

**Vegetation Monitoring at Four Northwest Florida Water
Management District Mitigation Sites
Fall 2017**

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Florida Natural Area Inventory
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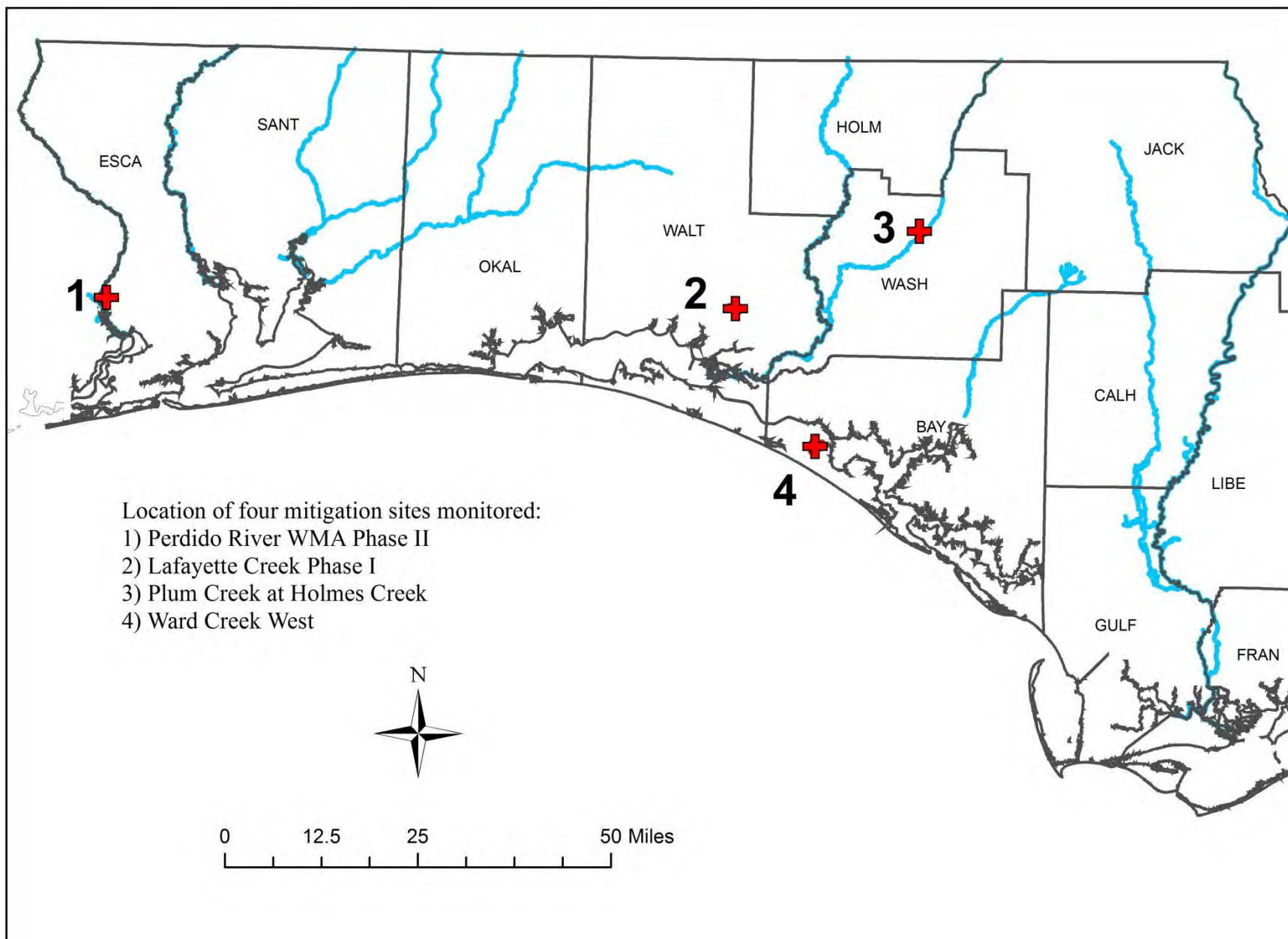
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Florida State University

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.

Taxonomy follows Wunderlin, R. P., B.F. Hansen, A.R. Franck, and F.B. Essig. 2017. Atlas of Florida Plants (<http://florida.plantatlas.usf.edu/>), Institute for Systematic Botany, University of South Florida, Tampa. In the summer of 2017 the Florida Natural Areas Inventory (FNAI) incorporated recent changes in scientific plant names found on this website. The resulting changes in scientific names in the 2017 report from those used in the 2016 report are listed below.

2016 Name	2017 Name	Common Name
<i>Aristida stricta</i> var. <i>beyrichiana</i>	<i>Aristida stricta</i>	wiregrass
<i>Asimina angustifolia</i>	<i>Asimina spatulata</i>	pawpaw
<i>Cyperus retrorsus</i>	<i>Cyperus ovatus</i>	pinebarren flatsedge
<i>Gaura angustifolia</i>	<i>Oenothera simulans</i>	southern beeblossum
<i>Licania michauxii</i>	<i>Geobalanus oblongifolius</i>	gopher apple
<i>Myrica caroliniensis</i>	<i>Morella caroliniensis</i>	evergreen bayberry
<i>Myrica cerifera</i>	<i>Morella cerifera</i>	southern bayberry
<i>Osmanthus americanus</i>	<i>Cartrema americana</i>	wild olive
<i>Oxypolis filiformis</i>	<i>Tiedemannia filiformis</i> ssp. <i>filiformis</i>	water dropwort
<i>Panicum anceps</i>	<i>Coleataenia anceps</i>	beaked panicum
<i>Panicum hians</i>	<i>Steinchisma hians</i>	gaping panicum
<i>Panicum verrucosum</i>	<i>Kelochloa verrucosa</i>	warty panicum
<i>Photinia pyrifolia</i>	<i>Aronia arbutifolia</i>	red chokeberry
<i>Sapium sabiferum</i>	<i>Triadica sebifera</i>	Chinese tallow tree
<i>Schizachyrium scoparium</i>	<i>Schizachyrium stoloniferum</i>	creeping little bluestem



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; Figure PR-1). The HPF and PF were converted to loblolly pine plantation in 2002. 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 from 2012 through 2016.

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 set up 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. Field surveys were performed by FNAI botanist Gary Schultz on October 31 and November 1 and 2, 2017.

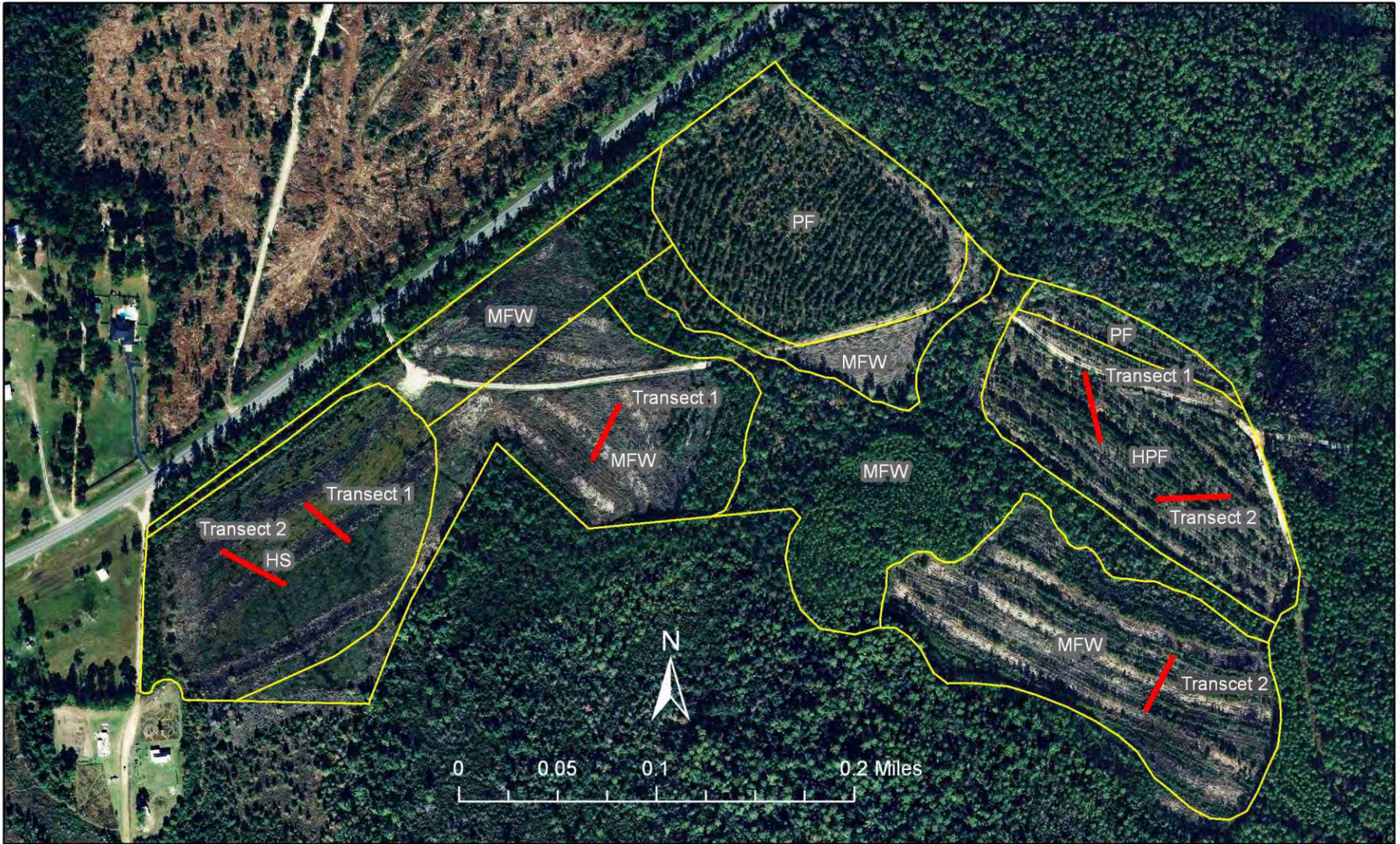


Figure PR-1. Location of permanent transects at Perdido Phase II Mitigation Site. HS=Hydric Savanna, HPF=Hydric Pine Flatwoods, MFW=Mixed Forested Wetland, PF=Pine Flatwoods.

RESULTS AND DISCUSSION

A total of 108 plant species were observed during the 2017 monitoring of the target communities at Perdido River Phase II (Table PR-1). Eleven new species were noted, i.e. species not observed in the previous five surveys since 2012.

Table PR-1. Species observed in target communities at Perdido River WMA – Phase II Mitigation Site on October 31 and November 1 and 2, 2017. (bold=new species)

Scientific Name	Common Name	Hydric pine flatwoods	Hydric savanna	Mixed forested wetland	Pine flatwoods	Grand Total
<i>Acer rubrum</i>	red maple	x	x	x	x	4
<i>Agalinis fasciculata</i>	beach false foxglove	x		x	x	3
<i>Andropogon glomeratus</i>	bushy bluestem	x			x	2
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	x	x	x	x	4
<i>Andropogon virginicus</i>	broomsedge bluestem	x	x	x	x	4
<i>Aristida stricta</i>	wiregrass	x			x	2
<i>Aronia arbutifolia</i>	red chokeberry		x		x	2
<i>Baccharis halimifolia</i>	groundsel tree	x				1
<i>Bidens mitis</i>	smallfruit beggarticks	x	x	x	x	4
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass	x				1
<i>Callicarpa americana</i>	American beautyberry	x				1
<i>Carex</i> sp.	sedge	x				1
<i>Carex glaucescens</i>	clustered sedge	x				1
<i>Carex verrucosa</i>	warty sedge				x	1
<i>Centella asiatica</i>	spadeleaf		x			1
<i>Chamaecyparis thyoides</i>	Atlantic white cedar			x		1
<i>Cinnamomum camphora</i>	camphor tree				x	1
<i>Cliftonia monophylla</i>	black titi	x		x		2
<i>Coleataenia anceps</i>	beaked panicum	x			x	2
<i>Ctenium aromaticum</i>	toothache grass	x				1
<i>Cyrilla racemiflora</i>	titi				x	1
<i>Dichanthelium leucothrix</i>	rough witchgrass	x	x	x		3
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	x		x	x	3
<i>Diospyros virginiana</i>	common persimmon	x			x	2
<i>Drosera capillaris</i>	pink sundew			x		1
<i>Eleocharis vivipara</i>	viviparous spikerush		x	x		2
<i>Elephantopus elatus</i>	tall elephantsfoot	x			x	2
<i>Eragrostis virginica</i>	coastal lovegrass			x		1
<i>Eriocaulon decangulare</i>	tenangle pipewort			x	x	2
<i>Eupatorium capillifolium</i>	dogfennel	x	x	x	x	4
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	x	x	x	x	4
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort				x	1
<i>Euthamia caroliniana</i>	slender flatterop goldenrod	x	x	x	x	4

Scientific Name	Common Name	Hydric pine flatwoods	Hydric savanna	Mixed forested wetland	Pine flatwoods	Grand Total
<i>Gaylussacia mosieri</i>	woolly huckleberry			x		1
<i>Helianthus angustifolius</i>	narrowleaf sunflower	x				1
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort		x		x	2
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	x	x	x		3
<i>Hypericum cistifolium</i>	roundpod St. John's wort				x	1
<i>Hypericum fasciculatum</i>	peelbark St. John's wort			x		1
<i>Hypericum hypericoides</i>	St. Andrew's cross				x	1
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	x		x	x	3
<i>Hyptis alata</i>	clustered bushmint				x	1
<i>Ilex coriacea</i>	large gallberry			x	x	2
<i>Ilex glabra</i>	gallberry	x	x	x	x	4
<i>Ilex vomitoria</i>	yaupon	x		x	x	3
<i>Juncus dichotomus</i>	forked rush	x	x	x		3
<i>Juncus marginatus</i>	grassleaf rush	x				1
<i>Kelochloa verrucosa</i>	warty panicgrass	x	x	x	x	4
<i>Lachnanthes caroliniana</i>	Carolina redroot	x	x	x	x	4
<i>Lachnocaulon anceps</i>	whitehead bogbutton	x		x	x	3
<i>Ludwigia linearis</i>	narrowleaf primrosewillow			x		1
<i>Ludwigia maritima</i>	seaside 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				1
<i>Magnolia grandiflora</i>	southern magnolia	x				1
<i>Magnolia virginiana</i>	sweetbay	x	x	x	x	4
<i>Morella caroliniensis</i>	evergreen bayberry				x	1
<i>Morella cerifera</i>	southern bayberry	x	x	x	x	4
moss	moss	x	x	x	x	4
<i>Oldenlandia uniflora</i>	clustered mille grains	x	x	x	x	4
<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>Paspalum setaceum</i>	thin paspalum			x		1
<i>Persea palustris</i>	swamp bay	x	x	x	x	4
<i>Pinus elliottii</i>	slash pine	x	x	x		3
<i>Pinus glabra</i>	spruce pine			x		1
<i>Pinus taeda</i>	loblolly pine	x	x	x	x	4
<i>Pluchea foetida</i>	stinking camphorweed	x			x	2
<i>Polygala lutea</i>	orange milkwort	x		x		2
<i>Polytrichum commune</i>	haircap moss	x		x	x	3
<i>Pteridium aquilinum</i>	bracken fern	x				1
<i>Quercus nigra</i>	water oak	x	x		x	3
<i>Quercus virginiana</i>	live oak				x	1

Scientific Name	Common Name	Hydric pine flatwoods	Hydric savanna	Mixed forested wetland	Pine flatwoods	Grand Total
<i>Rhexia virginica</i>	handsome harry	x	x	x	x	4
<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		1
<i>Rhynchospora fascicularis</i>	fascicled beaksedge		x	x		2
<i>Rhynchospora plumosa</i>	plumed beaksedge			x		1
<i>Rubus pensilvanicus</i>	sawtooth blackberry	x	x	x	x	4
<i>Saccharum giganteum</i>	sugarcane plumegrass		x			1
<i>Scirpus cyperinus</i>	woolgrass	x				1
<i>Scleria ciliata</i>	fringed nutrush			x		1
<i>Scleria</i> sp.	nutrush				x	1
<i>Sesbania vesicaria</i>	bladderpod			x		1
<i>Smilax auriculata</i>	earleaf greenbrier				x	1
<i>Smilax glauca</i>	cat greenbrier	x		x		2
<i>Solidago fistulosa</i>	pinebarren goldenrod	x	x	x	x	4
<i>Sphagnum</i> sp.	sphagnum moss	x	x	x	x	4
<i>Symphotrichum dumosum</i>	rice button aster	x			x	2
<i>Symplocos tinctoria</i>	horse sugar	x			x	2
<i>Taxodium ascendens</i>	pond cypress		x	x		2
<i>Toxicodendron radicans</i>	eastern poison ivy	x	x	x	x	4
<i>Triadica sebifera</i>	Chinese tallow tree	x			x	2
<i>Vaccinium arboreum</i>	sparkleberry	x				1
<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				1
<i>Viola primulifolia</i>	primroseleaf violet	x		x		2
<i>Viola sororia</i>	common blue violet	x		x	x	3
<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	x	3
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass			x		1
<i>Xyris fimbriata</i>	fringed yellow-eyed grass		x			1
Total number of taxa: 108		70	43	62	63	238

Hydric Savanna

Qualitative sampling. The target community of hydric savanna (Figure PR-1) had a total of 43 observed plant species (Table PR-1). It was dominated by herbaceous species, primarily sphagnum moss, smallfruit beggarticks, purple bluestem, pinebarren goldenrod, and fascicled

beaksedge. Shrubs were primarily limited to the slightly elevated windrows formed when the land was cleared for silviculture and consisted mainly of coastalplain St. John's wort, sawtooth blackberry, and swamp bay. Occasional slash pine and red maple saplings were widely scattered. This year was wetter than the previous year, with standing water in many places in this community.

Quantitative sampling. Transect 1 (Table PR-2, Figure PR-2) had a total of 29 species. Their total cover made up more than 100% of the area since sphagnum moss underlay the other species. In order to visually represent relative species cover in Figure PR-2 below, percent of total vegetative cover is used rather than percent cover of area. Table PR-2 gives the percent cover of area. The dominant species were sphagnum moss, smallfruit beggarticks, pine barren goldenrod, handsome harry, and purple bluestem. Transect 2 (Table PR-3, Figure PR-3) had a total of 22 species which also covered more than 100% of the area. The dominant species were sphagnum moss, smallfruit beggarticks, Virginia chainfern, purple bluestem, pinebarren goldenrod, and fascicled beaksedge.

