

**Vegetation Monitoring at Four Northwest Florida Water
Management District Mitigation Sites
Fall 2015**

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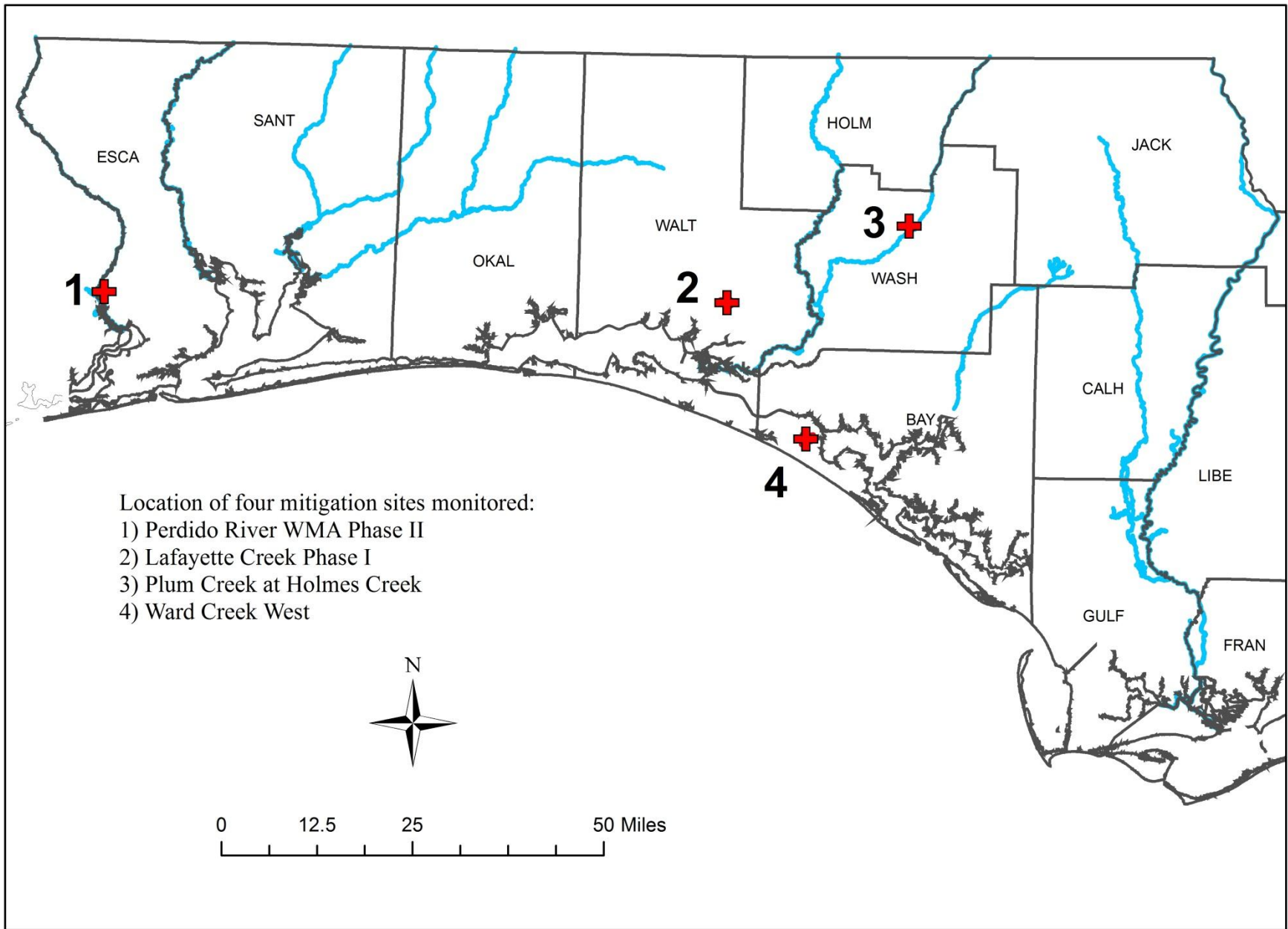
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This document contains separate qualitative and quantitative vegetation monitoring reports for four mitigation sites managed by the Northwest Florida Water Management District:

- 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 Water Management Area 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 WMA is located along the south side of US 90 (Nine Mile Road) and 6.4 miles west of Interstate Highway 10 (Figure PR-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 PR-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, 2013, and 2014.

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 PR-2). Data recorded consisted of the visually estimated percent cover of each plant species in eight separate meter square quadrats. Tree trunks in quadrats were noted in comments but not recorded as cover; canopy over 2 m in height was also not recorded as cover in quadrats. The quadrats were located at 0, 20, 40, 60, 80, 100, 120, and 140 feet along the left side of the transect line as one stands at the 0-ft quadrat and faces toward the 140-ft quadrat. 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 9 and 10, 2015.

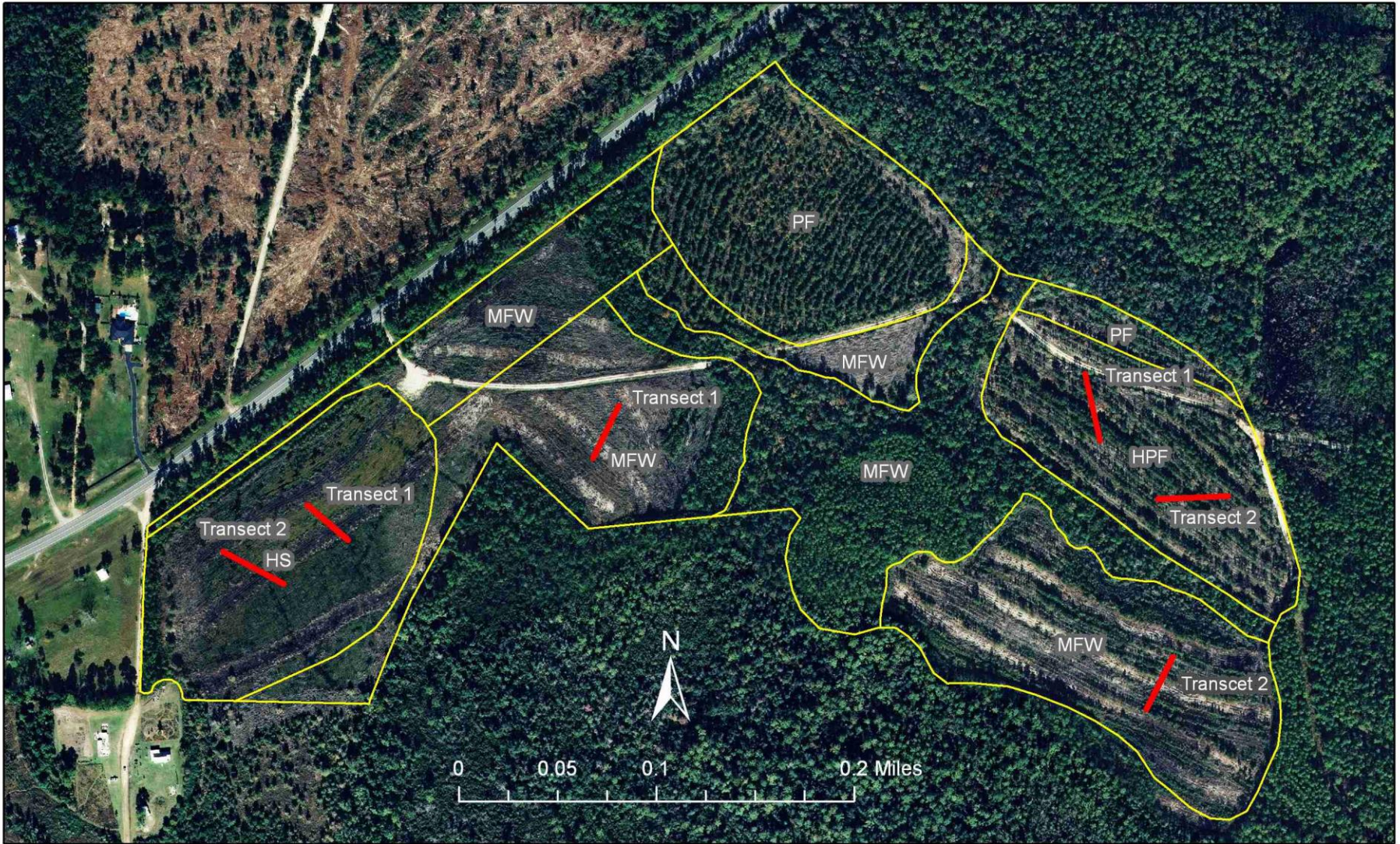


Figure PR-1. Location of permanent transects at Perdido Phase II Mitigation Site. HS=Hydric Savanna, HPF=Hydric Pine Flatwoods, MFW=Mixed Forested Wetlands, PF=Pine Flatwoods.

RESULTS AND DISCUSSION

A total of 109 plant species were observed during the 2015 monitoring of the target communities at Perdido Phase II (Table PR-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 ground was generally shallowly inundated. Table PR-1 provides a comprehensive list of the 49 plant species identified in this community.

Quantitative sampling. Transect 1 (Table PR-2, Figure PR-2) had a total of 23 species. Their total cover made up more than 100% of the area since sphagnum moss underlay the other species. In order to represent relative species cover in Figure PR-2 below, percent of total vegetative cover was used rather than percent cover of area. Table PR-2 gives the percent cover of area. The dominant species were sphagnum moss, pine barren goldenrod, handsome harry, purple bluestem, smallfruit beggarticks, and viviparous spikerush. Transect 2 (Table PR-3, Figure PR-3) had a total of 23 species which also covered more than 100% of the area. The dominant species were the same, plus Virginia chain fern and Carolina redroot.

Table PR-1. Species observed in target communities at Perdido River WMA – Phase II Mitigation Site on November 9 and 10, 2015.

Scientific Name	Common Name	hydric pine flatwoods	hydric savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Acer rubrum</i>	red maple	X	X	X	X	4
<i>Andropogon glomeratus</i>	bushy bluestem		X	X		2
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	X	X	X	X	4
<i>Andropogon virginicus</i>	broomsedge bluestem	X	X	X	X	4
<i>Anthraenantia villosa</i>	green silkyscale	X				1
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	X		X		2
<i>Arundinaria gigantea</i>	switchcane	X			X	2
<i>Baccharis halimifolia</i>	groundsel tree	X				1
<i>Bidens mitis</i>	smallfruit beggarticks	X	X		X	3
<i>Calamovilfa curtissii</i>	Curtiss’ sandgrass	X				1
<i>Carex glaucescens</i>	clustered sedge	X	X	X		3
<i>Carex</i> sp.	sedge	X				1
<i>Castanea pumila</i>	chinquapin			X		1

Scientific Name	Common Name	hydric pine flatwoods	hydric savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Centella asiatica</i>	spadeleaf		X	X	X	3
<i>Chamaecyparis thyoides</i>	Atlantic white cedar		X		X	2
<i>Cirsium nuttallii</i>	Nuttall's thistle				X	1
<i>Cinnamomum camphora</i>	camphor tree			X		1
<i>Clethra alnifolia</i>	sweet pepperbush	X				1
<i>Cliftonia monophylla</i>	black titi		X		X	2
<i>Cyrilla racemiflora</i>	titi	X	X		X	3
<i>Dichantherium scabriusculum</i>	woolly witchgrass	X			X	2
<i>Dichantherium</i> sp.	witchgrass	X		X	X	3
<i>Drosera brevifolia</i>	dwarf sundew				X	1
<i>Drosera capillaris</i>	pink sundew				X	1
<i>Eleocharis vivipara</i>	viviparous spikerush		X			1
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	X		X		2
<i>Eragrostis elliotii</i>	Elliott's lovegrass				X	1
<i>Eupatorium capillifolium</i>	dogfennel	X		X	X	3
<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>Fuirena breviseta</i>	saltmarsh umbrellasedge		X			1
<i>Gaylussacia mosieri</i>	woolly huckleberry	X			X	2
<i>Helianthus angustifolius</i>	narrowleaf sunflower	X			X	2
<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 crux-andreae</i>	St. Peter's Wort	X			X	2
<i>Hypericum hypericoides</i>	St. Andrew's cross	X		X		2
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	X				1
<i>Ilex cassine</i>	dahoon	X		X		2
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly		X			1
<i>Ilex coriacea</i>	large gallberry	X		X	X	3
<i>Ilex glabra</i>	gallberry	X	X	X	X	4
<i>Ilex opaca</i>	American holly	X				1
<i>Ilex vomitoria</i>	yaupon	X		X	X	3
<i>Juncus dichotomus</i>	forked rush		X			1
<i>Juniperus virginiana</i>	red cedar		X		X	2
<i>Lachnanthes caroliniana</i>	Carolina redroot	X	X	X	X	4
<i>Lachnocaulon anceps</i>	whitehead bogbutton	X		X	X	3
<i>Lobelia</i> sp.	lobelia			X		1

Scientific Name	Common Name	hydric pine flatwoods	hydric savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Ludwigia maritima</i>	seaside primrosewillow	X				1
<i>Ludwigia</i> sp.	primrosewillow	X				1
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow		X			1
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	X	X	X	X	4
<i>Lycopus rubellus</i>	taperleaf waterhorehound	X	X			2
<i>Lyonia lucida</i>	fetterbush	X			X	2
<i>Magnolia virginiana</i>	sweetbay		X	X	X	3
<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	X	X	X	4
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	X		X		2
<i>Panicum anceps</i>	beaked panicum	X		X		2
<i>Panicum hemitomom</i>	maidencane				X	1
<i>Panicum verrucosum</i>	warty panicgrass	X	X		X	3
<i>Panicum virgatum</i>	switchgrass	X				1
<i>Persea palustris</i>	swamp bay	X	X	X	X	4
<i>Photinia pyrifolia</i>	red chokeberry	X	X			2
<i>Pinus elliotii</i>	slash pine	X	X		X	3
<i>Pinus glabra</i>	spruce pine				X	1
<i>Pinus palustris</i>	longleaf pine				X	1
<i>Pinus taeda</i>	loblolly pine	X	X	X	X	4
<i>Pluchea longifolia</i>	longleaf camphorweed	X		X		2
<i>Polygala cymosa</i>	tall pinebarren milkwort		X			1
<i>Polygala lutea</i>	orange milkwort				X	1
<i>Polytrichum commune</i>	haircap moss				X	1
<i>Pteridium aquilinum</i>	bracken fern	X				1
<i>Quercus nigra</i>	water oak	X		X		2
<i>Quercus virginiana</i>	live oak			X		1
<i>Rhexia virginica</i>	handsome harry	X	X		X	3
<i>Rhododendron canescens</i>	mountain azalea	X				1
<i>Rhus copallinum</i>	winged sumac	X			X	2
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	X	X		X	3
<i>Rhynchospora</i> sp.	beaksedge		X			1
<i>Rubus pensilvanicus</i>	sawtooth blackberry	X	X	X	X	4
<i>Saccharum giganteum</i>	sugarcane plumegrass	X	X			2
<i>Sapium sebiferum</i>	Chinese tallow	X				1
<i>Scleria</i> sp.	nutrush	X				1

Scientific Name	Common Name	hydric pine flatwoods	hydric savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Serenoa repens</i>	saw palmetto				X	1
<i>Smilax bona-nox</i>	saw greenbrier			X		1
<i>Smilax glauca</i>	cat greenbrier	X		X	X	3
<i>Smilax laurifolia</i>	laurel greenbrier				X	1
<i>Solidago fistulosa</i>	pinebarren goldenrod	X	X	X	X	4
<i>Sphagnum</i> sp.	sphagnum moss	X	X	X	X	4
<i>Symphyotrichum dumosum</i>	rice button aster	X			X	2
<i>Taxodium distichum</i>	bald cypress		X		X	2
<i>Toxicodendron radicans</i>	eastern poison ivy	X	X		X	3
unknown moss	unknown moss	X	X			2
<i>Vaccinium corymbosum</i>	highbush blueberry	X	X	X		3
<i>Vaccinium elliotii</i>	Elliott's blueberry	X		X		2
<i>Viola lanceolata</i>	bog white violet	X			X	2
<i>Viola primulifolia</i>	primroseleaf violet				X	1
<i>Viola sororia</i>	common blue violet	X				1
<i>Vitis rotundifolia</i>	muscadine	X	X	X	X	4
<i>Woodwardia areolata</i>	netted chain fern	X	X	X	X	4
<i>Woodwardia virginica</i>	Virginia chain fern	X	X	X	X	4
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass		X		X	2
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass				X	1
<i>Xyris fimbriata</i>	fringed yellow-eyed grass		X			1
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass				X	1
Total number of species: 109		73	49	44	66	232

Figure PR-2. Percent of total vegetative cover for plant species in Hydric Savanna Transect 1.

