southern dewberry	X				1
<i>Saccharum giganteum</i>	sugarcane plumegrass		X			1
<i>Sapium sebiferum</i>	Chinese tallow	X				1
<i>Scirpus cyperinus</i>	woolgrass		X			1
<i>Smilax auriculata</i>	earleaf greenbrier	X				1
<i>Smilax glauca</i>	cat greenbrier	X		X	X	3
<i>Smilax laurifolia</i>	laurel greenbrier		X		X	2
<i>Solidago fistulosa</i>	pinebarren goldenrod	X	X	X	X	4
<i>Sphagnum</i> sp.	sphagnum moss	X	X	X	X	4
<i>Symphyotrichum walteri</i>	Walter's aster	X	X		X	3
<i>Taxodium ascendens</i>	pond cypress				X	1
<i>Taxodium distichum</i>	bald cypress		X		X	2
<i>Toxicodendron radicans</i>	eastern poison ivy	X	X			2
unknown moss	unknown moss	X			X	1
<i>Vaccinium corymbosum</i>	highbush blueberry	X		X		2
<i>Viola lanceolata</i>	bog white violet	X				1
<i>Viola sororia</i>	common blue violet	X			X	2
<i>Viola</i> sp.	violet				X	1
<i>Vitis rotundifolia</i>	muscadine	X	X	X	X	4
<i>Woodwardia areolata</i>	netted chain fern	X			X	2
<i>Woodwardia virginica</i>	Virginia chain fern	X	X			2
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	X	X		X	3
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass				X	1
<i>Xyris</i> sp.	yellow-eyed grass				X	1
Total number of species: 89		70	38	31	54	

Figure 2. Percent cover of plant species in Hydric Savanna Transect 1.

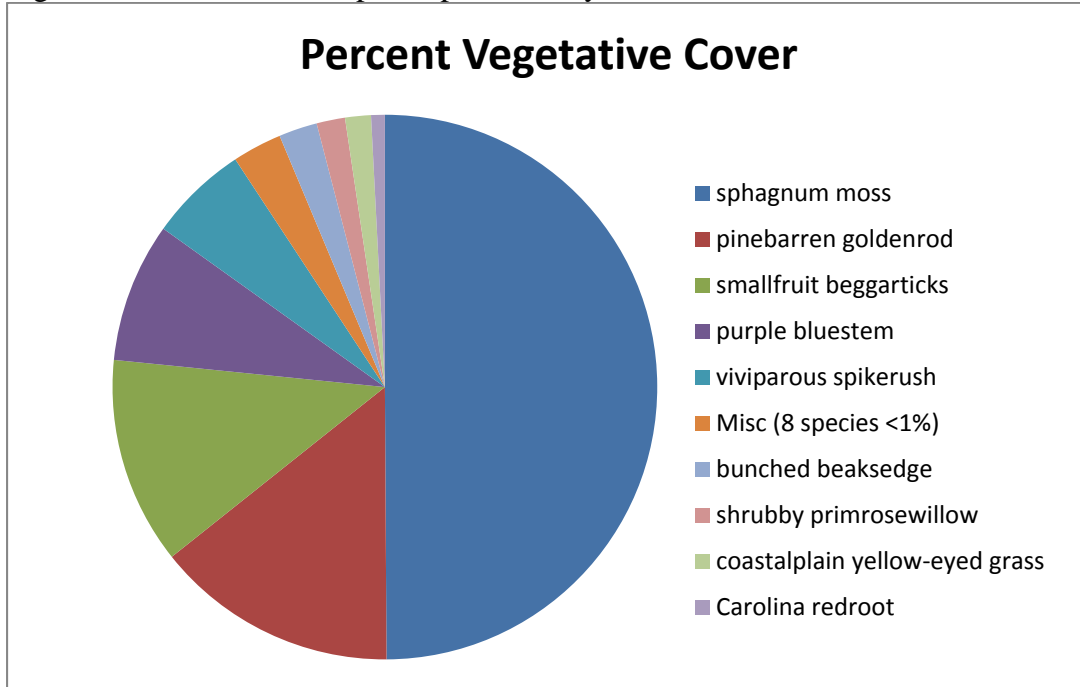


Table 2. Percent cover of plant species in Hydric Savanna Transect 1 when sampled on November 18, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum</i> sp.	sphagnum moss	75.56
<i>Solidago fistulosa</i>	pinebarren goldenrod	21.78
<i>Bidens mitis</i>	smallfruit beggarticks	18.61
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	12.56
<i>Eleocharis vivipara</i>	viviparous spikerush	8.89
<i>Rhynchospora cephalantha</i>	bunched beaksedge	3.44
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	2.56
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	2.33
<i>Lachnanthes caroliana</i>	Carolina redroot	1.22
<i>Panicum verrucosum</i>	warty panicgrass	0.83
<i>Rubus argutus</i>	sawtooth blackberry	0.83
<i>Woodwardia virginica</i>	Virginia chain fern	0.83
<i>Rhexia virginica</i>	handsome harry	0.72
<i>Persea palustris</i>	swamp bay	0.39
<i>Photinia pyrifolia</i>	red chokeberry	0.39
<i>Vitis rotundifolia</i>	muscadine	0.39
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	0.06

Scientific name	Common name	Average percent cover per quadrat
	Bare ground	0.00

Figure 3. Percent cover of plant species in Hydric Savanna Transect 2.

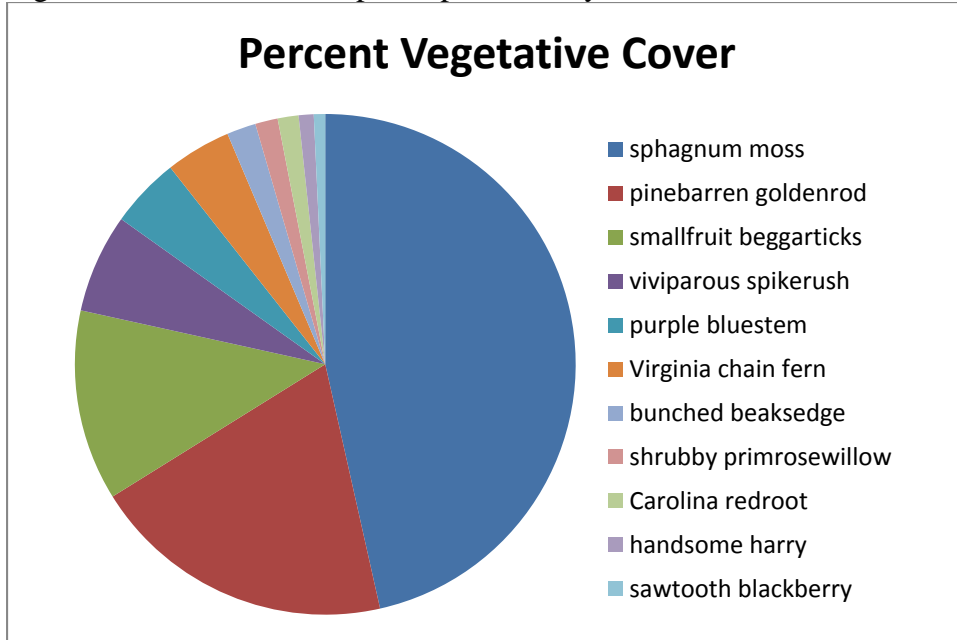


Table 3. Percent cover of plant species in Hydric Savanna Transect 2 when sampled on November 18, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum sp.</i>	sphagnum moss	74.44
<i>Solidago fistulosa</i>	pinebarren goldenrod	31.50
<i>Bidens mitis</i>	smallfruit beggarticks	19.72
<i>Eleocharis vivipara</i>	viviparous spikerush	10.22
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	7.28
<i>Woodwardia virginica</i>	Virginia chain fern	6.78
<i>Rhynchospora cephalantha</i>	bunched beaksedge	3.00
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	2.33
<i>Lachnanthes caroliana</i>	Carolina redroot	2.17
<i>Rhexia virginica</i>	handsome harry	1.56
<i>Rubus argutus</i>	sawtooth blackberry	1.17
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.22
<i>Oldenlandia uniflora</i>	clustered mille grains	0.17
<i>Panicum verrucosum</i>	warty panicgrass	0.17
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	0.11
	Bare ground	0.00

Mixed Forested Wetland

Qualitative sampling. The target community of mixed forested wetland (Figure 1) had a total of 54 observed plant species (Table 1). The vegetative cover was dominated by the tall grasses, purple bluestem and broomsedge bluestem. Sphagnum moss, pinebarren goldenrod, beakrush, and witchgrass were common. The shrubs, black titi, fetterbush, and sawtooth blackberry were mainly on slightly elevated windrows from past silviculture activities. Sapling slash and spruce pines were widely scattered throughout.

Quantitative sampling. Transect 1 had a total of 24 species and 5% bare ground (Table 4, Figure 4). Purple bluestem and sphagnum moss formed the majority of the herbaceous cover, with woody species sharing dominance, including slash pine, spruce pine, black titi and fetterbush. Transect 2 (Table 5, Figure 5) had a total of 30 species with no bare ground. The highest percent cover was by purple bluestem, with smaller amounts of sphagnum moss and broomsedge bluestem. Woody species were occasional, including primarily sawtooth blackberry, loblolly pine saplings, and swamp bay.

Figure 4. Percent cover of species in Mixed Forested Wetland Transect 1.

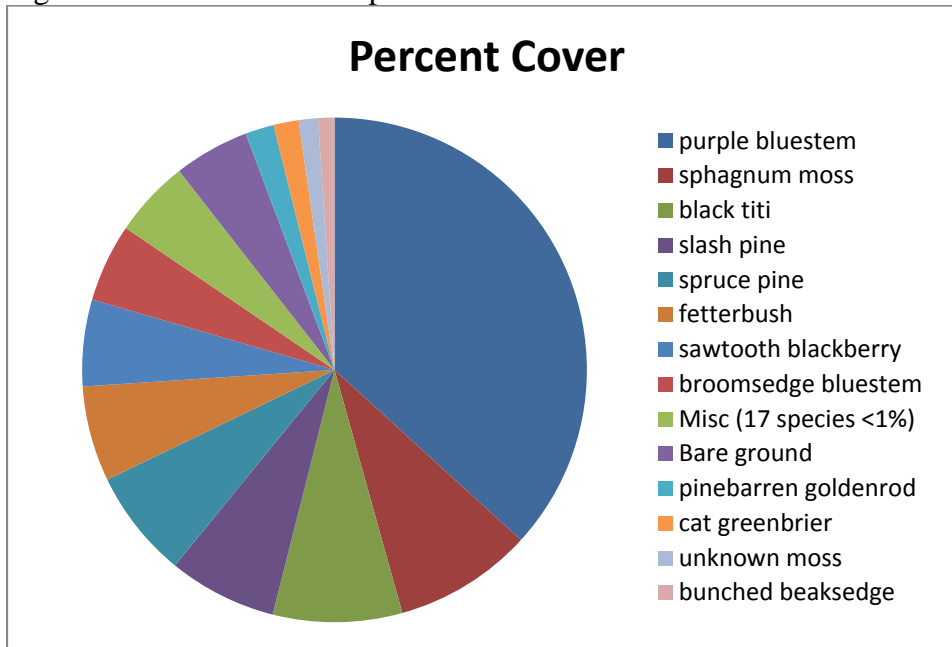


Table 4. Percent cover of plant species in Mixed Forested Wetland Transect 1 when sampled on November 18, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	36.78
<i>Sphagnum</i> sp.	sphagnum moss	8.89
<i>Cliftonia monophylla</i>	black titi	8.28
<i>Pinus elliotii</i>	slash pine	6.94
<i>Pinus glabra</i>	spruce pine	6.94
<i>Lyonia lucida</i>	fetterbush	6.11
<i>Rubus argutus</i>	sawtooth blackberry	5.56
<i>Andropogon virginicus</i>	broomsedge bluestem	5.00
<i>Solidago fistulosa</i>	pinebarren goldenrod	1.83
<i>Smilax glauca</i>	cat greenbrier	1.61
unknown moss	unknown moss	1.22
<i>Rhynchospora cephalantha</i>	bunched beaksedge	1.06
<i>Dichantherium</i> sp.	witchgrass	0.83
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass	0.83
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.78
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.56
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.50
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.39
<i>Ilex glabra</i>	gallberry	0.39
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	0.33
<i>Bidens mitis</i>	smallfruit beggarticks	0.17
<i>Drosera brevifolia</i>	dwarf sundew	0.06
<i>Rhexia virginica</i>	handsome harry	0.06
<i>Xyris ambigua</i>	Coastalplain yellow-eyed grass	0.06
	Bare ground	4.83

Figure 5. Percent cover of plant species in Mixed Forested Wetland Transect 2.

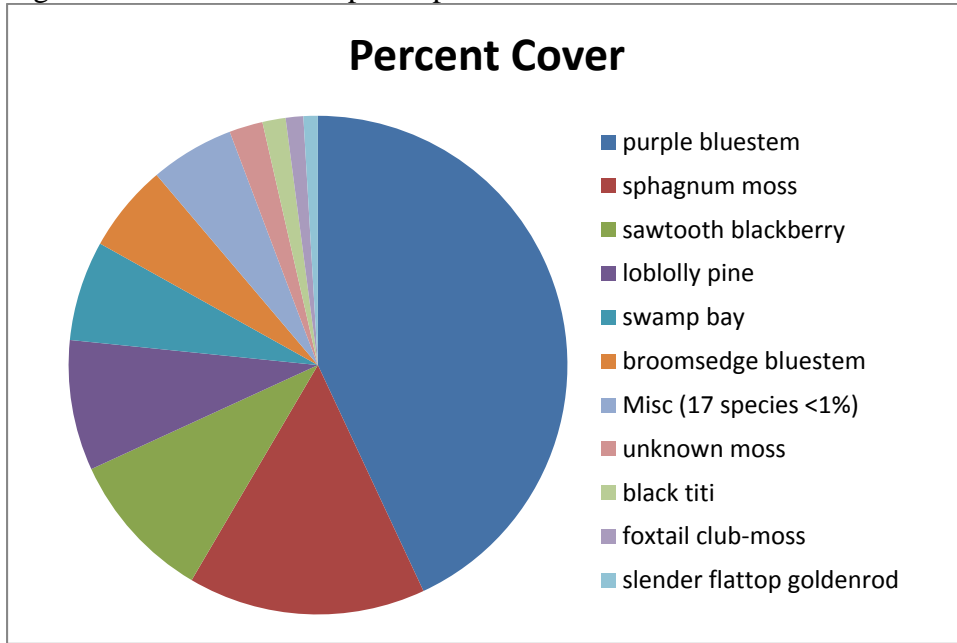


Table 5. Percent cover of plant species in Mixed Forested Wetland Transect 2 when sampled on November 18, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	46.11
<i>Sphagnum</i> sp.	sphagnum moss	16.50
<i>Rubus argutus</i>	sawtooth blackberry	10.39
<i>Pinus taeda</i>	loblolly pine	9.06
<i>Persea palustris</i>	swamp bay	6.94
<i>Andropogon virginicus</i>	broomsedge bluestem	6.11
unknown moss	unknown moss	2.33
<i>Cliftonia monophylla</i>	black titi	1.61
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	1.22
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.00
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.89
<i>Viola</i> sp.	violet	0.83
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.61
<i>Ilex coriacea</i>	large gallberry	0.44
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.39
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.39
<i>Panicum verrucosum</i>	warty panicgrass	0.39
<i>Pinus glabra</i>	spruce pine	0.39
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort	0.17
<i>Oldenlandia uniflora</i>	clustered mille grains	0.17

Scientific name	Common name	Average percent cover per quadrat
<i>Panicum anceps</i>	beaked panicum	0.17
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.17
<i>Smilax glauca</i>	cat greenbrier	0.17
<i>Smilax laurifolia</i>	laurel greenbrier	0.17
<i>Xyris</i> sp.	yellow-eyed grass	0.17
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	0.11
<i>Acer rubrum</i>	red maple	0.06
<i>Viola sororia</i>	common blue violet	0.06
<i>Woodwardia areolata</i>	netted chain fern	0.06
<i>Xyris ambigua</i>	Coastalplain yellow-eyed grass	0.06
	Bare ground	0.00

Hydric Pine Flatwoods

Qualitative monitoring. The target community of hydric pine flatwoods had a total of 70 plant species (Table 1). The nearly closed canopy of planted loblolly pines was about 30 ft tall. The open shrub layer consisted mainly of sawtooth blackberry, St. Andrew's cross, and swamp bay. The muscadine grape vine was common. The bedded ground frequently had patches bare of vegetation. The herbaceous layer was dominated by wiregrass, warty panicum, sphagnum, and broomsedge bluestem. Loblolly pine seedlings were common throughout. At the time of sampling, the ground was dry.