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

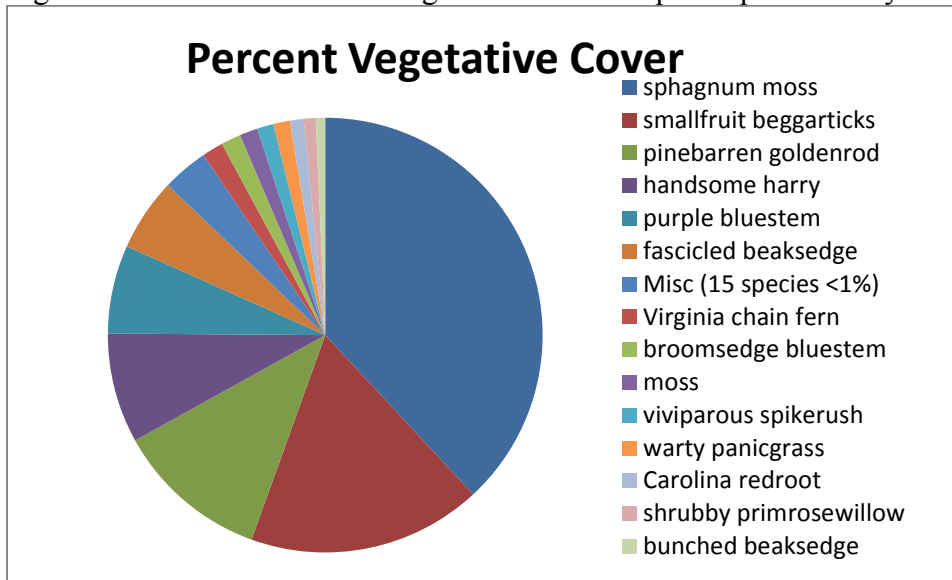


Table PR-2. Percent total vegetative cover of plant species in Hydric Savanna Transect 1 when sampled on November 1, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum</i> sp.	sphagnum moss	67.63
<i>Bidens mitis</i>	smallfruit beggarticks	30.94
<i>Solidago fistulosa</i>	pinebarren goldenrod	20.31
<i>Rhexia virginica</i>	handsome harry	14.50
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	11.69
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	9.63
<i>Woodwardia virginica</i>	Virginia chain fern	2.81
<i>Andropogon virginicus</i>	broomsedge bluestem	2.63
moss	moss	2.38
<i>Eleocharis vivipara</i>	viviparous spikerush	2.19
<i>Kelochloa verrucosa</i>	warty panicgrass	2.19
<i>Lachnanthes caroliana</i>	Carolina redroot	1.81
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	1.56
<i>Rhynchospora cephalantha</i>	bunched beaksedge	1.25
<i>Vitis rotundifolia</i>	muscadine	0.94
<i>Aronia arbutifolia</i>	red chokeberry	0.94
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	0.75
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.56
<i>Toxicodendron radicans</i>	eastern poison ivy	0.50
<i>Acer rubrum</i>	red maple	0.44
<i>Saccharum giganteum</i>	sugarcane plumegrass	0.44
<i>Persea palustris</i>	swamp bay	0.44
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.38
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.38
<i>Oldenlandia uniflora</i>	clustered mille grains	0.06
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.06

Scientific name	Common name	Average percent cover per quadrat
<i>Pinus taeda</i>	loblolly pine	0.06
<i>Dichanthelium leucothrix</i>	rough witchgrass	0.06
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.06
	Bare Ground	0.00

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

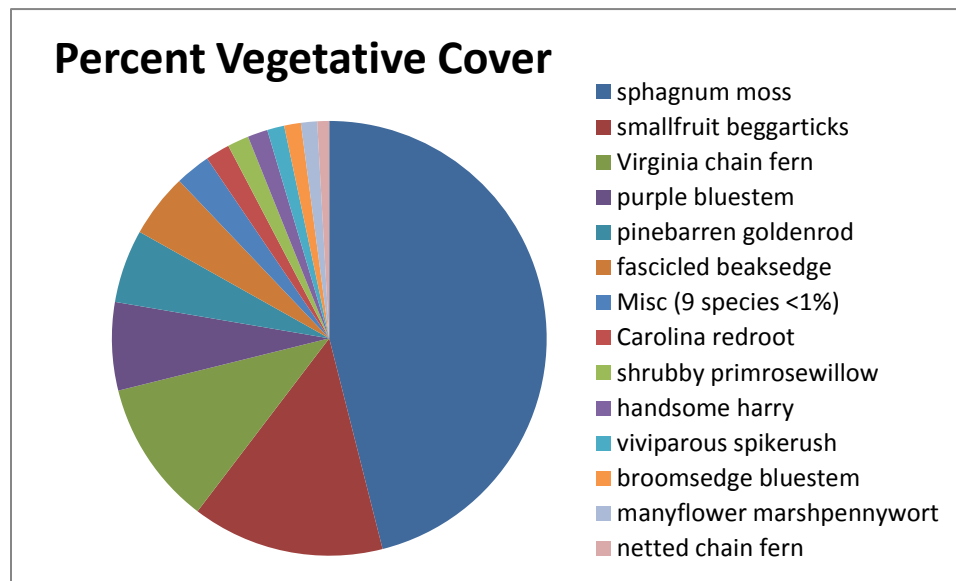


Table PR-3. Percent cover of plant species in Hydric Savanna Transect 2 when sampled on November 1, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum</i> sp.	sphagnum moss	81.25
<i>Bidens mitis</i>	smallfruit beggarticks	25.25
<i>Woodwardia virginica</i>	Virginia chain fern	19.00
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	11.56
<i>Solidago fistulosa</i>	pinebarren goldenrod	9.63
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	8.38
<i>Lachnanthes caroliana</i>	Carolina redroot	3.19
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	2.81
<i>Rhexia virginica</i>	handsome herry	2.63
<i>Eleocharis vivipara</i>	viviparous spikerush	2.25
<i>Andropogon virginicus</i>	broomsedge bluestem	2.19
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	2.13
<i>Woodwardia areolata</i>	netted chain fern	1.56
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.94
<i>Toxicodendron radicans</i>	eastern poison ivy	0.88
<i>Kellochloa verrucosa</i>	warty panicgrass	0.88

Scientific name	Common name	Average percent cover per quadrat
<i>Oldenlandia uniflora</i>	clustered mille grains	0.44
<i>Acer rubrum</i>	red maple	0.44
<i>Centella asiatica</i>	spadeleaf	0.44
<i>Juncus dichotomus</i>	forked rush	0.38
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.19
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.06
	Bare Ground	0.00

Mixed Forested Wetland

Qualitative sampling. The target community of mixed forested wetland (Figure PR-1) had a total of 62 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. Shrubs, such as black titi, sawtooth blackberry, and southern bayberry, 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 black titi, slash pine, southern bayberry and spruce pine. Transect 2 (Table PR-5, Figure PR-5) had a total of 38 species with no bare ground. The highest percent cover was by purple bluestem, followed by sawtooth blackberry, warty panicum, sphagnum moss, and pinebarren goldenrod.

Figure PR-4. Percent of total vegetative cover for species in Mixed Forested Wetland Transect 1.

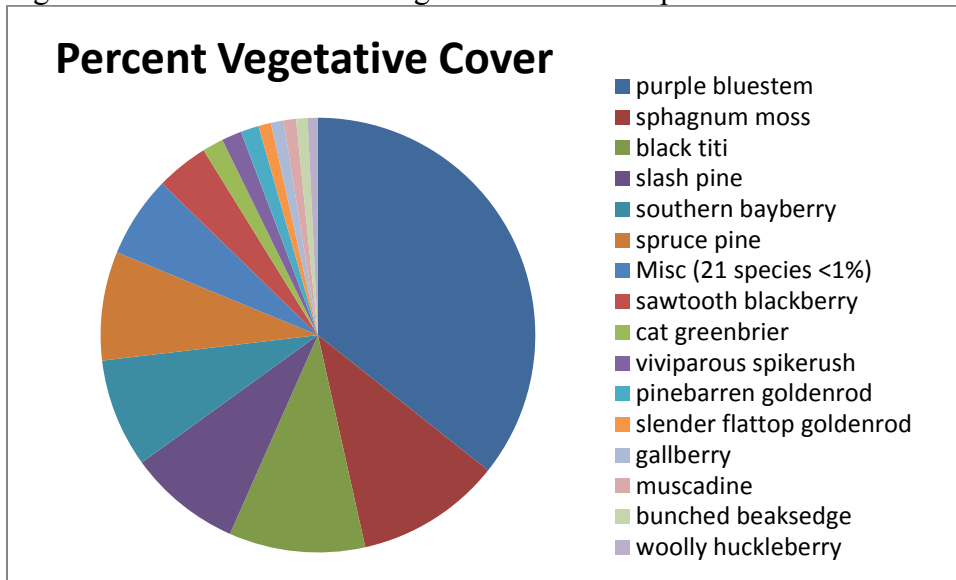


Table PR-4. Percent cover of plant species in Mixed Forested Wetland Transect 1 when sampled on November 1, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	52.63
<i>Sphagnum</i> sp.	sphagnum moss	15.94
<i>Cliftonia monophylla</i>	black titi	14.94
<i>Pinus elliotii</i>	slash pine	12.38
<i>Morella cerifera</i>	southern bayberry	11.94
<i>Pinus glabra</i>	spruce pine	11.94
<i>Rubus pensilvanicus</i>	sawtooth blackberry	5.75
<i>Smilax glauca</i>	cat greenbrier	2.31
<i>Eleocharis vivipara</i>	viviparous spikerush	2.19
<i>Solidago fistulosa</i>	pinebarren goldenrod	2.00
<i>Ilex glabra</i>	gallberry	1.38
<i>Vitis rotundifolia</i>	muscadine	1.38
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.38
<i>Rhynchospora cephalantha</i>	bunched beaksedge	1.25
<i>Gaylussacia mosieri</i>	woolly huckleberry	1.13
<i>Chamaecyparis thuyoides</i>	Atlantic white cedar	0.94
<i>Ludwigia linearis</i>	narrowleaf primrosewillow	0.94
<i>Dichanthelium leucothrix</i>	rough witchgrass	0.94
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.94
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.88
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.56
<i>Woodwardia virginica</i>	Virginia chain fern	0.56
<i>Taxodium ascendens</i>	pond cypress	0.44
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.44

Scientific name	Common name	Average percent cover per quadrat
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.44
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.38
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.38
<i>Eragrostis virginica</i>	coastal lovegrass	0.19
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.19
<i>Woodwardia areolata</i>	netted chain fern	0.19
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.19
<i>Oldenlandia uniflora</i>	clustered mille grains	0.13
<i>Rhexia virginica</i>	handsome harry	0.06
moss	moss	0.06
<i>Polygala lutea</i>	orange milkwort	0.06
<i>Xyris brevifolia</i>	shortleaf 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.

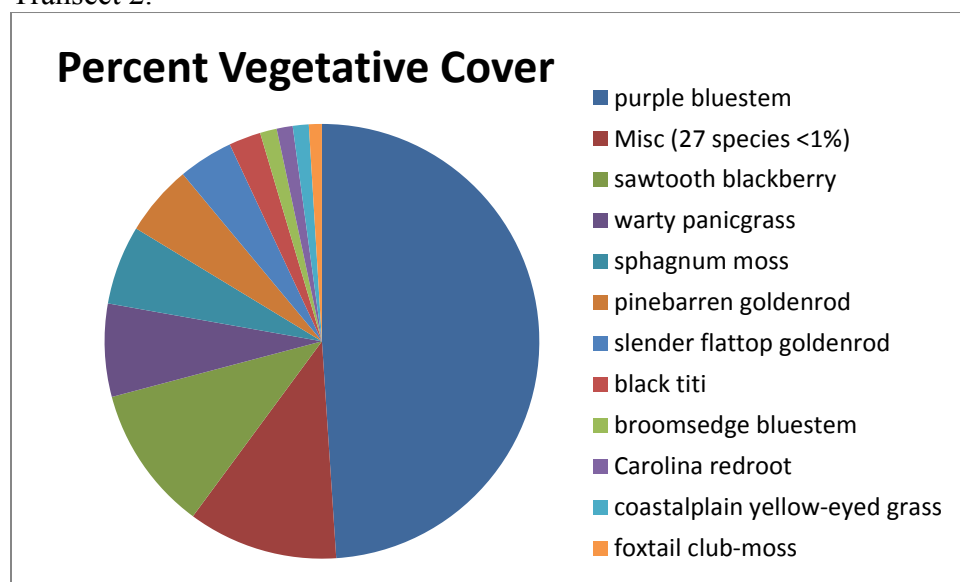


Table PR-5. Percent cover of plant species in Mixed Forested Wetland Transect 2 when sampled on October 31, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	54.00
<i>Rubus pensilvanicus</i>	sawtooth blackberry	11.88
<i>Kelochloa verrucosa</i>	warty panicgrass	7.63
<i>Sphagnum</i> sp.	sphagnum moss	6.50
<i>Solidago fistulosa</i>	pinebarren goldenrod	5.81
<i>Euthamia caroliniana</i>	slender flattop goldenrod	4.50

Scientific name	Common name	Average percent cover per quadrat
<i>Cliftonia monophylla</i>	black titi	2.63
<i>Andropogon virginicus</i>	broomsedge bluestem	1.38
<i>Lachnanthes caroliniana</i>	Carolina redroot	1.31
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	1.31
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	1.06
<i>Vitis rotundifolia</i>	muscadine	0.94
<i>Woodwardia areolata</i>	netted chain fern	0.94
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.88
moss	moss	0.88
<i>Woodwardia virginica</i>	Virginia chain fern	0.88
<i>Viola primulifolia</i>	primroseleaf violet	0.81
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.63
<i>Scleria ciliata</i>	fringed nutrush	0.63
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.63
<i>Smilax glauca</i>	cat greenbrier	0.44
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.44
<i>Ilex coriacea</i>	large gallberry	0.44
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.44
<i>Magnolia virginiana</i>	sweetbay	0.44
<i>Eleocharis vivipara</i>	viviparous spikerush	0.44
<i>Polygala lutea</i>	orange milkwort	0.38
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.38
<i>Oldenlandia uniflora</i>	clustered mille grains	0.25
<i>Rhexia virginica</i>	handsome harry	0.25
<i>Acer rubrum</i>	red maple	0.25
<i>Juncus dichotomus</i>	forked rush	0.19
<i>Ludwigia linearis</i>	narrowleaf primrosewillow	0.19
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.19
<i>Paspalum setaceum</i>	thin paspalum	0.19
<i>Drosera capillaris</i>	pink sundew	0.13
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	0.06
<i>Pinus elliotii</i>	slash pine	0.06
	Bare Ground	0.00

Hydric Pine Flatwoods

Qualitative monitoring. The target community of hydric pine flatwoods had a total of 70 plant species (Table PR-1). The 30-40 foot planted loblolly pines were thinned in 2017 by cutting selected rows of trees off near ground level. The resulting logs were left where they fell on the ground (Appendix A). Vines of muscadine grape were common. Much of the ground was covered by a thick layer of pine needle litter. The herbaceous layer was dominated by, warty panicum, an annual grass that appears to have increased in response to the thinning. Muscadine and cinnamon fern were also abundant. Loblolly pine seedlings were common throughout. About 70 plants of Curtiss' sandgrass (*Calamovilfa curtissii*), state listed as threatened, were noted in this community.

Quantitative monitoring. Where branches of the felled pines lay across the quadrats, they were removed in order to view the plants beneath (Appendix A). Transect 1 had a total of 18 species with 13% bare ground (i.e., unvegetated ground; Figure PR-6, Table PR-6). Warty panicum, muscadine, and cinnamon fern were the most abundant herbs. Transect 2 (Figure PR-7, Table PR-7) had a total of 26 species with 24% bare ground. Warty panicum was the dominant cover followed by muscadine and wiregrass, with lesser amounts of netted chain fern and cinnamon fern.