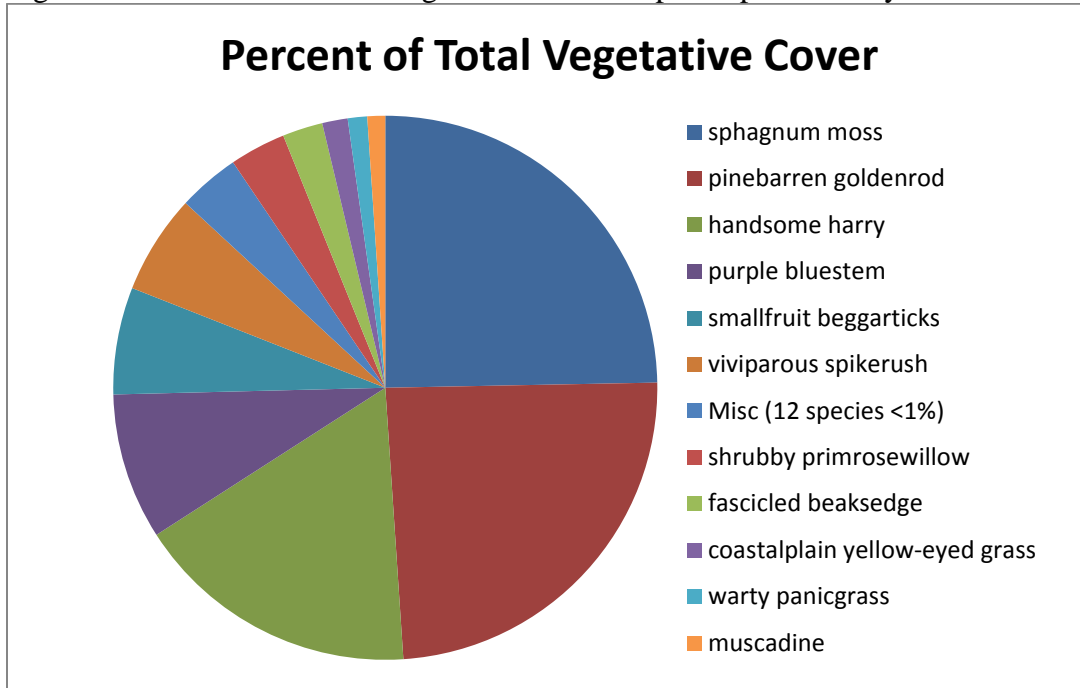


Table PR-2. Percent cover of plant species in Hydric Savanna Transect 1 when sampled on November 10, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum</i> sp.	sphagnum moss	50.94
<i>Solidago fistulosa</i>	pinebarren goldenrod	50.00
<i>Rhexia virginica</i>	handsome herry	35.00
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	17.94
<i>Bidens mitis</i>	smallfruit beggarticks	13.13
<i>Eleocharis vivipara</i>	viviparous spikerush	12.19
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	6.88
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	4.94
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	3.13
<i>Panicum verrucosum</i>	warty panicgrass	2.38
<i>Vitis rotundifolia</i>	muscadine	2.19
<i>Andropogon virginicus</i>	broomsedge bluestem	0.94
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.94
<i>Lachnanthes caroliana</i>	Carolina redroot	0.94
<i>Persea palustris</i>	swamp bay	0.94
<i>Saccharum giganteum</i>	sugarcane plumegrass	0.94
<i>Woodwardia virginica</i>	Virginia chain fern	0.94
<i>Juncus dichotomus</i>	forked rush	0.44
<i>Photinia pyrifolia</i>	red chokeberry	0.44

Scientific name	Common name	Average percent cover per quadrat
<i>Toxicodendron radicans</i>	eastern poison ivy	0.44
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.38
<i>Acer rubrum</i>	red maple	0.19
<i>Lycopus rubellus</i>	taperleaf waterhorehound	0.06
	Bare ground	0.00

Figure PR-3. Percent of total vegetative cover for plant species in Hydric Savanna Transect 2.

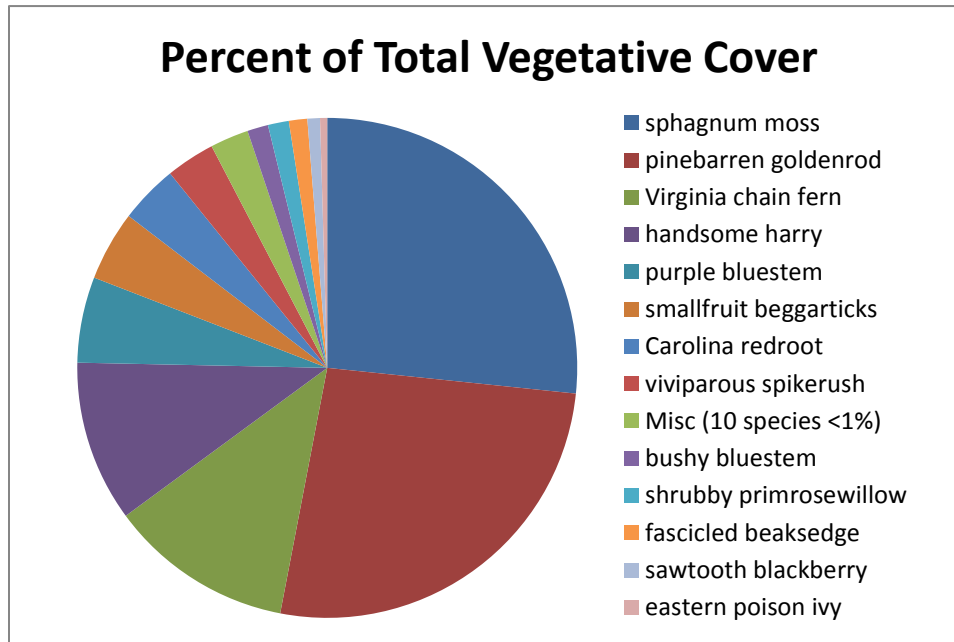


Table PR-3. Percent cover of plant species in Hydric Savanna Transect 2 when sampled on November 10, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum</i> sp.	sphagnum moss	61.56
<i>Solidago fistulosa</i>	pinebarren goldenrod	60.94
<i>Woodwardia virginica</i>	Virginia chain fern	27.50
<i>Rhexia virginica</i>	handsome harry	24.06
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	12.81
<i>Bidens mitis</i>	smallfruit beggarticks	10.44
<i>Lachnanthes caroliana</i>	Carolina redroot	8.75
<i>Eleocharis vivipara</i>	viviparous spikerush	7.31
<i>Andropogon glomeratus</i>	bushy bluestem	3.13
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	3.13
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	2.75
<i>Rubus pensilvanicus</i>	sawtooth blackberry	1.88
<i>Toxicodendron radicans</i>	eastern poison ivy	1.06

Scientific name	Common name	Average percent cover per quadrat
<i>Juncus dichotomus</i>	forked rush	0.94
unknown graminoid	unknown graminoid	0.88
<i>Woodwardia areolata</i>	netted chain fern	0.88
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.63
<i>Rhynchospora</i> sp.	beaksedge	0.63
<i>Acer rubrum</i>	red maple	0.56
<i>Panicum verrucosum</i>	warty panicgrass	0.44
<i>Saccharum giganteum</i>	sugarcane plumegrass	0.44
<i>Centella asiatica</i>	spadeleaf	0.19
<i>Oldenlandia uniflora</i>	clustered mille grains	0.19
	Bare ground	0.00

Mixed Forested Wetland

Qualitative sampling. The target community of mixed forested wetland (Figure PR-1) had a total of 66 observed plant species (Table PR-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 36 species and no bare ground (Table PR-4, Figure PR-4). Purple bluestem and sphagnum moss formed the majority of the herbaceous cover, with woody species sharing dominance, including slash pine, spruce pine, sawtooth blackberry and black titi. Transect 2 (Table PR-5, Figure PR-5) had a total of 28 species with no bare ground. The highest percent cover was by purple bluestem, with smaller amounts of sphagnum moss. Woody species were sparse, including primarily sawtooth blackberry, loblolly pine saplings, and swamp bay.

Figure PR-4. Percent of total vegetative cover for species in Mixed Forested Wetland Transect

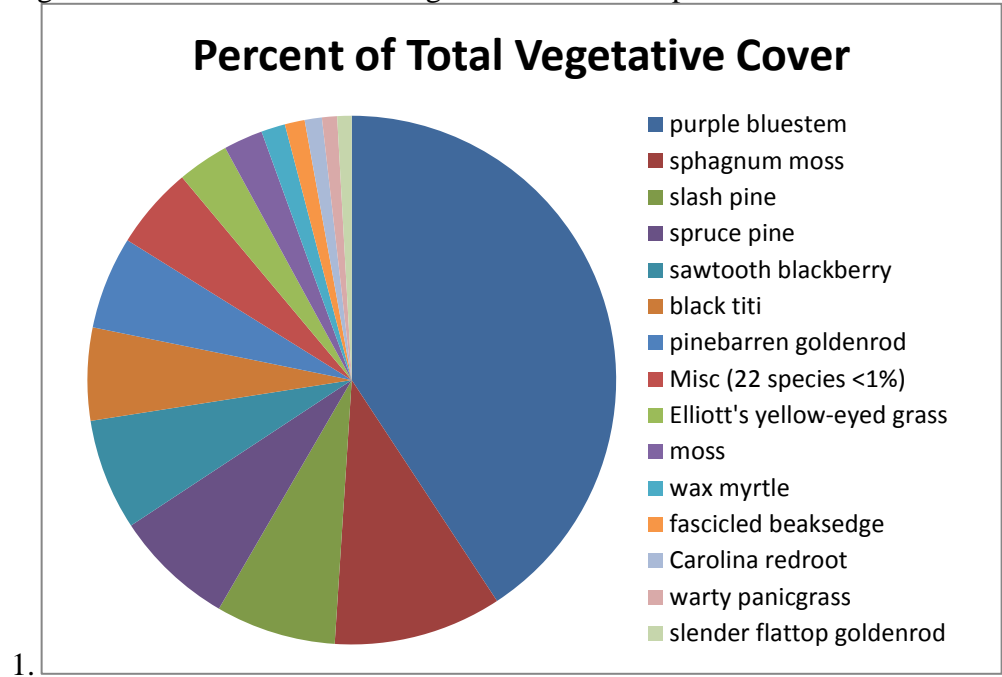


Table PR-4. Percent cover of plant species in Mixed Forested Wetland Transect 1 when sampled on November 9, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	60.63
<i>Sphagnum sp.</i>	sphagnum moss	15.31
<i>Pinus elliotii</i>	slash pine	10.94
<i>Pinus glabra</i>	spruce pine	10.94
<i>Rubus pensilvanicus</i>	sawtooth blackberry	10.13
<i>Cliftonia monophylla</i>	black titi	8.44
<i>Solidago fistulosa</i>	pinebarren goldenrod	8.44
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass	4.69
moss	moss	3.56
<i>Myrica cerifera</i>	wax myrtle	2.19
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	1.81
<i>Lachnanthes caroliniana</i>	Carolina redroot	1.56
<i>Panicum verrucosum</i>	warty panicgrass	1.38
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.31
<i>Andropogon virginicus</i>	broomsedge bluestem	0.94
<i>Smilax glauca</i>	cat greenbrier	0.88
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort	0.75
<i>Oldenlandia uniflora</i>	clustered mille grains	0.50
<i>Bidens mitis</i>	smallfruit beggarticks	0.44
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	0.44

Scientific name	Common name	Average percent cover per quadrat
<i>Dichanthelium</i> sp.	witchgrass	0.44
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.44
<i>Ilex glabra</i>	gallberry	0.44
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.44
<i>Toxicodendron radicans</i>	eastern poison ivy	0.44
<i>Viola lanceolata</i>	bog white violet	0.19
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.13
<i>Drosera brevifolia</i>	dwarf sundew	0.06
<i>Osmunda cinnamomea</i>	cinnamon fern	0.06
<i>Viola primulifolia</i>	primroseleaf violet	0.06
<i>Woodwardia virginica</i>	Virginia chain fern	0.06
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.06
	Bare ground	0.00

Figure PR-5. Percent of total vegetative cover for plant species in Mixed Forested Wetland Transect 2.

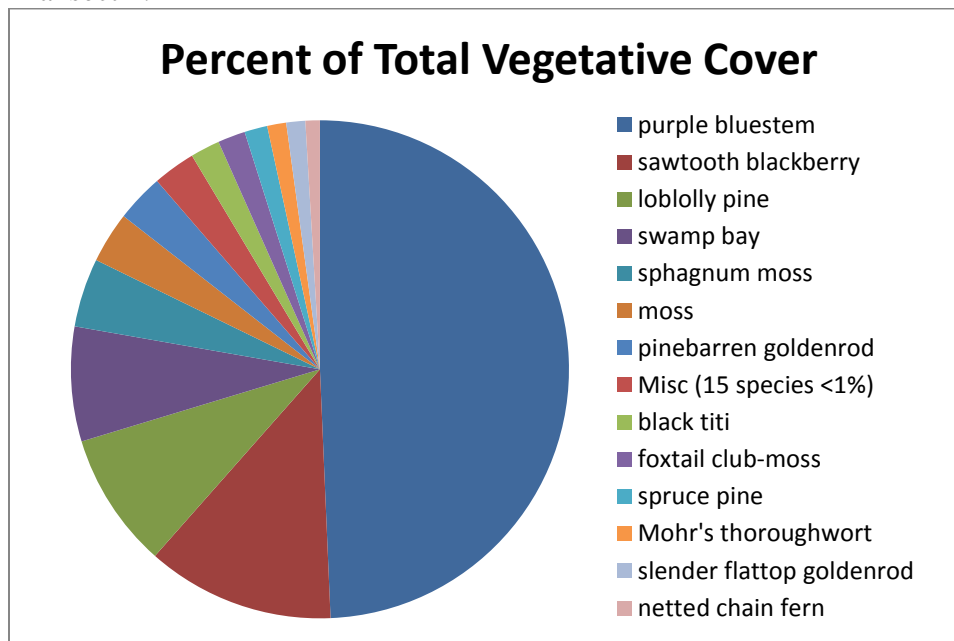


Table PR-5. Percent cover of plant species in Mixed Forested Wetland Transect 2 when sampled on November 9, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	72.50
<i>Rubus pensilvanicus</i>	sawtooth blackberry	17.94
<i>Pinus taeda</i>	loblolly pine	12.94

Scientific name	Common name	Average percent cover per quadrat
<i>Persea palustris</i>	swamp bay	10.94
<i>Sphagnum</i> sp.	sphagnum moss	6.56
moss	moss	4.88
<i>Solidago fistulosa</i>	pinebarren goldenrod	4.56
<i>Cliftonia monophylla</i>	black titi	2.81
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	2.63
<i>Pinus glabra</i>	spruce pine	2.19
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	1.81
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.81
<i>Woodwardia areolata</i>	netted chain fern	1.38
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.88
<i>Oldenlandia uniflora</i>	clustered mille grains	0.63
<i>Smilax glauca</i>	cat greenbrier	0.63
<i>Viola primulifolia</i>	primroseleaf violet	0.50
<i>Ilex coriacea</i>	large gallberry	0.38
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.19
<i>Magnolia virginiana</i>	sweetbay	0.19
<i>Vitis rotundifolia</i>	muscadine	0.19
<i>Acer rubrum</i>	red maple	0.13
<i>Drosera capillaris</i>	pink sundew	0.06
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.06
<i>Polygala lutea</i>	orange milkwort	0.06
<i>Smilax laurifolia</i>	laurel greenbrier	0.06
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.06
<i>Xyris</i> sp.	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 73 plant species (Table PR-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 and covered by pine needle litter. The herbaceous layer was dominated by wiregrass, warty panicum, sphagnum, and broomsedge bluestem. Loblolly pine seedlings were common throughout. Several plants of Curtiss' sandgrass (*Calamovilfa curtissii*), state listed as threatened, were noted in this community.