Quantitative monitoring. Transect 1 had a total of 24 species with 76% bare ground (Figure 6, Table 6). Muscadine vine formed highest cover. Warty panicum, wiregrass, cinnamon fern were the most abundant herbs. Transect 2 (Figure 7, Table 7) had a total of 33 species with 16% bare ground. The herbs were mainly warty panicum, sphagnum moss, cinnamon fern, broomsedge bluestem, and wiregrass.

Figure 6. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

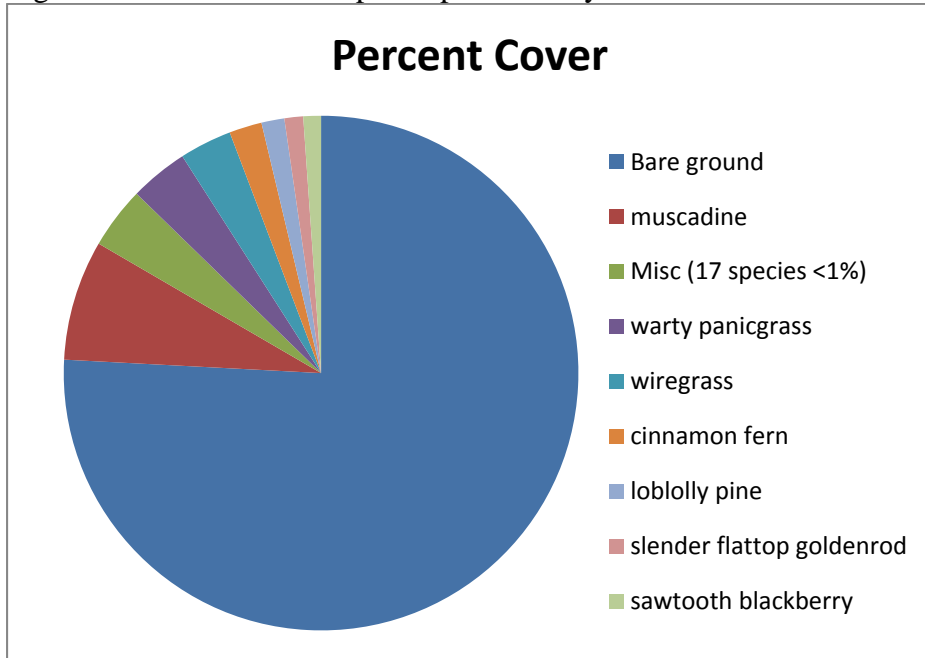


Table 6. Percent cover of species in Hydric Pine Flatwoods Transect 1 when sampled on November 18, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Vitis rotundifolia</i>	muscadine	7.56
<i>Panicum verrucosum</i>	warty panicgrass	3.67
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	3.28
<i>Osmunda cinnamomea</i>	cinnamon fern	2.06
<i>Pinus taeda</i>	loblolly pine	1.44
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.17
<i>Rubus argutus</i>	sawtooth blackberry	1.11
<i>Sphagnum</i> sp.	sphagnum moss	0.61
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	0.50
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.44
<i>Rubus trivialis</i>	southern dewberry	0.39
<i>Smilax auriculata</i>	earleaf greenbrier	0.39
<i>Toxicodendron radicans</i>	eastern poison ivy	0.39
<i>Andropogon virginicus</i>	broomsedge bluestem	0.22
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.22
<i>Panicum anceps</i>	beaked panicum	0.17
<i>Smilax glauca</i>	cat greenbrier	0.17
<i>Acalypha gracilens</i>	slender threeseed mercury	0.06
<i>Dichanthelium</i> sp.	witchgrass	0.06
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.06

Scientific name	Common name	Average percent cover per quadrat
<i>Hypericum hypericoides</i>	St. Andrew's cross	0.06
<i>Viola lanceolata</i>	bog white violet	0.06
<i>Viola sororia</i>	common blue violet	0.06
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.06
	Bare ground	75.83

Figure 7. Percent cover of plant species in Hydric Pine Flatwoods Transect 2.

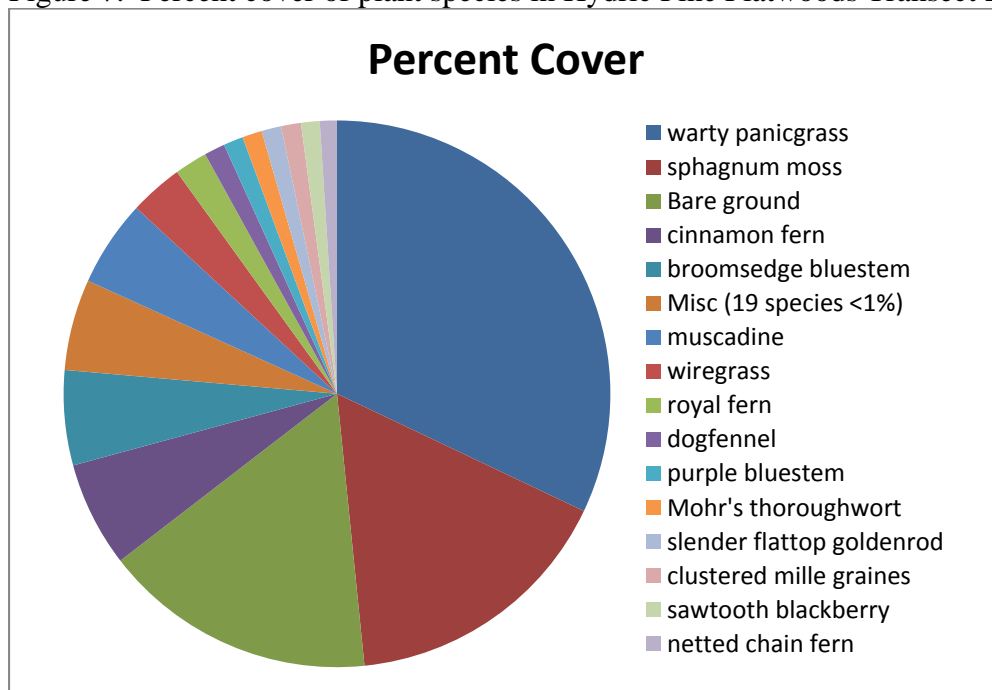


Table 7. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 when sampled on November 18, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Panicum verrucosum</i>	warty panicgrass	32.06
<i>Sphagnum sp.</i>	sphagnum moss	16.33
<i>Osmunda cinnamomea</i>	cinnamon fern	6.22
<i>Andropogon virginicus</i>	broomsedge bluestem	5.61
<i>Vitis rotundifolia</i>	muscadine	5.11
<i>Aristida stricta var. beyrichiana</i>	wiregrass	3.17
<i>Osmunda regalis var. spectabilis</i>	royal fern	1.94
<i>Eupatorium capillifolium</i>	dogfennel	1.22
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	1.17
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	1.17
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.17

Scientific name	Common name	Average percent cover per quadrat
<i>Oldenlandia uniflora</i>	clustered mille grains	1.17
<i>Rubus argutus</i>	sawtooth blackberry	1.11
<i>Woodwardia areolata</i>	netted chain fern	1.00
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	0.94
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.78
<i>Pinus taeda</i>	loblolly pine	0.67
<i>Smilax glauca</i>	cat greenbrier	0.56
<i>Woodwardia virginica</i>	Virginia chain fern	0.39
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	0.33
<i>Acer rubrum</i>	red maple	0.22
<i>Viola lanceolata</i>	bog white violet	0.22
<i>Cliftonia monophylla</i>	black titi	0.17
<i>Eleocharis vivipara</i>	viviparous spikerush	0.17
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.17
<i>Persea borbonia</i>	red bay	0.17
<i>Quercus nigra</i>	water oak	0.17
<i>Toxicodendron radicans</i>	eastern poison ivy	0.17
<i>Carex sp.</i>	sedge	0.06
<i>Centella asiatica</i>	spadeleaf	0.06
<i>Rhexia sp.</i>	meadowbeauty	0.06
unknown moss	unknown moss	0.06
<i>Viola sororia</i>	common blue violet	0.06
	Bare ground	16.17

Pine Flatwoods

Qualitative monitoring. A total of 31 species (Table 1) were observed in the pine flatwoods area. The open canopy was dominated by mature loblolly pines 30-50 feet tall. The hardwoods in the suc canopy had been cut down and the logs were lying on the ground. Some had re-sprouted from stumps. Muscadine vine was abundant. The diverse open shrub layer was dominated by gallberry, large gallberry, wax myrtle, sawtooth blackberry, and Elliott's blueberry. There was scattered wiregrass, along with sphagnum moss, royal fern, cinnamon fern, netted chain fern, and Virginia chain fern, in the herbaceous layer.

**Lafayette Creek - Phase I Mitigation Site
Qualitative and Quantitative Monitoring
December 2014**

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INTRODUCTION

The Lafayette Creek Phase I mitigation site of 509 acres was obtained to compensate for the loss of wetland function from the impacts associated with US 331 re-alignment at Freeport. The site is located north of SR 20 and Lafayette Creek. Access to the site is via Hollington Road, which is located 4.5 miles east of US 331 on the north side of SR 20. The gate to the site is at the north end of Hollington Road. The Phase I Mitigation project aims to restore sandhill (SA) to areas formerly planted with sand pine plantation and hydric savanna (HS) to areas of wetland shrubs (Figure 1). Quantitative and qualitative monitoring documented the current plant species composition and vegetation structure of these targeted communities. Qualitative monitoring was used to document areas of slash pine plantation being restored to high pine (HP) as well as the intact bay swamp (BS) and stream swamp (SS). The site vegetation was previously monitored by FNAI biologists in the fall of 2012 and 2013.

METHODS

The quantitative monitoring utilized 300 feet long permanent transect lines previously marked during the 2012 survey. Two transects were located in both the sandhill and hydric savanna areas (Figure 1). In 2013, metal T-posts were installed at the ends of each transect to provide permanent reference points. In 2014 the northern metal T-post in hydric savanna Transect 2 was missing. Its position was re-established and the metal T-post was replaced. Data recorded consisted of the visually estimated percent cover of each plant species in fifteen 1-meter square quadrats. The quadrats were located to the left of the transect line, 20 feet apart, starting at 0 feet and ending at 280 feet. The qualitative monitoring consisted of recording the species and vegetation structure observed along meandering pedestrian transects through each of these two communities plus high pine (HP), bay swamp (BS), and stream swamp (SS). The field surveys were performed by Gary Schultz and Ann Johnson on November 10th and 11th, 2014.

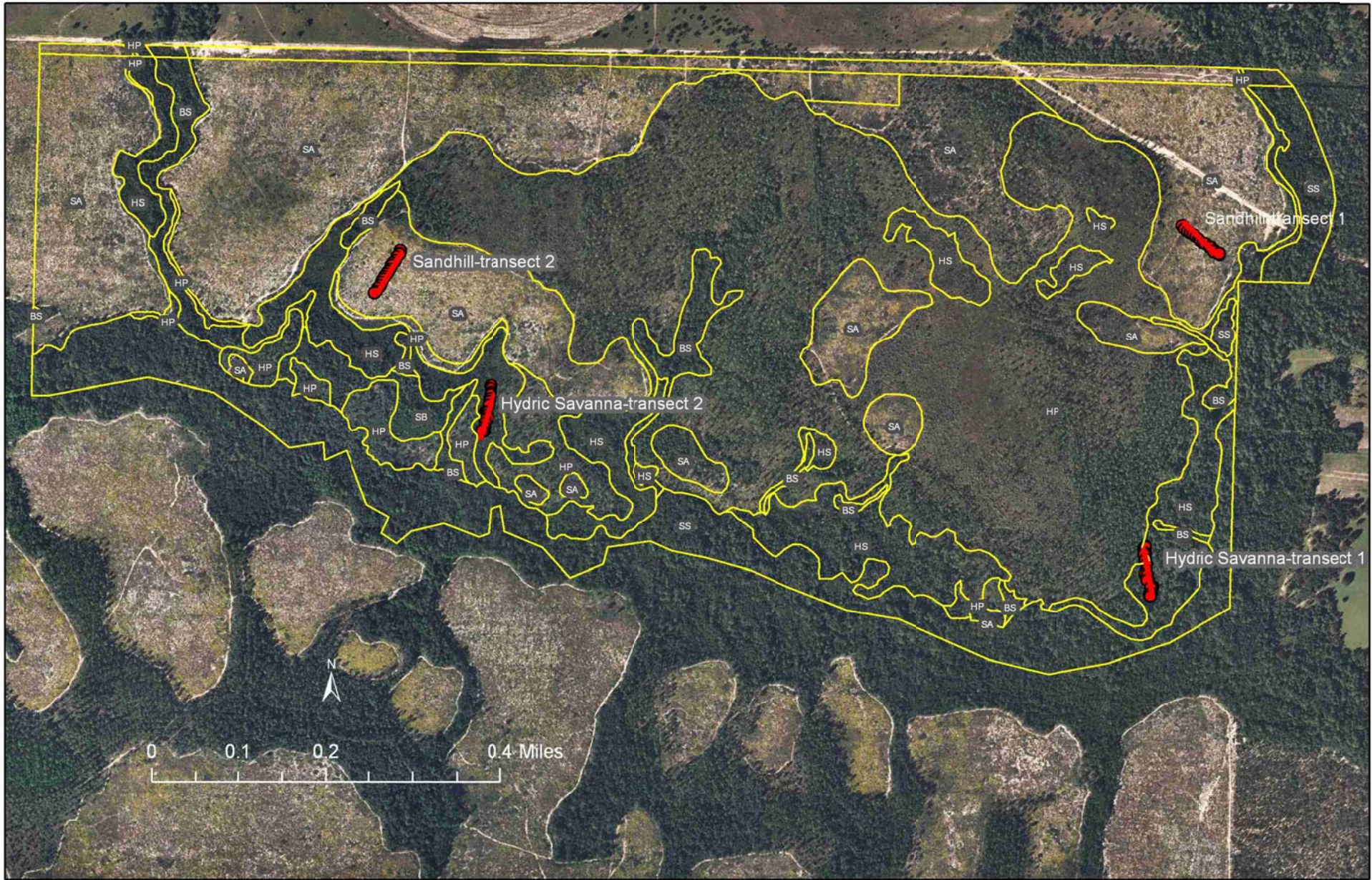


Figure 1. Location of permanent transects at Lafayette Creek – Phase I Mitigation Site. SA=Sandhill, HS=Hydric Savanna, HP=High Pine, BS=Bay Swamp, SS=Stream Swamp, SB=Shrub Bog.

RESULTS AND DISCUSSION

A total of 168 plant species were recorded in the surveyed areas of Lafayette Creek during the 2014 monitoring period. This total included 24 species not recorded in the previous 2012-13 sampling periods. There was one corrected identification: plants previously identified as blood sage (*Salvia coccinea*) should have been identified as scarlet calamint (*Calamintha coccinea*).