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

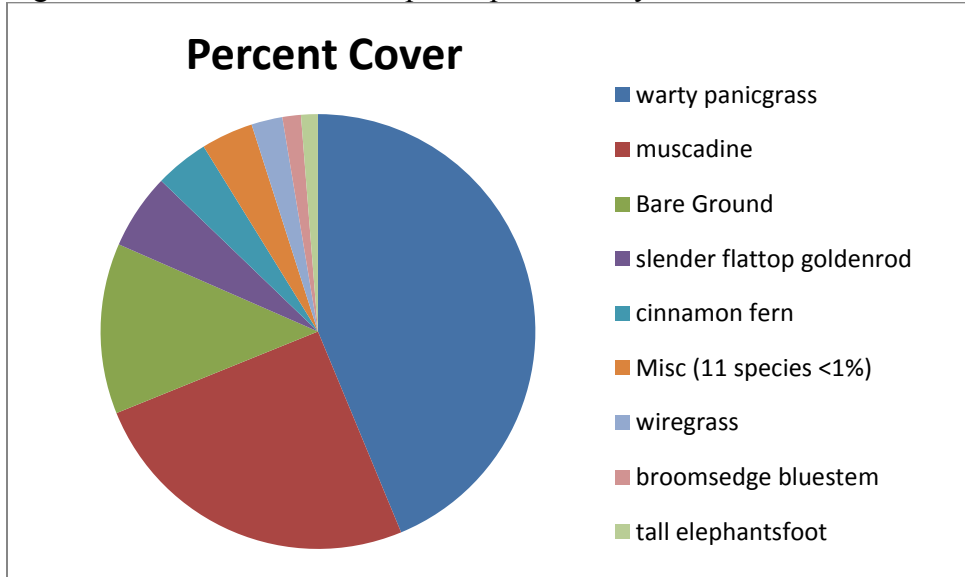


Table PR-6. Percent cover of species in Hydric Pine Flatwoods Transect 1 when sampled on October 31, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Kelloggloa verrucosa</i>	warty panicgrass	43.75
<i>Vitis rotundifolia</i>	muscadine	25.13
<i>Euthamia caroliniana</i>	slender flattop goldenrod	5.63
<i>Osmunda cinnamomea</i>	cinnamon fern	4.00
<i>Aristida stricta</i>	wiregrass	2.31
<i>Andropogon virginicus</i>	broomsedge bluestem	1.38
<i>Elephantopus elatus</i>	tall elephantsfoot	1.25
<i>Andropogon glomeratus</i>	bushy bluestem	0.94
<i>Toxicodendron radicans</i>	eastern poison ivy	0.63
<i>Smilax glauca</i>	cat greenbrier	0.44
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.44
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	0.44
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.44
<i>Viola lanceolata</i>	bog white violet	0.19
<i>Symphotrichum dumosum</i>	rice button aster	0.19

<i>Viola sororia</i>	common blue violet	0.06
<i>Vaccinium corymbosum</i>	highbush blueberry	0.06
<i>Pinus taeda</i>	loblolly pine	0.06
	Bare Ground	12.69

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

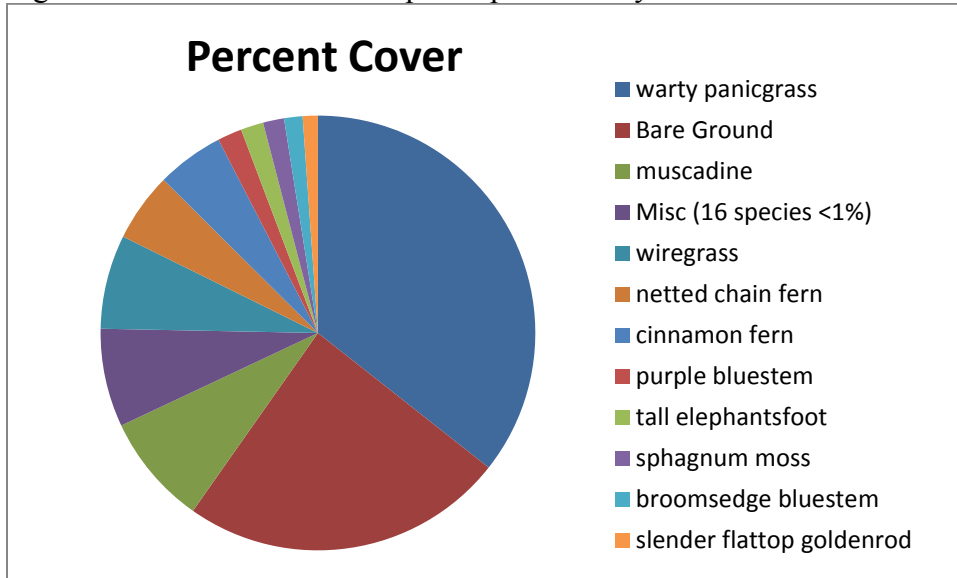


Table PR-7. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 when sampled on October 31, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Kelloggloa verrucosa</i>	warty panicgrass	35.63
<i>Vitis rotundifolia</i>	muscadine	8.25
<i>Aristida stricta</i>	wiregrass	7.00
<i>Woodwardia areolata</i>	netted chain fern	5.13
<i>Osmunda cinnamomea</i>	cinnamon fern	5.00
<i>Andropogon glomeratus</i> var. <i>glaucoopsis</i>	purple bluestem	1.81
<i>Elephantopus elatus</i>	tall elephantsfoot	1.69
<i>Sphagnum</i> sp.	sphagnum moss	1.56
<i>Andropogon virginicus</i>	broomsedge bluestem	1.38
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.13
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	0.94
<i>Ctenium aromaticum</i>	toothache grass	0.94
<i>Woodwardia virginica</i>	Virginia chain fern	0.94
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.63
<i>Smilax glauca</i>	cat greenbrier	0.56
<i>Cliftonia monophylla</i>	black titi	0.44
<i>Viola lanceolata</i>	bog white violet	0.44

Scientific name	Common name	Average percent cover per quadrat
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.44
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.44
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.44
<i>Vaccinium corymbosum</i>	highbush blueberry	0.38
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.19
<i>Carex</i> sp.	sedge	0.19
<i>Quercus nigra</i>	water oak	0.19
<i>Pinus taeda</i>	loblolly pine	0.13
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	0.06
	Bare Ground	24.13

Pine Flatwoods

Qualitative monitoring. The 30-50 foot- tall pines were thinned in 2017 by cutting selected rows of trees off near ground level. The resulting logs were left where they fell on the ground (Appendix A). The hardwoods in the subcanopy had been cut down in 2014 and some stumps had re-sprouted. Muscadine vine was abundant. The diverse open shrub layer was dominated by large gallberry, wax myrtle, and Elliott's blueberry. In the herbaceous layer were scattered clumps of wiregrass, with royal fern, cinnamon fern, netted chain fern, and Virginia chain fern more abundant in wetter areas. A total of 63 species (Table PR-1) were observed in this habitat.

**Lafayette Creek - Phase I Mitigation Site
Qualitative and Quantitative Monitoring
December 2017**

**Lafayette Creek – Phase I Mitigation Site
Qualitative and Quantitative Monitoring
December 2017**

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 re-alignment of highway US331 in 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. 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 formerly covered by 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 during the fall from 2012 through 2016.

METHODS

The quantitative monitoring utilized 300-foot permanent transect lines previously marked during the 2012 survey. Two transects were located in sandhill and two in 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 permanently staked in 2016. As additional markers, one-foot sections of rebar with 3-inch-square orange caps were staked at ground level at quadrats 20 and 40 along this transect, so the transect line could be recovered if the end stakes 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). Field surveys were performed by FNAI botanists Gary Schultz and Ann Johnson on October 16-18, 2017.

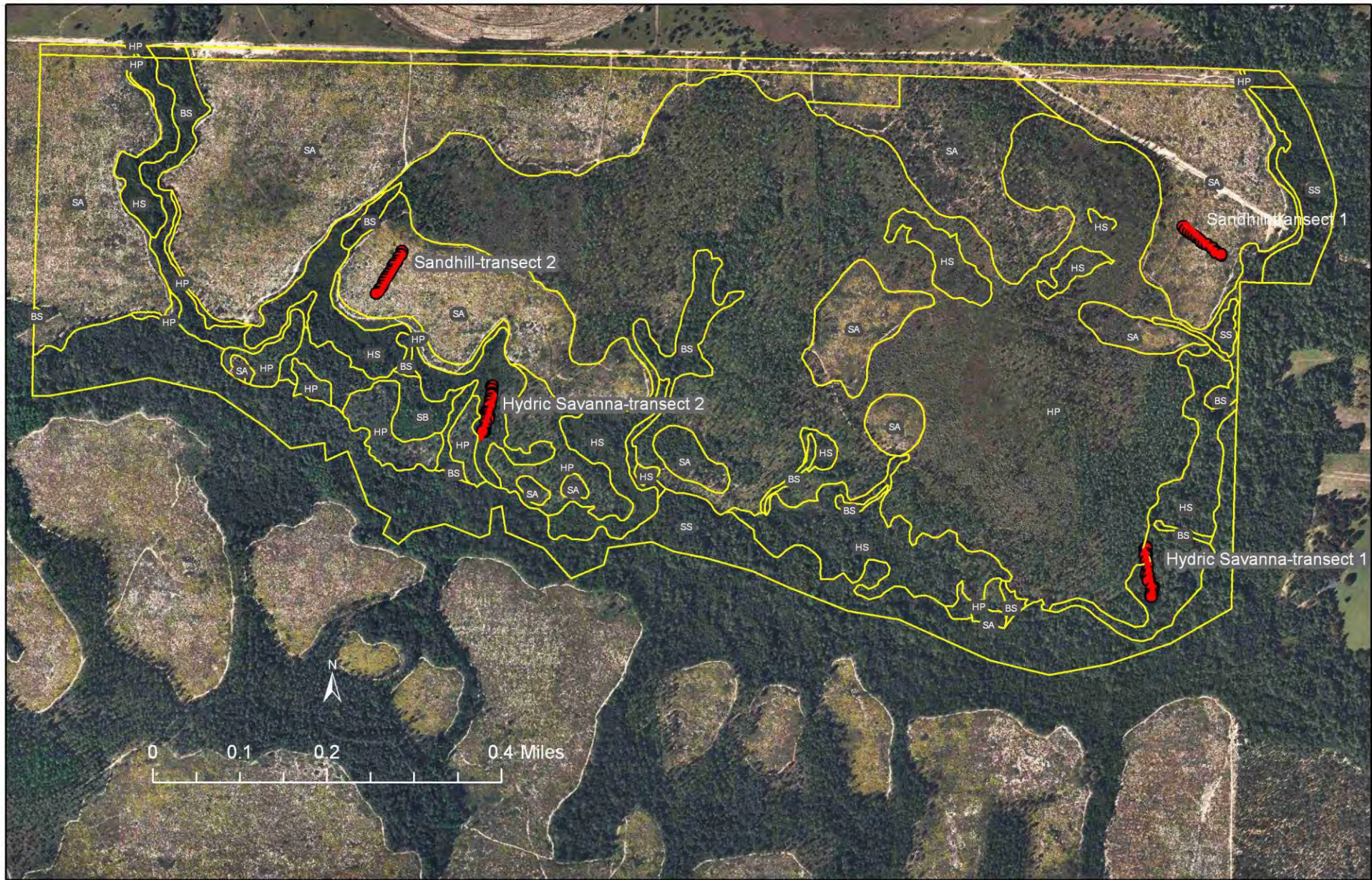


Figure LC-1. Location of permanent transects at Lafayette Creek – Phase I Mitigation Site. SA=Sandhill, HS=Hydric Savanna, HP=High Pine, BS=Bay Swamp, SS=Stream Swamp, SB=Shrub Bog.

RESULTS AND DISCUSSION

A total of 213 plant species were recorded in the surveyed areas of Lafayette Creek during the 2017 monitoring period (Table LC-1). Seventeen new species were found during the 2017 monitoring.

Table LC-1. Species observed in target communities at Lafayette Creek – Phase I Mitigation Site, October 16-18, 2017. (bold=new species)

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		x		2
<i>Agalinis fasciculata</i>	beach false foxglove				x		1
<i>Aletris lutea</i>	yellow colic-root		x				1
<i>Alnus serrulata</i>	hazel alder	x				x	2
<i>Amsonia ciliata</i>	fringed bluestar		x		x		2
<i>Andropogon gerardii</i>	big bluestem		x		x		2
<i>Andropogon glomeratus</i>	bushy bluestem			x			1
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem		x	x			2
<i>Andropogon</i> sp.	bluestem				x		1
<i>Andropogon ternarius</i>	splitbeard bluestem				x		1
<i>Andropogon virginicus</i>	broomsedge bluestem			x	x		2
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem			x	x		2
<i>Anthaenaria rufa</i>	purple silkscale			x			1
<i>Aristida purpurascens</i>	arrowfeather threeawn				x		1
<i>Aristida stricta</i>	wiregrass		x	x	x		3
<i>Arnoglossum sulcatum</i>	Georgia Indian-plantain	x					1
<i>Aronia arbutifolia</i>	red chokeberry			x			1
<i>Arundinaria gigantea</i>	switchcane	x					1
<i>Aureolaria pectinata</i>	fernleaf yellow false foxglove				x		1
<i>Baptisia lanceolata</i>	gopherweed				x		1
<i>Balduina angustifolia</i>	coastalplain honeycomb-head				x		1
<i>Berlandiera pumila</i>	soft greeneyes				x		1
<i>Bidens mitis</i>	smallfruit beggarticks			x			1
<i>Bigelovia nudata</i>	pineland rayless goldenrod		x	x			2
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge				x		1
<i>Callicarpa americana</i>	American beautyberry		x		x		2
<i>Calamintha coccinea</i>	scarlet calamint				x		1
<i>Carex tenax</i>	sandhill sedge				x		1
<i>Carphephorus odoratissimus</i>	vanillaleaf		x				1
<i>Cartrema americanum</i>	wild olive	x					1
<i>Castanea pumila</i>	chinquapin				x		1
<i>Ceanothus microphyllus</i>	littleleaf buckbrush				x		1

Scientific Name	Common Name	Bay swamp	High pine	Hydric savanna	Sandhill	Stream swamp	Grand Total
<i>Centella asiatica</i>	spadeleaf			x			1
Chamaesyce sp.	sandmat			x			1
<i>Chrysoma pauciflosculosa</i>	woody goldenrod				x		1
<i>Chrysopsis gossypina</i> ssp. <i>hyssopifolia</i>	cottony goldenaster		x		x		2
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster				x		1
<i>Chrysopsis linearifolia</i>	narrowleaf goldenaster				x		1
<i>Chrysopsis mariana</i>	Maryland goldenaster		x				1
<i>Cladonia leporina</i>	cup lichen				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>Coleataenia longifolia</i>	ciliate redtop panicum			x			1
<i>Conyza canadensis</i>	Canadian horseweed				x		1
<i>Coreopsis linifolia</i>	Texas tickseed			x			1
<i>Coreopsis pubescens</i>	star tickseed				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 ovatus</i>	pinebarren flatsedge				x		1
<i>Cyrilla racemiflora</i>	titi					x	1
<i>Dalea pinnata</i>	summer farewell				x		1
<i>Dichantherium aciculare</i>	needleleaf witchgrass				x		1
<i>Dichantherium acuminatum</i>	tapered witchgrass			x	x		2
<i>Dichantherium ensifolium</i>	cypress witchgrass			x			1
Dichantherium leucothrix	rough witchgrass			x			1
Dichantherium portoricense	hemlock witchgrass			x			1
<i>Dichantherium scabriusculum</i>	woolly witchgrass			x			1
<i>Dichantherium</i> sp.	witchgrass			x	x		2
<i>Dichantherium strigosum</i>	roughhair witchgrass			x	x		2
<i>Digitaria filiformis</i>	slender crabgrass				x		1
<i>Diodia virginiana</i>	Virginia buttonweed			x			1
<i>Diospyros virginiana</i>	common persimmon		x		x		2
Elephantopus nudatus	smooth elephantsfoot		x				1
<i>Eragrostis elliottii</i>	Elliott's lovegrass				x		1
<i>Eriocaulon compressum</i>	flattened pipewort			x			1
<i>Eriocaulon decangulare</i>	tenangle pipewort			x			1
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat				x		1
<i>Eryngium yuccifolium</i>	button rattlesnakemaster		x		x		2
<i>Eupatorium capillifolium</i>	dogfennel			x			1
<i>Eupatorium compositifolium</i>	yankeeweed		x		x		2
<i>Eupatorium mohrii</i>	Mohr's thoroughwort			x			1

Scientific Name	Common Name	Bay swamp	High pine	Hydric savanna	Sandhill	Stream swamp	Grand Total
<i>Eupatorium pilosum</i>	rough boneset			x			1
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort		x	x			2
<i>Eupatorium semiserratum</i>	smallflower thoroughwort			x			1
<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>	saltmarsh umbrellasedge			x			1
<i>Galactia minor</i>	leafy milkpea				x		1
<i>Gaylussacia dumosa</i>	dwarf huckleberry		x	x	x		3
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry					x	1
<i>Gelsemium sempervirens</i>	yellow jessamine		x		x		2
<i>Geobalanus oblongifolius</i>	gopher apple		x		x		2
<i>Gymnopogon</i> sp.	skeletongrass		x				1
<i>Helianthus angustifolius</i>	narrowleaf sunflower		x	x			2
<i>Helianthus heterophyllus</i>	variableleaf sunflower			x			1
<i>Helianthus radula</i>	stiff sunflower		x				1
<i>Hibiscus aculeatus</i>	comfortroot		x				1
<i>Houstonia procumbens</i>	roundleaf bluet				x		1
<i>Hypericum cistifolium</i>	roundpod St. John's wort			x			1
<i>Hypericum crux-andreae</i>	St. Peter's wort			x			1
<i>Hypericum fasciculatum</i>	peelbark St. John's wort			x			1
<i>Hypericum gentianoides</i>	orangegrass				x		1
<i>Hypericum hypericoides</i>	St. Andrew's cross				x		1
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort		x				1
<i>Ilex cassine</i>	dahoon	x					1
<i>Ilex coriacea</i>	large gallberry	x	x	x		x	4
<i>Ilex glabra</i>	gallberry		x	x	x		3
<i>Ilex opaca</i>	American holly	x					1
<i>Ilex vomitoria</i>	yaupon		x		x		2
<i>Ionactis linariifolia</i>	flaxleaf aster		x				1
<i>Ipomoea</i> sp.	morning glory				x		1
<i>Juncus trigonocarpus</i>	redpod rush			x			1
<i>Kelochloa verrucosa</i>	warty panicgrass		x	x			2
<i>Lachnanthes caroliniana</i>	Carolina redroot			x			1
<i>Lechea sessiliflora</i>	pineland pinweed				x		1
<i>Leucothoe axillaris</i>	coastal doghobble					x	1
<i>Liatris chapmanii</i>	Chapman's gayfeather				x		1
<i>Liatris elegans</i>	pinkscale gayfeather		x		x		2
<i>Liatris elegantula</i>	grassleaf gayfeather		x		x		2
<i>Liatris gracilis</i>	slender gayfeather		x		x		2