Quantitative monitoring. Transect 1 had a total of 20 species with 69% bare ground (i.e., unvegetated ground; Figure PR-6, Table PR-6). Wiregrass, muscadine, and cinnamon fern were the most abundant herbs. Transect 2 (Figure PR-7, Table PR-7) had a total of 37 species with

33% bare ground. Common herbs were wiregrass, cinnamon fern, sphagnum moss, and netted chain fern.

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

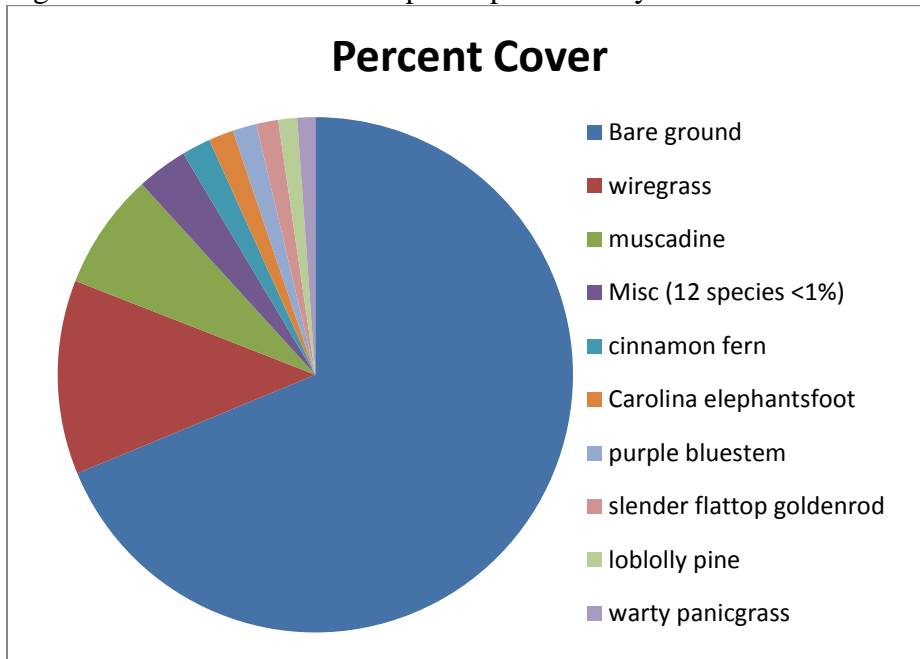


Table PR-6. Percent cover of species in Hydric Pine Flatwoods Transect 1 when sampled on November 9, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	12.19
<i>Vitis rotundifolia</i>	muscadine	7.31
<i>Osmunda cinnamomea</i>	cinnamon fern	1.81
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	1.56
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	1.50
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.38
<i>Pinus taeda</i>	loblolly pine	1.19
<i>Panicum verrucosum</i>	warty panicgrass	1.13
<i>Sphagnum</i> sp.	sphagnum moss	0.63
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.44
<i>Smilax glauca</i>	cat greenbrier	0.44
<i>Andropogon virginicus</i>	broomsedge bluestem	0.38
<i>Toxicodendron radicans</i>	eastern poison ivy	0.38
<i>Oldenlandia uniflora</i>	clustered mille grains	0.31
<i>Scleria</i> sp.	nutrush	0.19
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.19
<i>Dichanthelium</i> sp.	witchgrass	0.06

Scientific name	Common name	Average percent cover per quadrat
<i>Galium</i> sp.	bedstraw	0.06
<i>Ludwigia</i> sp.	primrosewillow	0.06
<i>Viola sororia</i>	common blue violet	0.06
	Bare ground	68.75

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

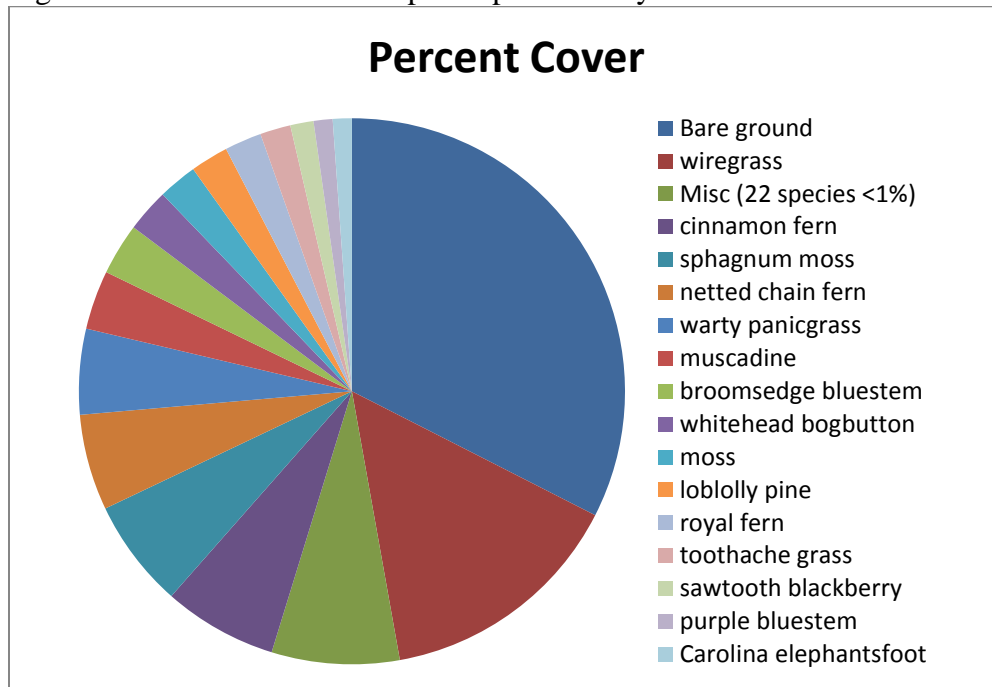


Table PR-7. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 when sampled on November 9, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	14.69
<i>Osmunda cinnamomea</i>	cinnamon fern	6.75
<i>Sphagnum</i> sp.	sphagnum moss	6.44
<i>Woodwardia areolata</i>	netted chain fern	5.69
<i>Panicum verrucosum</i>	warty panicgrass	5.06
<i>Vitis rotundifolia</i>	muscadine	3.50
<i>Andropogon virginicus</i>	broomsedge bluestem	3.06
<i>Lachnocaulon anceps</i>	whitehead bogbutton	2.56
moss	moss	2.31
<i>Pinus taeda</i>	loblolly pine	2.25
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	2.19
<i>Ctenium aromaticum</i>	toothache grass	1.81

Scientific name	Common name	Average percent cover per quadrat
<i>Rubus pensilvanicus</i>	sawtooth blackberry	1.38
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	1.13
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	1.13
<i>Eupatorium capillifolium</i>	dogfennel	0.88
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.88
<i>Oldenlandia uniflora</i>	clustered mille grains	0.88
<i>Smilax glauca</i>	cat greenbrier	0.88
<i>Cyrilla racemiflora</i>	titi	0.44
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.44
<i>Persea palustris</i>	swamp bay	0.44
<i>Vaccinium elliotii</i>	Elliott's blueberry	0.44
<i>Woodwardia virginica</i>	Virginia chain fern	0.44
<i>Toxicodendron radicans</i>	eastern poison ivy	0.38
<i>Acer rubrum</i>	red maple	0.19
<i>Hypericum hypericoides</i>	St. Andrew's cross	0.19
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	0.19
<i>Lycopus rubellus</i>	taperleaf waterhorehound	0.19
<i>Quercus nigra</i>	water oak	0.19
<i>Viola lanceolata</i>	bog white violet	0.19
<i>Dichanthelium</i> sp.	witchgrass	0.06
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.06
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.06
<i>Ludwigia maritima</i>	seaside primrosewillow	0.06
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.06
<i>Viola primulifolia</i>	primroseleaf violet	0.06
	Bare ground	32.50

Pine Flatwoods

Qualitative monitoring. A total of 44 species (Table PR-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 subcanopy had been cut down the previous year and the logs remained on the ground. Some stumps had re-sprouted. Muscadine vine was abundant. The diverse open shrub layer was dominated by gallberry, large gallberry, wax myrtle, sawtooth blackberry, and Elliott's blueberry. In the herbaceous layer were scattered clumps of wiregrass, along with sphagnum moss, royal fern, cinnamon fern, netted chain fern, and Virginia chain fern.

**Lafayette Creek - Phase I Mitigation Site
Qualitative and Quantitative Monitoring
December 2015**

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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 LC-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, 2013, and 2014.

METHODS

The quantitative monitoring utilized 300-foot permanent transect lines previously marked during the 2012 survey. Two transects were located in both the sandhill and hydric savanna areas (Figure LC-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. In 2015 the northern metal T-post in sandhill Transect 2 was missing. Its location was reestablished using the bearing from the remaining T-post and provisionally staked. Bearing and distances from witness trees were recorded for the endpoints of this transect so their locations could be re-established if they were lost in the future. Data recorded consisted of the visually estimated percent cover of each plant species in fifteen 1-meter square quadrats. Tree trunks in quadrats were noted in comments but not recorded as cover; canopy over 2 m in height was also not recorded as cover in 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 2-4, 2015.

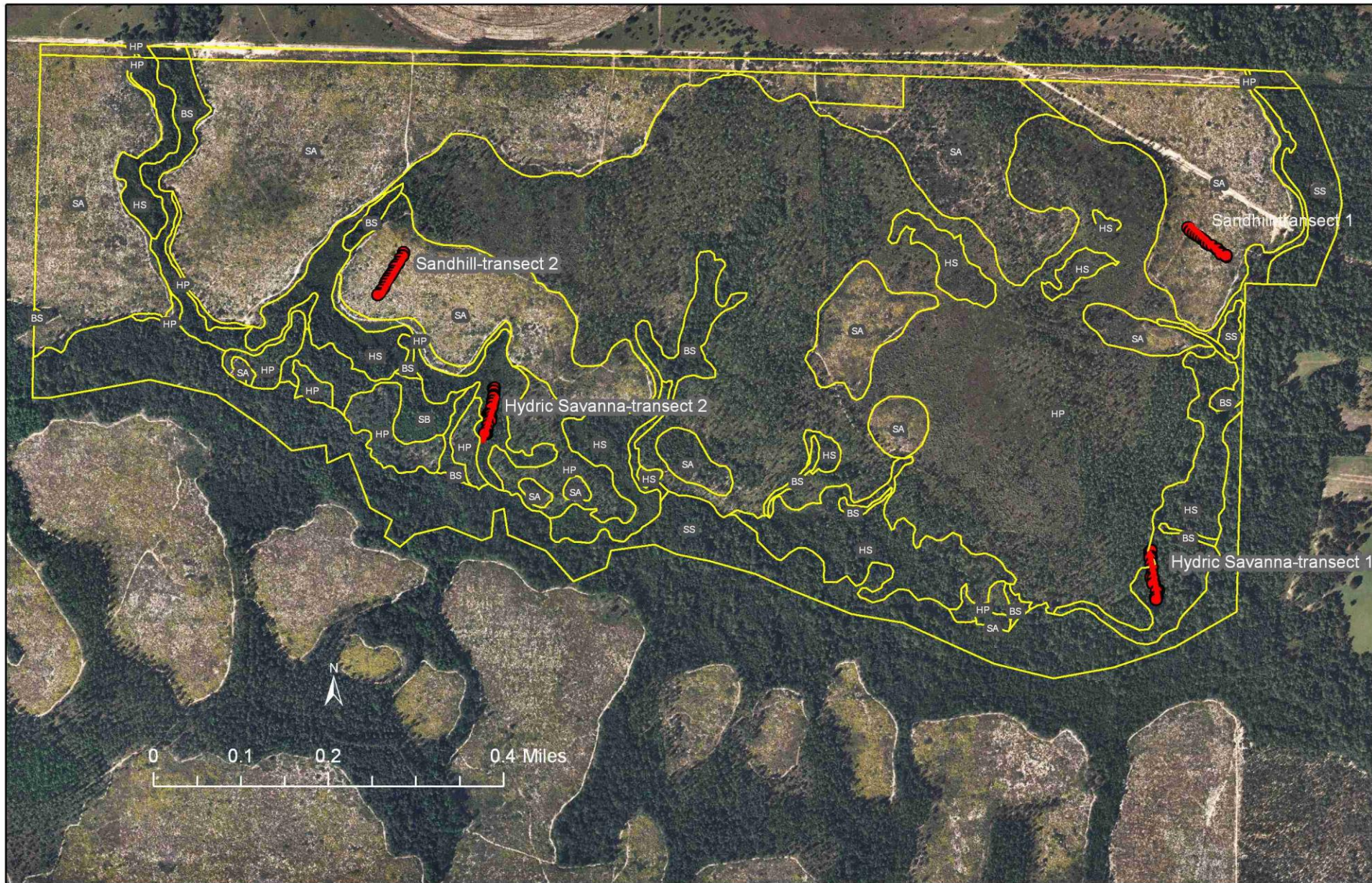


Figure LC-1. Location of permanent transects at Lafayette Creek – Phase I Mitigation Site. SA=Sandhill, HS=Hydric Savanna, HP=High Pine, BS=Bay Swamp, SS=Stream Swamp, SB=Shrub Bog.

RESULTS AND DISCUSSION

A total of 212 plant species were recorded in the surveyed areas of Lafayette Creek during the 2015 monitoring period (Table LC-1).

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 96 plant species were identified in this community (Table LC-1).

Quantitative sampling. The eastern Transect 1 (Table LC-2, Figure LC-2) was located on an east-facing slope. It had a total of 44 species with 47% bare ground. Herbs and shrubs were about equally abundant. The herbs with the highest percent cover were wiregrass, needleleaf witchgrass, little bluestem and tapered witchgrass. The most abundant woody species were saw palmetto and sand live oak. The western Transect 2 (Table LC-3, Figure LC-3) was situated near the top of a ridge. It had a total of 30 species with 55% bare ground. Wiregrass, Lynn Haven goldenaster, and broomsedge bluestem were the dominant herbs. The open shrub stratum was mainly seedling and sapling longleaf pine. (NB: This transect was re-established in 2015 following loss of the northern end stake.)

Table LC-1. Species observed in target communities at Lafayette Creek – Phase I Mitigation Site, November 23, 2015.