Sandhill

Qualitative sampling. The sandhill natural community has been degraded by past silviculture activities but retains many characteristic species. The diverse but somewhat sparse groundcover was dominated by wiregrass, needleleaf witchgrass, Lynn Haven goldenaster, little bluestem, and Piedmont gayfeather. Other common species included tapered witchgrass, broomsedge bluestem, and yankeeweed. The occasional shrubs were mainly woody goldenrod, young turkey oak, sand live oak, saw palmetto, yaupon, and sand blackberry. The vine earleaf greenbriar was common. Planted longleaf pines were common and ranged from 1 to 15 feet tall. A total of 67 plant species were identified in this community (Table 1).

Quantitative sampling. The eastern Transect 1 (Table 2, Figure 2) was located on an east-facing slope. It had a total of 33 species with 62% bare ground. Herbs and shrubs were about equally abundant. The herbs with the highest percent cover were wiregrass, needleleaf witchgrass, and little bluestem. The most abundant woody species were saw palmetto, sand live oak, and longleaf pine seedlings. The western Transect 2 (Table 3, Figure 3) was situated near the top of a ridge. It had a total of 23 species with 36% bare ground. Wiregrass, Lynn Haven goldenaster and needleleaf witchgrass were the dominant herbs. The open shrub stratum was mainly woody goldenrod, sand blackberry, turkey oak, and seedling longleaf pine.

Table 1. Species observed in target communities at Lafayette Creek – Phase I Mitigation Site, November 10-11, 2014.

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Acer rubrum</i>	red maple	X					1
<i>Andropogon glomeratus</i>	bushy bluestem			X			1
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem			X			1
<i>Andropogon gyrans</i>	Elliott's bluestem				X		1
<i>Andropogon gyrans</i> var. <i>stenophyllus</i>	Elliott's bluestem			X			1
<i>Andropogon ternarius</i>	splitbeard bluestem				X		1
<i>Andropogon virginicus</i>	broomsedge bluestem			X	X		2
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem		X				1
<i>Anthraenantia villosa</i>	green silkyscale			X			1
<i>Aristida purpurascens</i>	arrowfeather threeawn				X		1
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass		X	X	X		3
<i>Arnoglossum sulcatum</i>	Georgia indian-plantain			X			1

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Arundinaria gigantea</i>	switchcane			X			1
<i>Aureolaria pectinata</i>	fernleaf yellow foxglove		X				1
<i>Balduina angustifolia</i>	coastalplain honeycomb-head		X		X		2
<i>Baptisia lanceolata</i>	gopherweed				X		1
<i>Bigelovia nudata</i>	pineland rayless goldenrod			X			1
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge				X		1
<i>Calamintha coccinea</i>	scarlet calamint				X		1
<i>Callicarpa americana</i>	American beautyberry	X	X				2
<i>Carex glaucescens</i>	clustered sedge			X			1
<i>Carphephorus odoratissimus</i>	vanillaleaf		X				1
<i>Centella asiatica</i>	spadeleaf			X			1
<i>Chrysoma pauciflosculosa</i>	woody goldenrod				X		1
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster				X		1
<i>Chrysopsis linearifolia</i>	narrowleaf goldenaster				X		1
<i>Chrysopsis mariana</i>	Maryland goldenaster		X		X		2
<i>Clethra alnifolia</i>	sweet pepperbush	X		X			2
<i>Cliftonia monophylla</i>	black titi	X		X		X	3
<i>Conyza canadensis</i>	Canadian horseweed				X		1
<i>Croptilon divaricatum</i>	slender scratchdaisy				X		1
<i>Ctenium aromaticum</i>	toothache grass		X	X			2
<i>Cyperus retrorsus</i>	pinebarren flatsedge				X		1
<i>Cyrilla racemiflora</i>	titi		X			X	2
<i>Dichantherium aciculare</i>	needleleaf witchgrass				X		1
<i>Dichantherium acuminatum</i>	tapered witchgrass		X	X	X		3
<i>Dichantherium commutatum</i>	variable witchgrass			X	X		2
<i>Dichantherium scabriusculum</i>	woolly witchgrass			X			1
<i>Dichantherium</i> sp.	witchgrass			X	X		2
<i>Diodia virginiana</i>	Virginia buttonweed		X				1
<i>Diospyros virginiana</i>	common persimmon			X	X		2
<i>Drosera capillaris</i>	pink sundew			X			1
<i>Elephantopus elatus</i>	tall elephantsfoot		X		X		2
<i>Eragrostis</i> sp.	lovegrass				X		1
<i>Eragrostis virginica</i>	coastal lovegrass				X		1
<i>Erigeron vernus</i>	early whitetop fleabane			X			1
<i>Eriocaulon compressum</i>	flattened pipewort			X			1
<i>Eriocaulon decangulare</i>	tenangle pipewort			X			1
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat				X		1
<i>Eupatorium compositifolium</i>	yankeeweed		X		X		2

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Eupatorium mohrii</i>	Mohr's thoroughwort		X				1
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort		X	X			2
<i>Euphorbia discoidalis</i>	summer spurge		X				1
<i>Eurybia eryngiifolia</i>	thistleleaf aster		X				1
<i>Euthamia caroliniana</i>	slender flattop goldenrod		X		X		2
<i>Fuirena</i> sp.	umbrellasedge			X			1
<i>Galactia regularis</i>	eastern milkpea				X		1
<i>Gaylussacia dumosa</i>	dwarf huckleberry		X	X	X		3
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry			X			1
<i>Gelsemium sempervirens</i>	yellow jessamine		X				1
<i>Helianthus angustifolius</i>	narrowleaf sunflower		X	X			2
<i>Helianthus radula</i>	stiff sunflower		X				1
<i>Houstonia procumbens</i>	roundleaf bluet				X		1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort			X			1
<i>Hypericum fasciculatum</i>	peelbark St. John's wort			X			1
<i>Hypericum gentianoides</i>	orangegrass				X		1
<i>Hypericum hypericoides</i>	St. Andrew's cross			X	X		2
<i>Ilex cassine</i>	dahoon			X			1
<i>Ilex coriacea</i>	large gallberry	X		X		X	3
<i>Ilex glabra</i>	gallberry		X	X	X		3
<i>Ilex vomitoria</i>	yaupon		X	X	X		3
<i>Juncus trigonocarpus</i>	redpod rush			X			1
<i>Lachnanthes caroliniana</i>	Carolina redroot			X			1
<i>Lachnocaulon anceps</i>	whitehead bogbutton			X			1
<i>Liatris gracilis</i>	slender gayfeather				X		1
<i>Liatris secunda</i>	Piedmont gayfeather				X		1
<i>Liatris spicata</i>	dense gayfeather			X			1
<i>Licania michauxii</i>	gopher apple				X		1
<i>Lobelia glandulosa</i>	glade lobelia		X				1
<i>Lupinus diffusus</i>	skyblue lupine				X		1
<i>Lycopodiella alopecuroides</i>	foxtail club-moss			X			1
<i>Lycopodiella</i> sp.	club-moss			X			1
<i>Lyonia lucida</i>	fetterbush					X	1
<i>Magnolia grandiflora</i>	southern magnolia		X				1
<i>Magnolia virginiana</i>	sweetbay	X	X	X		X	4
<i>Mitreola angustifolia</i>	narrowleaf hornpod			X			1
<i>Myrica caroliniensis</i>	evergreen bayberry	X					1
<i>Myrica inodora</i>	odorless bayberry		X	X		X	3

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo	X					1
<i>Oclemena reticulata</i>	whitetop aster			X			1
<i>Oldenlandia uniflora</i>	clustered mille grains		X	X			2
<i>Opuntia humifusa</i>	pricklypear				X		1
<i>Osmanthus americanus</i>	wild olive	X	X				2
<i>Osmunda cinnamomea</i>	cinnamon fern	X		X		X	3
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern			X		X	2
<i>Panicum longifolium</i>	panicum			X			1
<i>Panicum verrucosum</i>	warty panicgrass			X			1
<i>Panicum virgatum</i>	switchgrass		X		X		2
<i>Paspalum setaceum</i>	thin paspalum				X		1
<i>Persea palustris</i>	swamp bay	X				X	2
<i>Pinus clausa</i>	sand pine				X		1
<i>Pinus elliotii</i>	slash pine		X	X	X		3
<i>Pinus palustris</i>	longleaf pine				X		1
<i>Pinus serotina</i>	pond pine			X			1
<i>Pinus</i> sp.	pine			X			1
<i>Pityopsis aspera</i>	pineland silkgrass		X		X		2
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass		X				1
<i>Polygonella gracilis</i>	tall jointweed				X		1
<i>Pteridium aquilinum</i>	bracken fern		X	X			2
<i>Pterocaulon pycnostachyum</i>	blackroot		X				1
<i>Quercus geminata</i>	sand live oak		X		X		2
<i>Quercus hemisphaerica</i>	laurel oak				X		1
<i>Quercus incana</i>	bluejack oak				X		1
<i>Quercus laevis</i>	turkey oak				X		1
<i>Quercus minima</i>	dwarf live oak				X		1
<i>Quercus nigra</i>	water oak	X				X	2
<i>Quercus pumila</i>	runner oak		X				1
<i>Rhexia lutea</i>	yellow meadowbeauty			X			1
<i>Rhexia</i> sp.	meadowbeauty			X			1
<i>Rhododendron canescens</i>	mountain azalea					X	1
<i>Rhus copallinum</i>	winged sumac		X		X		2
<i>Rhynchospora cephalantha</i>	bunched beaksedge			X			1
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge			X			1
<i>Rhynchospora ciliaris</i>	fringed beaksedge			X			1
<i>Rhynchospora compressa</i>	flatfruit beaksedge			X			1
<i>Rhynchospora</i> sp.	beaksedge			X			1

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Rubus argutus</i>	sawtooth blackberry			X			1
<i>Rubus cuneifolius</i>	sand blackberry		X		X		2
<i>Sabatia brevifolia</i>	shortleaf rosegentian		X				1
<i>Saccharum giganteum</i>	sugarcane plumegrass			X			1
<i>Sarracenia leucophylla</i>	white-top pitcherplant			X			1
<i>Schizachyrium scoparium</i>	little bluestem				X		1
<i>Schizachyrium tenerum</i>	slender bluestem		X		X		1
<i>Scirpus cyperinus</i>	woolgrass			X			1
<i>Scleria ciliata</i>	fringed nutrush				X		1
<i>Scleria reticularis</i>	netted nutrush			X			1
<i>Scleria</i> sp.	nutrush			X			1
<i>Scoparia dulcis</i>	licoriceweed			X			1
<i>Serenoa repens</i>	saw palmetto		X		X		2
<i>Sericocarpus tortifolius</i>	whitetop aster		X		X		1
<i>Smilax auriculata</i>	earleaf greenbrier				X		1
<i>Smilax glauca</i>	cat greenbrier		X	X			2
<i>Smilax laurifolia</i>	laurel greenbrier	X		X		X	3
<i>Smilax pumila</i>	sarsaparilla vine		X				1
<i>Solidago odora</i>	sweet goldenrod				X		1
<i>Sorghastrum secundum</i>	lopsided indiagrass				X		1
<i>Sphagnum</i> sp.	sphagnum moss					X	1
<i>Stillingia sylvatica</i>	queen's delight				X		1
<i>Styrax americanus</i>	American snowbell					X	1
<i>Symphotrichum adnatum</i>	scaleleaf aster		X				1
<i>Symphotrichum dumosum</i>	rice button aster		X	X	X		3
<i>Toxicodendron radicans</i>	eastern poison ivy		X				1
<i>Toxicodendron vernix</i>	poison sumac					X	1
<i>Tragia urens</i>	wavyleaf noseburn		X				1
unknown herb	unknown herb			X	X		2
<i>Utricularia subulata</i>	zigzag bladderwort			X			1
<i>Utricularia juncea</i>	southern bladderwort			X			1
<i>Vaccinium arboreum</i>	sparkleberry				X		1
<i>Vaccinium myrsinites</i>	shiny blueberry		X		X		2
<i>Viola primulifolia</i>	primroseleaf violet		X	X			2
<i>Vitis rotundifolia</i>	muscadine	X	X			X	3
<i>Woodwardia areolata</i>	netted chain fern					X	1
<i>Woodwardia virginica</i>	Virginia chain fern			X			1
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass			X			1

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass			X			1
<i>Xyris fimbriata</i>	fringed yellow-eyed grass			X			1
<i>Xyris</i> sp.	yellow-eyed grass			X			1
<i>Yucca filamentosa</i>	Adam's needle		X		X		2
Total number of taxa: 168		14	54	80	67	17	

Figure 2. Percent cover of plant species in Sandhill Transect 1.

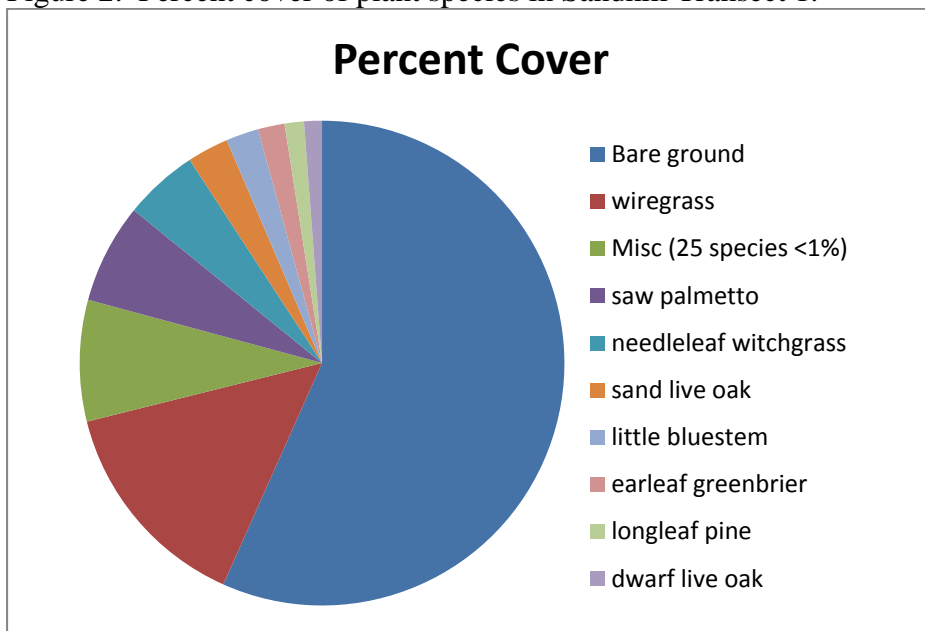


Table 2. Percent cover of plant species in Sandhill Transect 1 when sampled on November 10, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	15.70
<i>Serenoa repens</i>	saw palmetto	7.23
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	5.40
<i>Quercus geminata</i>	sand live oak	3.00
<i>Schizachyrium scoparium</i>	little bluestem	2.37
<i>Smilax auriculata</i>	earleaf greenbrier	1.93
<i>Pinus palustris</i>	longleaf pine	1.40
<i>Quercus minima</i>	dwarf live oak	1.30
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	0.90
<i>Eupatorium compositifolium</i>	yankeeweed	0.80

Scientific name	Common name	Average percent cover per quadrat
<i>Dichanthelium acuminatum</i>	tapered witchgrass	0.77
<i>Rhus copallinum</i>	winged sumac	0.73
<i>Rubus cuneifolius</i>	sand blackberry	0.73
<i>Hypericum gentianoides</i>	orangegrass	0.60
<i>Andropogon virginicus</i>	broomsedge bluestem	0.57
<i>Andropogon gyrans</i>	Elliott's bluestem	0.50
<i>Licania michauxii</i>	gopher apple	0.50
<i>Polygonella gracilis</i>	tall jointweed	0.50
<i>Schizachyrium tenerum</i>	slender bluestem	0.50
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.50
<i>Pityopsis aspera</i>	pineland silkgrass	0.47
<i>Solidago odora</i>	sweet goldenrod	0.27
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.07
<i>Paspalum setaceum</i>	thin paspalum	0.07
<i>Eragrostis virginica</i>	coastal lovegrass	0.07
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.03
<i>Liatris secunda</i>	Piedmont gayfeather	0.03
<i>Opuntia humifusa</i>	pricklypear	0.03
<i>Yucca filamentosa</i>	Adam's needle	0.03
<i>Cyperus retrorsus</i>	pinebarren flatsedge	0.03
<i>Galactia regularis</i>	eastern milkpea	0.03
<i>Scleria ciliata</i>	fringed nutrush	0.03
<i>Houstonia procumbens</i>	roundleaf bluet	0.03
	Bare ground	61.67

Figure 3. Percent cover of plant species in Sandhill Transect 2.