Scientific Name	Common Name	Bay swamp	High pine	Hydric savanna	Sandhill	Stream swamp	Grand Total
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather				x		1
<i>Liatris spicata</i>	dense gayfeather		x	x			2
<i>Liatris tenuifolia</i>	shortleaf gayfeather		x		x		2
<i>Lobelia brevifolia</i>	shortleaf lobelia		x	x			2
<i>Lophiola aurea</i>	golden crest			x			1
<i>Ludwigia pilosa</i>	hairy primrosewillow		x	x			2
<i>Ludwigia</i> sp				x			1
<i>Lycopodiella alopecuroides</i>	foxtail club-moss			x			1
<i>Lycopodiella caroliniana</i>	slender club-moss			x			1
<i>Lyonia lucida</i>	fetterbush			x			1
<i>Magnolia grandiflora</i>	southern magnolia		x				1
<i>Magnolia virginiana</i>	sweetbay	x	x	x		x	4
<i>Mimosa quadrivalvis</i>	sensitive briar				x		1
<i>Mitreola sessilifolia</i>	swamp hornpod		x				1
<i>Muhlenbergia capillaris</i> var. <i>trichopodes</i>	cutover muhly			x			1
<i>Nyssa biflora</i>	swamp tupelo	x		x			2
<i>Oldenlandia corymbosa</i>	flattop mille graine			x			1
<i>Opuntia humifusa</i>	pricklypear				x		1
<i>Osmunda cinnamomea</i>	cinnamon fern			x		x	2
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern			x		x	2
<i>Oxydendrum arboreum</i>	sourwood	x					1
<i>Panicum virgatum</i>	switchgrass		x		x		2
<i>Paspalum setaceum</i>	thin paspalum				x		1
<i>Pinus elliotii</i>	slash pine		x	x			2
<i>Pinus palustris</i>	longleaf pine				x		1
<i>Pinus serotina</i>	pond pine	x		x			2
<i>Pinus taeda</i>	loblolly pine			x			1
<i>Pityopsis aspera</i>	pineland silkgrass				x		1
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass		x		x		2
<i>Pluchea foetida</i>	stinking camphorweed		x				1
<i>Polygonella gracilis</i>	tall jointweed				x		1
<i>Polypremum procumbens</i>	rustweed			x	x		2
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting				x		1
<i>Pteridium aquilinum</i>	bracken fern		x	x			2
<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 laurifolia</i>	swamp laurel oak					x	1
<i>Quercus margarettae</i>	sand post oak				x		1
<i>Quercus minima</i>	dwarf live oak				x		1

Scientific Name	Common Name	Bay swamp	High pine	Hydric savanna	Sandhill	Stream swamp	Grand Total
<i>Quercus nigra</i>	water oak	x					1
<i>Quercus pumila</i>	runner oak		x				1
<i>Rhexia alifanus</i>	savannah meadowbeauty		x	x			2
<i>Rhexia petiolata</i>	fringed meadowbeauty			x			1
<i>Rhododendron canescens</i>	mountain 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 ciliaris</i>	fringed beaksedge			x			1
<i>Rhynchospora compressa</i>	flatfruit beaksedge			x			1
<i>Rhynchospora gracilentia</i>	slender beaksedge			x			1
<i>Rhynchospora plumosa</i>	plumed beaksedge			x			1
<i>Rubus cuneifolius</i>	sand blackberry				x		1
<i>Rubus pensilvanicus</i>	sawtooth blackberry			x			1
<i>Sabatia brevifolia</i>	shortleaf rosegentian		x				1
<i>Salvia azurea</i>	azure blue sage		x				1
<i>Sarracenia leucophylla</i>	white-top pitcherplant			x			1
<i>Schizachyrium stoloniferum</i>	creeping little bluestem				x		1
<i>Schizachyrium tenerum</i>	slender bluestem				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>Serenoa repens</i>	saw palmetto		x		x		2
<i>Sericocarpus tortifolius</i>	whiteweed aster		x		x		2
<i>Seymeria cassioides</i>	yaupon blackberry		x	x			2
<i>Seymeria pectinata</i>	Piedmont blackberry				x		1
<i>Smilax auriculata</i>	earleaf greenbrier				x		1
<i>Smilax glauca</i>	cat greenbrier		x	x			2
<i>Smilax laurifolia</i>	laurel greenbrier	x	x	x	x		4
<i>Smilax pumila</i>	sarsaparilla vine		x				1
<i>Solidago odora</i>	sweet goldenrod				x		1
<i>Solidago puberula</i> var. <i>pulverulenta</i>	downy goldenrod				x		1
<i>Solidago</i> sp.	goldenrod		x				1
<i>Sorghastrum elliottii</i>	slender indiagrass		x				1
<i>Symphotrichum adnatum</i>	scaleleaf aster		x		x		2
<i>Symphotrichum concolor</i>	eastern silver aster				x		1
<i>Symphotrichum dumosum</i>	rice button aster		x		x		2
<i>Tephrosia virginiana</i>	goat's rue				x		1
<i>Trichostema dichotomum</i>	forked bluecurls				x		1

Scientific Name	Common Name	Bay swamp	High pine	Hydric savanna	Sandhill	Stream swamp	Grand Total
<i>Trichostema setaceum</i>	narrowleaf bluecurls				x		1
unknown herb	unknown herb			x	x		2
<i>Utricularia juncea</i>	southern bladderwort			x			1
<i>Vaccinium arboreum</i>	sparkleberry		x		x		2
<i>Vaccinium corymbosum</i>	highbush blueberry					x	1
<i>Vaccinium myrsinites</i>	shiny blueberry		x		x		2
<i>Viola</i> sp.	violet			x			1
<i>Vitis rotundifolia</i>	muscadine	x			x		2
<i>Woodwardia areolata</i>	netted chain fern					x	1
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass			x			1
<i>Xyris drummondii</i>	Drummond'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
<i>Xyris platylepis</i>	tall yellow-eyed grass			x			1
<i>Yucca filamentosa</i>	Adam's needle		x		x		2
Total number of taxa: 212		18	66	86	102	13	285

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, with Piedmont gayfeather, Lynn Haven goldenaster and yankeeweed also frequent. Scattered shrubs and small trees include saw palmetto, sand live oak, and turkey oak. Characteristic sandhill species, such as summer farewell, sandhill sedge, and soft greeneyes were also noted in small numbers. Planted longleaf pines were frequent, ranging from 1 to 15 feet tall. A total of 102 plant species were identified in this community (Table LC-1).

Quantitative sampling. The eastern Transect 1 (Figure LC-2, Table LC-2) was located on an east-facing slope. It had a total of 46 species with 53% bare ground. Wiregrass and saw palmetto were about equally abundant. Other common herbs included Lynn Haven goldenaster, orangegrass, yankeeweed, and needleleaf witchgrass; sand live oak and sand blackberry were the common woody species. The western Transect 2 (Table LC-3, Figure LC-3) was situated near the top of a ridge. It had a total of 33 species with 42% bare ground. Wiregrass, Lynn Haven goldenaster, broomsedge bluestem, and roughhair witchgrass were the dominant herbs. The open shrub stratum was composed mainly of turkey oak and seedling and sapling longleaf pine. (NB: This transect was re-established in 2015 following loss of the northern end stake.)

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

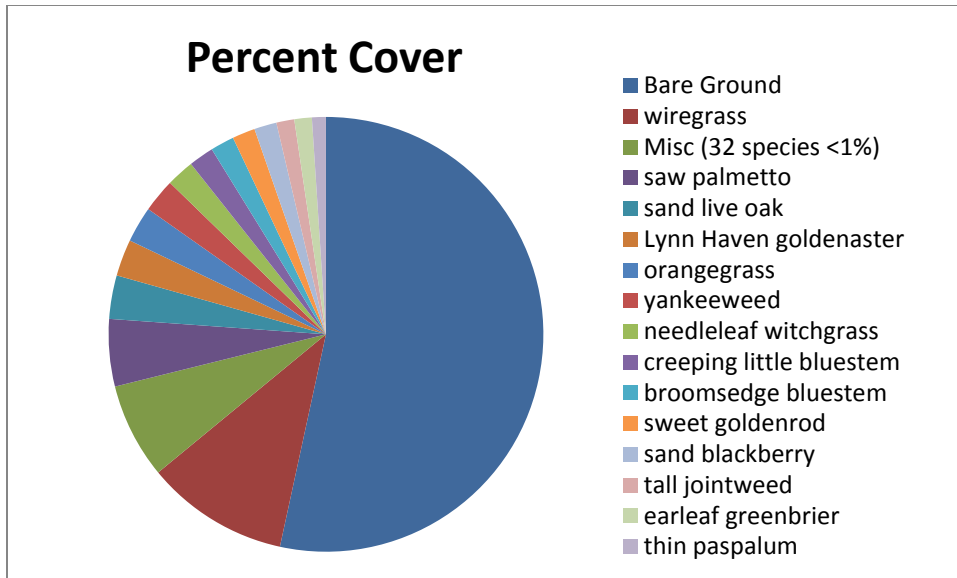


Table LC-2. Percent cover of plant species in Sandhill Transect 1 sampled on October 16, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i>	wiregrass	10.63
<i>Serenoa repens</i>	saw palmetto	5.00
<i>Quercus geminata</i>	sand live oak	3.23
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	2.73
<i>Hypericum gentianoides</i>	orangegrass	2.67
<i>Eupatorium compositifolium</i>	yankeeweed	2.50
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	2.07
<i>Schizachyrium stoloniferum</i>	creeping little bluestem	1.87
<i>Andropogon virginicus</i>	broomsedge bluestem	1.77
<i>Solidago odora</i>	sweet goldenrod	1.70
<i>Rubus cuneifolius</i>	sand blackberry	1.67
<i>Polygonella gracilis</i>	tall jointweed	1.33
<i>Smilax auriculata</i>	earleaf greenbrier	1.30
<i>Paspalum setaceum</i>	thin paspalum	1.03
<i>Dichanthelium strigosum</i>	roughhair witchgrass	0.97
<i>Pityopsis aspera</i>	pineland silkgrass	0.73
<i>Geobalanus oblongifolius</i>	gopher apple	0.57
<i>Quercus minima</i>	dwarf live oak	0.50
<i>Galactia minor</i>	leafy milkpea	0.50
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.47
<i>Rhus copallinum</i>	winged sumac	0.47
<i>Dichanthelium acuminatum</i>	tapered witchgrass	0.37
<i>Schizachyrium tenerum</i>	slender bluestem	0.33
<i>Eragrostis elliottii</i>	Elliott's lovegrass	0.30
<i>Cyperus ovatus</i>	pinebarren flatsedge	0.23
<i>Agalinis divaricata</i>	pineland false foxglove	0.23
<i>Rhynchosia cytisoides</i>	royal snoutbean	0.20

Scientific name	Common name	Average percent cover per quadrat
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.17
<i>Mimosa quadrivalvis</i>	sensitive briar	0.13
<i>Panicum virgatum</i>	switchgrass	0.13
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.10
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather	0.10
<i>Digitaria filiformis</i>	slender crabgrass	0.10
<i>Scleria triglomerata</i>	whip nutrush	0.10
<i>Conyza canadensis</i>	Canadian horseweed	0.03
<i>Balduina angustifolia</i>	coastalplain honeycomb-head	0.03
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.03
<i>Scleria ciliata</i>	fringed nutrush	0.03
<i>Euphorbia floridana</i>	greater Florida spurge	0.03
<i>Ipomoea</i> sp.	morning glory	0.03
<i>Lechea sessiliflora</i>	pineland pinweed	0.03
<i>Opuntia humifusa</i>	pricklypear	0.03
<i>Houstonia procumbens</i>	roundleaf bluet	0.03
<i>Liatris tenuifolia</i>	shortleaf gayfeather	0.03
<i>Cnidoscolus stimulosus</i>	tread softly	0.03
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	0.03
	Bare Ground	53.40

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

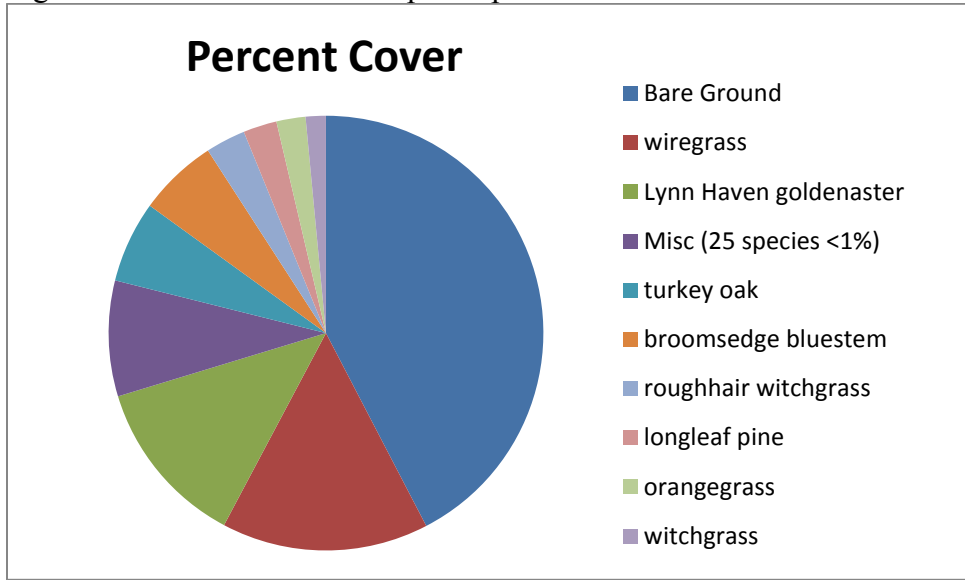


Table LC-3. Percent cover of plant species in Sandhill Transect 2 sampled on October 17, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i>	wiregrass	15.40
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	12.53
<i>Quercus laevis</i>	turkey oak	6.07
<i>Andropogon virginicus</i>	broomsedge bluestem	5.90
<i>Dichanthelium strigosum</i>	roughhair witchgrass	2.97
<i>Pinus palustris</i>	longleaf pine	2.50
<i>Hypericum gentianoides</i>	orangegrass	2.17
<i>Dichanthelium sp.</i>	witchgrass	1.50
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.93
<i>Eupatorium compositifolium</i>	yankeeweed	0.93
<i>Smilax auriculata</i>	earleaf greenbrier	0.80
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	0.80
<i>Schizachyrium stoloniferum</i>	creeping little bluestem	0.73
<i>Liatris pauciflora var. secunda</i>	Piedmont gayfeather	0.53
<i>Geobalanus oblongifolius</i>	gopher apple	0.50
<i>Dalea pinnata</i>	summer farewell	0.50
<i>Galactia minor</i>	leafy milkpea	0.43
<i>Polygonella gracilis</i>	tall jointweed	0.43
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.40
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.33
<i>Smilax laurifolia</i>	laurel greenbrier	0.23
<i>Chrysopsis gossypina ssp. hyssopifolia</i>	cottony goldenaster	0.20
<i>Croton argyranthemus</i>	silver croton	0.13
<i>Rubus cuneifolius</i>	sand blackberry	0.10

Scientific name	Common name	Average percent cover per quadrat
<i>Liatris tenuifolia</i>	shortleaf gayfeather	0.10
<i>Andropogon ternarius</i>	splitbeard bluestem	0.10
<i>Dichanthelium acuminatum</i>	tapered witchgrass	0.10
<i>Conyza canadensis</i>	Canadian horseweed	0.07
<i>Balduina angustifolia</i>	coastalplain honeycomb-head	0.07
unknown herb	unknown herb	0.07
<i>Cladonia leporina</i>	cup lichen	0.03
<i>Opuntia humifusa</i>	pricklypear	0.03
<i>Croptilon divaricatum</i>	slender scratchdaisy	0.03
	Bare Ground	42.37

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 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 and warty panicum dominating in the wetter sections and wiregrass in the drier parts. Scattered shrubs included black titi, large gallberry, sweet pepperbush, and gallberry. Disturbance by current and past hog rooting was noted at many locations. A total of 87 species were recorded from this community (Table LC-1).

Quantitative sampling. The eastern Transect 1 (Table LC-4, Figure LC-4) was on a south-facing slope and had a total of 54 species with 37% bare ground. Herbaceous species made up most of the transect cover. Wiregrass showed a doubling of its cover relative to the 2016 sample. Other abundant herbs included bushy bluestem, broomsedge bluestem, and warty panicgrass. The western Transect 2 (Table LC-5, Figure LC-5) was also on a south facing slope. It had a total of 44 species with 51% bare ground. The drier north end had abundant purple bluestem and wiregrass and was shaded by pond pine, while the wetter and more open south end was largely bare ground due to hog rooting that had occurred since the 2016 sampling.

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

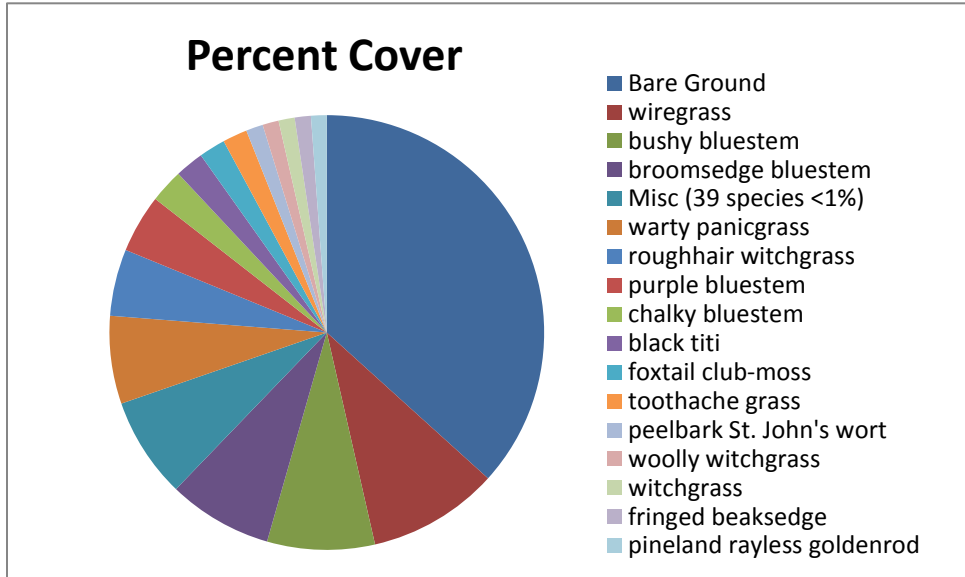


Table LC-4. Percent cover of plant species in Hydric Savanna Transect 1 sampled on October 18, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i>	wiregrass	9.73
<i>Andropogon glomeratus</i>	bushy bluestem	8.00
<i>Andropogon virginicus</i>	broomsedge bluestem	7.77
<i>Kelochloa verrucosa</i>	warty panicgrass	6.53
<i>Dichantherium strigosum</i>	roughhair witchgrass	4.97
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	4.33
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	2.50
<i>Cliftonia monophylla</i>	black titi	2.13
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	1.97
<i>Ctenium aromaticum</i>	toothache grass	1.83
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	1.27
<i>Rhynchospora ciliaris</i>	fringed beaksedge	1.20
<i>Dichantherium</i> sp.	witchgrass	1.20
<i>Dichantherium scabriusculum</i>	woolly witchgrass	1.20
<i>Bigelovia nudata</i>	pineland rayless goldenrod	1.17
<i>Smilax glauca</i>	cat greenbrier	0.83
<i>Ilex coriacea</i>	large gallberry	0.73
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.63
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.60
<i>Eupatorium pilosum</i>	rough boneset	0.57
<i>Dichantherium leucothrix</i>	rough witchgrass	0.53
<i>Dichantherium portoricense</i>	hemlock witchgrass	0.23
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	0.23