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Acer rubrum</i>	red maple	X				X	2
<i>Agalinis divaricata</i>	pineland false foxglove				X		1
<i>Agalinis fasciculata</i>	beach false foxglove			X	X		2
<i>Agalinis obtusifolia</i>	tenlobe false foxglove				X		1
<i>Aletris lutea</i>	yellow colic-root			X			1
<i>Alnus serrulata</i>	hazel alder	X					1
<i>Amsonia ciliata</i>	fringed bluestar				X		1
<i>Andropogon arctatus</i>	pinewoods bluestem			X			1
<i>Andropogon glomeratus</i>	bushy bluestem			X			1
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem		X	X			2
<i>Andropogon gyrans</i>	Elliott's bluestem				X		1
<i>Andropogon gyrans</i> var. <i>stenophyllus</i>	Elliott's bluestem			X			1
<i>Andropogon</i> sp.	bluestem				X		1

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<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 silkscale			X			1
<i>Aristida condensata</i>	big threeawn				X		1
<i>Aristida mohrii</i>	Mohr's threeawn				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		X			2
<i>Arundinaria gigantea</i>	switchcane			X			1
<i>Aureolaria pectinata</i>	fernleaf yellow foxglove		X				1
<i>Balduina angustifolia</i>	coastalplain honeycomb-head				X		1
<i>Baptisia lanceolata</i>	gopherweed				X		1
<i>Bidens mitis</i>	smallfruit beggarticks			X			1
<i>Bigelovia nudata</i>	pineland rayless goldenrod			X			1
<i>Bignonia capreolata</i>	crossvine					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		X		X	3
<i>Carphephorus odoratissimus</i>	vanillaleaf		X				1
<i>Centella asiatica</i>	spadeleaf			X			1
<i>Chamaecrista nictitans</i>	sensitive pea			X			1
<i>Chaptalia tomentosa</i>	sunbonnets			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>Cladina evansii</i>	a lichen				X		1
<i>Clematis virginiana</i>	virginsbower				X		1
<i>Clethra alnifolia</i>	sweet pepperbush	X	X	X		X	4
<i>Cliftonia monophylla</i>	black titi	X		X			2
<i>Cnidocolus stimulosus</i>	tread softly				X		1
<i>Croptilon divaricatum</i>	slender scratchdaisy				X		1
<i>Croton argyranthemus</i>	silver croton				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>Dalea pinnata</i>	summer farewell				X		1

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Dichantheium aciculare</i>	needleleaf witchgrass				X		1
<i>Dichantheium acuminatum</i>	tapered witchgrass			X	X		2
<i>Dichantheium commutatum</i>	variable witchgrass				X		1
<i>Dichantheium ensifolium</i>	cypress witchgrass			X			1
<i>Dichantheium scabriusculum</i>	woolly witchgrass			X		X	2
<i>Dichantheium</i> sp.	witchgrass			X			1
<i>Dichantheium strigosum</i>	roughhair witchgrass			X			1
<i>Diodia virginiana</i>	Virginia buttonweed			X			1
<i>Diospyros virginiana</i>	common persimmon				X		1
<i>Drosera capillaris</i>	pink sundew			X			1
<i>Elephantopus</i> sp.	elephantsfoot				X		1
<i>Eragrostis elliottii</i>	Elliott's lovegrass				X		1
<i>Eragrostis virginica</i>	coastal lovegrass				X		1
<i>Eriocaulon compressum</i>	flattened pipewort			X			1
<i>Eriocaulon decangulare</i>	tenangle pipewort	X		X			2
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat				X		1
<i>Eupatorium capillifolium</i>	dogfennel			X			1
<i>Eupatorium compositifolium</i>	yankeeweed				X		1
<i>Eupatorium mohrii</i>	Mohr's thoroughwort			X			1
<i>Eupatorium pilosum</i>	rough boneset			X			1
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort		X	X			2
<i>Euphorbia discoidalis</i>	summer spurge				X		1
<i>Euphorbia floridana</i>	greater Florida spurge				X		1
<i>Eurybia eryngiifolia</i>	thistleleaf aster		X				1
<i>Euthamia caroliniana</i>	slender flattop goldenrod		X	X			2
<i>Fuirena breviseta</i>	umbrellasedge			X			1
<i>Galactia regularis</i>	eastern milkpea				X		1
<i>Galactia</i> sp.	milkpea				X		1
<i>Gaylussacia dumosa</i>	dwarf huckleberry		X		X		2
<i>Gelsemium sempervirens</i>	yellow jessamine		X			X	1
<i>Hamamelis virginiana</i>	witch hazel	X					1
<i>Helianthus angustifolius</i>	narrowleaf sunflower			X			1
<i>Helianthus radula</i>	stiff sunflower		X		X		2
<i>Hibiscus aculeatus</i>	comfortroot		X				1
<i>Houstonia procumbens</i>	roundleaf bluet				X		1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	X		X			2
<i>Hypericum gentianoides</i>	orangegrass				X		1
<i>Hypericum hypericoides</i>	St. Andrew's cross			X	X	X	3

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort			X			1
<i>Ilex cassine</i>	dahoon	X	X	X			3
<i>Ilex coriacea</i>	large gallberry	X		X			2
<i>Ilex glabra</i>	gallberry		X	X	X		3
<i>Ilex opaca</i>	American holly		X		X		2
<i>Ilex vomitoria</i>	yaupon		X		X		2
<i>Itea virginica</i>	Virginia willow					X	1
<i>Juncus canadensis</i>	Canada rush			X			1
<i>Juncus trigonocarpus</i>	redpod rush			X			1
<i>Lachnanthes caroliniana</i>	Carolina redroot			X			1
<i>Lachnocaulon anceps</i>	whitehead bogbutton		X	X			2
<i>Lechea sessilifolia</i>	pineland pinweed				X		1
<i>Leucothoe axillaris</i>	coastal doghobble					X	1
<i>Liatris elegans</i>	pinkscale gayfeather				X		1
<i>Liatris gracilis</i>	slender gayfeather				X		1
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather				X		1
<i>Liatris spicata</i>	dense gayfeather			X			1
<i>Liatris tenuifolia</i>	shortleaf gayfeather				X		1
<i>Licania michauxii</i>	gopher apple				X		1
<i>Liriodendron tulipifera</i>	tuliptree			X		X	2
<i>Lobelia brevifolia</i>	shortleaf lobelia			X			1
<i>Lophiola aurea</i>	goldcrest			X			1
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow			X			1
<i>Lupinus diffusus</i>	skyblue lupine				X		1
<i>Lycopodiella alopecuroides</i>	foxtail club-moss		X	X			2
<i>Lyonia lucida</i>	fetterbush	X				X	2
<i>Magnolia virginiana</i>	sweetbay	X	X	X			3
<i>Mikania scandens</i>	climbing hempvine					X	1
<i>Mimosa quadrivalvis</i>	sensitive briar				X		1
<i>Muhlenbergia expansa</i>	cutover muhly			X			1
<i>Myrica caroliniensis</i>	evergreen bayberry	X					1
<i>Myrica inodora</i>	odorless bayberry	X		X			2
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo	X		X		X	3
<i>Onoclea sensibilis</i>	sensitive fern			X			1
<i>Opuntia humifusa</i>	pricklypear				X		1
<i>Osmanthus americanus</i>	wild olive				X		1
<i>Osmunda cinnamomea</i>	cinnamon fern	X	X	X		X	4
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern			X			1

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<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				1
<i>Pinus clausa</i>	sand pine				X		1
<i>Pinus elliottii</i>	slash pine	X	X	X	X		4
<i>Pinus palustris</i>	longleaf pine		X		X		2
<i>Pinus serotina</i>	pond pine	X		X			2
<i>Pinus taeda</i>	loblolly pine			X		X	2
<i>Pityopsis aspera</i>	pineland silkgrass				X		1
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass		X		X		2
<i>Polygonella gracilis</i>	tall jointweed				X		1
<i>Pteridium aquilinum</i>	bracken fern		X	X			2
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting				X		1
<i>Pteridium aquilinum</i>	bracken		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 margarettae</i>	sand post oak				X		1
<i>Quercus minima</i>	dwarf live oak		X		X		2
<i>Quercus nigra</i>	water oak	X					1
<i>Quercus pumila</i>	runner oak		X				1
<i>Rhexia alifanus</i>	tall meadowbeauty			X			1
<i>Rhexia petiolata</i>	fringed meadowbeauty			X			1
<i>Rhexia sp.</i>	meadowbeauty			X			1
<i>Rhexia virginica</i>	handsome harry			X			1
<i>Rhododendron viscosum</i>	swamp azalea	X					1
<i>Rhus copallinum</i>	winged sumac				X		1
<i>Rhynchosia cytisoides</i>	royal snoutbean				X		1
<i>Rhynchospora cephalantha</i>	bunched beaksedge			X			1
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge			X			1
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge			X			1
<i>Rhynchospora compressa</i>	flatfruit beaksedge			X			1
<i>Rhynchospora fascicularis</i>	fascicled beaksedge			X			1
<i>Rhynchospora sp.</i>	beaksedge			X			1

Scientific Name	Common Name	bay swamp	high pine	hydic savanna	Sandhill	stream swamp	Grand Total
<i>Rubus pensilvanicus</i>	sawtooth blackberry	X		X			2
<i>Rubus cuneifolius</i>	sand blackberry		X		X		2
<i>Ruellia ciliosa</i>	ciliate wild petunia				X		1
<i>Saccharum giganteum</i>	sugarcane plumegrass			X			1
<i>Sarracenia leucophylla</i>	white-top pitcherplant			X			1
<i>Schizachyrium sanguineum</i>	crimson bluestem			X			1
<i>Schizachyrium scoparium</i>	little bluestem				X		1
<i>Schizachyrium tenerum</i>	slender bluestem				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 triglomerata</i>	whip nutrush			X			1
<i>Scoparia dulcis</i>	licoriceweed			X			1
<i>Serenoa repens</i>	saw palmetto	X	X	X	X		4
<i>Sericocarpus tortifolius</i>	whitetop aster				X		1
<i>Seymeria cassioides</i>	yaupon blacksenia				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	X			3
<i>Solidago fistulosa</i>	pinebarren goldenrod			X			1
<i>Solidago odora</i>	sweet goldenrod		X		X		2
<i>Solidago stricta</i>	wand goldenrod			X			1
<i>Sphagnum</i> sp.	sphagnum moss	X		X			2
<i>Stillingia sylvatica</i>	queen's delight				X		1
<i>Symphotrichum adnatum</i>	scaleleaf aster		X				1
<i>Symphotrichum concolor</i>	eastern silver aster				X		1
<i>Symphotrichum dumosum</i>	rice button aster		X	X	X		3
<i>Symplocos tinctoria</i>	horse sugar					X	1
<i>Taxodium ascendens</i>	pond cypress					X	1
<i>Tephrosia chrysophylla</i>	scurf hoary-pea				X		1
<i>Tephrosia virginiana</i>	goat's rue				X		1
<i>Toxicodendron radicans</i>	eastern poison ivy		X				1
<i>Toxicodendron vernix</i>	poison sumac					X	1
<i>Tragia</i> sp.	wavyleaf noseburn				X		1
<i>Utricularia juncea</i>	southern bladderwort			X			1
<i>Vaccinium arboreum</i>	sparkleberry		X		X		2
<i>Vaccinium corymbosum</i>	highbush blueberry	X	X				2
<i>Vaccinium elliotii</i>	Elliott's blueberry				X		1

Scientific Name	Common Name	bay swamp	high pine	hydric savanna	Sandhill	stream swamp	Grand Total
<i>Vaccinium myrsinites</i>	shiny blueberry		X		X		2
<i>Viola primulifolia</i>	primroseleaf violet			X			1
<i>Viola sororia</i>	common blue violet					X	1
<i>Vitis rotundifolia</i>	muscadine	X	X	X	X	X	5
<i>Woodwardia areolata</i>	netted chain fern					X	1
<i>Woodwardia virginica</i>	Virginia chain fern	X	X	X			3
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass			X			1
<i>Xyris fimbriata</i>	fringed yellow-eyed grass			X		X	2
<i>Yucca filamentosa</i>	Adam's needle				X		1
Total number of taxa: 212		29	45	100	96	23	293

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

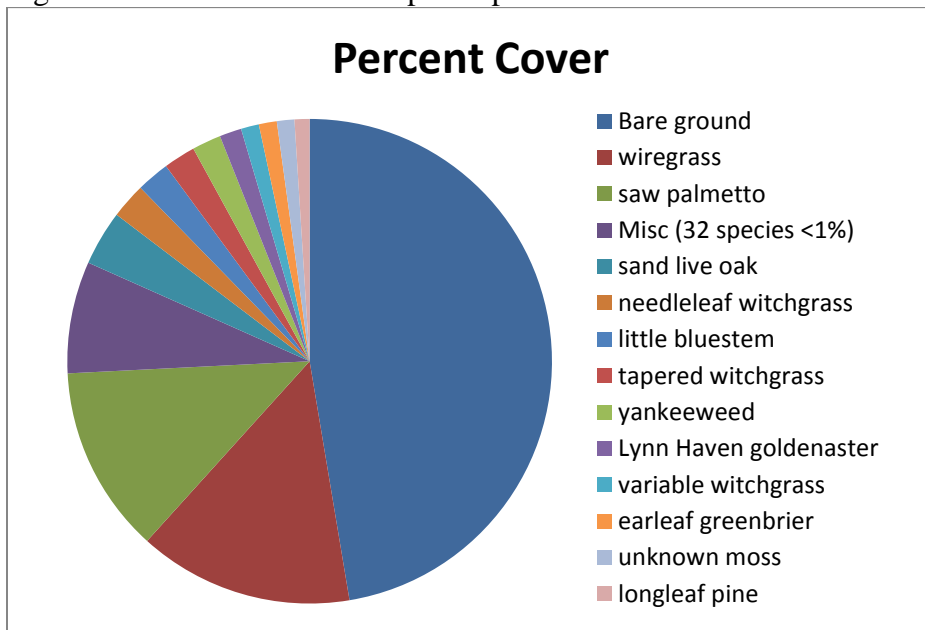


Table LC-2. Percent cover of plant species in Sandhill Transect 1 when sampled on November 2, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	14.33
<i>Serenoa repens</i>	saw palmetto	12.50
<i>Quercus geminata</i>	sand live oak	3.67
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	2.37
<i>Schizachyrium scoparium</i>	little bluestem	2.20

Scientific name	Common name	Average percent cover per quadrat
<i>Dichanthelium acuminatum</i>	tapered witchgrass	2.13
<i>Eupatorium compositifolium</i>	yankeeweed	1.93
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	1.47
<i>Dichanthelium commutatum</i>	variable witchgrass	1.20
<i>Smilax auriculata</i>	earleaf greenbrier	1.20
unknown moss	unknown moss	1.17
<i>Pinus palustris</i>	longleaf pine	1.00
<i>Schizachyrium tenerum</i>	slender bluestem	0.83
<i>Quercus minima</i>	dwarf live oak	0.77
<i>Polygonella gracilis</i>	tall jointweed	0.63
<i>Solidago odora</i>	sweet goldenrod	0.63
<i>Hypericum gentianoides</i>	orangegrass	0.50
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.50
<i>Rhus copallinum</i>	winged sumac	0.47
<i>Licania michauxii</i>	gopher apple	0.43
<i>Paspalum setaceum</i>	thin paspalum	0.40
<i>Pityopsis aspera</i>	pineland silkgrass	0.37
<i>Eragrostis virginica</i>	coastal lovegrass	0.33
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.27
<i>Opuntia humifusa</i>	pricklypear	0.23
<i>Rubus cuneifolius</i>	sand blackberry	0.17
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.13
<i>Mimosa quadrivalvis</i>	sensitive briar	0.13
<i>Galactia regularis</i>	eastern milkpea	0.10
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather	0.07
<i>Cnidioscolus stimulosus</i>	tread softly	0.07
<i>Euphorbia discoidalis</i>	summer spurge	0.03
<i>Aristida mohrii</i>	Mohr's threeawn	0.03
<i>Vaccinium myrsinites</i>	shiny blueberry	0.03
<i>Andropogon ternarius</i>	splitbeard bluestem	0.03
<i>Scleria ciliata</i>	fringed nutrush	0.03
<i>Liatris tenuifolia</i>	shortleaf gayfeather	0.03
<i>Rhynchosia cytisoides</i>	royal snoutbean	0.03
<i>Stylisma patens</i>	coastalplain dawnflower	0.03
<i>Andropogon</i> sp.	bluestem	0.03
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	0.03
<i>Ruellia ciliosa</i>	ciliate wild petunia	0.03
<i>Liatris pauciflora</i> var. <i>secunda</i>	fewflower gayfeather	0.03
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.03
	Bare ground	47.37