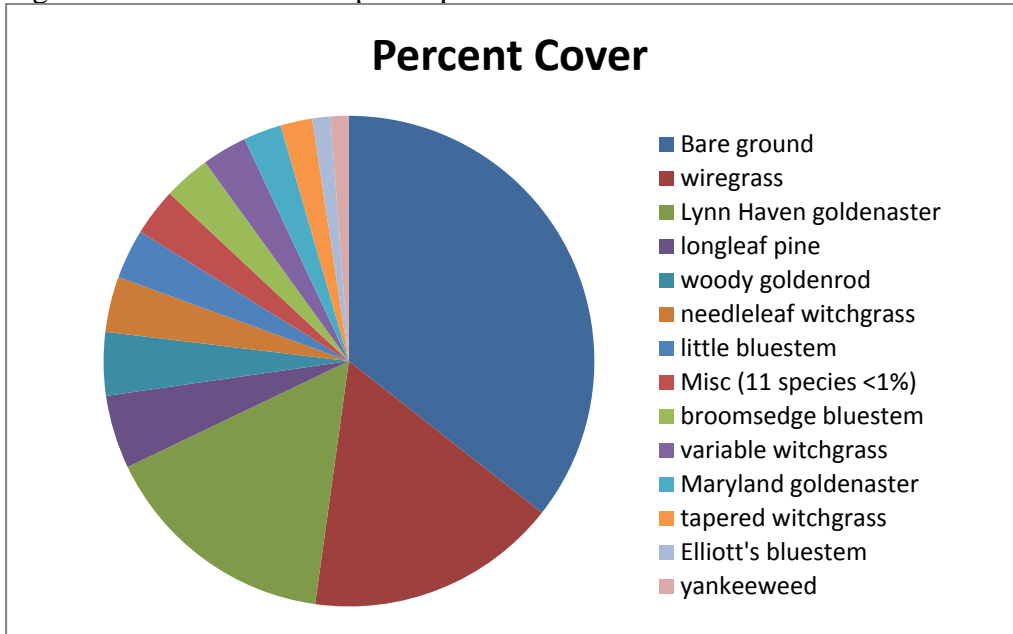


Table 3. Percent cover of plant species in Sandhill Transect 2 when sampled on November 11, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	16.60
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	15.70
<i>Pinus palustris</i>	longleaf pine	4.83
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	4.17
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	3.67
<i>Schizachyrium scoparium</i>	little bluestem	3.27
<i>Andropogon virginicus</i>	broomsedge bluestem	3.07
<i>Dichanthelium commutatum</i>	variable witchgrass	2.97
<i>Chrysopsis mariana</i>	Maryland goldenaster	2.50
<i>Dichanthelium acuminatum</i>	tapered witchgrass	2.10
<i>Andropogon gyrans</i>	Elliott's bluestem	1.20
<i>Eupatorium compositifolium</i>	yankeeweed	1.20
<i>Smilax auriculata</i>	earleaf greenbrier	0.97
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.47
<i>Hypericum gentianoides</i>	orangegrass	0.37
<i>Rubus cuneifolius</i>	sand blackberry	0.27
<i>Conyza canadensis</i>	Canadian horseweed	0.23
<i>Licania michauxii</i>	gopher apple	0.23
<i>Polygonella gracilis</i>	tall jointweed	0.23
<i>Quercus laevis</i>	turkey oak	0.23
<i>Liatris secunda</i>	Piedmont gayfeather	0.07

Scientific name	Common name	Average percent cover per quadrat
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.03
unknown herb	unknown herb	0.03
	Bare ground	35.60

Hydric Savanna

Qualitative sampling. The restoration of the fire-suppressed hydric savanna was begun in the last three years by mowing down the often dense shrubs with a Gyro-Trac machine. Follow-up prescribed burning had further reduced the shrub strata. As a result, much of the ground was bare or sparsely vegetated and there was some disturbance by vehicle tracks in the two sampling periods prior to 2014. In 2014 warty panicum and Chapman’s beaksedge have colonized a portion of this formerly bare area. Occasional areas with water seepage at the bottom of the sandhill ridge had whitetop pitcher-plants and abundant beaksedges. A wide variety of herbs were colonizing the rest of the area, with beaksedges dominating in the wetter sections and wiregrass in the drier parts. The sparse shrubs include black titi, large gallberry, sweet pepperbush, and gallberry. Scattered mature pond pine provided an open canopy. The soil was often saturated and small areas of inundation were found at the lower elevations. A total of 80 species were recorded from this community (Table 1), an increase over the prior two years.

Quantitative sampling. The eastern Transect 1 (Table 4, Figure 4) was on a south-facing slope and had a total of 34 species with 60% bare ground. Herbaceous cover made up most of the transect. The most abundant herbs were witchgrasses, warty panicgrass, Chapman’s beaksedge, and wiregrass. Bushy bluestem and purple bluestem were also common. The sparse shrubs included black titi, gallberry, and large gallberry. The western Transect 2 (Table 5, Figure 5) was also on a south facing slope. It had a total of 35 species with 59% bare ground. The drier north end had abundant purple bluestem, wiregrass, and blue huckleberry, while the wetter south end was dominated by Chapman’s beaksedge, warty panicgrass, and fringed yellow-eyed grass.

Figure 4. Percent cover of plant species in Hydric Savanna Transect 1.

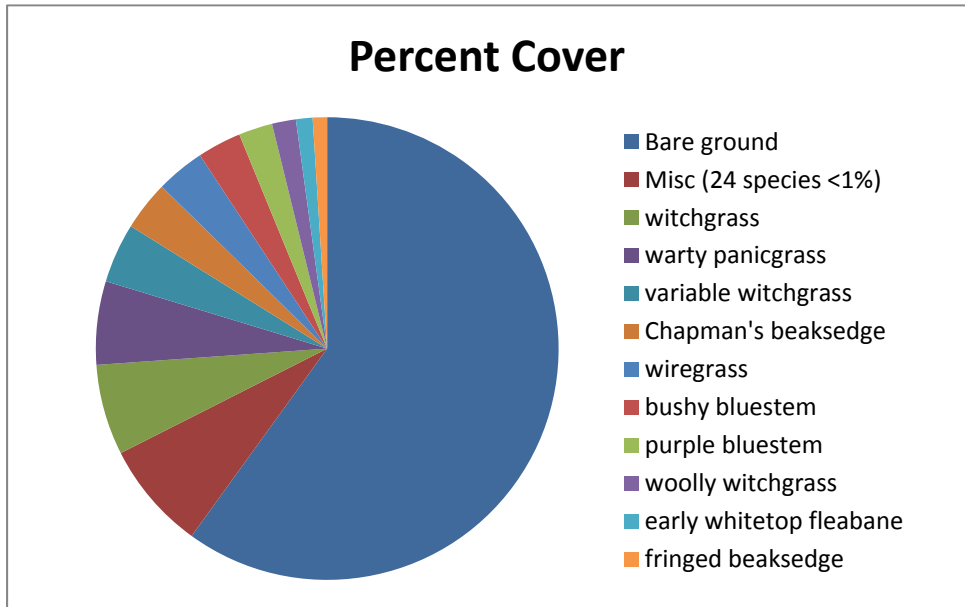


Table 4. Percent cover of plant species in Hydric Savanna Transect 1 when sampled on November 11, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Dichanthelium</i> sp.	witchgrass	6.33
<i>Panicum verrucosum</i>	warty panicgrass	5.83
<i>Dichanthelium commutatum</i>	variable witchgrass	4.17
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	3.47
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	3.40
<i>Andropogon glomeratus</i>	bushy bluestem	3.07
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	2.37
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	1.67
<i>Erigeron vernus</i>	early whitetop fleabane	1.17
<i>Rhynchospora ciliaris</i>	fringed beaksedge	1.00
<i>Cliftonia monophylla</i>	black titi	0.97
<i>Panicum longifolium</i>	panicum	0.73
<i>Ilex glabra</i>	gallberry	0.70
<i>Scleria</i> sp.	nutrush	0.70
<i>Ilex coriacea</i>	large gallberry	0.53
<i>Bigelovia nudata</i>	pineland rayless goldenrod	0.50
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort	0.50
<i>Xyris</i> sp.	yellow-eyed grass	0.50
<i>Oclemena reticulata</i>	whitetop aster	0.50
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.27
<i>Ctenium aromaticum</i>	toothache grass	0.23

Scientific name	Common name	Average percent cover per quadrat
<i>Lycopodiella sp.</i>	club-moss	0.23
<i>Myrica inodora</i>	odorless bayberry	0.23
<i>Ilex vomitoria</i>	yaupon	0.23
<i>Xyris ambigua</i>	coastalplain yellow-eyed	0.23
<i>Rubus argutus</i>	sawtooth blackberry	0.23
<i>Drosera capillaris</i>	pink sundew	0.03
<i>Helianthus angustifolius</i>	narrowleaf sunflower	0.03
<i>Lachnanthes caroliana</i>	Carolina redroot	0.03
<i>Pinus elliottii</i>	slash pine	0.03
unknown herb	unknown herb	0.03
<i>Scleria reticularis</i>	netted nutrush	0.03
<i>Pinus serotina</i>	pond pine	0.03
<i>Pinus sp.</i>	pine	0.03
	Bare ground	59.97

Figure 5. Percent cover of plant species in Hydric Savanna Transect 2.

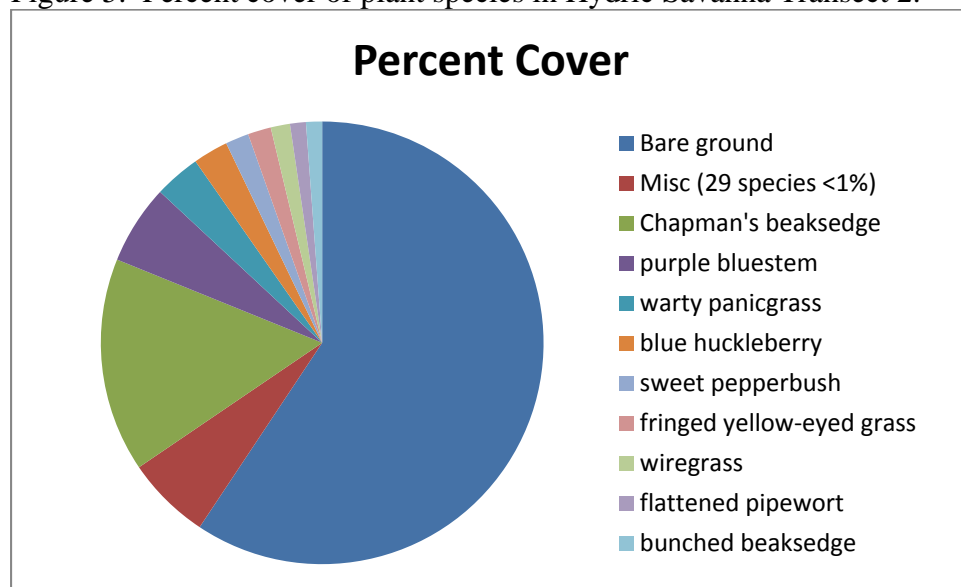


Table 5. Percent cover of plant species in Hydric Savanna Transect 2 when sampled on November 11, 2014

Scientific name	Common name	Average percent cover per quadrat
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	15.63
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	5.80
<i>Panicum verrucosum</i>	warty panicgrass	3.37

Scientific name	Common name	Average percent cover per quadrat
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry	2.57
<i>Clethra alnifolia</i>	sweet pepperbush	1.70
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	1.70
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	1.40
<i>Eriocaulon compressum</i>	flattened pipewort	1.17
<i>Rhynchospora cephalantha</i>	bunched beaksedge	1.17
<i>Andropogon virginicus</i>	broomsedge bluestem	0.73
<i>Smilax laurifolia</i>	laurel greenbrier	0.73
<i>Andropogon glomeratus</i>	bushy bluestem	0.50
<i>Pteridium aquilinum</i>	bracken fern	0.47
<i>Dichantherium</i> sp.	witchgrass	0.30
<i>Cliftonia monophylla</i>	black titi	0.27
<i>Ilex coriacea</i>	large gallberry	0.27
<i>Lachnanthes caroliana</i>	Carolina redroot	0.27
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.27
<i>Smilax glauca</i>	cat greenbrier	0.27
unknown herb	unknown herb	0.27
<i>Dichantherium acuminatum</i>	tapered witchgrass	0.23
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	0.23
<i>Ilex glabra</i>	gallberry	0.23
<i>Scirpus cyperinus</i>	woolgrass	0.23
<i>Woodwardia virginica</i>	Virginia chain fern	0.23
<i>Osmunda cinnamomea</i>	cinnamon fern	0.23
<i>Rhynchospora</i> sp.	beaksedge	0.07
<i>Drosera capillaris</i>	pink sundew	0.03
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.03
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.03
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.03
<i>Oldenlandia uniflora</i>	clustered mille grains	0.03
<i>Pinus elliotii</i>	slash pine	0.03
<i>Xyris</i> sp.	yellow-eyed grass	0.03
<i>Utricularia subulata</i>	zigzag bladderwort	0.03
	Bare ground	59.33

High Pine

Qualitative sampling. Mature slash pine plantation still covers most of the area being restored to high pine. Thinning of the pines and prescribed fire had opened up the canopy in some sections. An often dense shrub layer was dominated by gallberry, yaupon, American beautyberry, and large gallberry. More open areas had wiregrass, purple bluestem, plus many

other herbs including toothache grass, thistleleaf aster, scaleleaf aster, glade lobelia, and vanillaleaf. The total number of species observed in this community was 54 (Table 1).

Bay Swamp

Qualitative sampling. This relatively undisturbed natural community occurs as a narrow band along the small stream tributaries to Lafayette Creek. The often dense canopy consisted of sweetbay, swamp bay, black titi, water oak, and swamp tupelo. The also dense shrub layer was primarily fetterbush, large gallberry, black titi, plus odorless bayberry, sweet pepperbush, evergreen bayberry, and wild olive. Cinnamon fern was in the sparse herb stratum and laurel greenbrier was a common vine. The total number of species observed in this community was 14 (Table 1).

Stream Swamp

Qualitative sampling. This relatively undisturbed natural community occurred along the narrow floodplain of Lafayette Creek and its major tributary, Wolf Creek. It was observed along one of its drier tributaries. The closed canopy was composed of water oak, swamp bay, and sweetbay. The often dense shrubs consisted of titi, black titi, large gallberry, odorless bayberry, and fetterbush. Sphagnum moss, cinnamon fern, and royal fern made up the sparse groundcover. The total number of species observed in this community was 17 (Table 1).

Plum Creek at Holmes Creek Mitigation Site
Qualitative and Quantitative Monitoring
December 2014

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INTRODUCTION

The Plum Creek at Holmes Creek Mitigation Site compensates for the loss of wetland function due to the impact of the SR 79 Open Creek Bridge in Washington County, Florida. The 130-acre tract lies just north of Holmes Creek and is contiguous with other Northwest Florida Water Management District holdings along the creek. Access is by going south on SR 79 for 6.3 miles from I-10 to Johnson Road. Head east on Johnson Road to the gate on the south side of the winding road. The Plum Creek Mitigation project aims to restore sandhill (SA) from pine plantation and mixed forested wetlands (MFW) from a wetland impacted by a beaver pond (Figure 1). Quantitative and qualitative monitoring documented the current plant species composition and vegetation structure of the communities targeted for restoration as well as an intact mixed forested wetland community. The site vegetation was previously monitored by FNAI biologists in the fall of 2012 and 2013.