Scientific name	Common name	Average percent cover per quadrat
<i>Pinus elliotii</i>	slash pine	0.23
<i>Diodia virginiana</i>	Virginia buttonweed	0.23
<i>Dichanthelium ensifolium</i>	cypress witchgrass	0.20
<i>Eriocaulon compressum</i>	flattened pipewort	0.20
<i>Coreopsis linifolia</i>	Texas tickseed	0.20
<i>Seymeria cassioides</i>	yaupon blacksenna	0.20
<i>Rhexia alifanus</i>	savannah meadowbeauty	0.17
<i>Helianthus heterophyllus</i>	variableleaf sunflower	0.17
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.13
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.13
<i>Coleataenia longifolia</i>	ciliate redtop panicum	0.10
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.10
<i>Ilex glabra</i>	gallberry	0.10
<i>Lophiola aurea</i>	golden crest	0.10
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.10
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.10
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.10
<i>Smilax laurifolia</i>	laurel greenbrier	0.07
<i>Pinus taeda</i>	loblolly pine	0.07
<i>Scleria reticularis</i>	netted nutrush	0.07
<i>Rhynchospora compressa</i>	flatfruit beaksedge	0.03
<i>Oldenlandia corymbosa</i>	flattop mille grains	0.03
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.03
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort	0.03
<i>Polypremum procumbens</i>	rustweed	0.03
<i>Chamaesyce</i> sp.	sandmat	0.03
<i>Lobelia brevifolia</i>	shortleaf lobelia	0.03
<i>Pinus elliotii</i> seedlings	slash pine seedlings	0.03
<i>Centella asiatica</i>	spadeleaf	0.03
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.03
	Bare Ground	36.70

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

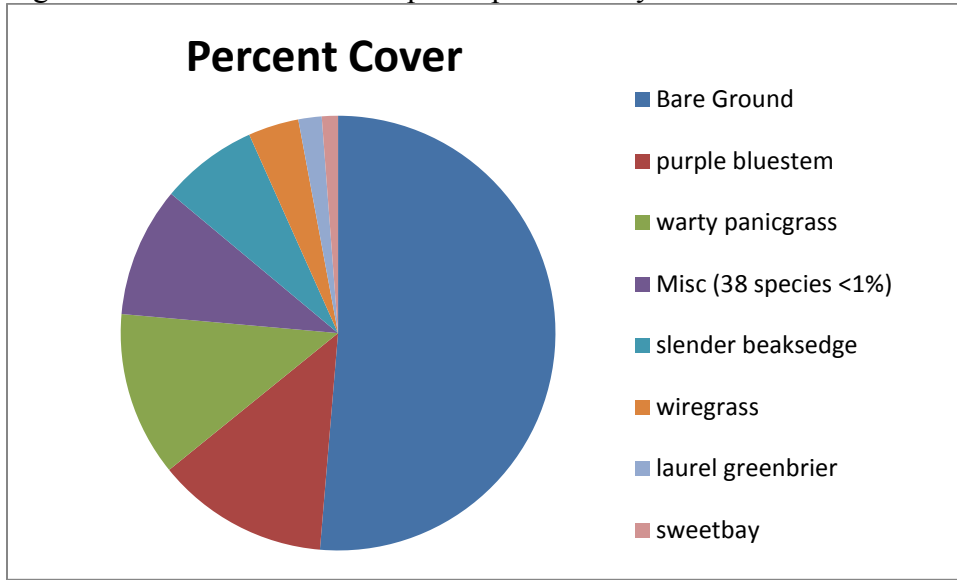


Table LC-5. Percent cover of plant species in Hydric Savanna Transect 2 sampled on October 17, 2018.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	12.83
<i>Kelochloa verrucosa</i>	warty panicgrass	12.23
<i>Rhynchospora gracilentia</i>	slender beaksedge	7.23
<i>Aristida stricta</i>	wiregrass	3.77
<i>Smilax laurifolia</i>	laurel greenbrier	1.73
<i>Magnolia virginiana</i>	sweetbay	1.20
<i>Smilax glauca</i>	cat greenbrier	0.93
<i>Andropogon glomeratus</i>	bushy bluestem	0.90
<i>Rhexia alifanus</i>	savannah meadowbeauty	0.80
<i>Pteridium aquilinum</i>	bracken fern	0.73
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.60
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.60
<i>Juncus trigonocarpus</i>	redpod rush	0.60
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.50
<i>Dichantherium strigosum</i>	roughhair witchgrass	0.50
<i>Andropogon virginicus</i>	broomsedge bluestem	0.47
<i>Ilex coriacea</i>	large gallberry	0.47
<i>Ilex glabra</i>	gallberry	0.27
<i>Dichantherium</i> sp.	witchgrass	0.27
<i>Rhynchospora compressa</i>	flatfruit beaksedge	0.23
<i>Clethra alnifolia</i>	sweet pepperbush	0.23
<i>Pinus elliottii</i>	slash pine	0.13
<i>Nyssa biflora</i>	swamp tupelo	0.13

Scientific name	Common name	Average percent cover per quadrat
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.13
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	0.10
<i>Eupatorium capillifolium</i>	dogfennel	0.10
<i>Lyonia lucida</i>	fetterbush	0.10
<i>Ludwigia</i> sp.	primrosewillow	0.10
<i>Utricularia juncea</i>	southern bladderwort	0.10
<i>Dichantheium acuminatum</i>	tapered witchgrass	0.10
<i>Eupatorium pilosum</i>	rough boneset	0.07
<i>Dichantheium leucothrix</i>	rough witchgrass	0.07
unknown herb	unknown herb	0.07
<i>Cliftonia monophylla</i>	black titi	0.03
<i>Xyris drummondii</i>	Drummond's yellow-eyed grass	0.03
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.03
<i>Eriocaulon compressum</i>	flattened pipewort	0.03
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.03
<i>Scleria reticularis</i>	netted nutrush	0.03
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	0.03
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.03
<i>Lycopodiella caroliniana</i>	slender club-moss	0.03
<i>Viola</i> sp.	violet	0.03
<i>Dichantheium scabriusculum</i>	woolly witchgrass	0.03
	Bare Ground	51.33

High Pine

Qualitative sampling. Mature slash pine plantation still covers most of the area being restored to high pine. Thinning of the pines and prescribed fire have opened up the canopy in some sections. The understory may be either a dense shrub layer dominated by yaupon or an open grassy groundlayer of wiregrass with scattered saw palmetto and gallberry. Nearer the ecotone with hydric savanna many other herbs are found with the wiregrass, including pinkscale gayfeather, toothache grass, scaleleaf aster, rough boneset, and vanillaleaf. The total number of species observed in this community was 66 (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, titi, water oak, and swamp tupelo. The frequently dense shrub layer on the edges was primarily composed of fetterbush, large gallberry, black titi, and wild olive. Cinnamon fern and Georgia Indian plantain were in the sparse herb stratum and laurel greenbrier was a common vine. The total number of species observed in this community was 18 (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 pond cypress, swamp tupelo, and sweetbay. The often dense shrubs consisted of coastal doghobble, hazel alder, sweet pepperbush, black titi, and large gallberry. Sphagnum moss, cinnamon fern, royal fern, and netted chainfern made up the sparse groundcover. The total number of species observed in this community was 13 (Table LC-1).

Plum Creek at Holmes Creek Mitigation Site
Qualitative and Quantitative Monitoring
December 2017

**Plum Creek at Holmes Creek Mitigation Site
Qualitative and Quantitative Monitoring
October 2017**

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 wetland (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 during the fall from 2012 through 2016.

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, Ann Johnson, and Kim Gullledge on October 18, 19, and November 1, 2017.

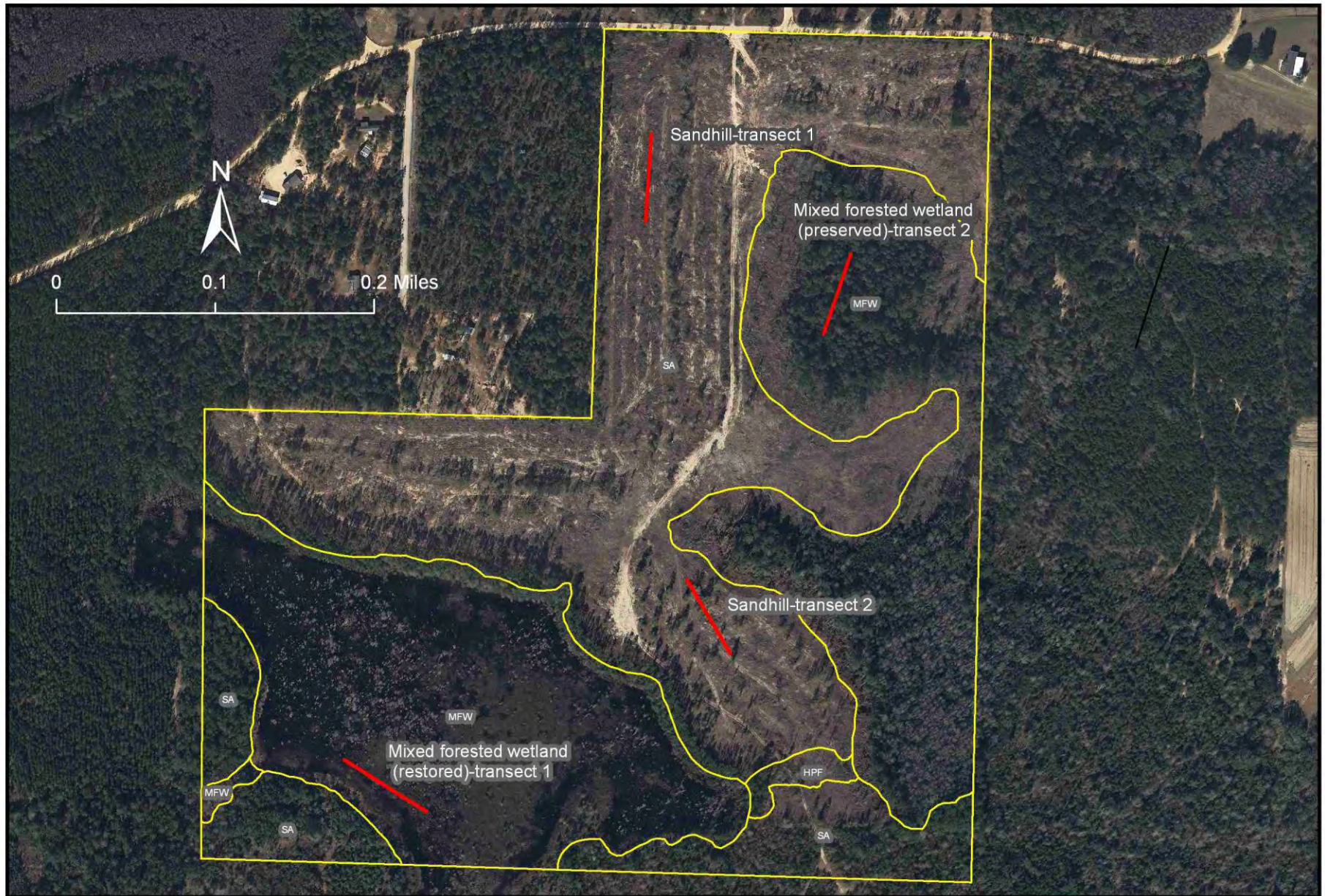


Figure PC-1. Location of permanent transects at Plum Creek at Holmes Creek Mitigation Site in Sandhill and Mixed Forested Wetland,

RESULTS AND DISCUSSION

A total of 160 plant species were observed during the 2017 monitoring period in the target communities at Plum Creek at Holmes Creek Mitigation Site (Table PC-1). Thirteen new species were found during the 2017 monitoring.

Table PC-1. Plant species observed in target communities at Plum Creek at Holmes Creek Mitigation Site on October 17 and 18, 2017 (bold=new species)

Scientific Name	Common Name	Mixed forested wetland-preserved	Mixed forested wetland-restoration	Sandhill	Grand Total
<i>Acer rubrum</i>	red maple	x	x		2
<i>Agalinis fasciculata</i>	beach false foxglove			x	1
<i>Agalinis obtusifolia</i>	tenlobe false foxglove			x	1
<i>Ambrosia artemisiifolia</i>	common ragweed			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 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>Apteria aphylla</i>	nodding nixie	x			1
<i>Aristida purpurascens</i>	arrowfeather threeawn			x	1
<i>Aristida stricta</i>	wiregrass			x	1
<i>Aronia arbutifolia</i>	red chokeberry		x		1
<i>Asimina spatulata</i>	paw paw			x	1
<i>Baccharis halimifolia</i>	groundsel tree			x	1
<i>Baptisia lanceolata</i>	gopherweed			x	1
<i>Brasenia schreberi</i>	watershield		x		1
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge			x	1
<i>Carex striata</i>	Walter's sedge	x			1
<i>Carex tenax</i>	sandhill sedge			x	1
<i>Carphephorus odoratissimus</i>	vanillaleaf			x	1
<i>Cartrema americanum</i>	wild olive	x		x	2
<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>	Evans' reindeer lichen			x	1
<i>Cladonia leporina</i>	cup 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>Conyza canadensis</i>	Canadian horseweed			x	1
<i>Croptilon divaricatum</i>	slender scratchdaisy			x	1

Scientific Name	Common Name	Mixed forested wetland-preserved	Mixed forested wetland-restoration	Sandhill	Grand Total
<i>Croton argyranthemus</i>	silver croton			x	1
<i>Cyperus ovatus</i>	pinebarren 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 laxiflorum</i>	openflower witchgrass			x	1
<i>Dichantherium</i> sp.	witchgrass			x	1
<i>Dichantherium sphaerocarpon</i>	roundseed witchgrass			x	1
<i>Diodia teres</i>	poor joe			x	1
<i>Diospyros virginiana</i>	common persimmon			x	1
<i>Dulichium arundinaceum</i>	threeway sedge		x		1
<i>Elephantopus elatus</i>	tall elephantsfoot			x	1
<i>Eleocharis equisetoides</i>	jointed spikerush		x		1
<i>Eragrostis elliotii</i>	Elliott's lovegrass			x	1
<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	x	2
<i>Euphorbia floridana</i>	greater Florida spurge			x	1
<i>Euthamia caroliniana</i>	slender flattop goldenrod		x	x	2
<i>Galactia minor</i>	leafy milkpea			x	1
<i>Galium hispidulum</i>	coastal bedstraw			x	1
<i>Gaylussacia dumosa</i>	dwarf huckleberry			x	1
<i>Gelsemium sempervirens</i>	yellow jessamine			x	1
<i>Geobalanus oblongifolius</i>	gopher apple			x	1
<i>Gordonia lasianthus</i>	loblolly bay	x			1
<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		1
<i>Hypericum gentianoides</i>	orangegrass			x	1
<i>Hypericum hypericoides</i>	St. Andrew's cross			x	1
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	x			1
<i>Ilex coriacea</i>	large gallberry	x			1
<i>Ilex glabra</i>	gallberry		x	x	2
<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>Lechea minor</i>	thymeleaf pinweed			x	1

Scientific Name	Common Name	Mixed forested wetland-preserved	Mixed forested wetland-restoration	Sandhill	Grand Total
<i>Lechea sessiliflora</i>	pineland pinweed			x	1
<i>Liatris elegans</i>	pinkscale gayfeather			x	1
<i>Liatris gracilis</i>	slender gayfeather			x	1
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather			x	1
<i>Liatris spicata</i>	dense gayfeather			x	1
<i>Liquidambar styraciflua</i>	sweetgum	x			1
<i>liverwort</i>		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>moss</i>		x			1
<i>Morella caroliniensis</i>	evergreen bayberry	x			1
<i>Morella cerifera</i>	southern bayberry	x	x		2
<i>Nymphaea odorata</i>	white waterlily		x		1
<i>Oenothera biennis</i>	common eveningprimrose			x	1
<i>Oenothera simulans</i>	southern beeblossom			x	1
<i>Panicum hemitomon</i>	maidencane		x		1
<i>Paspalum setaceum</i>	thin paspalum			x	1
<i>Paspalum</i> sp.	crowgrass			x	1
<i>Penstemon multiflorus</i>	manyflower beardtongue			x	1
<i>Persea palustris</i>	swamp bay	x			1
<i>Pieris phyllireifolia</i>	climbing fetterbush	x	x		2
<i>Pinus clausa</i>	sand pine			x	1
<i>Pinus elliottii</i>	slash pine		x	x	2
<i>Pinus palustris</i>	longleaf pine			x	1
<i>Pityopsis aspera</i>	pineland silkgrass			x	1
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass			x	1
<i>Polygala nana</i>	candyroot			x	1
<i>Polygonella gracilis</i>	tall jointweed			x	1
<i>Polypremum procumbens</i>	rustweed			x	1
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting			x	1
<i>Pteridium aquilinum</i>	bracken fern			x	1
<i>Quercus falcata</i>	southern red oak			x	1
<i>Quercus geminata</i>	sand live oak			x	1
<i>Quercus hemisphaerica</i>	laurel oak			x	1
<i>Quercus incana</i>	bluejack oak			x	1
<i>Quercus laevis</i>	turkey oak			x	1
<i>Quercus margarettae</i>	sand post oak			x	1
<i>Rhododendron canescens</i>	mountain azalea	x			1
<i>Rhynchosia cytisoides</i>	royal snoutbean			x	1