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

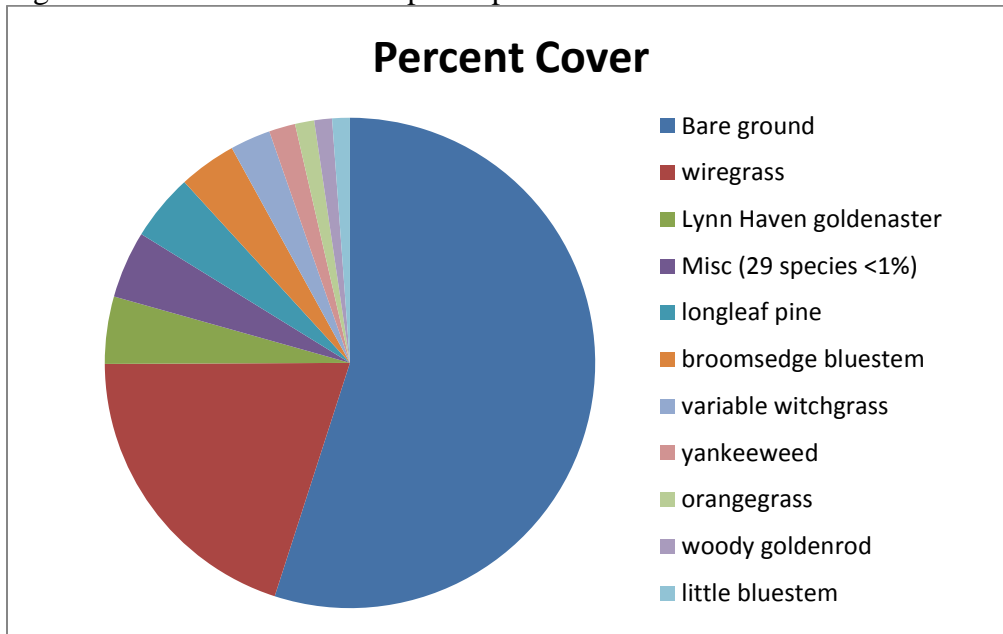


Table LC-3. Percent cover of plant species in Sandhill Transect 2 when sampled on November 3, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	19.97
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	4.43
<i>Pinus palustris</i>	longleaf pine	4.40
<i>Andropogon virginicus</i>	broomsedge bluestem	3.80
<i>Dichanthelium commutatum</i>	variable witchgrass	2.67
<i>Eupatorium compositifolium</i>	yankeeweed	1.73
<i>Hypericum gentianoides</i>	orangegrass	1.27
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	1.17
<i>Schizachyrium scoparium</i>	little bluestem	1.17
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.73
<i>Polygonella gracilis</i>	tall jointweed	0.67
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.67
<i>Smilax auriculata</i>	earleaf greenbrier	0.60
<i>Dichanthelium acuminatum</i>	tapered witchgrass	0.47
<i>Aristida mohrii</i>	Mohr's threeawn	0.23
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.20
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.10
<i>Quercus laevis</i>	turkey oak	0.10
<i>Andropogon</i> sp.	bluestem	0.10

Scientific name	Common name	Average percent cover per quadrat
<i>Licania michauxii</i>	gopher apple	0.10
<i>Serenoa repens</i>	saw palmetto	0.10
<i>Andropogon gyrans</i>	Elliott's bluestem	0.10
<i>Mimosa quadrivalvis</i>	sensitive briar	0.03
<i>Liatris tenuifolia</i>	shortleaf gayfeather	0.03
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather	0.03
<i>Galactia</i> sp.	milkpea	0.03
<i>Galactia regularis</i>	eastern milkpea	0.03
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.03
<i>Euphorbia discoidalis</i>	summer spurge	0.03
<i>Euphorbia floridana</i>	greater Florida spurge	0.03
	Bare ground	54.97

Hydric Savanna

Qualitative sampling. The restoration of the fire-suppressed hydric savanna was begun in 2010 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 colonized a portion of the 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 100 species were recorded from this community (Table LC-1), an increase over the prior two years. Pine-woods bluestem (*Andropogon arctatus*), state-listed as threatened, was noted in this community in 2015.

Quantitative sampling. The eastern Transect 1 (Table LC-4, Figure LC-4) was on a south-facing slope and had a total of 43 species with 47% bare ground. Herbaceous cover made up most of the transect. The most abundant herbs were roughhair witchgrass, wiregrass, and warty panicgrass. Purple bluestem and pinewoods bluestem were also common. The western Transect 2 (Table LC-5, Figure LC-5) was also on a south facing slope. It had a total of 31 species with 42% bare ground. The drier north end had abundant purple bluestem and wiregrass, while the wetter south end was dominated by Chapman's beaksedge and warty panicgrass.

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

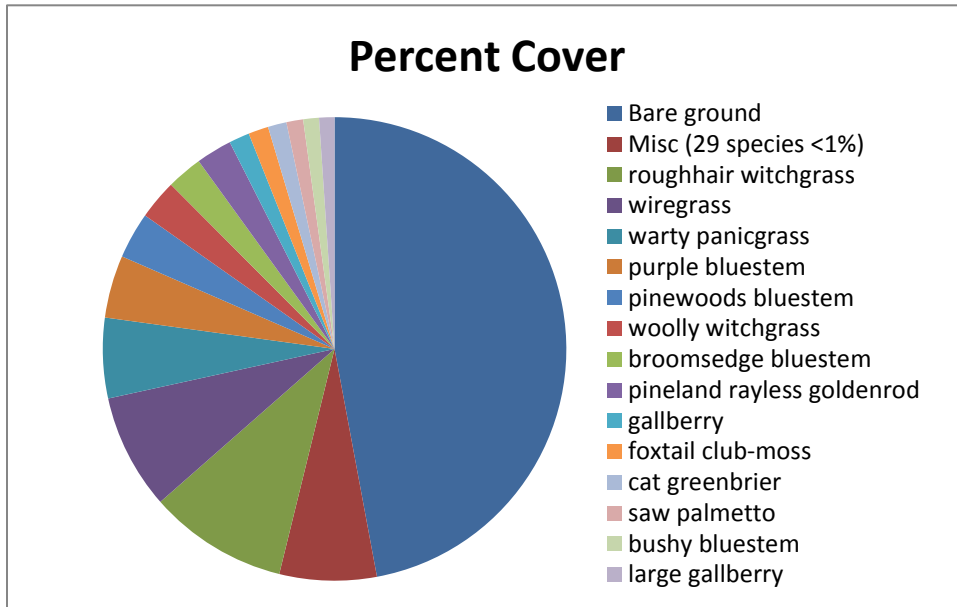


Table LC-4. Percent cover of plant species in Hydric Savanna Transect 1 when sampled on November 4, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Dichanthelium strigosum</i>	roughhair witchgrass	9.70
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	8.03
<i>Panicum verrucosum</i>	warty panicgrass	5.60
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	4.37
<i>Andropogon arctatus</i>	pinewoods bluestem	3.23
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	2.77
<i>Andropogon virginicus</i>	broomsedge bluestem	2.50
<i>Bigelovia nudata</i>	pineland rayless goldenrod	2.50
<i>Ilex glabra</i>	gallberry	1.43
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	1.40
<i>Smilax glauca</i>	cat greenbrier	1.30
<i>Serenoa repens</i>	saw palmetto	1.17
<i>Andropogon glomeratus</i>	bushy bluestem	1.10
<i>Ilex coriacea</i>	large gallberry	1.07
<i>Xyris ambigua</i>	coastalplain yellow-eyed	0.83
<i>Cliftonia monophylla</i>	black titi	0.80
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.70
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.50
<i>Panicum longifolium</i>	panicum	0.50
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.47
<i>Rhynchospora compressa</i>	flatfruit beaksedge	0.27

Scientific name	Common name	Average percent cover per quadrat
<i>Schizachyrium sanguineum</i>	crimson bluestem	0.23
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.23
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	0.23
<i>Helianthus angustifolius</i>	narrowleaf sunflower	0.23
<i>Ctenium aromaticum</i>	toothache grass	0.23
<i>Eupatorium pilosum</i>	rough boneset	0.23
<i>Aletris lutea</i>	yellow colic-root	0.23
<i>Pinus elliotii</i>	slash pine	0.13
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	0.10
<i>Vaccinium arboreum</i>	sparkleberry	0.10
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.10
<i>Arundinaria gigantea</i>	switchcane	0.10
<i>Rhexia alifanus</i>	savannah meadowbeauty	0.10
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.10
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.10
<i>Callicarpa americana</i>	American beautyberry	0.03
<i>Eriocaulon compressum</i>	flattened pipewort	0.03
<i>Smilax laurifolia</i>	laurel greenbrier	0.03
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.03
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.03
<i>Rhexia</i> sp.	meadowbeauty	0.03
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	0.03
	Bare ground	47.07

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

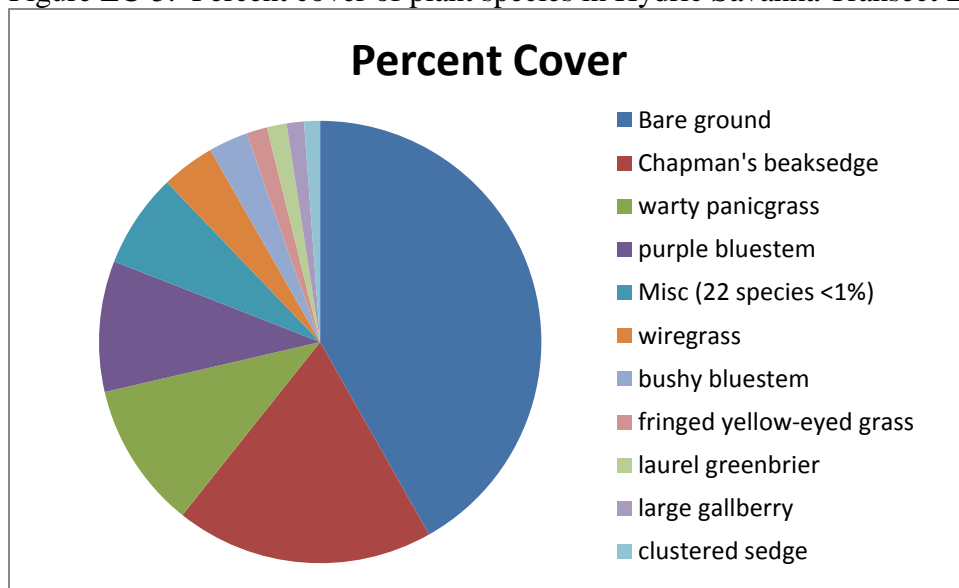


Table LC-5. Percent cover of plant species in Hydric Savanna Transect 2 when sampled on November 3, 2015

Scientific name	Common name	Average percent cover per quadrat
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	18.90
<i>Panicum verrucosum</i>	warty panicgrass	10.67
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	9.57
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	3.90
<i>Andropogon glomeratus</i>	bushy bluestem	2.87
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	1.53
<i>Smilax laurifolia</i>	laurel greenbrier	1.43
<i>Ilex coriacea</i>	large gallberry	1.27
<i>Carex glaucescens</i>	clustered sedge	1.17
<i>Dichantherium</i> sp.	witchgrass	0.77
<i>Pteridium aquilinum</i>	bracken fern	0.73
<i>Cliftonia monophylla</i>	black titi	0.60
<i>Smilax glauca</i>	cat greenbrier	0.53
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.53
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.50
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.50
<i>Clethra alnifolia</i>	sweet pepperbush	0.33
<i>Vaccinium corymbosum</i>	highbush blueberry	0.23
<i>Rhynchospora</i> sp.	beaksedge	0.23
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.23
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo	0.23
<i>Lachnanthes carolina</i>	Carolina redroot	0.23
<i>Pinus elliotii</i>	slash pine	0.23
<i>Magnolia virginiana</i>	sweetbay	0.23
<i>Eupatorium capillifolium</i>	dogfennel	0.20
<i>Eriocaulon compressum</i>	flattened pipewort	0.20
<i>Dichantherium ensifolium</i>	cyress witchgrass	0.10
<i>Utricularia juncea</i>	southern bladderwort	0.10
<i>Rhynchospora compressa</i>	flatfruit beaksedge	0.10
<i>Rhexia</i> sp.	meadowbeauty	0.03
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	0.03
	Bare ground	41.80

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 45 (Table LC-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 29 (Table LC-1).

Stream Swamp

Qualitative sampling. This relatively undisturbed natural community occurred along the narrow floodplain of Lafayette Creek and its major tributary, Wolf Creek. 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 23 (Table LC-1).

Plum Creek at Holmes Creek Mitigation Site
Qualitative and Quantitative Monitoring
December 2015

**Plum Creek at Holmes Creek Mitigation Site
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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 PC-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, 2013, and 2014.

METHODS

The quantitative monitoring utilized 300-foot- 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 PC-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. Tree trunks in quadrats were noted in comments but not recorded as cover; canopy over 2 m in height was also not recorded as cover in quadrats. 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 4 and 5, 2015.

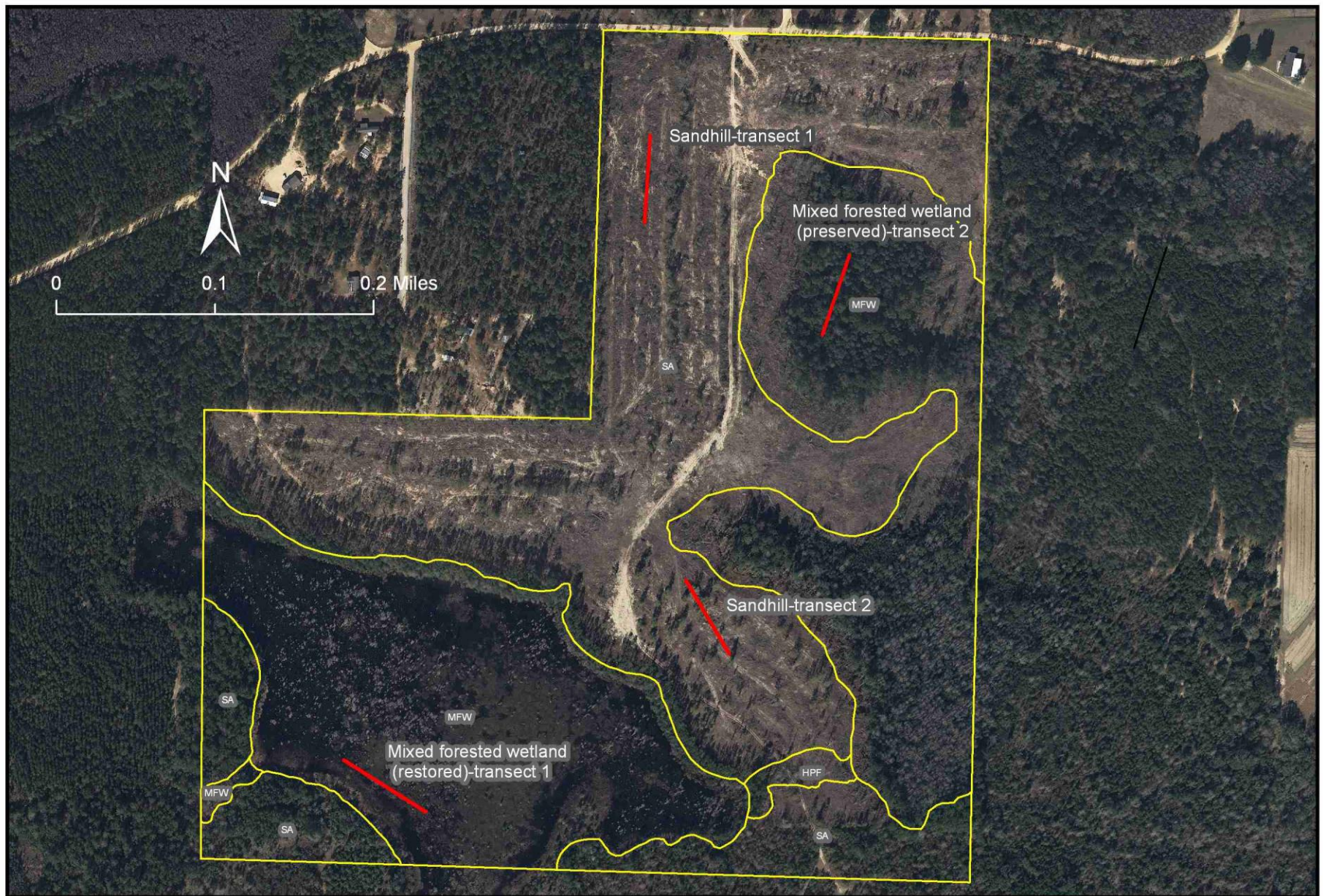


Figure PC-1. Location of permanent transects at Plum Creek at Holmes Creek Mitigation Site in Sandhill and Mixed Forested Wetland,

RESULTS AND DISCUSSION

A total of 128 plant species were observed during the 2015 monitoring period in the target communities at Plum Creek at Holmes Creek Mitigation Site (Table PC-1).

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 PC-1).

Quantitative sampling. The northern Transect 1 (Table PC-2, Figure PC-2) was located midslope on an east-facing hill. It had a total of 44 species with 55% bare ground. The herbs with the highest percent cover were and broomsedge bluestem, Lynn Haven goldenaster, and wiregrass. Shrubs were sparse, the most abundant being yaupon. The southern Transect 2 (Table PC-3, Figure PC-3) was situated near the top of a low ridge. It had a total of 38 species with 21% bare ground. Common herbs included Lynn Haven goldenaster, rustweed, and needleleaf witchgrass. The common woody species were longleaf pine saplings, saw palmetto, and sawtooth blackberry. Bearings and distances to nearby longleaf saplings were taken to allow re-location of the endpoints of this transect.