METHODS

The quantitative monitoring utilized 300 feet long permanent transect lines previously marked during the 2012 survey. Two transects were located in the sandhill, one in the restoration mixed forested wetland, and one in preserved mixed forested wetland (Figure 1). In 2013, metal T-posts were installed at the ends of each transect to provide more permanent reference points. Data recorded consisted of the visually estimated percent cover of each plant species in fifteen 1-meter square quadrats. The quadrats were located to the left of the transect line and placed 20 feet apart, starting at 0 feet and ending at 280 feet. The qualitative monitoring consisted of recording the species and vegetation structure observed along meandering pedestrian transects through each of these communities. The field surveys were performed by FNAI botanists, Gary Schultz and Ann Johnson on November 12 and 13, 2014.

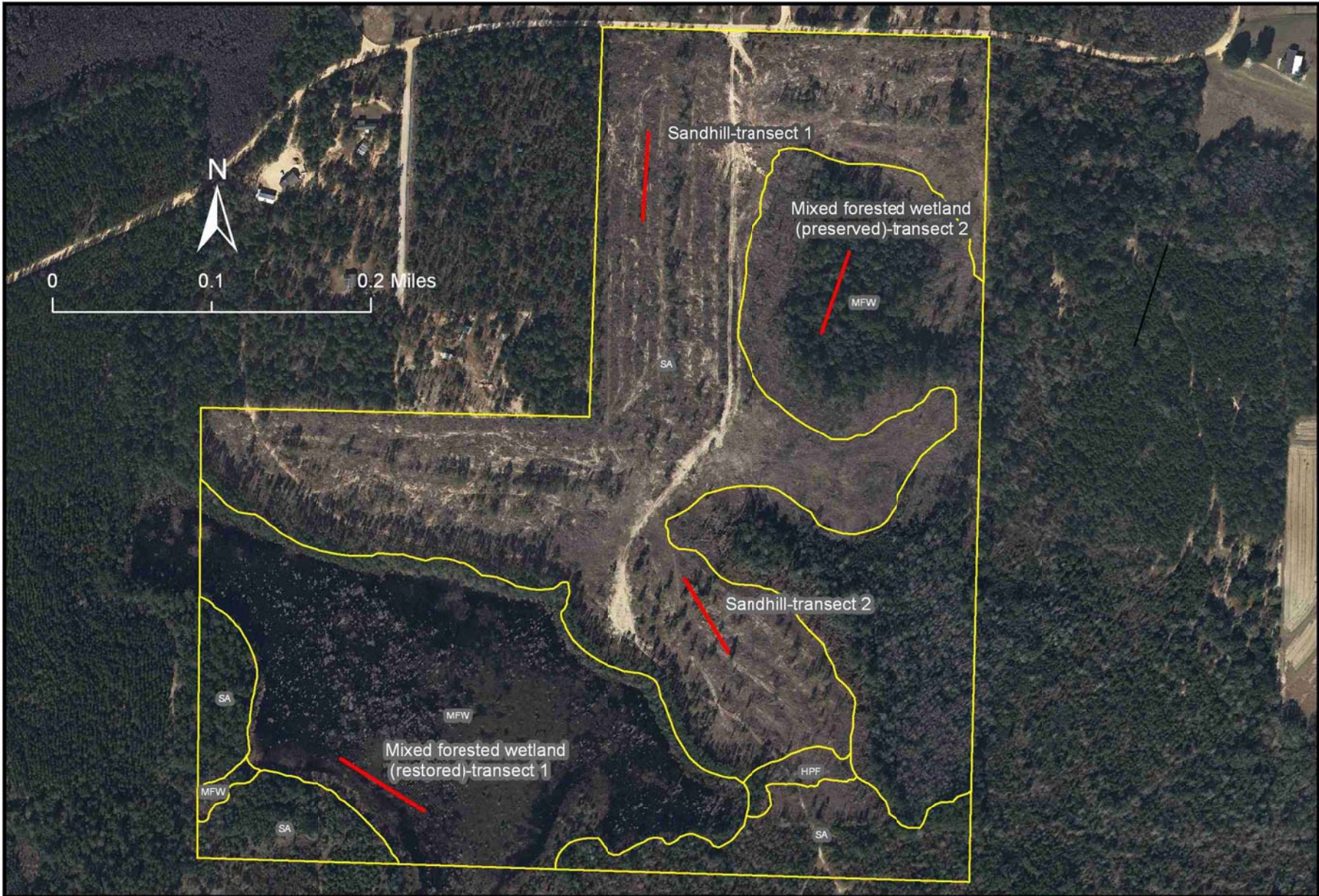


Figure 1. Location of permanent transects at Plum Creek at Holmes Creek Mitigation Site in Sandhill and Mixed Forested Wetland,

RESULTS AND DISCUSSION

A total of 128 plant species were observed during the 2014 monitoring period in the target communities at Plum Creek at Holmes Creek Mitigation Site.

Sandhill

Qualitative sampling. The sandhill natural community has been degraded by past silviculture activities but retains many characteristic species. Young planted longleaf pines were spaced over the hillside. The diverse but somewhat sparse groundcover included wiregrass, broomsedge bluestem, little bluestem, and needleleaf witchgrass. The occasional shrubs were mainly sand live oak, yaupon, turkey oak, sparkleberry, and sand blackberry. The vine earleaf greenbriar was common. A total of 88 plant species were identified in this community (Table 1). This is lower than the 117 species found in September 2013, but is similar to the 79 found in November 2012. A number of active gopher tortoise burrows were noted in the course of the sandhill survey.

Quantitative sampling. The northern Transect 1 (Table 2, Figure 2) was located midslope on an east-facing hill. It had a total of 36 species with 58% bare ground. The herbs with the highest percent cover were Lynn Haven goldenaster, yankeeweed, orangegrass and broomsedge bluestem. Shrubs were sparse, the most abundant being yaupon and sand blackberry. The southern Transect 2 (Table 3, Figure 3) was situated near the top of a low ridge. It had a total of 33 species with 51% bare ground. Common herbs were similar and included Lynn Haven goldenaster, broomsedge bluestem, needleleaf witchgrass, and rustweed. The open shrub stratum was mainly sand blackberry. The vine earleaf greenbriar was common, as were longleaf pine saplings.

Table 1. Plant species observed in target communities at Plum Creek at Holmes Creek Mitigation Site November 12 and 13, 2014.

Scientific Name	Common Name	Sandhill	Mixed Forested Wetland-Restoration	Mixed Forested Wetland-Preserved	Grand Total
<i>Acer rubrum</i>	red maple		X		1
<i>Ambrosia artemisiifolia</i>	common ragweed	X			1
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem		X		1
<i>Andropogon gyrans</i>	Elliott's bluestem	X			1
<i>Andropogon ternarius</i>	splitbeard bluestem	X			1
<i>Andropogon virginicus</i>	broomsedge bluestem	X	X		2
<i>Apteria aphylla</i>	nodding nixie			X	1
<i>Aristida purpurascens</i>	arrowfeather threeawn	X			1
<i>Aristida purpurascens var. virgata</i>	arrowfeather threeawn	X			1
<i>Aristida stricta var. beyrichiana</i>	wiregrass	X			1
<i>Asimina angustifolia</i>	slimleaf pawpaw	X			1
<i>Baptisia lanceolata</i>	gopherweed	X			1

Scientific Name	Common Name	Sandhill	Mixed Forested Wetland- Restoration	Mixed Forested Wetland- Preserved	Grand Total
<i>Berlandiera pumila</i>	soft greeneyes	X			1
<i>Bidens mitis</i>	smallfruit beggarticks		X		1
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	X			1
<i>Callicarpa americana</i>	American beautyberry	X			1
<i>Carex sp.</i>	sedge		X	X	2
<i>Carphephorus odoratissimus</i>	vanillaleaf	X			1
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	X			1
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	X			1
<i>Cladina evansii</i>	a lichen	X			
<i>Clethra alnifolia</i>	sweet pepperbush			X	1
<i>Cliftonia monophylla</i>	black titi			X	1
<i>Conyza canadensis</i>	Canadian horseweed	X			1
<i>Croptilon divaricatum</i>	slender scratchdaisy	X			1
<i>Cyperus retrorsus</i>	pinebarren flatsedge	X			1
<i>Cyrilla racemiflora</i>	titi		X	X	2
<i>Dalea pinnata</i>	summer farewell	X			1
<i>Decodon verticillatus</i>	willow herb		X		1
<i>Dichantherium aciculare</i>	needleleaf witchgrass	X			1
<i>Dichantherium acuminatum</i>	tapered witchgrass	X			1
<i>Dichantherium commutatum</i>	variable witchgrass	X			1
<i>Dichantherium sp.</i>	witchgrass	X			1
<i>Dichantherium sphaerocarpon</i>	roundseed witchgrass	X			1
<i>Diodia virginiana</i>	Virginia buttonweed	X			1
<i>Diospyros virginiana</i>	common persimmon	X			1
<i>Dulichium arundinaceum</i>	threeway sedge		X		1
<i>Elephantopus elatus</i>	tall elephantsfoot	X			1
<i>Eragrostis elliotii</i>	Elliott's lovegrass	X			1
<i>Eragrostis virginica</i>	coastal lovegrass	X			1
<i>Eremochloa ophiuroides</i>	centipede grass	X			1
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	X			1
<i>Eupatorium compositifolium</i>	yankeeweed	X			1
<i>Euthamia caroliniana</i>	slender flattop goldenrod	X	X		2
<i>Galactia regularis</i>	eastern milkpea	X			1
<i>Gelsemium sempervirens</i>	yellow jessamine	X			1
<i>Houstonia procumbens</i>	roundleaf bluet	X			1
<i>Hypericum gentianoides</i>	orangegrass	X			1
<i>Ilex coriacea</i>	large gallberry			X	1
<i>Ilex opaca</i>	American holly	X			1
<i>Ilex vomitoria</i>	yaupon	X			1

Scientific Name	Common Name	Sandhill	Mixed Forested Wetland- Restoration	Mixed Forested Wetland- Preserved	Grand Total
<i>Itea virginica</i>	Virginia willow		X		1
<i>Juncus canadensis</i>	Canadian rush		X		1
<i>Juniperus virginiana</i>	red cedar	X			1
<i>Lachnanthes caroliniana</i>	Carolina redroot		X		1
<i>Lechea sessiliflora</i>	pineland pinweed	X			1
<i>Liatris elegans</i>	pinkscale gayfeather	X			1
<i>Liatris gracilis</i>	slender gayfeather	X			1
<i>Liatris secunda</i>	Piedmont gayfeather	X			1
<i>Liatris spicata</i>	dense gayfeather	X			1
<i>Licania michauxii</i>	gopher apple	X			1
<i>Ludwigia linearis</i>	narrowleaf primrosewillow		X		1
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow		X		1
<i>Lycopus rubellus</i>	taperleaf waterhorehound		X		1
<i>Lyonia lucida</i>	fetterbush		X	X	2
<i>Magnolia virginiana</i>	sweetbay		X	X	2
<i>Myrica caroliniensis</i>	evergreen bayberry			X	1
<i>Myrica cerifera</i>	wax myrtle		X		1
<i>Myrica inodora</i>	odorless bayberry			X	1
<i>Nymphaea odorata</i>	white waterlily		X		1
<i>Nymphoides aquatica</i>	big floatingheart		X		1
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo		X	X	2
<i>Osmanthus americanus</i>	wild olive	X		X	2
<i>Osmunda cinnamomea</i>	cinnamon fern			X	1
<i>Panicum anceps</i>	beaked panicum	X			1
<i>Panicum virgatum</i>	switchgrass	X			1
<i>Paspalum notatum</i>	bahiagrass	X			1
<i>Paspalum urvillei</i>	vaseygrass	X			1
<i>Persea palustris</i>	swamp bay			X	1
<i>Pinus palustris</i>	longleaf pine	X			1
<i>Pityopsis aspera</i>	pineland silkgrass	X			1
<i>Polygonella gracilis</i>	tall jointweed	X			1
<i>Polypremum procumbens</i>	rustweed	X			1
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	X			1
<i>Pteridium aquilinum</i>	bracken fern	X			1
<i>Quercus falcata</i>	southern red oak	X			1
<i>Quercus geminata</i>	sand live oak	X			1
<i>Quercus hemisphaerica</i>	laurel oak	X			1
<i>Quercus incana</i>	bluejack oak	X			1
<i>Quercus laevis</i>	turkey oak	X			1

Scientific Name	Common Name	Sandhill	Mixed Forested Wetland- Restoration	Mixed Forested Wetland- Preserved	Grand Total
<i>Quercus margaretta</i>	sand post oak	X			1
<i>Rhododendron canescens</i>	mountain azalea			X	1
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge		X		1
<i>Rhynchospora megalocarpa</i>	sandyfield beaksedge	X			1
<i>Rubus cuneifolius</i>	sand blackberry	X			1
<i>Saccharum giganteum</i>	sugarcane plumegrass		X	X	2
<i>Schizachyrium scoparium</i>	little bluestem	X			1
<i>Scleria ciliata</i>	fringed nutrush	X			1
<i>Serenoa repens</i>	saw palmetto	X			1
<i>Sericocarpus tortifolius</i>	whitetop aster	X			1
<i>Smilax auriculata</i>	earleaf greenbrier	X			1
<i>Smilax glauca</i>	cat greenbrier	X			1
<i>Smilax laurifolia</i>	laurel greenbrier			X	1
<i>Smilax pumila</i>	sarsaparilla vine	X			1
<i>Solidago fistulosa</i>	pinebarren goldenrod		X		1
<i>Solidago odora</i>	sweet goldenrod	X			1
<i>Sphagnum sp.</i>	sphagnum moss			X	1
<i>Stillingia sylvatica</i>	queen's delight	X			1
<i>Stylisma patens</i>	coastalplain dawnflower	X			1
<i>Symphyotrichum concolor</i>	eastern silver aster	X			1
<i>Symphyotrichum dumosum</i>	rice button aster	X			1
<i>Taxodium ascendens</i>	pond cypress		X		1
<i>Tephrosia spicata</i>	spiked hoary pea	X			1
<i>Tradescantia hirsutiflora</i>	hairyflower spiderwort	X			1
<i>Trichostema dichotomum</i>	forked bluecurls	X			1
unknown grass	unknown grass	X			1
unknown herb	unknown herb	X			1
unknown moss	unknown moss			X	1
<i>Vaccinium arboreum</i>	sparkleberry	X		X	2
<i>Vaccinium corymbosum</i>	highbush blueberry			X	1
<i>Vaccinium elliotii</i>	Elliott's blueberry	X			1
<i>Vaccinium stamineum</i>	deerberry	X			1
<i>Viburnum nudum</i>	possumhaw			X	1
<i>Vitis rotundifolia</i>	muscadine	X		X	2
<i>Woodwardia areolata</i>	netted chain fern			X	1
<i>Woodwardia virginica</i>	Virginia chain fern		X	X	2
<i>Xyris fimbriata</i>	fringed yellow-eyed grass		X	X	2
<i>Yucca filamentosa</i>	Adam's needle	X			
Total number of species: 128		88	27	26	

Figure 2. Percent cover of plant species in Sandhill Transect 1.