Scientific Name	Common Name	Mixed forested wetland-preserved	Mixed forested wetland-restoration	Sandhill	Grand Total
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge		x		1
<i>Richardia humistrata</i>	South American Mexican clover			x	1
<i>Rubus cuneifolius</i>	sand blackberry			x	1
<i>Rubus pensilvanicus</i>	sawtooth blackberry	x			1
<i>Saccharum giganteum</i>	sugarcane plumegrass		x		1
<i>Schizachyrium scoparium</i>	little bluestem			x	1
<i>Schizachyrium stoloniferum</i>	creeping little bluestem			x	1
<i>Scleria ciliata</i>	fringed nutrush			x	1
<i>Scleria</i> sp.	nutrush			x	1
<i>Serenoa repens</i>	saw palmetto			x	1
<i>Smilax auriculata</i>	earleaf greenbrier			x	1
<i>Smilax bona-nox</i>	saw greenbrier			x	1
<i>Smilax glauca</i>	cat greenbrier	x		x	2
<i>Smilax laurifolia</i>	laurel greenbrier	x			1
<i>Smilax pumila</i>	sarsaparilla vine			x	1
<i>Smilax walteri</i>	coral greenbrier		x		1
<i>Solidago fistulosa</i>	pinebarren goldenrod		x	x	2
<i>Solidago odora</i>	sweet goldenrod			x	1
<i>Sorghastrum secundum</i>	lopsided indiagrass			x	1
<i>Sphagnum</i> sp.	sphagnum moss	x	x		2
<i>Stillingia sylvatica</i>	queen's delight			x	1
<i>Stylisma patens</i>	coastalplain dawnflower			x	1
<i>Symphotrichum dumosum</i>	rice button aster			x	1
<i>Taxodium ascendens</i>	pond cypress		x		1
<i>Tragia smallii</i>	Small's noseburn			x	1
<i>Tragia urens</i>	wavyleaf noseburn			x	1
<i>Triadenum virginicum</i>	Virginia marsh St. John's wort		x		1
<i>Trichostema dichotomum</i>	forked bluecurls			x	1
<i>Trichostema setaceum</i>	narrowleaf bluecurls			x	1
unknown fern		x			1
unknown herb		x		x	2
unknown woody		x			1
<i>Utricularia gibba</i>	humped bladderwort		x		1
<i>Vaccinium arboreum</i>	sparkleberry			x	1
<i>Vaccinium corymbosum</i>	highbush blueberry	x	x		2
<i>Vaccinium elliotii</i>	Elliott's blueberry	x		x	2
<i>Vaccinium myrsinites</i>	shiny blueberry			x	1
<i>Vaccinium stamineum</i>	deerberry			x	1
<i>Vernonia angustifolia</i>	tall ironweed			x	1
<i>Viburnum nudum</i>	possumhaw	x			1
<i>Vitis rotundifolia</i>	muscadine	x		x	2

Scientific Name	Common Name	Mixed forested wetland-preserved	Mixed forested wetland-restoration	Sandhill	Grand Total
<i>Woodwardia areolata</i>	netted chain fern	x			1
<i>Woodwardia virginica</i>	Virginia chain fern	x	x		2
<i>Xyris fimbriata</i>	fringed yellow-eyed grass		x		1
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass		x		1
<i>Yucca filamentosa</i>	Adam's needle			x	1
Total number of taxa: 160		33	34	112	170

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 broomsedge bluestem, little bluestem, and needleleaf witchgrass. Wiregrass was very sparse and native weedy species constituted most of the herb layer. The occasional shrubs were mainly yaupon, turkey oak, sparkleberry, and sand blackberry. The earleaf greenbrier vine was common. A total of 112 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 53 species with 42% bare ground. The ground layer consisted of mainly herbaceous species with scattered shrubs, principally yaupon. The dominants were similar to previous years. Broomsedge bluestem had the the highest percent cover by followed by yaupon, orangegrass, earleaf greenbrier, and Lynn Haven goldenaster. Wiregrass was present at low levels. The southern Transect 2 (Table PC-3, Figure PC-3) was situated near the top of a low ridge. It had a total of 46 species with 40% bare ground. The vegetation was about 50% herbaceous/50% woody species cover. Among the herbs, Lynn Haven goldenaster had the highest cover followed by rustweed, yellow jessamine, and yankeeweed. Saw palmetto, sand blackberry and the woody vine, earleaf greenbrier, formed most of the woody cover.

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

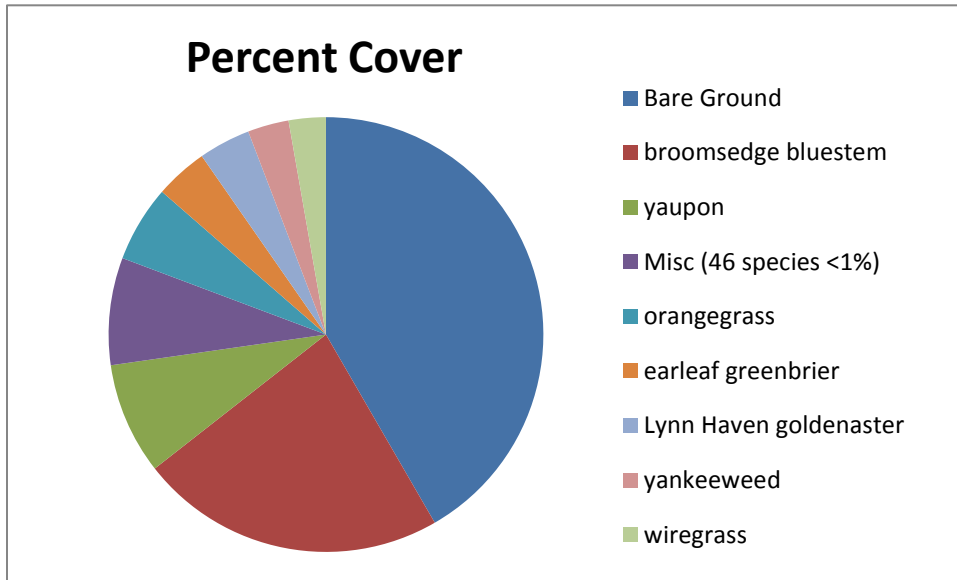


Table PC-2. Percent cover of plant species in Sandhill Transect 1 sampled on October 19, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon virginicus</i>	broomsedge bluestem	22.83
<i>Ilex vomitoria</i>	yaupon	8.33
<i>Hypericum gentianoides</i>	orangegrass	5.70
<i>Smilax auriculata</i>	earleaf greenbrier	3.93
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	3.87
<i>Eupatorium compositifolium</i>	yankeeweed	3.07
<i>Aristida stricta</i>	wiregrass	2.77
<i>Gelsemium sempervirens</i>	yellow jessamine	0.90
<i>Solidago odora</i>	sweet goldenrod	0.70
<i>Vaccinium stamineum</i>	deerberry	0.60
<i>Eragrostis elliottii</i>	Elliott's lovegrass	0.50
<i>Trichostema dichotomum</i>	forked bluecurls	0.50
<i>Andropogon ternarius</i>	splitbeard bluestem	0.47
<i>Dichanthelium laxiflorum</i>	openflower witchgrass	0.43
<i>Pteridium aquilinum</i>	bracken fern	0.33
<i>Dichanthelium acuminatum</i>	tapered witchgrass	0.33
<i>Smilax glauca</i>	cat greenbrier	0.27
<i>Hypericum hypericoides</i>	St. Andrew's cross	0.27
<i>Smilax pumila</i>	sarsaparilla vine	0.23
<i>Eupatorium compositifolium</i>	yankeeweed	0.23
<i>Agalinis fasciculata</i>	beach false foxglove	0.20
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.13
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	0.13
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.10
<i>Galium hispidulum</i>	coastal bedstraw	0.10
<i>Scleria ciliata</i>	fringed nutrush	0.10
<i>Galactia minor</i>	leafy milkpea	0.10

Scientific name	Common name	Average percent cover per quadrat
<i>Lechea sessiliflora</i>	pineland pinweed	0.10
<i>Symphotrichum dumosum</i>	rice button aster	0.10
<i>Quercus margarettae</i>	sand post oak	0.10
<i>Carex tenax</i>	sandhill sedge	0.10
<i>Vernonia angustifolia</i>	tall ironweed	0.10
<i>Conyza canadensis</i>	Canadian horseweed	0.07
<i>Dichanthelium sphaerocarpon</i>	roundseed witchgrass	0.07
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	0.07
<i>Cnidoscolus stimulosus</i>	tread softly	0.07
<i>Dichanthelium</i> sp.	witchgrass	0.07
<i>Stylisma patens</i>	coastalplain dawnflower	0.03
<i>Paspalum</i> sp.	crowgrass	0.03
<i>Liatris spicata</i>	dense gayfeather	0.03
<i>Eupatorium capillifolium</i>	dogfennel	0.03
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.03
<i>Scleria</i> sp.	nutrush	0.03
<i>Cyperus ovatus</i>	pinebarren flatsedge	0.03
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.03
<i>Pityopsis aspera</i>	pineland silkgrass	0.03
<i>Rhynchosia cytisoides</i>	royal snoutbean	0.03
<i>Rubus cuneifolius</i>	sand blackberry	0.03
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.03
<i>Croptilon divaricatum</i>	slender scratchdaisy	0.03
<i>Oenothera simulans</i>	southern beeblossom	0.03
<i>Dalea pinnata</i>	summer farewell	0.03
<i>Paspalum setaceum</i>	thin paspalum	0.03
	Bare Ground	41.77

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

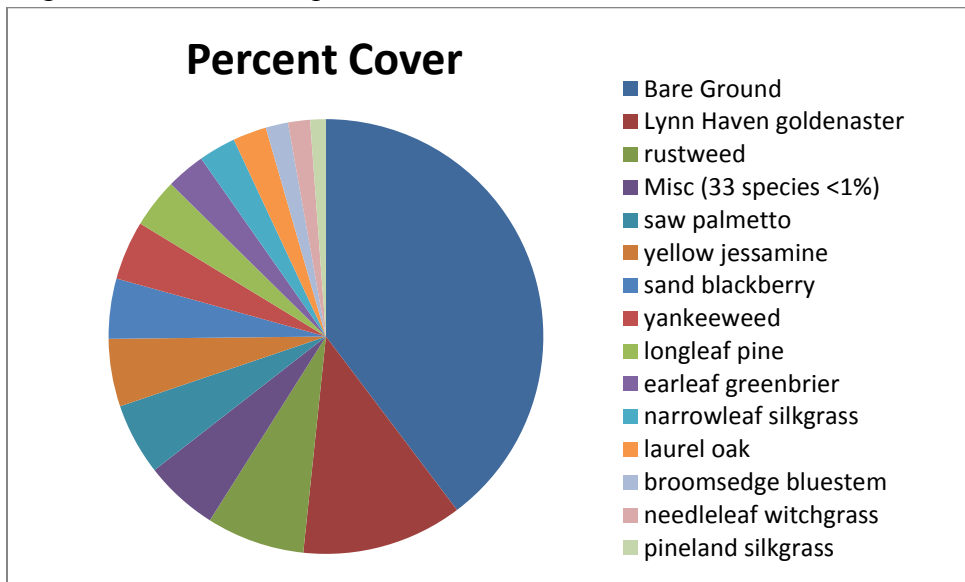


Table PC-3. Percent cover of plant species in Sandhill Transect 2 when sampled on October 19, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	11.97
<i>Polypremum procumbens</i>	rustweed	7.30
<i>Serenoa repens</i>	saw palmetto	5.33
<i>Gelsemium sempervirens</i>	yellow jessamine	5.03
<i>Rubus cuneifolius</i>	sand blackberry	4.47
<i>Eupatorium compositifolium</i>	yankeeweed	4.40
<i>Pinus palustris</i>	longleaf pine	3.67
<i>Smilax auriculata</i>	earleaf greenbrier	2.90
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass	2.77
<i>Quercus hemisphaerica</i>	laurel oak	2.50
<i>Andropogon virginicus</i>	broomsedge bluestem	1.67
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	1.63
<i>Pityopsis aspera</i>	pineland silkgrass	1.17
<i>Hypericum gentianoides</i>	orangegrass	0.97
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.43
<i>Smilax bona-nox</i>	saw greenbrier	0.43
<i>Dichanthelium laxiflorum</i>	openflower witchgrass	0.40
<i>Hibiscus aculeatus</i>	comfortroot	0.37
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	0.37
<i>Andropogon ternarius</i>	splitbeard bluestem	0.33
<i>Vaccinium arboreum</i>	sparkleberry	0.27
<i>Pteridium aquilinum</i>	bracken fern	0.23
<i>Solidago odora</i>	sweet goldenrod	0.23

Scientific name	Common name	Average percent cover per quadrat
<i>Dichanthelium acuminatum</i>	tapered witchgrass	0.23
<i>Agalinis fasciculata</i>	beach false foxglove	0.10
<i>Cladonia leporina</i>	cup lichen	0.10
<i>Trichostema dichotomum</i>	forked bluecurls	0.10
<i>Lechea sessiliflora</i>	pineland pinweed	0.10
<i>Croptilon divaricatum</i>	slender scratchdaisy	0.10
<i>Polygala nana</i>	candyroot	0.07
<i>Eupatorium capillifolium</i>	dogfennel	0.07
<i>Cyperus ovatus</i>	pinebarren flatsedge	0.07
<i>Symphotrichum dumosum</i>	rice button aster	0.07
<i>Dichanthelium sphaerocarpon</i>	roundseed witchgrass	0.07
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.03
<i>Galium hispidulum</i>	coastal bedstraw	0.03
<i>Cladina evansii</i>	Evans' reindeer lichen	0.03
<i>Scleria ciliata</i>	fringed nutrush	0.03
<i>Trichostema setaceum</i>	narrowleaf bluecurls	0.03
<i>Scleria</i> sp.	nutrush	0.03
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.03
<i>Houstonia procumbens</i>	roundleaf bluet	0.03
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.03
<i>Tragia smallii</i>	Small's noseburn	0.03
unknown herb	unknown herb	0.03
<i>Tragia urens</i>	wavyleaf noseburn	0.03
	Bare Ground	39.70

Mixed Forested Wetland (Restoration)

Qualitative sampling. The 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 a nearly impenetrable interlacing thicket. 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, loosehead beaksedge, and maidencane. The total number of species observed in this community was 34 (Table PC-1).

Quantitative sampling. Transect 1 (Table PC-4, Figure PC-4) had a total of 14 species with 16% bare ground. The highest percent cover was by willow herb followed by white water-lily and shrubby primrose willow. Willow herb was not in leaf at the time of the sampling.

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

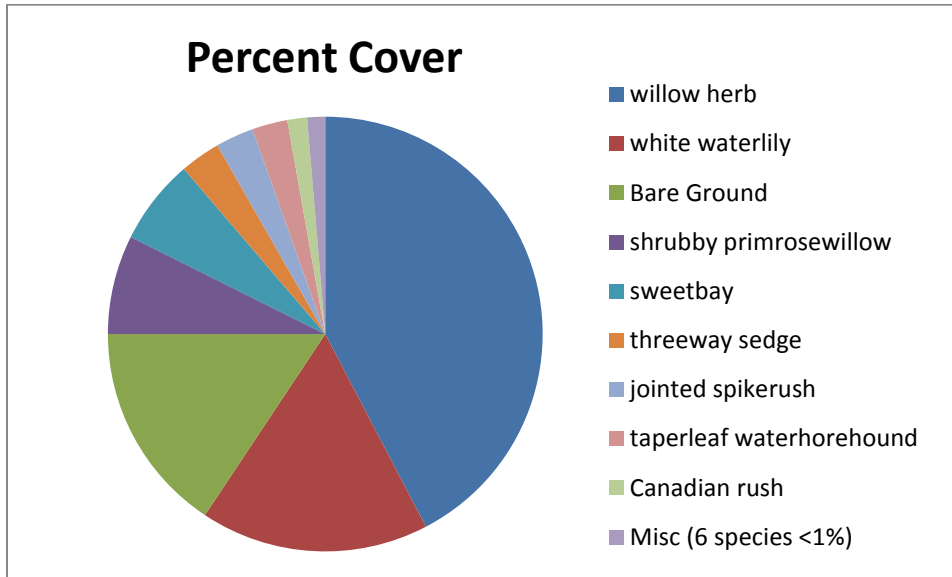


Table PC-4. Percent cover of plant species in Mixed Forested Wetland (Restored) Transect 1 when sampled on October 18, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Decodon verticillatus</i>	willow herb	42.33
<i>Nymphaea odorata</i>	white waterlily	17.00
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	7.37
<i>Magnolia virginiana</i>	sweetbay	6.37
<i>Dulichium arundinaceum</i>	threeway sedge	3.00
<i>Eleocharis equisetoides</i>	jointed spikerush	2.83
<i>Lycopus rubellus</i>	taperleaf waterhorehound	2.63
<i>Juncus canadensis</i>	Canadian rush	1.47
<i>Taxodium ascendens</i>	pond cypress	0.50
<i>Utricularia gibba</i>	humped bladderwort	0.37
<i>Itea virginica</i>	Virginia willow	0.23
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.10
<i>Triadenum virginicum</i>	Virginia marsh St. John's wort	0.10
<i>Panicum hemitomom</i>	maidencane	0.03
	Bare Ground	15.67

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 formed dense shade with occasional openings. Dominant species were sweetbay, swamp tupelo, and Virginia live oak. The dense subcanopy was formed primarily by tree-size black titi, and swamp bay. The moderately dense shrub layer consisted mainly of large gallberry, fetterbush, and sweet pepperbush. The sparse herb layer was primarily sphagnum moss. The muck soil was saturated, but no standing water was present at the time of sampling. The total number of species observed in this community was 33 (Table PC-1).

Quantitative sampling. Transect 2 (Table PC-5, Figure PC-5) had a total of 23 species with 52% bare ground. The dominant shrubs were large gallberry, fetterbush and sweet pepperbush, with lesser amounts of black titi and sweetbay. Sphagnum moss formed most of the sparse herbaceous cover.