Table PC-1. Plant species observed in target communities at Plum Creek at Holmes Creek Mitigation Site November 4 and 5, 2015.

Scientific Name	Common Name	Sandhill	Mixed Forested Wetland-Restoration	Mixed Forested Wetland-Preserved	Grand Total
<i>Acer rubrum</i>	red maple		X		1
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	X	X		2
<i>Andropogon sp.</i>	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</i>	arrowfeather threeawn	X			1
<i>Aristida stricta var. beyrichiana</i>	wiregrass	X			1
<i>Asimina angustifolia</i>	slimleaf pawpaw	X			1
<i>Baccharis halimifolia</i>	groundsel tree	X			1
<i>Baptisia lanceolata</i>	gopherweed	X			1
<i>Berlandiera pumila</i>	soft greeneyes	X			1
<i>Bidens mitis</i>	smallfruit beggarticks		X		1

Scientific Name	Common Name	Sandhill	Mixed Forested Wetland- Restoration	Mixed Forested Wetland- Preserved	Grand Total
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	X			1
<i>Callicarpa americana</i>	American beautyberry	X			1
<i>Carex glaucescens</i>	clustered sedge			X	1
<i>Carex sp.</i>	sedge		X	X	2
<i>Carphephorus odoratissimus</i>	vanillaleaf	X			1
<i>Cephalanthus occidentalis</i>	common buttonbush		X		1
<i>Chamaecrista fasciculata</i>	partridge pea	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			1
<i>Clethra alnifolia</i>	sweet pepperbush			X	1
<i>Cliftonia monophylla</i>	black titi			X	1
<i>Cnidocolus stimulosus</i>	tread softly	X			1
<i>Cyperus retrorsus</i>	pinebarren flatsedge	X			1
<i>Cyperus sp.</i>	flatsedge	X			1
<i>Cyrilla racemiflora</i>	titi			X	1
<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 portoricense</i>	hemlock witchgrass	X			1
<i>Dichantherium sp.</i>	witchgrass	X			1
<i>Diospyros virginiana</i>	common persimmon	X			1
<i>Dulichium arundinaceum</i>	threeway sedge		X		1
<i>Eleocharis equisetoides</i>	jointed spikerush		X		1
<i>Elephantopus elatus</i>	tall elephantsfoot	X			1
<i>Eragrostis spectabilis</i>	purple lovegrass	X			1
<i>Eragrostis virginica</i>	coastal lovegrass	X			1
<i>Eupatorium capillifolium</i>	dogfennel	X			1
<i>Eupatorium compositifolium</i>	yankeeweed	X			1
<i>Eupatorium pilosum</i>	rough boneset		X		1
<i>Euthamia caroliniana</i>	slender flattop goldenrod	X			1
<i>Galactia sp.</i>	milkpea	X			1
<i>Galium hispidulum</i>	coastal bedstraw	X			1
<i>Gaura sp.</i>	beeblossom	X			1
<i>Gaylussacia dumosa</i>	dwarf huckleberry	X			1
<i>Gelsemium sempervirens</i>	yellow jessamine	X			1
<i>Hieracium sp.</i>	hawkweed	X			1

Scientific Name	Common Name	Sandhill	Mixed Forested Wetland- Restoration	Mixed Forested Wetland- Preserved	Grand Total
<i>Houstonia procumbens</i>	roundleaf bluet	X			1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort		X		1
<i>Hypericum gentianoides</i>	orangegrass	X			1
<i>Hypericum hypericoides</i>	St. Andrew's cross	X			1
<i>Ilex coriacea</i>	large gallberry			X	1
<i>Ilex glabra</i>	gallberry	X			1
<i>Ilex opaca</i>	American holly	X			1
<i>Ilex vomitoria</i>	yaupon	X			1
<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>Lechea</i> sp.	pineland pinweed	X			1
<i>Liatris gracilis</i>	slender gayfeather	X			1
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather	X			1
<i>Liquidambar styraciflua</i>	sweetgum			X	1
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow		X		1
<i>Lycopus rubellus</i>	taperleaf waterhorehound		X		1
<i>Lyonia lucida</i>	fetterbush			X	1
<i>Magnolia virginiana</i>	sweetbay		X	X	2
<i>Myrica cerifera</i>	wax myrtle		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 hemitomon</i>	maidencane		X		1
<i>Panicum virgatum</i>	switchgrass	X			1
<i>Persea palustris</i>	swamp bay			X	1
<i>Pinus elliotii</i>	slash pine	X			1
<i>Pinus palustris</i>	longleaf pine	X			1
<i>Pinus serotina</i>	pond pine			X	1
<i>Pityopsis aspera</i>	pineland silkgrass	X			1
<i>Pluchea longifolia</i>	longleaf camphorweed			X	1
<i>Pluchea</i> sp.	camphorweed	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

Scientific Name	Common Name	Sandhill	Mixed Forested Wetland- Restoration	Mixed Forested Wetland- Preserved	Grand Total
<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 margaretta</i>	sand post oak	X			1
<i>Rhexia petiolata</i>	fringed meadowbeauty		X		1
<i>Rhododendron canescens</i>	mountain azalea			X	1
<i>Rhynchospora cephalantha</i>	bunched beaksedge			X	1
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge		X		1
<i>Rhynchospora nitens</i>	shortbeak beaksedge		X		1
<i>Rubus cuneifolius</i>	sand blackberry	X			1
<i>Saccharum giganteum</i>	sugarcane plumegrass		X	X	2
<i>Salvia azurea</i>	azure blue sage	X			1
<i>Sapium sebiferum</i>	Chinese tallow			X	1
<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		X	2
<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>Solidago sp.</i>	goldenrod	X			1
<i>Solidago stricta</i>	wand goldenrod	X			1
<i>Sphagnum sp.</i>	sphagnum moss			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>Triadenum virginicum</i>	Virginia marsh St. John's wort		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			1
<i>Vaccinium corymbosum</i>	highbush blueberry			X	1
<i>Vaccinium stamineum</i>	deerberry	X			1
<i>Vernonia angustifolia</i>	tall ironweed	X			1
<i>Vitis rotundifolia</i>	muscadine	X		X	2

Scientific Name	Common Name	Sandhill	Mixed Forested Wetland- Restoration	Mixed Forested Wetland- Preserved	Grand Total
<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
<i>Xyris fimbriata</i>	fringed yellow-eyed grass		X		1
Total number of species: 128		88	30	26	144

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

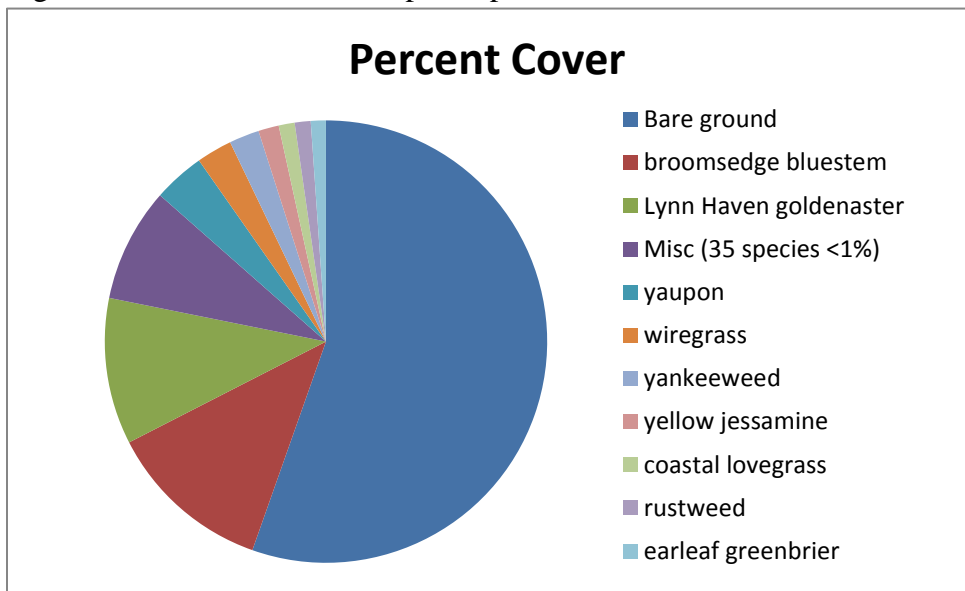


Table PC-2. Percent cover of plant species in Sandhill Transect 1 when sampled on November 4, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon virginicus</i>	broomsedge bluestem	12.07
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	10.70
<i>Ilex vomitoria</i>	yaupon	3.77
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	2.60
<i>Eupatorium compositifolium</i>	yankeeweed	2.20
<i>Gelsemium sempervirens</i>	yellow jessamine	1.50
<i>Eragrostis virginica</i>	coastal lovegrass	1.17
<i>Polypremum procumbens</i>	rustweed	1.17
<i>Smilax auriculata</i>	earleaf greenbrier	1.10
<i>Dichantherium acuminatum</i>	tapered witchgrass	0.83
<i>Hypericum gentianoides</i>	orangegrass	0.80

Scientific name	Common name	Average percent cover per quadrat
<i>Eupatorium capillifolium</i>	dogfennel	0.80
<i>Dichantheium commutatum</i>	variable witchgrass	0.67
<i>Panicum virgatum</i>	switchgrass	0.50
<i>Galium hispidulum</i>	coastal bedstraw	0.50
<i>Andropogon</i> sp.	bluestem	0.50
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.33
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	0.27
<i>Houstonia procumbens</i>	roundleaf bluet	0.27
<i>Baptisia lanceolata</i>	gopherweed	0.23
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.23
<i>Pteridium aquilinum</i>	bracken fern	0.23
<i>Rubus cuneifolius</i>	sand blackberry	0.23
<i>Smilax glauca</i>	cat greenbrier	0.23
<i>Solidago odora</i>	sweet goldenrod	0.23
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	0.23
<i>Vernonia angustifolia</i>	tall ironweed	0.23
<i>Scleria ciliata</i>	fringed nutrush	0.10
<i>Smilax laurifolia</i>	laurel greenbrier	0.10
<i>Baccharis halimifolia</i>	groundsel tree	0.10
<i>Eragrostis spectabilis</i>	purple lovegrass	0.10
<i>Liatris pauciflora</i>	fewflower gayfeather	0.10
<i>Vaccinium stamineum</i>	deerberry	0.10
<i>Galactia</i> sp.	milkpea	0.07
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather	0.03
<i>Gaura</i> sp.	beeblossom	0.03
<i>Solidago stricta</i>	wand goldenrod	0.03
<i>Quercus margarettae</i>	sand post oak	0.03
<i>Liatris gracilis</i>	slender gayfeather	0.03
<i>Dalea pinnata</i>	summer farewell	0.03
<i>Berlandiera pumila</i>	soft greeneyes	0.03
<i>Cnidocolus stimulosus</i>	tread softly	0.03
<i>Pluchea</i> sp.	camphorweed	0.03
<i>Hieracium</i> sp.	hawkweed	0.03
	Bare ground	55.40

Figure PC-3. Percent species cover in Sandhill Transect 2.

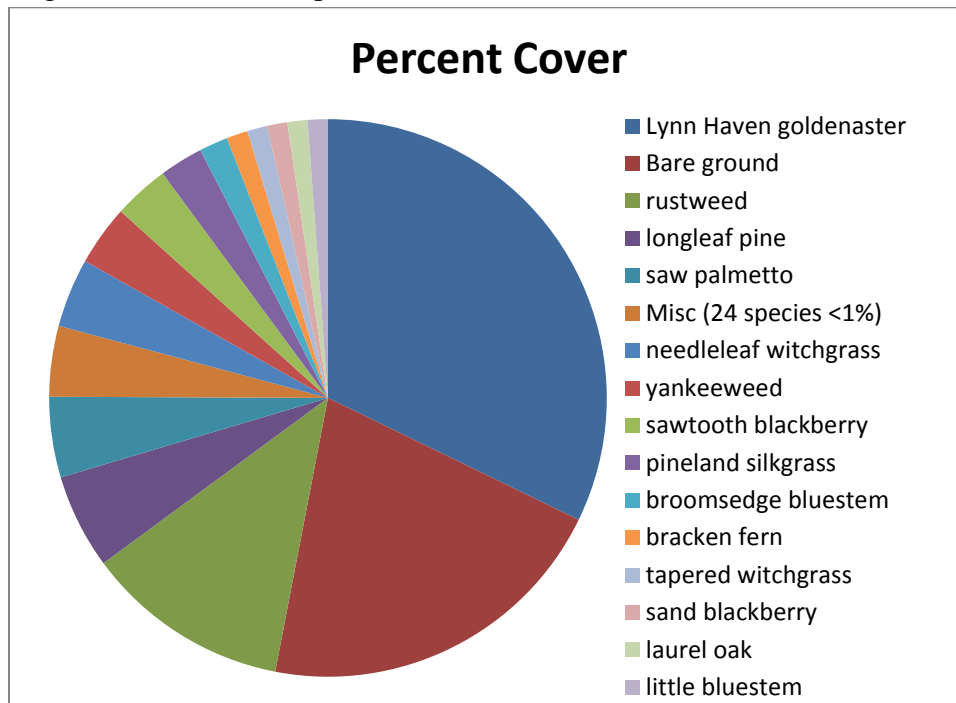


Table PC-3. Percent cover of plant species in Sandhill Transect 2 when sampled on November 5, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	32.20
<i>Polypremum procumbens</i>	rustweed	11.87
<i>Pinus palustris</i>	longleaf pine	5.50
<i>Serenoa repens</i>	saw palmetto	4.67
<i>Dichantheium aciculare</i>	needleleaf witchgrass	4.00
<i>Eupatorium compositifolium</i>	yankeeweed	3.50
<i>Rubus pensilvanicus</i>	sawtooth blackberry	3.23
<i>Pityopsis aspera</i>	pineland silkgrass	2.53
<i>Andropogon virginicus</i>	broomsedge bluestem	1.67
<i>Pteridium aquilinum</i>	bracken fern	1.23
<i>Dichantheium acuminatum</i>	tapered witchgrass	1.17
<i>Rubus cuneifolius</i>	sand blackberry	1.17
<i>Quercus hemisphaerica</i>	laurel oak	1.17
<i>Schizachyrium scoparium</i>	little bluestem	1.17
<i>Gelsemium sempervirens</i>	yellow jessamine	0.83
<i>Solidago odora</i>	sweet goldenrod	0.53
<i>Smilax auriculata</i>	earleaf greenbrier	0.53
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.50

Scientific name	Common name	Average percent cover per quadrat
<i>Cyperus retrorsus</i>	pinebarren flatsedge	0.20
<i>Dichantheium commutatum</i>	variable witchgrass	0.20
<i>Dichantheium</i> sp.	witchgrass	0.17
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.10
<i>Cyperus</i> sp.	flatsedge	0.10
<i>Diospyros virginiana</i>	common persimmon	0.10
<i>Andropogon ternarius</i>	splitbeard bluestem	0.10
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	0.10
<i>Vaccinium arboreum</i>	sparkleberry	0.10
<i>Hypericum hypericoides</i>	St. Andrew's cross	0.10
<i>Houstonia procumbens</i>	roundleaf bluet	0.07
<i>Symphotrichum dumosum</i>	rice button aster	0.07
<i>Dichantheium portoricense</i>	hemlock witchgrass	0.07
unknown herb	unknown herb	0.03
<i>Scleria ciliata</i>	fringed nutrush	0.03
<i>Penstemon</i> sp.	beardtongue	0.03
unknown grass	unknown grass	0.03
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.03
<i>Hypericum gentianoides</i>	orangegrass	0.03
<i>Cladina evansii</i>	a lichen	0.03
	Bare ground	20.83

Mixed Forested Wetland (Restoration)

Qualitative sampling. This mixed forested wetland restoration area (Figure PC-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 30 (Table PC-1).

Quantitative sampling. Transect 1 (Table PC-4, Figure PC-4) had a total of 19 species with 6% bare ground. The highest percent cover was by taperleaf water horehound followed by willow herb, shrubby primrose willow, and sweetbay. The decrease in cover of willow herb relative to the 2012/3 sample was due to its leafless condition at the time of sampling.