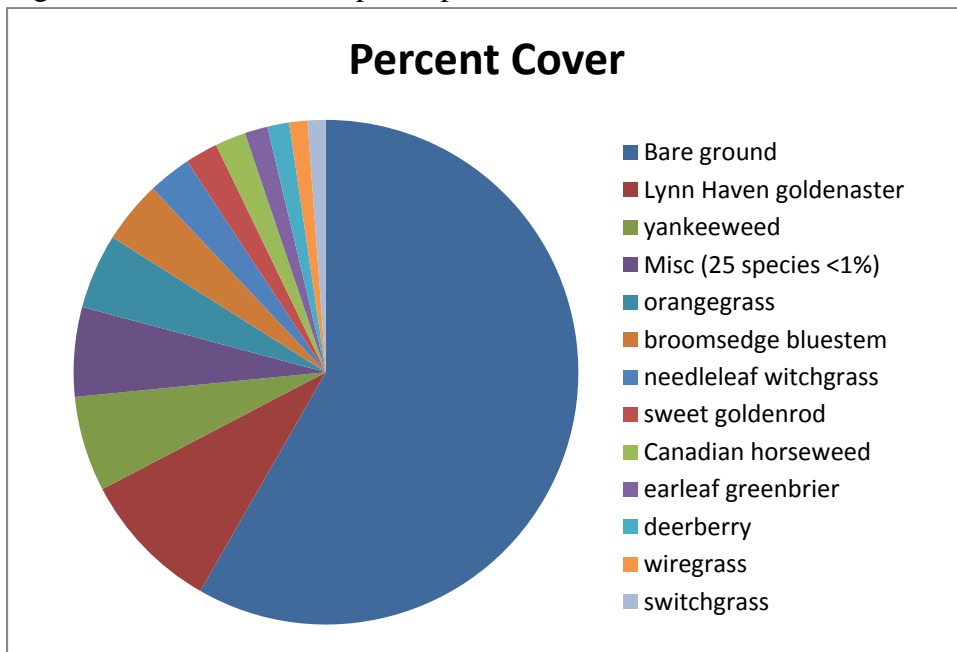


Table 2. Percent cover of plant species in Sandhill Transect 1 when sampled on November 13, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	9.03
<i>Eupatorium compositifolium</i>	yankeeweed	6.10
<i>Hypericum gentianoides</i>	orangegrass	4.80
<i>Andropogon virginicus</i>	broomsedge bluestem	4.00
<i>Dichantheium aciculare</i>	needleleaf witchgrass	2.77
<i>Solidago odora</i>	sweet goldenrod	2.10
<i>Conyza canadensis</i>	Canadian horseweed	1.97
<i>Smilax auriculata</i>	earleaf greenbrier	1.47
<i>Vaccinium stamineum</i>	deerberry	1.40
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	1.17
<i>Panicum virgatum</i>	switchgrass	1.17
<i>Ilex vomitoria</i>	yaupon	0.73
<i>Gelsemium sempervirens</i>	yellow jessamine	0.60
<i>Aristida purpurascens</i> var. <i>virgata</i>	arrowfeather threeawn	0.50
<i>Andropogon gyrans</i>	Elliott's bluestem	0.50
<i>Dichantheium commutatum</i>	variable witchgrass	0.50

Scientific name	Common name	Average percent cover per quadrat
<i>Pteridium aquilinum</i>	bracken fern	0.37
<i>Dichanthelium</i> sp.	witchgrass	0.37
<i>Dichanthelium acuminatum</i>	tapered witchgrass	0.27
<i>Polypremum procumbens</i>	rustweed	0.23
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.23
<i>Eragrostis virginica</i>	coastal lovegrass	0.23
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	0.13
<i>Smilax glauca</i>	cat greenbrier	0.13
<i>Rubus cuneifolius</i>	sand blackberry	0.10
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.10
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.10
<i>Liatris secunda</i>	Piedmont gayfeather	0.10
<i>Quercus margaretta</i>	sand post oak	0.10
<i>Schizachyrium scoparium</i>	little bluestem	0.10
<i>Scleria ciliata</i>	fringed nutrush	0.10
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.10
<i>Andropogon ternarius</i>	splitbeard bluestem	0.03
unknown grass	unknown grass	0.03
unknown herb	unknown herb	0.03
<i>Houstonia procumbens</i>	roundleaf bluet	0.03
	Bare ground	58.30

Figure 3. Percent species cover in Sandhill Transect 2.

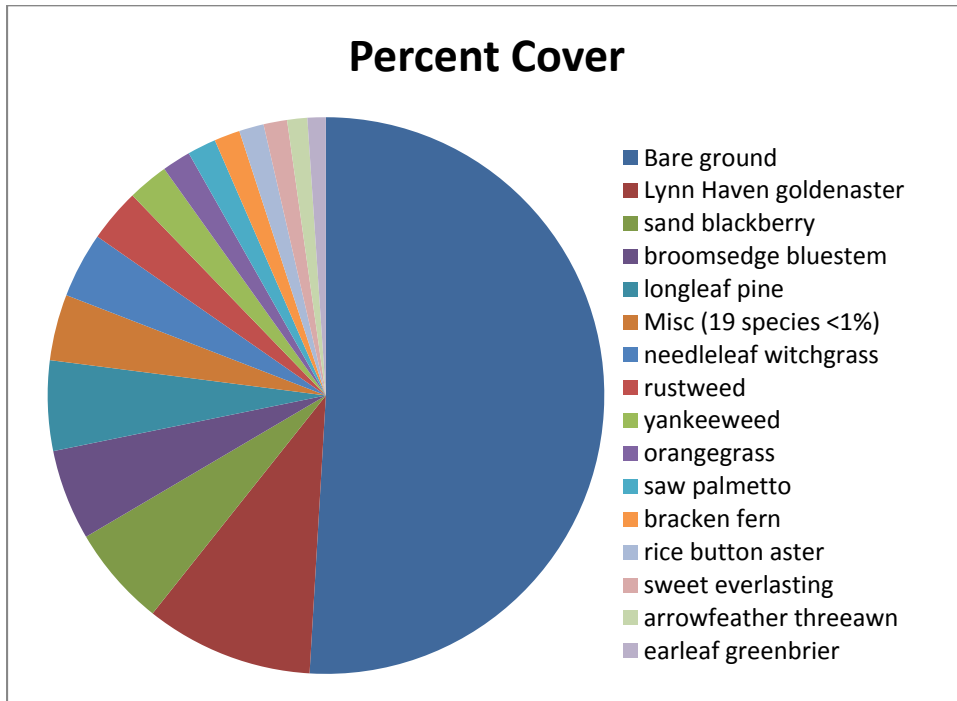


Table 3. Percent cover of plant species in Sandhill Transect 2 when sampled on November 13, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	9.77
<i>Rubus cuneifolius</i>	sand blackberry	5.83
<i>Andropogon virginicus</i>	broomsedge bluestem	5.27
<i>Pinus palustris</i>	longleaf pine	5.23
<i>Dichantheium aciculare</i>	needleleaf witchgrass	3.80
<i>Polypremum procumbens</i>	rustweed	3.10
<i>Eupatorium compositifolium</i>	yankeeweed	2.37
<i>Hypericum gentianoides</i>	orangegrass	1.67
<i>Serenoa repens</i>	saw palmetto	1.67
<i>Pteridium aquilinum</i>	bracken fern	1.50
<i>Symphyotrichum dumosum</i>	rice button aster	1.43
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	1.37
<i>Aristida purpurascens</i> var. <i>virgata</i>	arrowfeather threeawn	1.17
<i>Smilax auriculata</i>	earleaf greenbrier	1.07
<i>Andropogon ternarius</i>	splitbeard bluestem	0.47
<i>Solidago odora</i>	sweet goldenrod	0.43
<i>Conyza canadensis</i>	Canadian horseweed	0.33
<i>Gelsemium sempervirens</i>	yellow jessamine	0.33

Scientific name	Common name	Average percent cover per quadrat
<i>Vaccinium arboreum</i>	sparkleberry	0.33
<i>Pityopsis aspera</i>	pineland silkgrass	0.33
<i>Dichantherium commutatum</i>	variable witchgrass	0.30
<i>Vitis rotundifolia</i>	muscadine	0.23
<i>Quercus hemisphaerica</i>	laurel oak	0.23
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.23
<i>Cyperus retrorsus</i>	pinebarren flatsedge	0.13
<i>Dichantherium</i> sp.	witchgrass	0.10
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.10
<i>Dichantherium acuminatum</i>	tapered witchgrass	0.10
<i>Liatris secunda</i>	Piedmont gayfeather	0.03
<i>Scleria ciliata</i>	fringed nutrush	0.03
unknown herb	unknown herb	0.03
<i>Croptilon divaricatum</i>	slender scratchdaisy	0.03
<i>Lechea sessiliflora</i>	pineland pinweed	0.03
	Bare ground	50.93

Mixed Forested Wetland (Restoration)

Qualitative sampling. This mixed forested wetland restoration area (Figure 1) resembled a marsh due to its sparse tree cover. The muck soil of the former beaver pond was inundated at the time of the survey. The vegetative cover consisted primarily of willow herb, a low shrub with woody base and herbaceous stems that arch over to form an impenetrable interlacing mass. Interspersed with the willow herb were patches of young cypress with occasional swamp tupelo, sweetbay, and red maple. Shallower areas near the shore were lined with a diverse set of wetland herbs, including taperleaf waterhorehound, and maidencane. The total number of species observed in this community was 27 (Table 1).

Quantitative sampling. Transect 1 (Table 4, Figure 4) had a total of 16 species with 36% bare ground. The highest percent cover was by taperleaf water horehound followed by willow herb, shrubby primrose willow, broomsedge bluestem, and Canadian rush. The decrease in cover of willow herb relative to the two prior years was due to its leafless condition at the time of sampling.

Figure 4. Percent cover of plant species in Mixed Forested Wetland (Restoration) Transect 1.

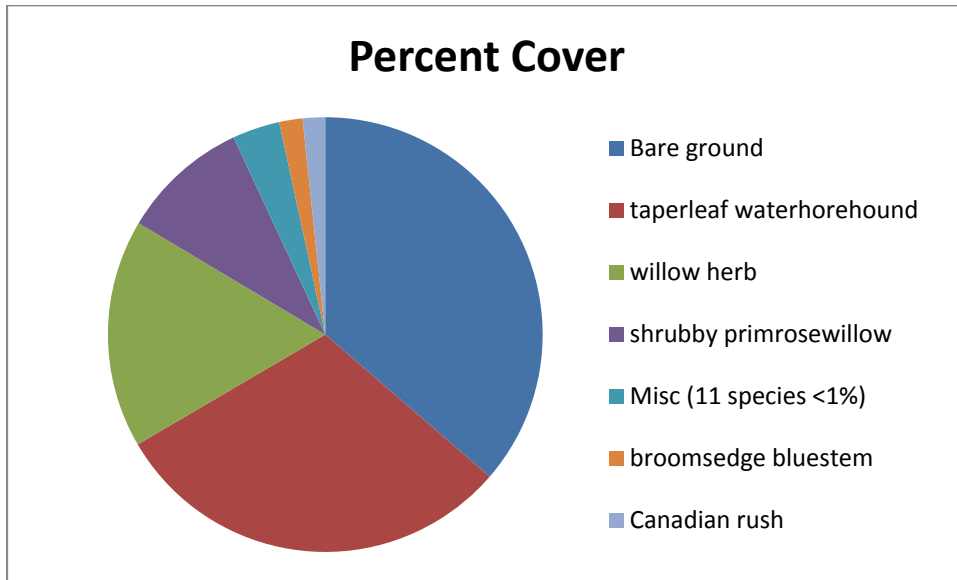


Table 4. Percent cover of plant species in Mixed Forested Wetland (Restoration) Transect 1 when sampled on November 12, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Lycopus rubellus</i>	taperleaf waterhorehound	30.23
<i>Decodon verticillatus</i>	willow herb	17.00
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	9.50
<i>Andropogon virginicus</i>	broomsedge bluestem	1.73
<i>Juncus canadensis</i>	Canadian rush	1.67
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.83
<i>Lachnanthes caroliana</i>	Carolina redroot	0.50
<i>Itea virginica</i>	Virginia willow	0.47
<i>Dulichium arundinaceum</i>	threeway sedge	0.40
<i>Nymphoides aquatica</i>	big floatingheart	0.33
<i>Ludwigia linearis</i>	narrowleaf primrosewillow	0.23
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	0.23
<i>Bidens mitis</i>	smallfruit beggarticks	0.20
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.20
<i>Nymphaea odorata</i>	white waterlily	0.10
<i>Carex</i> sp.	sedge	0.03
	Bare ground	36.33

Mixed Forested Wetland (Preserved)

Qualitative sampling. The preserved mixed forested wetland (Figure 1) was a relatively undisturbed mature baygall forest. The tall canopy of large trees was dominated by sweetbay and swamp tupelo. The dense subcanopy had tree-size black titi, and swamp bay. The moderately dense shrub layer consisted of large gallberry, sweet pepperbush, wild olive, and fetterbush. The sparse herb layer was primarily sphagnum moss. The muck soil was saturated and a few scattered pools of standing water were present. The total number of species observed in this community was 26 (Table 1).

Quantitative sampling. Transect 2 (Table 5, Figure 5) had a total of 13 species with 74% bare ground. (Note: Species cover included ground layer species, tree trunks rooted in the quadrat, and shrubs less than 2 inches dbh. Shading by canopy and subcanopy species was not included.) The dominant shrubs were large gallberry and fetterbush. Sphagnum moss and a sedge had the highest herbaceous cover.

Figure 5. Percent cover of plant species in Mixed Forested Wetland (Preserved) Transect 2.

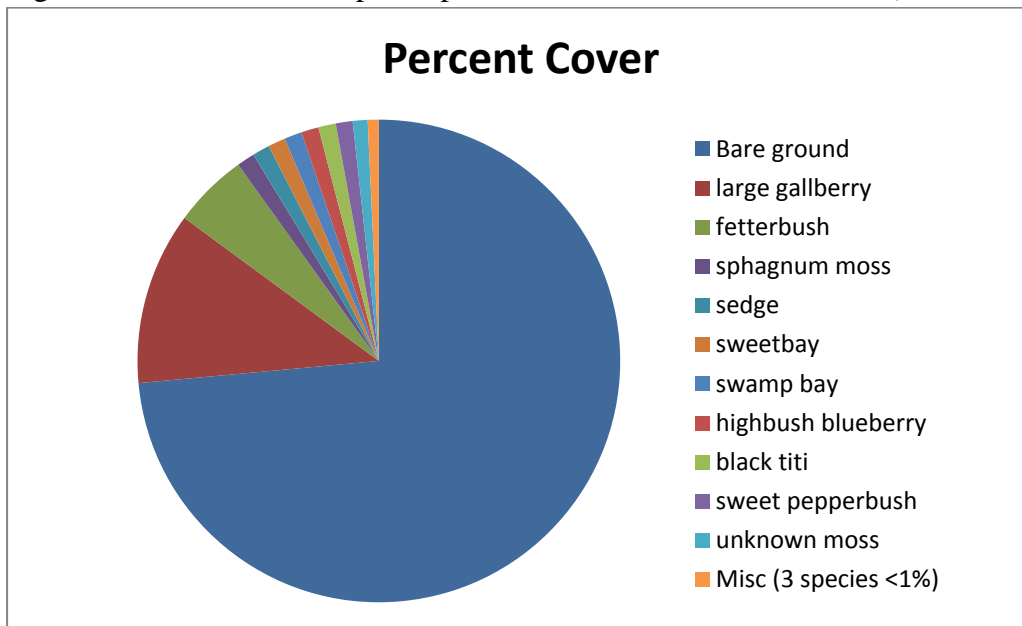


Table 5. Percent cover of plant species in Mixed Forested Wetland (Preserved) Transect 2 when sampled on November 12, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Ilex coriacea</i>	large gallberry	11.57
<i>Lyonia lucida</i>	fetterbush	5.00
<i>Sphagnum sp.</i>	sphagnum moss	1.20
<i>Carex sp.</i>	sedge	1.17

Scientific name	Common name	Average percent cover per quadrat
<i>Magnolia virginiana</i>	sweetbay	1.17
<i>Persea palustris</i>	swamp bay	1.17
<i>Vaccinium corymbosum</i>	highbush blueberry	1.17
<i>Cliftonia monophylla</i>	black titi	1.17
<i>Clethra alnifolia</i>	sweet pepperbush	1.13
unknown moss	unknown moss	1.00
<i>Vitis rotundifolia</i>	muscadine	0.47
<i>Rhododendron canescens</i>	mountain azalea	0.23
<i>Apteria aphylla</i>	nodding nixie	0.03
	Bare ground	73.53

Ward Creek West Mitigation Site
Qualitative and Quantitative Monitoring
December 2014

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Qualitative and Quantitative Monitoring
December 2014**

INTRODUCTION

The Ward Creek West Mitigation Site consists of 724 acres in Bay County managed by the Northwest Florida Water Management District. It is located 0.5 mile west of SR 79 and 2.5 miles north of the junction of SR 79 and US 98. The Ward Creek West mitigation project aims to restore hydric pine flatwoods (HPF) and hydric pine savanna (HPS) which had been converted to slash pine plantation, as well as to convert portions of the mixed forested wetlands to cypress (CY; Figure 1). Quantitative and qualitative monitoring was used to document the current plant species composition and vegetation structure of these targeted communities. The site vegetation was previously monitored by FNAI biologists in the fall of 2012 and 2013.