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

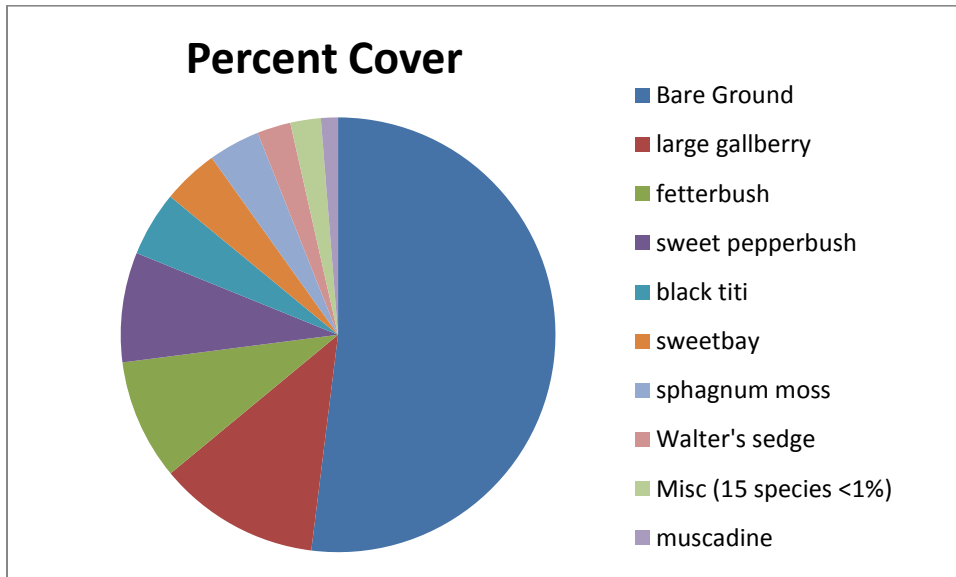


Table PC-5. Percent cover of plant species in Mixed Forested Wetland (Preserved) Transect 2 sampled on October 18, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Ilex coriacea</i>	large gallberry	12.03
<i>Lyonia lucida</i>	fetterbush	8.97
<i>Clethra alnifolia</i>	sweet pepperbush	8.17
<i>Cliftonia monophylla</i>	black titi	4.83
<i>Magnolia virginiana</i>	sweetbay	4.17
<i>Sphagnum</i> sp.	sphagnum moss	3.83
<i>Carex striata</i>	Walter's sedge	2.50
<i>Vitis rotundifolia</i>	muscadine	1.27

Scientific name	Common name	Average percent cover per quadrat
<i>Vaccinium corymbosum</i>	highbush blueberry	0.50
<i>Rhododendron canescens</i>	mountain azalea	0.50
moss	moss	0.37
<i>Woodwardia areolata</i>	netted chain fern	0.23
<i>Smilax laurifolia</i>	laurel greenbrier	0.17
<i>liverwort</i>	liverwort	0.10
<i>Apteria aphylla</i>	nodding nixie	0.10
<i>Persea palustris</i>	swamp bay	0.07
<i>Smilax glauca</i>	cat greenbrier	0.03
<i>Pieris phyllyreifolia</i>	climbing fetterbush	0.03
<i>Vaccinium elliotii</i>	Elliott's blueberry	0.03
<i>Acer rubrum</i>	red maple	0.03
unknown fern	unknown fern	0.03
unknown herb	unknown herb	0.03
unknown woody	unknown woody	0.03
	Bare Ground	51.97

Ward Creek West Mitigation Site
Qualitative and Quantitative Monitoring
December 2017

**Ward Creek West Mitigation Site
Qualitative and Quantitative Monitoring
December 2017**

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 during the fall from 2012 through 2016.

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 the ends of each transects to provide permanent reference points. Two transects were located in the hydric pine flatwoods target community and two in hydric pine savanna (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 botanists Ann Johnson and Kim Gullledge on October 30-November 1, 2017.

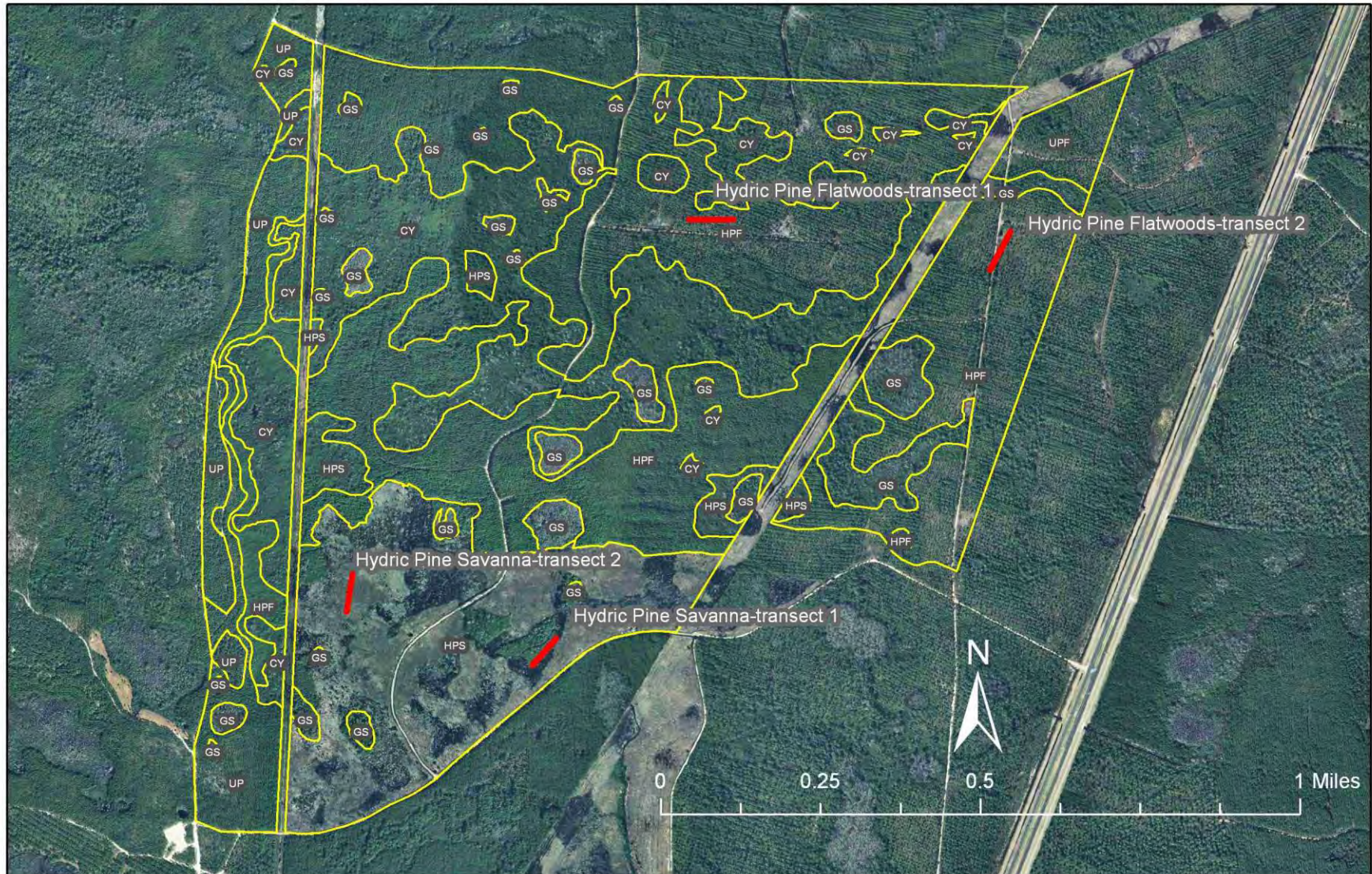


Figure WC-1. Location of permanent transects at Ward Creek West Mitigation Site. CY=Cypress, UP=Upland Pine, HPF=Hydrich Pine Flatwoods, HPS=Hydrich Pine Savanna, GS=Gum Swamp.

RESULTS AND DISCUSSION

A total of 144 plant species were recorded during 2017 monitoring session in the target communities at Ward Creek West (Table WC-1). Twenty-seven new species were recorded during the 2017 monitoring.

Table WC-1. Plant species observed in the target communities at Ward Creek West Mitigation Site on October 24-26, 2016. (bold=new species)

Scientific Name	Common Name	Cypress	Hyaric pine flatwoods	Hyaric pine savanna	Grand Total
<i>Andropogon glomeratus</i>	bushy bluestem			x	1
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem		x	x	2
<i>Andropogon</i> sp.	bluestem		x	x	2
<i>Andropogon virginicus</i>	broomsedge bluestem		x	x	2
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem			x	1
<i>Aristida palustris</i>	longleaf threeawn			x	1
<i>Aristida spiciformis</i>	bottlebrush threeawn		x	x	2
<i>Aristida stricta</i>	wiregrass		x	x	2
<i>Aronia arbutifolia</i>	red chokeberry		x	x	2
<i>Asclepias</i> sp.	milkweed		x		1
<i>Baccharis halimifolia</i>	groundsel tree			x	1
<i>Bartonia paniculata</i>	twining screwstem			x	1
<i>Burmannia biflora</i>	bluethread			x	1
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass			x	1
<i>Carex glaucescens</i>	clustered sedge			x	1
<i>Carphephorus odoratissimus</i>	vanillaleaf		x		1
<i>Chrysopsis mariana</i>	Maryland goldenaster		x		1
<i>Cleistes bifaria</i>	Fernald's pogonia			x	1
<i>Clethra alnifolia</i>	sweet pepperbush	x	x	x	3
<i>Cliftonia monophylla</i>	black titi	x	x	x	3
<i>Coleataenia</i> sp.	panicgrass			x	1
<i>Ctenium aromaticum</i>	toothache grass			x	1
<i>Cyperus haspan</i>	haspan flatsedge	x			1
<i>Cyperus</i> sp.	flatsedge		x		1
<i>Cyrilla racemiflora</i>	titi	x	x	x	3
<i>Dichantherium ensifolium</i>	cypress witchgrass		x	x	2
<i>Dichantherium portoricense</i>	hemlock witchgrass		x		1
<i>Dichantherium</i> sp.	witchgrass		x	x	2
<i>Dichantherium sphaerocarpon</i>	roundseed witchgrass		x		1
<i>Drosera capillaris</i>	pink sundew			x	1
<i>Eleocharis tuberculosa</i>	conecup spikerush		x		1
<i>Eriocaulon decangulare</i>	tenangle pipewort			x	1
<i>Eubotrys racemosus</i>	swamp doghobble	x			1
<i>Eupatorium leucolepis</i>	justiceweed			x	1
<i>Eupatorium mohrii</i>	Mohr's thoroughwort		x	x	2

Scientific Name	Common Name	Cypress	Hyacinth pine flatwoods	Hyacinth pine savanna	Grand Total
<i>Euthamia caroliniana</i>	slender flattop goldenrod		x	x	2
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge			x	1
<i>Gaylussacia dumosa</i>	dwarf huckleberry		x		1
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry		x		1
<i>Gaylussacia mosieri</i>	woolly huckleberry		x		1
<i>Gelsemium sempervirens</i>	yellow jessamine		x		1
<i>Geobalanus oblongifolius</i>	gopher apple		x		1
<i>Helianthus angustifolius</i>	narrowleaf sunflower			x	1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort		x	x	2
<i>Hypericum chapmanii</i>	Chapman's St. John's wort		x	x	2
<i>Hypericum cistifolium</i>	roundpod St. John's wort		x		1
<i>Hypericum crux-andreae</i>	St. Peter's wort		x		1
<i>Hypericum fasciculatum</i>	peelbark St. John's wort			x	1
<i>Hypericum gentianoides</i>	orangegrass		x		1
<i>Hypericum microsepalum</i>	flatwoods St. John's wort		x	x	2
<i>Hypericum</i> sp. seedlings	St. Johns wort		x	x	2
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort		x		1
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	x	x		2
<i>Ilex coriacea</i>	large gallberry		x	x	2
<i>Ilex glabra</i>	gallberry		x	x	2
<i>Ilex vomitoria</i>	yaupon		x	x	2
<i>Juncus marginatus</i>	grassleaf rush		x		1
<i>Juncus scirpoides</i>	needlepod rush		x	x	2
<i>Kalmia hirsuta</i>	hairy wicky		x	x	2
<i>Kelochloa verrucosa</i>	warty panicgrass		x	x	2
<i>Lachnanthes caroliniana</i>	Carolina redroot		x	x	2
<i>Lachnocaulon anceps</i>	whitehead bogbutton		x		1
<i>Liatris elegantula</i>	grassleaf gayfeather			x	1
<i>Liatris spicata</i>	dense gayfeather		x		1
<i>Lobelia brevifolia</i>	shortleaf lobelia			x	1
<i>Ludwigia linifolia</i>	southeastern primrosewillow			x	1
<i>Ludwigia pilosa</i>	hairy primrosewillow		x		1
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow			x	1
<i>Lycopodiella alopecuroides</i>	foxtail club-moss			x	1
<i>Lycopodiella caroliniana</i>	slender club-moss			x	1
<i>Lyonia ferruginea</i>	rusty staggerbush		x	x	2
<i>Lyonia lucida</i>	fetterbush	x	x	x	3
<i>Magnolia virginiana</i>	sweetbay		x		1
<i>Morella caroliniensis</i>	evergreen bayberry	x			1
<i>Morella pumila</i>	dwarf bayberry		x		1
moss	moss		x		1
<i>Muhlenbergia capillaris</i> var. <i>trichopodes</i>	cutover muhly			x	1
<i>Nyssa ursina</i>	bog tupelo			x	1

Scientific Name	Common Name	Cypress	Hyaric pine flatwoods	Hyaric pine savanna	Grand Total
<i>Osmunda cinnamomea</i>	cinnamon fern		x		1
<i>Persea palustris</i>	swamp bay		x		1
<i>Pieris phyllireifolia</i>	climbing fetterbush			x	1
<i>Pinus elliotii</i>	slash pine	x	x	x	3
<i>Pinus palustris</i>	longleaf pine			x	1
<i>Pluchea sp.</i>	camphorweed			x	1
<i>Polygala cruciata</i>	drumheads			x	1
<i>Polygala cymosa</i>	tall pinebarren milkwort			x	1
<i>Polygala lutea</i>	orange milkwort			x	1
<i>Proserpinaca pectinata</i>	combleaf mermaidweed		x	x	2
<i>Pteridium aquilinum</i>	bracken fern			x	1
<i>Quercus minima</i>	dwarf live oak		x		1
<i>Rhexia alifanus</i>	savannah meadowbeauty		x		1
<i>Rhexia nuttallii</i>	Nuttall's 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 canescens</i>	mountain azalea		x		1
<i>Rhus copallinum</i>	winged sumac		x		1
<i>Rhynchospora baldwinii</i>	Baldwin's beaksedge			x	1
<i>Rhynchospora cephalantha</i>	bunched beaksedge			x	1
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge		x	x	2
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge			x	1
<i>Rhynchospora ciliaris</i>	fringed beaksedge		x	x	2
<i>Rhynchospora compressa</i>	flatfruit beaksedge		x		1
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge	x		x	2
<i>Rhynchospora fascicularis</i>	fascicled beaksedge		x	x	2
<i>Rhynchospora fernaldii</i>	Fernald's beaksedge			x	1
<i>Rhynchospora gracilentia</i>	slender beaksedge			x	1
<i>Rhynchospora microcephala</i>	bunched beaksedge		x		1
<i>Rhynchospora plumosa</i>	plumed beaksedge		x	x	2
<i>Rhynchospora sp.</i>	beaksedge		x	x	2
<i>Sabatia brevifolia</i>	shortleaf rosegentian		x		1
<i>Saccharum giganteum</i>	sugarcane plumegrass			x	1
<i>Sarracenia rubra</i>	sweet pitcherplant			x	1
<i>Scleria baldwinii</i>	Baldwin's nutrush			x	1
<i>Scleria sp.</i>	nutrush		x		1
<i>Scleria triglomerata</i>	whip nutrush			x	1
<i>Serenoa repens</i>	saw palmetto		x	x	2
<i>Smilax auriculata</i>	earleaf greenbrier		x		1
<i>Smilax laurifolia</i>	laurel greenbrier	x	x	x	3
<i>Smilax walteri</i>	coral greenbrier			x	1
<i>Solidago fistulosa</i>	pinebarren goldenrod			x	1

Scientific Name	Common Name	Cypress	Hyaric pine	Hyaric pine	Grand Total
			flatwoods	savanna	
<i>Sphagnum</i> sp.	sphagnum moss		x	x	2
<i>Steinchisma hians</i>	gaping panicum		x	x	2
<i>Symphotrichum chapmanii</i>	savannah aster			x	1
<i>Syngonanthus flavidulus</i>	yellow hatpins			x	1
<i>Taxodium ascendens</i>	pond cypress	x		x	2
<i>Tiedemannia filiformis</i> ssp. <i>filiformis</i>	water cowbane			x	1
unknown herb	unknown herb		x	x	2
unknown woody	unknown woody		x		1
<i>Utricularia juncea</i>	southern bladderwort			x	1
<i>Utricularia purpurea</i>	eastern purple bladderwort			x	1
<i>Vaccinium corymbosum</i>	highbush blueberry	x	x		2
<i>Vaccinium darrowii</i>	Darrow's blueberry		x		1
<i>Vaccinium myrsinites</i>	shiny blueberry		x		1
<i>Vitis rotundifolia</i>	muscadine	x	x	x	3
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass		x	x	2
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass		x	x	2
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass		x		1
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass		x	x	2
<i>Xyris fimbriata</i>	fringed yellow-eyed grass			x	1
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass		x	x	2
<i>Xyris jupicai</i>	Richard's yellow-eyed grass		x		1
<i>Xyris</i> sp.	yellow-eyed grass		x	x	2
<i>Xyris stricta</i>	pineland yellow-eyed grass			x	1
Total number of taxa: 144		14	85	100	199

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 Transect 1 (western transect) had been bedded years ago when the pines were planted. This area had a moderately dense shrub stratum and an herbaceous layer composed primarily of purple bluestem. The eastern section near Transect 2 had more saw palmetto and gallberry and a diverse herbaceous cover with scattered patches of wiregrass and beaksedges. The total number of species observed in this community was 85 (Table WC-1).

Quantitative sampling. The western Transect 1 (Table WC-2, Figure WC-2) had a total of 26 species with 47% bare ground. The dominant species were similar to 2016. Purple bluestem contributed the most cover, followed by woody species (large gallberry and black titi, rusty staggerbush, and slash pine seedlings). The eastern Transect 2 (Table WC-3, Figure WC-3) had a total of 45 species with 41% bare ground. The vegetation was more diverse than in Transect 1. Shrubby species contributed most of the cover, primarily and saw palmetto, gallberry, black titi, and blue huckleberry with lesser amounts of dwarf live oak, and flatwoods St. Johns wort. Shortleaf yellow-eyed grass, sphagnum moss, bunched beaksedge, and fascicled beaksedge made up most of the sparse herbaceous cover.