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

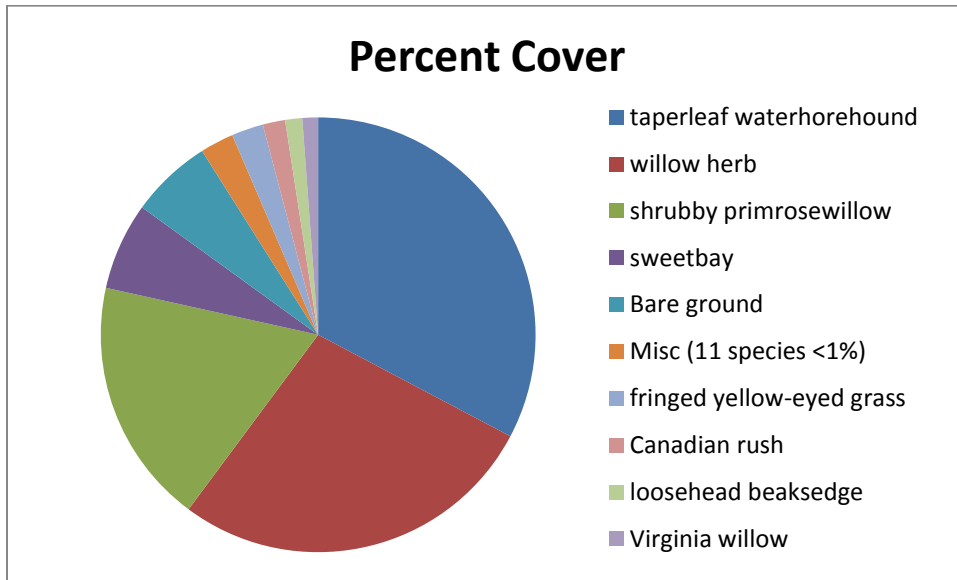


Table PC-4. Percent cover of plant species in Mixed Forested Wetland (Restoration) Transect 1 when sampled on November 4, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Lycopus rubellus</i>	taperleaf waterhorehound	32.73
<i>Decodon verticillatus</i>	willow herb	27.43
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	18.30
<i>Magnolia virginiana</i>	sweetbay	6.50
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	2.37
<i>Juncus canadensis</i>	Canadian rush	1.67
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	1.27
<i>Itea virginica</i>	Virginia willow	1.17
<i>Rhynchospora nitens</i>	shortbeak beaksedge	0.50
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.50
<i>Bidens mitis</i>	smallfruit beggarticks	0.37
<i>Andropogon virginicus</i>	broomsedge bluestem	0.33
<i>Dulichium arundinaceum</i>	threeway sedge	0.27
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	0.23
<i>Nymphoides aquatica</i>	big floatingheart	0.10
<i>Triadenum virginicum</i>	Virginia marsh St. John's wort	0.10
<i>Nymphoides cordata</i>	little floatingheart	0.03
<i>Nyssa sylvatica</i> var. <i>biflora</i>	swamp tupelo	0.03
<i>Cephalanthus occidentalis</i>	common buttonbush	0.03
	Bare ground	6.07

Mixed Forested Wetland (Preserved)

Qualitative sampling. The preserved mixed forested wetland (Figure PC-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 PC-1).

Quantitative sampling. Transect 2 (Table PC-5, Figure PC-5) had a total of 13 species with 62% 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 fetterbush and large gallberry, with lesser amounts of highbush blueberry and sweet pepperbush. Sphagnum moss formed most of the sparse herbaceous cover.

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

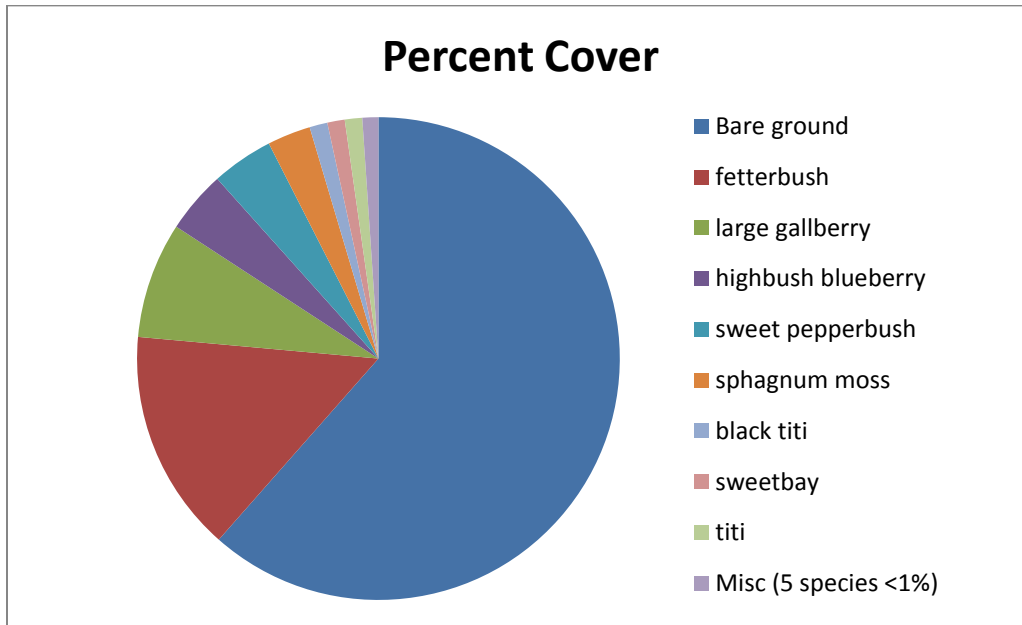


Table PC-5. Percent cover of plant species in Mixed Forested Wetland (Preserved) Transect 2 when sampled on November 4, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Lyonia lucida</i>	fetterbush	14.93
<i>Ilex coriacea</i>	large gallberry	7.77
<i>Vaccinium corymbosum</i>	highbush blueberry	4.17
<i>Clethra alnifolia</i>	sweet pepperbush	4.13
<i>Sphagnum</i> sp.	sphagnum moss	2.90
<i>Cliftonia monophylla</i>	black titi	1.20
<i>Magnolia virginiana</i>	sweetbay	1.17
<i>Cyrilla racemiflora</i>	titi	1.17
<i>Carex</i> sp.	sedge	0.50
<i>Vitis rotundifolia</i>	muscadine	0.23
unknown moss	unknown moss	0.13
<i>Apteris aphylla</i>	nodding nixie	0.10
<i>Rhododendron canescens</i>	mountain azalea	0.10
	Bare ground	61.5

Ward Creek West Mitigation Site
Qualitative and Quantitative Monitoring
December 2015

**Ward Creek West Mitigation Site
Qualitative and Quantitative Monitoring
December 2015**

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 WC-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, 2013, and 2014.

METHODS

The quantitative monitoring utilized 300-foot-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 WC-1). Data recorded consisted of the visually estimated percent cover of each plant species found in fifteen separate 1-meter square quadrats. Tree trunks in quadrats were noted in comments but not recorded as cover; canopy over 2 m in height was also not recorded as cover in quadrats. The quadrats were located to the left side of the transect line 20 feet apart, starting at the 0 point 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 10-12, 2015.

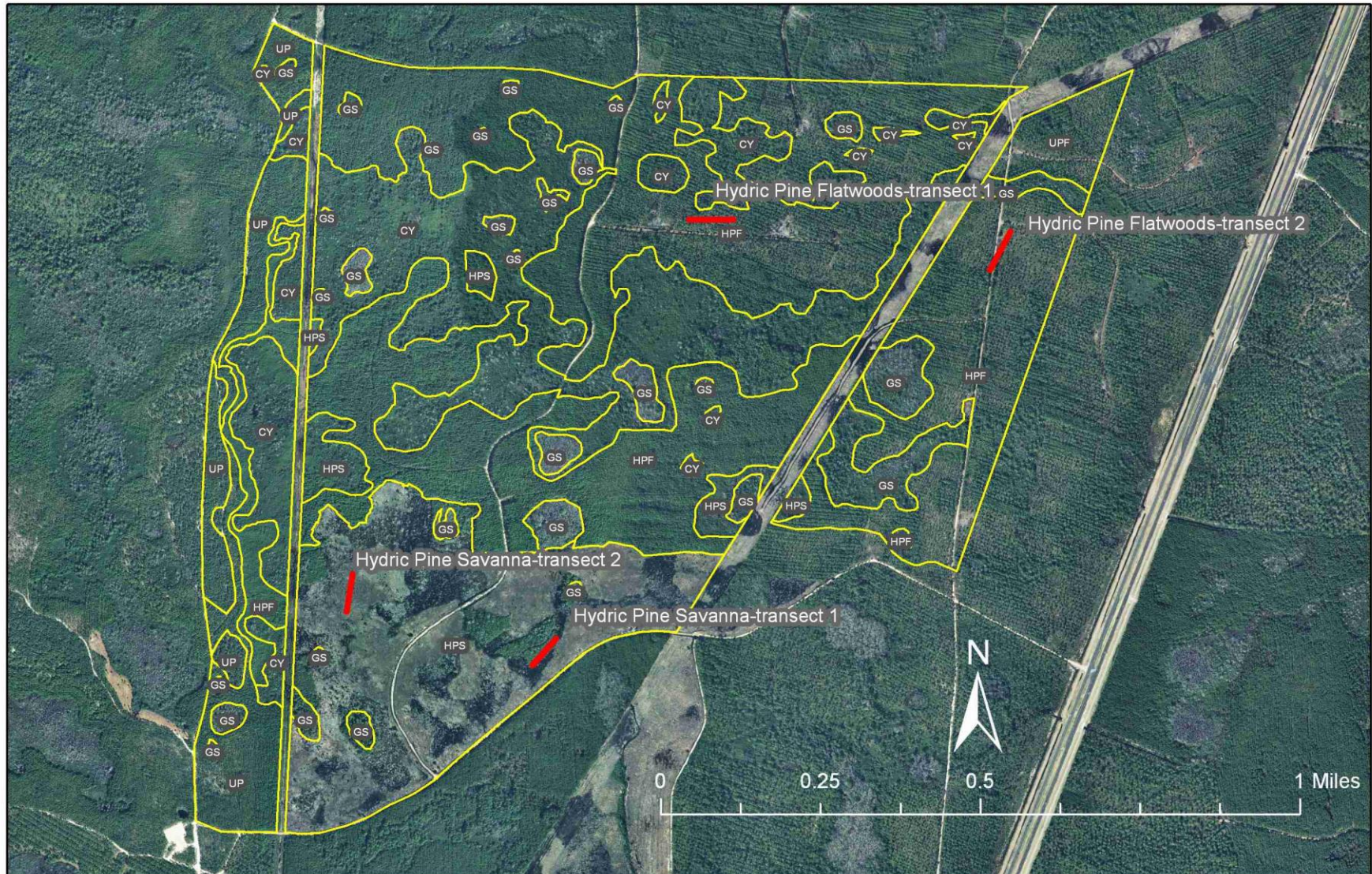


Figure WC-1. Location of permanent transects at Ward Creek West Mitigation Site. CY=Cypress, UP=Upland Pine, HPF=Hydric Pine Flatwoods, HPS=Hydric Pine Savanna, GS=Gum Swamp.

RESULTS AND DISCUSSION

A total of 112 plant species were recorded during 2015 monitoring session in the target communities at Ward Creek West (Table WC-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 moist to 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 an 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 67 (Table WC-1).

Quantitative sampling. The western Transect 1 (Table WC-2, Figure WC-2) had a total of 16 species with 59% bare ground. Woody species contributed the most cover (large gallberry and black titi, and slash pine seedlings), followed by purple bluestem. The eastern Transect 2 (Table WC-3, Figure WC-3) had a total of 32 species with 34% bare ground. The vegetation was more diverse than in Transect 1. Shrubby species contributed most of the cover, primarily gallberry and dwarf live oak, with the rest of the shrub cover fairly evenly divided between coastalplain St John's wort, saw palmetto, large gallberry, and black titi. Witchgrass species and purple bluestem made up most of the sparse herbaceous cover.

Table WC-1. Plant species observed in the target communities at Ward Creek West Mitigation Site, November 10, 11, and 12, 2015.

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 sp.</i>	bluestem		X		1
<i>Andropogon virginicus</i>	broomsedge bluestem		X	X	2
<i>Andropogon virginicus var. glaucus</i>	chalky bluestem	X		X	2
<i>Aristida spiciformis</i>	bottlebrush threeawn		X		1
<i>Aristida stricta var. beyrichiana</i>	wiregrass		X	X	2
<i>Balduina angustifolia</i>	coastalplain honeycomb-head		X		1
<i>Bidens mitis</i>	smallfruit beggarticks		X		1
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass			X	1
<i>Carex striata</i>	Walter's sedge			X	1
<i>Carphephorus odoratissimus</i>	vanillaleaf		X		1

Scientific Name	Common Name	cypress	hydric pine flatwoods	hydric pine savanna	Grand Total
<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
<i>Cliftonia monophylla</i>	black titi	X	X	X	3
<i>Ctenium aromaticum</i>	toothache grass			X	1
<i>Cyrilla racemiflora</i>	titi	X	X	X	3
<i>Dichantherium commutatum</i>	variable witchgrass		X		1
<i>Dichantherium erectifolium</i>	erectleaf witchgrass			X	1
<i>Dichantherium portoricense</i>	hemlock witchgrass		X		1
<i>Dichantherium sp.</i>	witchgrass		X	X	2
<i>Diodia virginiana</i>	Virginia buttonweed		X		1
<i>Drosera capillaris</i>	pink sundew			X	1
<i>Eriocaulon decangulare</i>	tenangle pipewort	X		X	2
<i>Eupatorium leucolepis</i>	justiceweed			X	1
<i>Eupatorium linearifolium</i>	waxy thoroughwort			X	1
<i>Eupatorium sp.</i>	thoroughwort		X	X	2
<i>Euthamia caroliniana</i>	slender flattop goldenrod		X	X	2
<i>Fuirena pumila</i>	dwarf umbrellasedge			X	1
<i>Gaylussacia frondosa var. tomentosa</i>	blue huckleberry		X		1
<i>Gelsemium sempervirens</i>	yellow jessamine		X		1
<i>Helianthus angustifolius</i>	narrowleaf sunflower			X	1
<i>Houstonia procumbens</i>	roundleaf bluet		X		1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort		X	X	2
<i>Hypericum fasciculatum</i>	peelbark St. John's wort			X	1
<i>Hypericum microsepalum</i>	flatwoods St. John's wort		X		1
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort		X	X	2
<i>Ilex cassine var. myrtifolia</i>	myrtle-leaved holly	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	2
<i>Juncus scirpoides</i>	needlepod rush		X		1
<i>Kalmia hirsuta</i>	hairy wicky		X	X	2
<i>Lachnanthes caroliniana</i>	Carolina redroot		X	X	2
<i>Lachnocaulon anceps</i>	whitehead bogbutton		X		1
<i>Liatris spicata</i>	dense gayfeather			X	1
<i>Lobelia brevifolia</i>	shortleaf lobelia			X	1
<i>Lophiola aurea</i>	golden crest			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		1
<i>Lyonia fruticosa</i>	coastalplain staggerbush			X	1
<i>Lyonia ligustrina</i> var. <i>foliosiflora</i>	maleberry		X		1
<i>Lyonia lucida</i>	fetterbush	X	X	X	3
<i>Magnolia virginiana</i>	sweetbay	X	X	X	3
<i>Myrica caroliniensis</i>	evergreen bayberry	X			1
<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	X	2
<i>Onoclea sensibilis</i>	sensitive fern		X		1
<i>Osmunda cinnamomea</i>	cinnamon fern	X			1
<i>Panicum longifolium</i>	panicum	X			1
<i>Panicum verrucosum</i>	warty panicgrass		X	X	2
<i>Panicum virgatum</i>	switchgrass			X	1
<i>Persea palustris</i>	swamp bay	X			1
<i>Photinia pyrifolia</i>	red chokeberry		X		1
<i>Pinus elliottii</i>	slash pine	X	X	X	3
<i>Pinus palustris</i>	longleaf pine	X			1
<i>Pluchea</i> sp.	camphorweed			X	1
<i>Polygala cruciata</i>	drumheads			X	1
<i>Polygala lutea</i>	orange milkwort		X		1
<i>Polygonella gracilis</i>	tall jointweed		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	X	2
<i>Rhexia virginica</i>	handsome harry		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	1
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge		X	X	2
<i>Rhynchospora compressa</i>	flatfruit beaksedge		X	X	2
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge			X	1
<i>Rhynchospora fascicularis</i>	fascicled beaksedge		X		1
<i>Rhynchospora plumosa</i>	plumed beaksedge		X	X	2
<i>Rhynchospora</i> sp.	beaksedge		X	X	2
<i>Rubus pensilvanicus</i>	sawtooth blackberry		X		1