METHODS

The quantitative monitoring utilized 300 feet long permanent transect lines previously marked during the 2012 survey. In 2013, metal T-posts were placed at each end of the transects to provide permanent reference points. Two transects were located in both the hydric pine flatwoods and hydric pine savanna areas (Figure 1). Data recorded consisted of the visually estimated percent cover of each plant species found in fifteen separate 1-meter square quadrats. The quadrats were located to the left side of the transect line 20 feet apart, starting at 0 feet and ending at 280 feet. The qualitative monitoring consisted of recording the species and vegetation structure observed along meandering pedestrian transects through each of the two target communities plus the cypress area. The field surveys were performed by FNAI botanist Ann Johnson on November 17, 18, and 19, 2014.

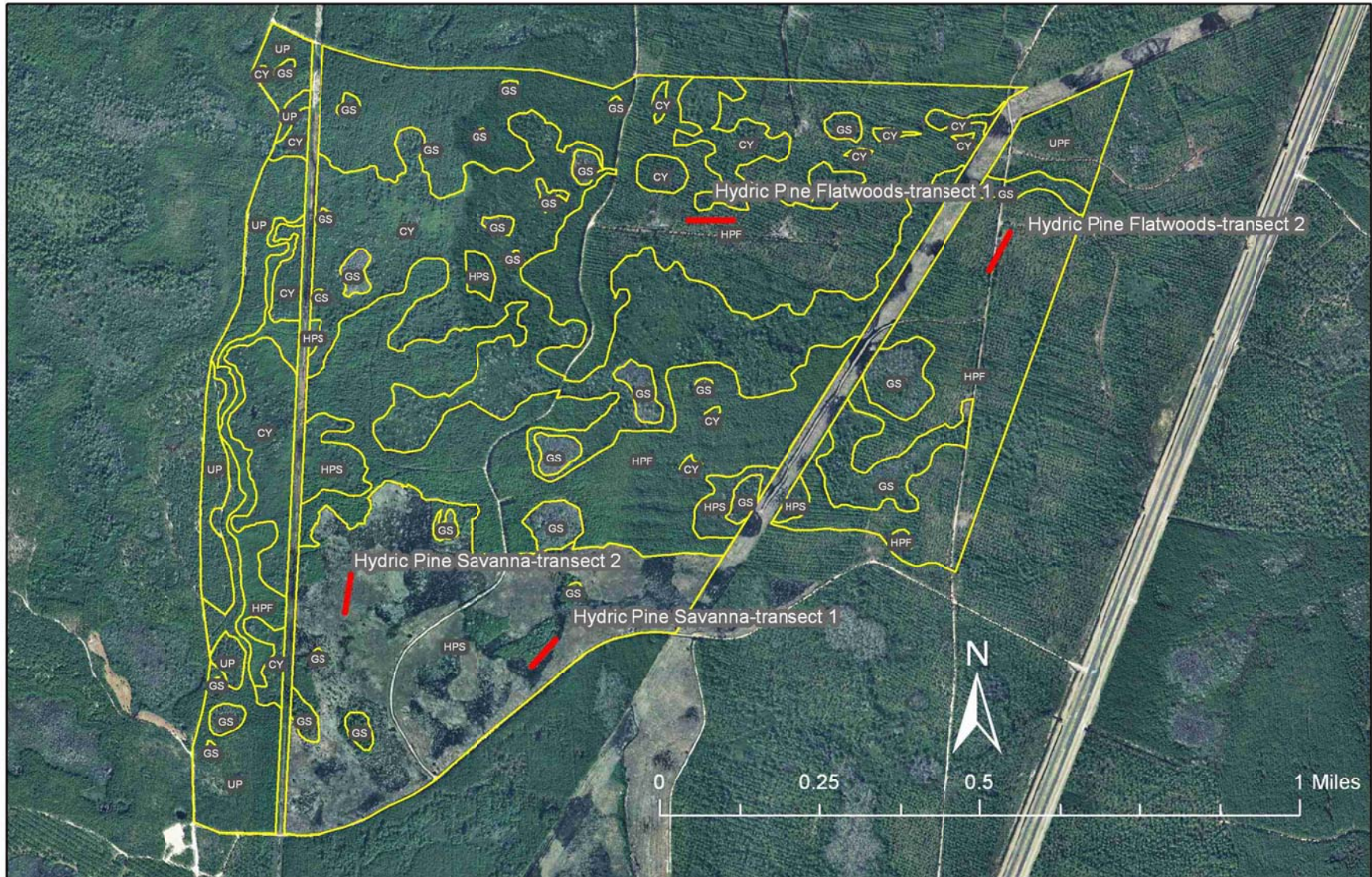


Figure 1. Location of permanent transects at Ward Creek West Mitigation Site. CY=Cypress, UP=Upland Pine, HPF=Hydric Pine Flatwoods, HPS=Hydric Pine Savanna, GS=Gum Swamp.

RESULTS AND DISCUSSION

A total of 116 plant species were recorded during 2014 monitoring session in the target communities at Ward Creek West (Table 1).

Hydric Pine Flatwoods

Qualitative sampling. The hydric pine flatwoods areas had been disturbed in the past few years by the silviculture action of thinning of the mature planted slash pines. The soil was currently dry but old machinery ruts were evident. The open canopy of mature slash pines covered a variously dense shrub layer. The area near the western Transect 1 had been bedded years ago when the pines were planted. This area had a moderately dense shrub stratum and a herbaceous layer of composed primarily of purple bluestem. The eastern section had more saw palmetto and gallberry and a diverse herbaceous cover with scattered wiregrass and beaksedges. The total number of species observed in this community was 82 (Table 1).

Quantitative sampling. The western Transect 1 (Table 2, Figure 2) had a total of 20 species with 68% bare ground. The shrubs had re-sprouted following a current year's fire and were primarily large gallberry, black titi, flatwoods St John's wort, and saw palmetto. Purple bluestem dominated the herbaceous groundlayer. The eastern Transect 2 (Table 3, Figure 3) had a total of 37 species with 16% bare ground. The vegetation was more diverse than in Transect 1. Although the shrubby species, fetterbush and saw palmetto, had the highest cover, the remaining cover was fairly evenly divided between shrubs and herbs, such as dwarf live oak and Chapman's beaksedge.

Table 1. Plant species observed in the target communities at Ward Creek West Mitigation Site, November 17, 18, and 19, 2014.

Scientific Name	Common Name	cypress	hydric pine flatwoods	hydric pine savanna	Grand Total
<i>Acer rubrum</i>	red maple	X			1
<i>Andropogon glomeratus</i>	bushy bluestem		X	X	2
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem		X	X	2
<i>Andropogon gyrans var. stenophyllus</i>	Elliott's bluestem			X	1
<i>Andropogon virginicus</i>	broomsedge bluestem		X	X	2
<i>Andropogon virginicus var. glaucus</i>	chalky bluestem	X	X	X	3
<i>Aristida spiciformis</i>	bottlebrush threeawn		X		1
<i>Aristida stricta var. beyrichiana</i>	wiregrass		X	X	2
<i>Bidens mitis</i>	smallfruit beggarticks		X		1
<i>Carphephorus odoratissimus</i>	vanillaleaf		X	X	2
<i>Centella asiatica</i>	spadeleaf			X	1
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster			X	1
<i>Clethra alnifolia</i>	sweet pepperbush	X	X		2

Scientific Name	Common Name	cypress	hydric pine flatwoods	hydric pine savanna	Grand Total
<i>Cliftonia monophylla</i>	black titi	X	X	X	3
<i>Conradina canescens</i>	false rosemary			X	1
<i>Ctenium aromaticum</i>	toothache grass		X		1
<i>Cyrilla racemiflora</i>	titi	X	X	X	3
<i>Dichantherium acuminatum</i>	tapered witchgrass		X		1
<i>Dichantherium commutatum</i>	variable witchgrass		X		1
<i>Dichantherium ensifolium</i>	cypress witchgrass		X		1
<i>Dichantherium scabriusculum</i>	woolly witchgrass	X		X	2
<i>Dichantherium sp.</i>	witchgrass		X		1
<i>Dichantherium sphaerocarpon</i>	roundseed witchgrass	X			1
<i>Diospyros virginiana</i>	common persimmon		X		1
<i>Drosera capillaris</i>	pink sundew			X	1
<i>Eriocaulon decangulare</i>	tenangle pipewort			X	1
<i>Eupatorium mohrii</i>	Mohr's thoroughwort		X		1
<i>Eupatorium sp.</i>	thoroughwort		X		1
<i>Euthamia caroliniana</i>	slender flattop goldenrod		X	X	2
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge		X	X	2
<i>Gaylussacia frondosa var. tomentosa</i>	blue huckleberry		X		1
<i>Gaylussacia mosieri</i>	woolly huckleberry		X		1
<i>Gelsemium sempervirens</i>	yellow jessamine		X		1
<i>Helianthus angustifolius</i>	narrowleaf sunflower			X	1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort		X	X	2
<i>Hypericum cistifolium</i>	roundpod St. John's wort	X			1
<i>Hypericum fasciculatum</i>	peelbark St. John's wort			X	1
<i>Hypericum microsepalum</i>	flatwoods St. John's wort		X	X	2
<i>Ilex cassine</i>	dahoon	X			1
<i>Ilex cassine var. myrtifolia</i>	myrtle-leaved holly	X		X	2
<i>Ilex coriacea</i>	large gallberry	X	X		2
<i>Ilex glabra</i>	gallberry		X	X	2
<i>Ilex vomitoria</i>	yaupon		X		1
<i>Juncus scirpoides</i>	needlepod rush		X	X	2
<i>Lachnanthes caroliniana</i>	Carolina redroot		X	X	2
<i>Lachnocaulon anceps</i>	whitehead bogbutton		X		1
<i>Liatris secunda</i>	Piedmont gayfeather		X		1
<i>Liatris spicata</i>	dense gayfeather		X	X	2
<i>Lophiola aurea</i>	golden crest			X	1
<i>Ludwigia lanceolata</i>	lancheaf primrosewillow		X		1

Scientific Name	Common Name	cypress	hydric pine flatwoods	hydric pine savanna	Grand Total
<i>Lycopodiella alopecuroides</i>	foxtail club-moss			X	1
<i>Lyonia ferruginea</i>	rusty staggerbush		X	X	2
<i>Lyonia fruticosa</i>	coastalplain staggerbush			X	1
<i>Lyonia lucida</i>	fetterbush	X	X	X	3
<i>Magnolia virginiana</i>	sweetbay	X			1
<i>Myrica caroliniensis</i>	evergreen bayberry			X	1
<i>Myrica cerifera</i>	wax myrtle	X	X		2
<i>Nyssa ogeche</i>	ogeechee tupelo	X			1
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo	X			1
<i>Nyssa ursina</i>	bog tupelo		X		1
<i>Osmunda cinnamomea</i>	cinnamon fern	X			1
<i>Panicum longifolium</i>	panicum		X		1
<i>Panicum verrucosum</i>	warty panicgrass		X		1
<i>Persea palustris</i>	swamp bay	X			1
<i>Photinia pyrifolia</i>	red chokeberry		X		1
<i>Pieris phyllireifolia</i>	climbing fetterbush			X	1
<i>Pinus elliottii</i>	slash pine	X	X	X	3
<i>Pinus</i> sp.	pine		X	X	2
<i>Pluchea foetida</i>	stinking camphorweed		X		1
<i>Pluchea rosea</i>	rosy camphorweed			X	1
<i>Polygala lutea</i>	orange milkwort		X		1
<i>Polygonella polygama</i>	october flower		X		1
<i>Pteridium aquilinum</i>	bracken fern			X	1
<i>Quercus minima</i>	dwarf live oak		X		1
<i>Rhexia petiolata</i>	fringed meadowbeauty		X		1
<i>Rhexia virginica</i>	handsome harry		X		1
<i>Rhododendron canescens</i>	mountain azalea	X			1
<i>Rhus copallinum</i>	winged sumac		X		1
<i>Rhynchospora cephalantha</i>	bunched beaksedge		X	X	2
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge		X	X	2
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge		X	X	2
<i>Rhynchospora ciliaris</i>	fringed beaksedge	X		X	2
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge			X	1
<i>Rhynchospora fascicularis</i>	fascicled beaksedge		X	X	2
<i>Rhynchospora gracilentata</i>	slender beaksedge		X		1
<i>Rhynchospora plumosa</i>	plumed beaksedge		X	X	2
<i>Rhynchospora</i> sp.	beaksedge	X	X	X	3

Scientific Name	Common Name	cypress	hydric pine flatwoods	hydric pine savanna	Grand Total
<i>Rubus argutus</i>	sawtooth blackberry		X		1
<i>Sabatia brevifolia</i>	shortleaf rosegentian		X		1
<i>Sarracenia flava</i>	yellow pitcherplant			X	1
<i>Schizachyrium scoparium</i>	little bluestem		X		1
<i>Scleria ciliata</i>	fringed nutrush		X	X	2
<i>Scleria triglomerata</i>	whip nutrush		X		1
<i>Serenoa repens</i>	saw palmetto		X	X	2
<i>Sericocarpus tortifolius</i>	whitetop aster		X		1
<i>Smilax auriculata</i>	earleaf greenbrier		X		1
<i>Smilax glauca</i>	cat greenbrier		X		1
<i>Smilax laurifolia</i>	laurel greenbrier	X	X	X	3
<i>Solidago odora</i>	sweet goldenrod		X	X	2
<i>Sphagnum</i> sp.	sphagnum moss	X			1
<i>Stillingia aquatica</i>	water toothleaf		X		1
<i>Taxodium ascendens</i>	pond cypress	X			1
unknown grass	unknown grass			X	1
unknown herb	unknown herb		X	X	2
<i>Vaccinium corymbosum</i>	highbush blueberry		X		1
<i>Vaccinium myrsinites</i>	shiny blueberry		X		1
<i>Vitis rotundifolia</i>	muscadine	X	X		2
<i>Woodwardia areolata</i>	netted chain fern	X			1
<i>Woodwardia virginica</i>	Virginia chain fern		X		1
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass		X	X	2
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass		X		1
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass		X	X	2
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	X	X	X	3
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass		X		1
<i>Xyris</i> sp.	yellow-eyed grass		X		1
<i>Xyris stricta</i>	pineland yellow-eyed grass		X		1
Total number of species: 116		28	82	55	