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

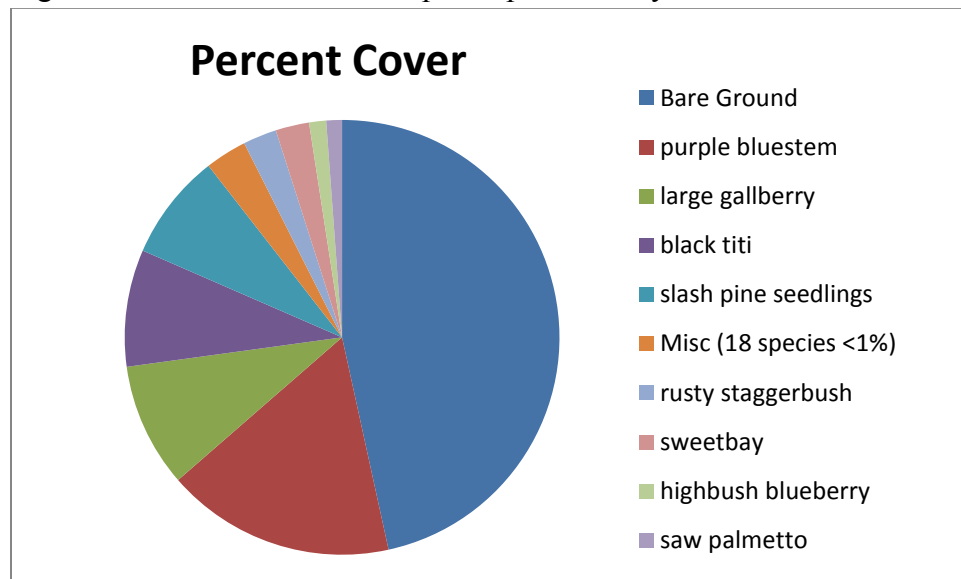


Table WC-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 when sampled on October 31, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	17.03
<i>Ilex coriacea</i>	large gallberry	9.23
<i>Cliftonia monophylla</i>	black titi	8.70
<i>Pinus elliotii</i> seedlings	slash pine seedlings	7.93
<i>Lyonia ferruginea</i>	rusty staggerbush	2.50
<i>Magnolia virginiana</i>	sweetbay	2.50
<i>Vaccinium corymbosum</i>	highbush blueberry	1.27
<i>Serenoa repens</i>	saw palmetto	1.17
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	0.77
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.43
<i>Smilax laurifolia</i>	laurel greenbrier	0.37
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.33
<i>Dichantherium</i> sp.	witchgrass	0.23
<i>Clethra alnifolia</i>	sweet pepperbush	0.20
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.13
<i>Rhynchospora</i> sp.	beaksedge	0.10
<i>Hypericum</i> sp. seedling	Hypericum sp. seedling	0.10
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.10
unknown herb	unknown herb	0.10
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.03
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Rhexia alifanus</i>	savannah meadowbeauty	0.03
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.03
<i>Pinus elliotii</i>	slash pine	0.03
<i>Cyrilla racemiflora</i>	titi	0.03
unknown woody	unknown woody	0.03
	Bare Ground	46.57

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

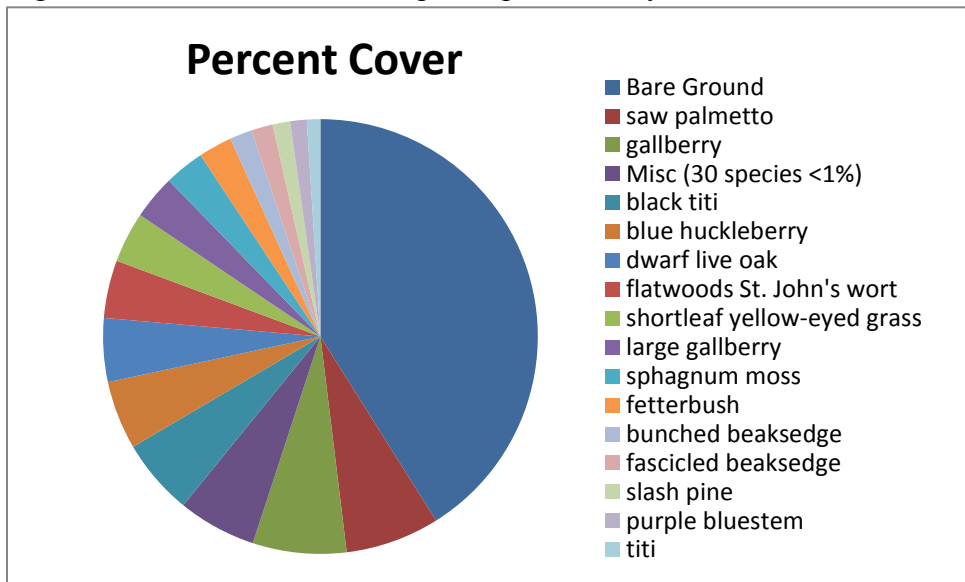


Table WC-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 when sampled on October 31, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Serenoa repens</i>	saw palmetto	7.00
<i>Ilex glabra</i>	gallberry	6.97
<i>Cliftonia monophylla</i>	black titi	5.67
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry	5.10
<i>Quercus minima</i>	dwarf live oak	4.73
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	4.30
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	3.77
<i>Ilex coriacea</i>	large gallberry	3.30
<i>Sphagnum</i> sp.	sphagnum moss	2.97
<i>Lyonia lucida</i>	fetterbush	2.50
<i>Rhynchospora microcephala</i>	bunched beaksedge	1.67
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	1.60
<i>Pinus elliotii</i>	slash pine	1.30
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	1.23
<i>Cyrtia racemiflora</i>	titi	1.00
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.70
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.63
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.50
<i>Vaccinium myrsinites</i>	shiny blueberry	0.50
<i>Pinus elliotii</i> seedlings	slash pine seedlings	0.37
<i>Aronia arbutifolia</i>	red chokeberry	0.30
<i>Dichantherium</i> sp.	witchgrass	0.30
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.23
<i>Carphephorus odoratissimus</i>	vanillaleaf	0.23

Scientific name	Common name	Average percent cover per quadrat
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.23
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass	0.20
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.20
unknown herb	unknown herb	0.17
<i>Smilax auriculata</i>	earleaf greenbrier	0.13
moss	moss	0.13
<i>Dichanthelium sphaerocarpon</i>	roundseed witchgrass	0.13
<i>Rhynchospora</i> sp.	beaksedge	0.10
<i>Andropogon virginicus</i>	broomsedge bluestem	0.10
<i>Vaccinium darrowii</i>	Darrow's blueberry	0.10
<i>Steinchisma hians</i>	gaping panicum	0.10
<i>Vitis rotundifolia</i>	muscadine	0.10
<i>Scleria</i> sp.	nutrush	0.10
<i>Andropogon</i> sp.	bluestem	0.03
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.03
<i>Proserpinaca pectinata</i>	combleaf mermaidweed	0.03
<i>Smilax laurifolia</i>	laurel greenbrier	0.03
<i>Xyris jupicai</i>	Richard's yellow-eyed grass	0.03
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.03
<i>Kelochloa verrucosa</i>	warty panicgrass	0.03
<i>Xyris</i> sp.	yellow-eyed grass	0.03
	Bare Ground	41.07

Hydric Pine Savanna

Qualitative sampling. The hydric pine savanna restoration area was highly disturbed by past silviculture operations. The pines have been harvested and the vegetative cover currently consists of a dense, tall stand of purple bluestem intermixed with widely scattered clumps of wiregrass. Widely scattered young slash pine and pond cypress and shrub clumps of fetterbush, titi and black titi occur throughout. The soil was dry at the time of sampling except in a few lower pockets with standing water. Three state-listed species were found in this community, the threatened Curtiss' sandgrass (*Calamovilfa curtissii*) and red-flowered pitcher plant (*Sarracenia rubra*), plus the endangered upland spreading pogonia (*Cleistes bifaria*). The total number of plant species observed in this community was 100 (Table WC-1).

Quantitative sampling. Transect 1 (Table WC-4, Figure WC-4) had a total of 44 species and 20% bare ground. Groundcover was heavily dominated by purple bluestem, followed by the shrubs peelbark St. John's wort, fetterbush, and black titi. Other herbs contributed small amounts of cover in the wetter portions including fascicled beaksedge, Elliott's yelloweyed grass, tenangle pipewort, and slender beaksedge. The vine, laurel greenbrier, was also common

in the lower portion of the transect. Transect 2 (Table WC-5, Figure WC-5) had a total of 41 species and 41% bare ground. The vegetation was dominated by purple bluestem followed by shrubby species, primarily black titi and fetterbush. Peelbark St. Johns wort was present as seedlings as a result of a prescribed fire in 2017. The next most abundant herbaceous species, totalling less than ten percent of cover, were foxtail club-moss, plumed beaksedge, tenangle pipewort, fascicled beaksedge, and wiregrass.

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

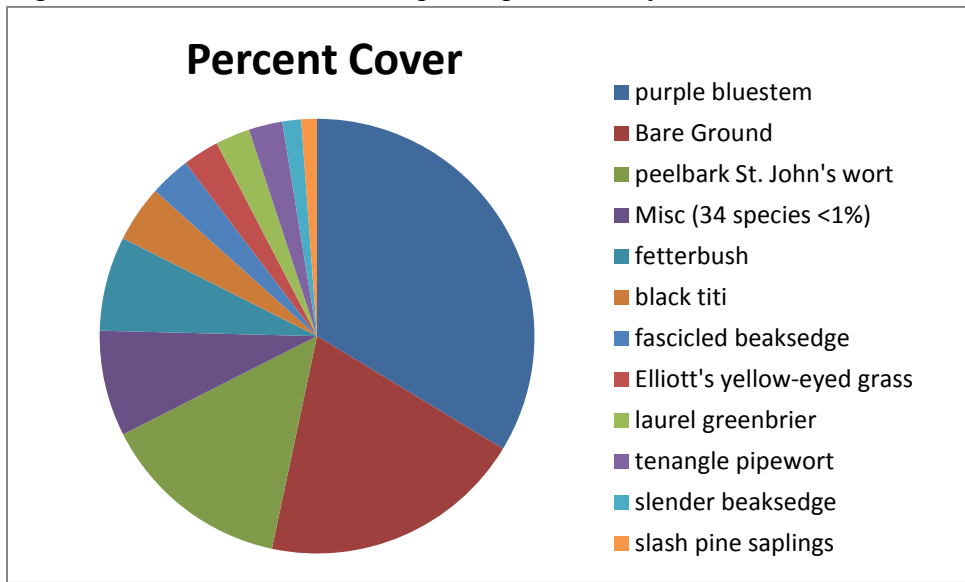


Table WC-4. Percent cover of species in Hydric Pine Savanna Transect 1 sampled on October 30, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	33.67
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	14.20
<i>Lyonia lucida</i>	fetterbush	7.03
<i>Cliftonia monophylla</i>	black titi	4.20
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	3.03
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass	2.70
<i>Smilax laurifolia</i>	laurel greenbrier	2.57
<i>Eriocaulon decangulare</i>	tenangle pipewort	2.50
<i>Rhynchospora gracilentia</i>	slender beaksedge	1.40
<i>Pinus elliotii</i> sapling	slash pine saplings	1.17
<i>Rhynchospora</i> sp.	beaksedge	0.93
<i>Lachnanthes caroliana</i>	Carolina redroot	0.80
<i>Ilex coriacea</i>	large gallberry	0.77
<i>Pinus elliotii</i> seedlings	slash pine seedlings	0.77
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.60
<i>Cyrilla racemiflora</i>	titi	0.40

Scientific name	Common name	Average percent cover per quadrat
<i>Drosera capillaris</i>	pink sundew	0.33
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge	0.33
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.33
<i>Aristida stricta</i>	wiregrass	0.33
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.30
<i>Sphagnum</i> sp.	sphagnum moss	0.27
<i>Pinus elliotii</i> seedlings	slash pine seedlings	0.23
<i>Sarracenia rubra</i>	sweet pitcherplant	0.23
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.13
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.13
unknown herb	unknown herb	0.13
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.10
<i>Pinus taeda</i> seedling	loblolly pine seedlings	0.10
<i>Pinus elliotii</i>	slash pine	0.10
<i>Xyris</i> sp.	yellow-eyed grass	0.10
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.03
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.03
<i>Polygala cruciata</i>	drumheads	0.03
<i>Rhynchospora fernaldii</i>	Fernald's beaksedge	0.03
<i>Cleistes bifaria</i>	Fernald's pogonia	0.03
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.03
<i>Rhexia</i> sp.	meadowbeauty	0.03
<i>Rhexia nuttallii</i>	Nuttall's meadowbeauty	0.03
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.03
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Hypericum</i> sp.	St. John's wort	0.03
<i>Dichanthelium</i> sp.	witchgrass	0.03
<i>Xyris</i> sp.	yellow-eyed grass	0.03
	Bare Ground	19.67

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

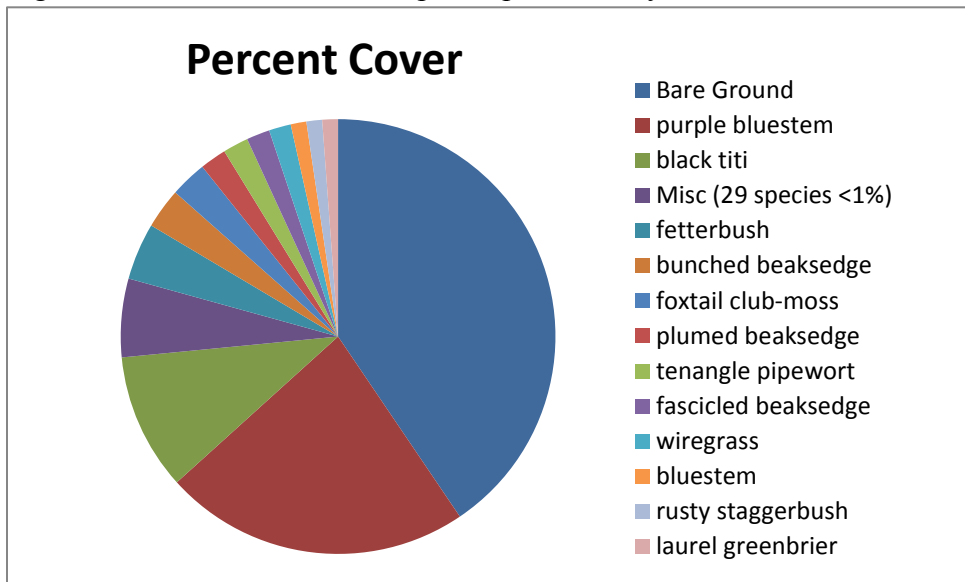


Table WC-5. Percent cover of plant species in Hydric Pine Savanna Transect 2 sampled on October 31, 2017.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	22.77
<i>Cliftonia monophylla</i>	black titi	10.17
<i>Lyonia lucida</i>	fetterbush	4.23
<i>Rhynchospora cephalantha</i>	bunched beaksedge	3.00
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	2.73
<i>Rhynchospora plumosa</i>	plumed beaksedge	1.97
<i>Eriocaulon decangulare</i>	tenangle pipewort	1.90
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	1.73
<i>Aristida stricta</i>	wiregrass	1.63
<i>Andropogon</i> sp.	bluestem	1.17
<i>Smilax laurifolia</i>	laurel greenbrier	1.17
<i>Lyonia ferruginea</i>	rusty staggerbush	1.17
<i>Cyrilla racemiflora</i>	titi	0.80
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.60
<i>Andropogon glomeratus</i>	bushy bluestem	0.50
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.50
<i>Lachnanthes caroliana</i>	Carolina redroot	0.33
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.30
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.30
<i>Pinus elliotii</i> seedlings	slash pine seedlings	0.27
<i>Andropogon virginicus</i>	broomsedge bluestem	0.23
<i>Dichantheium ensifolium</i>	cypress witchgrass	0.23
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.23
<i>Hypericum</i> sp. seedlings	Hypericum sp. seedling	0.20
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.13

Scientific name	Common name	Average percent cover per quadrat
<i>Pteridium aquilinum</i>	bracken fern	0.10
<i>Pluchea</i> sp.	camphorweed	0.10
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	0.10
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	0.10
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.10
<i>Kalmia hirsuta</i>	hairy wicky	0.10
<i>Sphagnum</i> sp.	sphagnum moss	0.10
<i>Hypericum</i> sp.	St. John's wort	0.10
<i>Ctenium aromaticum</i>	toothache grass	0.10
<i>Rhynchospora</i> sp.	beaksedge	0.07
<i>Pinus elliottii</i>	slash pine	0.07
<i>Pinus palustris</i>	longleaf pine	0.03
<i>Helianthus angustifolius</i>	narrowleaf sunflower	0.03
<i>Drosera capillaris</i>	pink sundew	0.03
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.03
unknown herb	unknown herb	0.03
	Bare Ground	40.53

Cypress

Qualitative sampling. The cypress target community was visited at three sites, two in the western portion of the large cypress polygon running east-west across the entire Ward Creek project and one in the smaller cypress polygon on the north boundary of the project area (Figure WC-1). At the large cypress polygon, the canopy consisted of scattered pond cypress trees ca 50 feet tall with a dense subcanopy of tree-sized titi ca 20 ft tall; the sparse shrub layer consisted of widely scattered fetterbush. Cleared openings were dominated by shortbristle horned beaksedge. The swamp edges consisted of either dense evergreen shrubs including titi, highbush blueberry, and swamp doghobble, or scattered clumps of herbs such as haspan, flatsedge, and clustered sedge, plus swamp bayberry. At the time of 2017 sampling, the ground was moist to inundated. The smaller cypress polygon on the north boundary had a few young pond cypress under planted slash pines but consisted mainly of titi and black titi shrubs with laurel greenbriar. The original community in this area may have been wet flatwoods rather than cypress and the pine plantation appears to have been planted through it. Total number of species observed in this community was 14 (Table WC-1).

APPENDIX A

Photographs of Pines Thinned in 2017 in Pine Flatwoods and Hydric Pine Flatwoods



Perdido River: results of recent thinning in Pine Flatwoods, November 2, 2017 (photo by Gary Schultz)



Perdido River: results of recent thinning in Hydric Pine Flatwoods, transect 1, November 2, 2017 (photo by Gary Schultz)



Perdido River: results of recent thinning in Hydric Pine Flatwoods, transect 2, November 2, 2017 (photo by Gary Schultz)