Scientific Name	Common Name	cypress	hydric pine flatwoods	hydric pine savanna	Grand Total
<i>Sabatia brevifolia</i>	shortleaf rosegentian		X	X	2
<i>Saccharum giganteum</i>	sugarcane plumegrass			X	1
<i>Sarracenia rubra</i>	sweet pitcherplant			X	1
<i>Scleria ciliata</i>	fringed nutrush		X		1
<i>Scleria reticularis</i>	netted nutrush			X	1
<i>Serenoa repens</i>	saw palmetto		X		1
<i>Smilax auriculata</i>	earleaf greenbrier		X		1
<i>Smilax laurifolia</i>	laurel greenbrier	X	X	X	3
<i>Solidago fistulosa</i>	pinebarren goldenrod		X	X	2
<i>Solidago odora</i>	sweet goldenrod		X		1
<i>Sphagnum</i> sp.	sphagnum moss	X			1
<i>Syngonanthus flavidulus</i>	yellow hatpins		X	X	2
<i>Taxodium ascendens</i>	pond cypress	X			1
unknown graminoid	unknown graminoid			X	1
unknown moss	unknown moss			X	1
<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 virginica</i>	Virginia chain fern		X		1
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass			X	1
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass		X		1
<i>Xyris drummondii</i>	Drummond's yellow-eyed grass			X	1
<i>Xyris elliotii</i>	Elliott's 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: 112		25	67	63	155

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

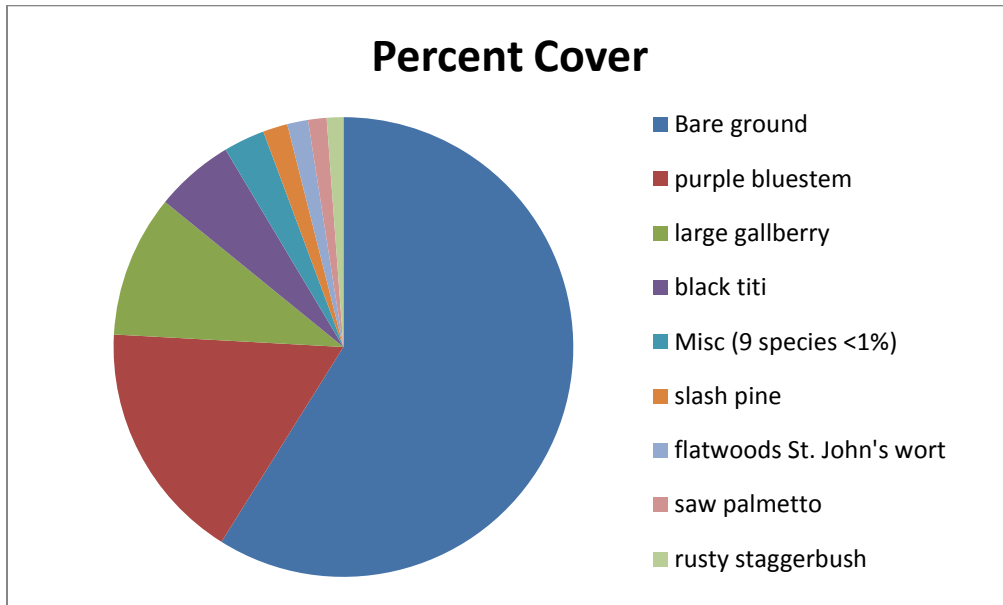


Table WC-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 when sampled on November 11, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	16.97
<i>Ilex coriacea</i>	large gallberry	10.00
<i>Cliftonia monophylla</i>	black titi	5.57
<i>Pinus elliotii</i> (seedlings)	slash pine	1.73
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	1.47
<i>Serenoa repens</i>	saw palmetto	1.30
<i>Lyonia ferruginea</i>	rusty staggerbush	1.17
<i>Smilax laurifolia</i>	laurel greenbrier	0.87
<i>Clethra alnifolia</i>	sweet pepperbush	0.60
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.43
<i>Vitis rotundifolia</i>	muscadine	0.43
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.23
<i>Vaccinium corymbosum</i>	highbush blueberry	0.23
<i>Dichanthelium</i> sp.	witchgrass	0.03
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.03
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.03
	Bare ground	58.90

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

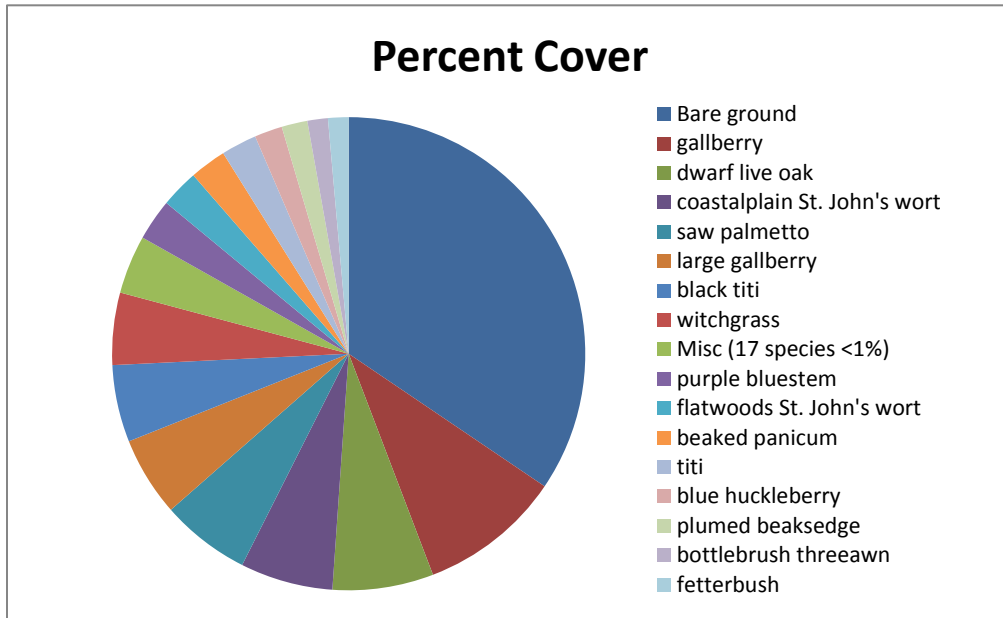


Table WC-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 when sampled on November 11, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Ilex glabra</i>	gallberry	9.73
<i>Quercus minima</i>	dwarf live oak	6.90
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	6.33
<i>Serenoa repens</i>	saw palmetto	6.10
<i>Ilex coriacea</i>	large gallberry	5.43
<i>Cliftonia monophylla</i>	black titi	5.27
<i>Dichantherium</i> sp.	witchgrass	4.93
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	2.83
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	2.60
<i>Panicum anceps</i>	beaked panicum	2.50
<i>Cyrilla racemiflora</i>	titi	2.43
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry	1.90
<i>Rhynchospora plumosa</i>	plumed beaksedge	1.77
<i>Aristida spiciformis</i>	bottlebrush threeawn	1.40
<i>Lyonia lucida</i>	fetterbush	1.40
<i>Pinus elliotii</i>	slash pine	0.83
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.50
<i>Syngonanthus flavidulus</i>	yellow hatpins	0.50
<i>Vaccinium myrsinites</i>	shiny blueberry	0.47
<i>Andropogon</i> sp.	bluestem	0.23

Scientific name	Common name	Average percent cover per quadrat
<i>Photinia pyrifolia</i>	red chokeberry	0.23
<i>Rhexia virginica</i>	handsome harry	0.23
<i>Smilax auriculata</i>	earleaf greenbrier	0.20
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.13
<i>Rhynchospora</i> sp.	beaksedge	0.13
<i>Dichantherium commutatum</i>	variable witchgrass	0.10
<i>Dichantherium portoricense</i>	hemlock witchgrass	0.10
<i>Lyonia ligustrina</i> var. <i>foliosiflora</i>	maleberry	0.10
<i>Xyris</i> sp.	yellow-eyed grass	0.10
<i>Houstonia procumbens</i>	roundleaf bluet	0.07
<i>Carphephorus odoratissimus</i>	vanillaleaf	0.03
<i>Panicum verrucosum</i>	warty panicgrass	0.03
	Bare ground	34.47

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. Two large clumps of Curtiss' sandgrass (*Calamovilfa curtissii*), listed as threatened by the state, were found in this community. The total number of plant species observed in this community was 63 (Table WC-1).

Quantitative sampling. Transect 1 (Table WC-4, Figure WC-4) had a total of 24 species and 38% bare ground. Groundcover was heavily dominated by purple bluestem, with lesser amounts of Elliott's yelloweyed grass. The sparse shrub layer was mostly composed of peelbark St. John's wort and fetterbush. Transect 2 (Table WC-5, Figure WC-5) had a total of 27 species and 35% bare ground. The vegetation was also dominated by purple bluestem plus a small amount of wiregrass. Black titi was the most common species in the sparse shrub layer, followed by fetterbush, and peelbark St. Johns wort.

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

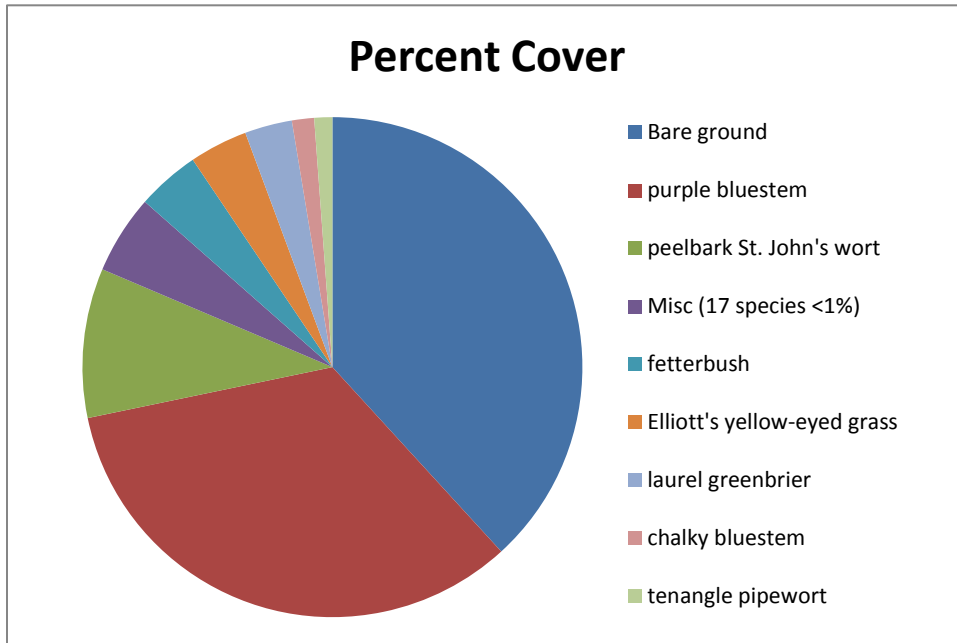


Table WC-4. Percent cover of species in Hydric Pine Savanna Transect 1 when sampled on November 10, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	33.53
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	9.67
<i>Lyonia lucida</i>	fetterbush	4.07
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass	3.77
<i>Smilax laurifolia</i>	laurel greenbrier	3.07
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	1.43
<i>Eriocaulon decangulare</i>	tenangle pipewort	1.17
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.73
<i>Cyrilla racemiflora</i>	titi	0.57
<i>Andropogon virginicus</i>	broomsedge bluestem	0.50
<i>Rhynchospora</i> sp.	beaksedge	0.50
<i>Pinus elliotii</i>	slash pine	0.43
<i>Ilex coriacea</i>	large gallberry	0.33
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.33
<i>Cliftonia monophylla</i>	black titi	0.23
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.23
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.23
<i>Sarracenia rubra</i>	sweet pitcherplant	0.23
unknown graminoid	unknown graminoid	0.20
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.13
<i>Scleria reticularis</i>	netted nutrush	0.13

Scientific name	Common name	Average percent cover per quadrat
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.10
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.10
<i>Xyris stricta</i>	pineland yellow-eyed grass	0.10
	Bare ground	38.20

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

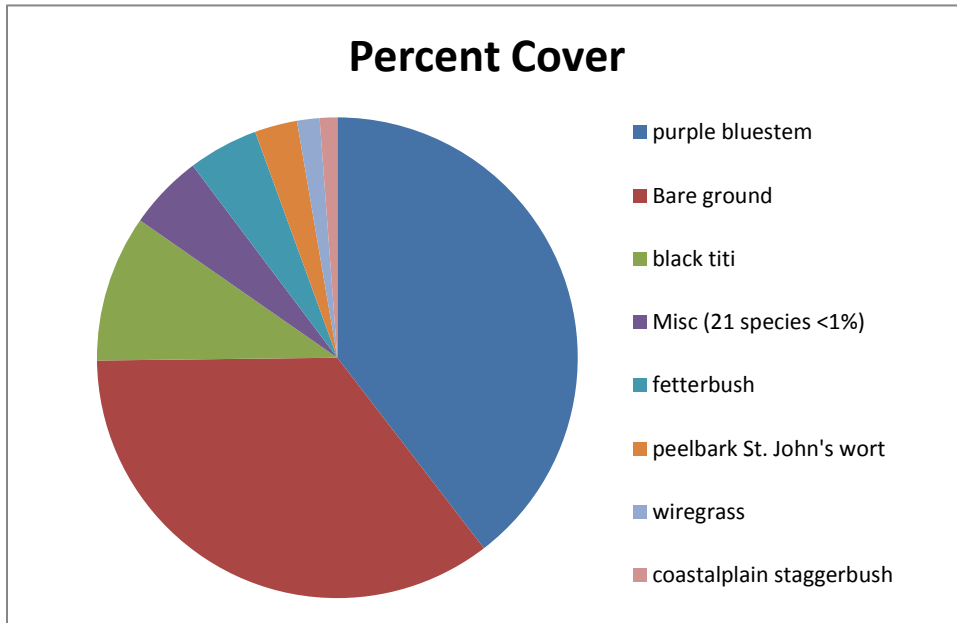


Table WC-5. Percent cover of plant species in Hydric Pine Savanna Transect 2 when sampled on November 11, 2015.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	39.17
<i>Cliftonia monophylla</i>	black titi	9.77
<i>Lyonia lucida</i>	fetterbush	4.67
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	2.83
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	1.50
<i>Lyonia fruticosa</i>	coastalplain staggerbush	1.17
<i>Andropogon virginicus</i>	broomsedge bluestem	0.83
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.73
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.73
<i>Cyrilla racemiflora</i>	titi	0.47
<i>Pinus elliotii</i>	slash pine	0.33
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.27
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.27

Scientific name	Common name	Average percent cover per quadrat
<i>Ilex vomitoria</i>	yaupon	0.23
<i>Smilax laurifolia</i>	laurel greenbrier	0.23
<i>Ctenium aromaticum</i>	toothache grass	0.10
<i>Kalmia hirsuta</i>	hairy wicky	0.10
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.10
<i>Pluchea</i> sp.	camphorweed	0.10
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.10
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.10
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.10
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.07
<i>Eupatorium</i> sp.	thoroughwort	0.03
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.03
<i>Pteridium aquilinum</i>	bracken fern	0.03
unknown moss	unknown moss	0.03
	Bare ground	34.90

Cypress

Qualitative sampling. The cypress areas occurred along water drainage channels with a dense evergreen canopy on the edges composed of black titi, swamp bay, longleaf and slash pine, and sweetbay, with deciduous species such as Ogeechee tupelo, swamp tupelo, and pond cypress in the center. The shrub layer often consisted of dense stands of black titi and large gallberry on the edges and very sparse stands in the center, composed of fetterbush, and sweet pepperbush. Herbs were very infrequent. At the time of sampling, the the ground was moist to inundated. Total number of species observed in this community was 25 (Table WC-1).