Figure 2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

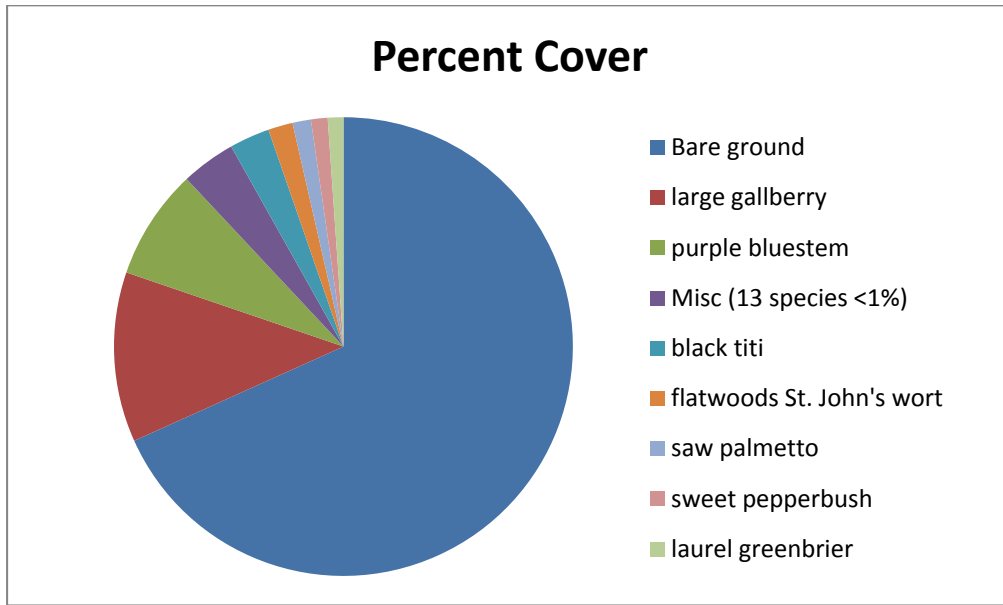


Table 2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 when sampled on November 18, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Ilex coriacea</i>	large gallberry	11.97
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	7.80
<i>Cliftonia monophylla</i>	black titi	2.83
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	1.73
<i>Serenoa repens</i>	saw palmetto	1.30
<i>Clethra alnifolia</i>	sweet pepperbush	1.17
<i>Smilax laurifolia</i>	laurel greenbrier	1.10
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.83
<i>Andropogon virginicus var. glaucus</i>	chalky bluestem	0.60
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.60
<i>Vaccinium corymbosum</i>	highbush blueberry	0.33
<i>Dichantherium sp.</i>	witchgrass	0.27
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.23
<i>Scleria ciliata</i>	fringed nutrush	0.23
<i>Ludwigia lanceolata</i>	lanceleaf primrosewillow	0.20
<i>Rubus argutus</i>	sawtooth blackberry	0.17
<i>Vitis rotundifolia</i>	muscadine	0.13
<i>Pinus sp.</i>	pine	0.10
<i>Rhynchospora sp.</i>	beaksedge	0.10
<i>Dichantherium commutatum</i>	variable witchgrass	0.03
	Bare ground	68.27

Figure 3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2.

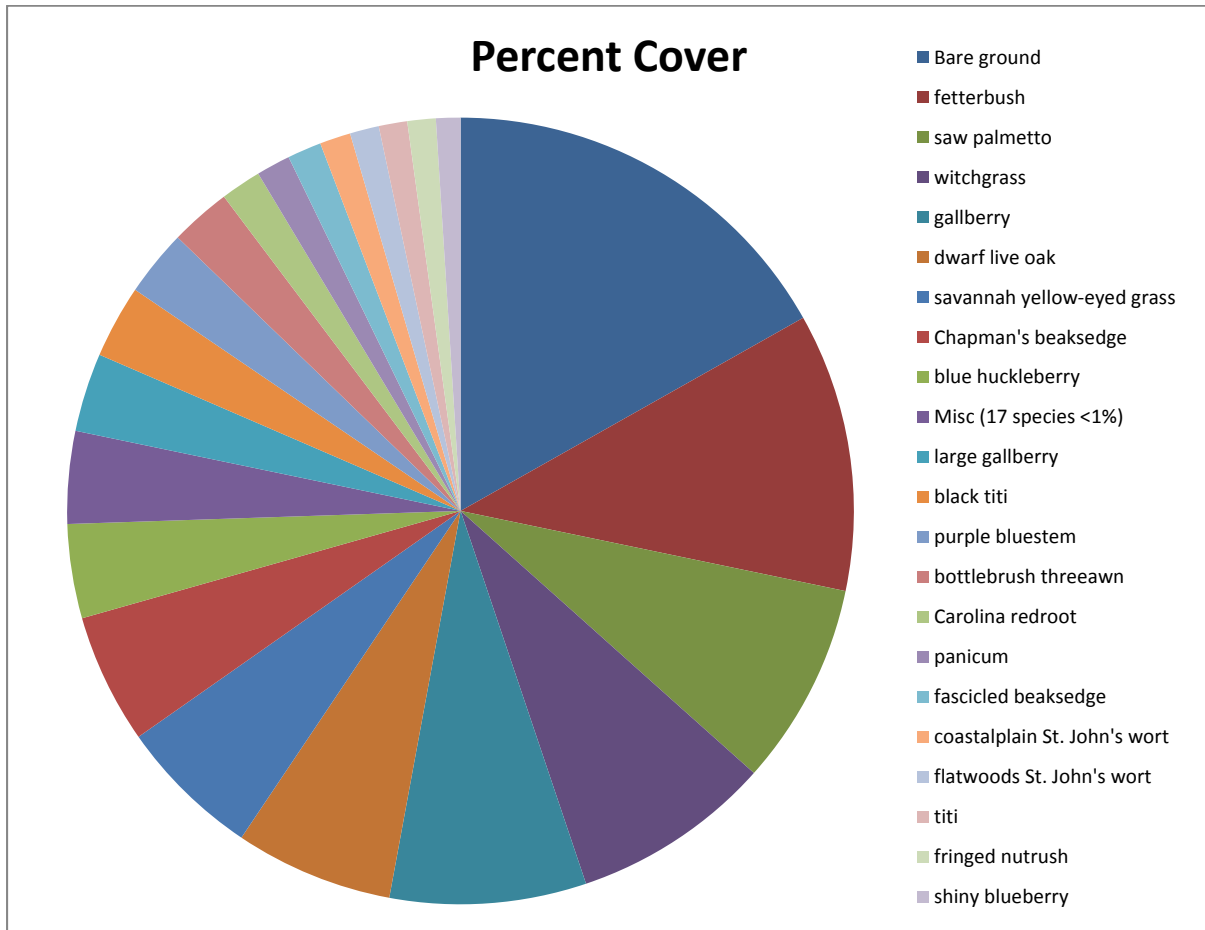


Table 3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 when sampled on September 17, 2013.

Scientific name	Common name	Average percent cover per quadrat
<i>Lyonia lucida</i>	fetterbush	11.43
<i>Serenoa repens</i>	saw palmetto	8.33
<i>Dichanthelium</i> sp.	witchgrass	8.23
<i>Ilex glabra</i>	gallberry	8.07
<i>Quercus minima</i>	dwarf live oak	6.50
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	5.87
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	5.33
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry	3.87
<i>Ilex coriacea</i>	large gallberry	3.23
<i>Cliftonia monophylla</i>	black titi	3.00
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	2.73

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida spiciformis</i>	bottlebrush threeawn	2.50
<i>Lachnanthes caroliana</i>	Carolina redroot	1.67
<i>Panicum longifolium</i>	panicum	1.40
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	1.40
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	1.27
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	1.20
<i>Cyrtia racemiflora</i>	titi	1.17
<i>Scleria ciliata</i>	fringed nutrush	1.17
<i>Vaccinium myrsinites</i>	shiny blueberry	1.00
<i>Photinia pyrifolia</i>	red chokeberry	0.57
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.50
<i>Dichantherium commutatum</i>	variable witchgrass	0.43
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.33
<i>Rhynchospora sp.</i>	beaksedge	0.33
<i>Dichantherium acuminatum</i>	tapered witchgrass	0.23
<i>Ilex vomitoria</i>	yaupon	0.23
<i>Schizachyrium scoparium</i>	little bluestem	0.23
<i>Xyris stricta</i>	pineland yellow-eyed grass	0.23
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.10
<i>Pinus elliotii</i>	slash pine	0.10
<i>Polygala lutea</i>	orange milkwort	0.10
<i>Rhexia virginica</i>	handsome harry	0.10
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.10
<i>Smilax auriculata</i>	earleaf greenbrier	0.10
<i>Carphephorus odoratissimus</i>	vanillaleaf	0.07
unknown herb	unknown herb	0.03
	Bare ground	16.83

Hydric Pine Savanna

Qualitative sampling. The hydric pine savanna restoration area was highly disturbed by silviculture operations. The pines have been harvested and the vegetative cover currently consists of a dense, tall stand of purple bluestem with scattered clumps of wiregrass intermixed. Widely scattered young slash pine and pond cypress and shrub clumps of fetterbush, titi and black titi occur throughout. The soil was dry except in a few lower pockets with standing water. The total number of plant species observed in this community was 55 (Table 1).

Quantitative sampling. Transect 1 (Table 4, Figure 4) had a total of 23 species and 42% bare ground. The latter figure was similar to the previous November sample in 2012. Groundcover was dominated by purple bluestem, with lesser amounts of Elliott's yelloweyed grass and chalky bluestem. Major shrubs were peelbark St. John's wort and fetterbush. Transect 2 (Table

5, Figure 5) had a total of 22 species and an average of 39% bare ground. The vegetation was similar to Transect 1 except that wiregrass slightly more abundant.

Figure 4. Percent cover of plant species in Hydric Pine Savanna Transect 1.

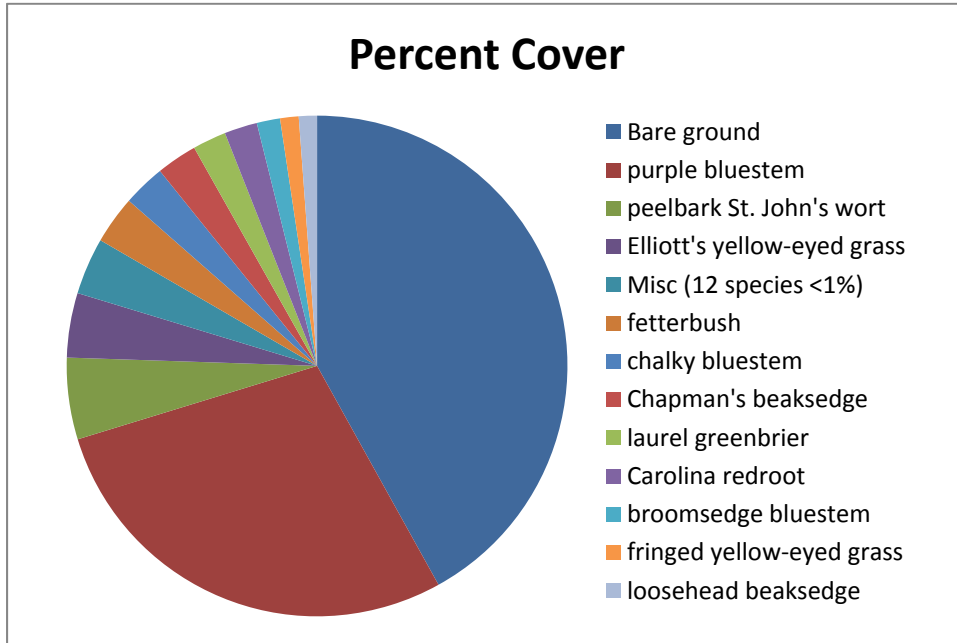


Table 4. Percent cover of species in Hydric Pine Savanna Transect 1 when sampled on November 18, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	28.33
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	5.27
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass	4.17
<i>Lyonia lucida</i>	fetterbush	3.10
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	2.73
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	2.63
<i>Smilax laurifolia</i>	laurel greenbrier	2.17
<i>Lachnanthes caroliana</i>	Carolina redroot	2.13
<i>Andropogon virginicus</i>	broomsedge bluestem	1.50
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	1.20
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	1.17
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.50
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	0.50
<i>Ilex glabra</i>	gallberry	0.50
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge	0.50
<i>Drosera capillaris</i>	pink sundew	0.43
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	0.33
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.23

Scientific name	Common name	Average percent cover per quadrat
<i>Cyrilla racemiflora</i>	titi	0.20
<i>unknown herb</i>	unknown herb	0.17
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.10
<i>Pinus elliotii</i>	slash pine	0.10
<i>Scleria ciliata</i>	fringed nutrush	0.10
	Bare ground	41.93

Figure 5. Percent cover of plant species in Hydric Pine Savanna Transect 2.

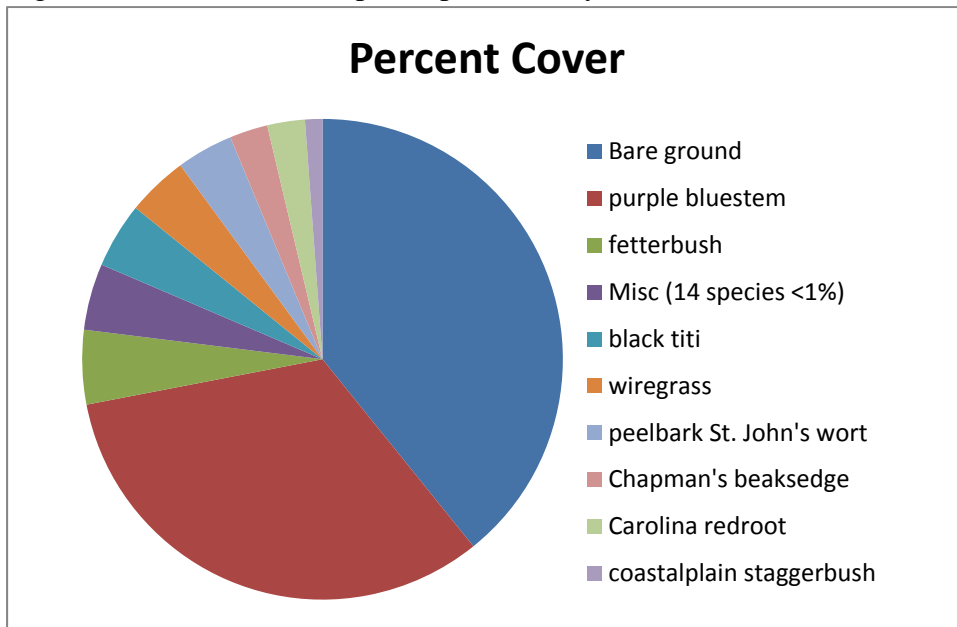


Table 5. Percent cover of plant species in Hydric Pine Savanna Transect 2 when sampled on November 18, 2014.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	32.77
<i>Lyonia lucida</i>	fetterbush	5.00
<i>Cliftonia monophylla</i>	black titi	4.40
<i>Aristida stricta var. beyrichiana</i>	wiregrass	4.10
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	3.80
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	2.57
<i>Lachnanthes caroliniana</i>	Carolina redroot	2.53
<i>Lyonia fruticosa</i>	coastalplain staggerbush	1.17
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.97
<i>Cyrilla racemiflora</i>	titi	0.73
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.57

Scientific name	Common name	Average percent cover per quadrat
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.50
<i>Pinus elliotii</i>	slash pine	0.33
<i>Andropogon virginicus var. glaucus</i>	chalky bluestem	0.23
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.23
<i>Pluchea rosea</i>	rosy camphorweed	0.23
<i>Smilax laurifolia</i>	laurel greenbrier	0.23
<i>Helianthus angustifolius</i>	narrowleaf sunflower	0.10
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.10
<i>Rhynchospora sp.</i>	beaksedge	0.10
unknown grass	unknown grass	0.10
<i>Pinus sp.</i>	pine	0.03
	Bare ground	39.2

Cypress

Qualitative sampling. The cypress areas occurred along water drainage channels with a dense evergreen canopy on the edges composed of titi, swamp bay, slash pine, sweetbay with deciduous species such as Ogeechee tupelo, swamp tupelo, and pond cypress in the center. The shrub layer often was dense titi and large gallberry on the edges and was sparse in center, consisting of fetterbush, azalea, and sweet pepperbush. Herbs were very infrequent. At the time of sampling, the soils were dry. Total number of species observed in this community was 28 (Table 1).