

**Vegetation Monitoring at Four Northwest Florida Water
Management District Mitigation Sites
Fall 2016**

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December 2016

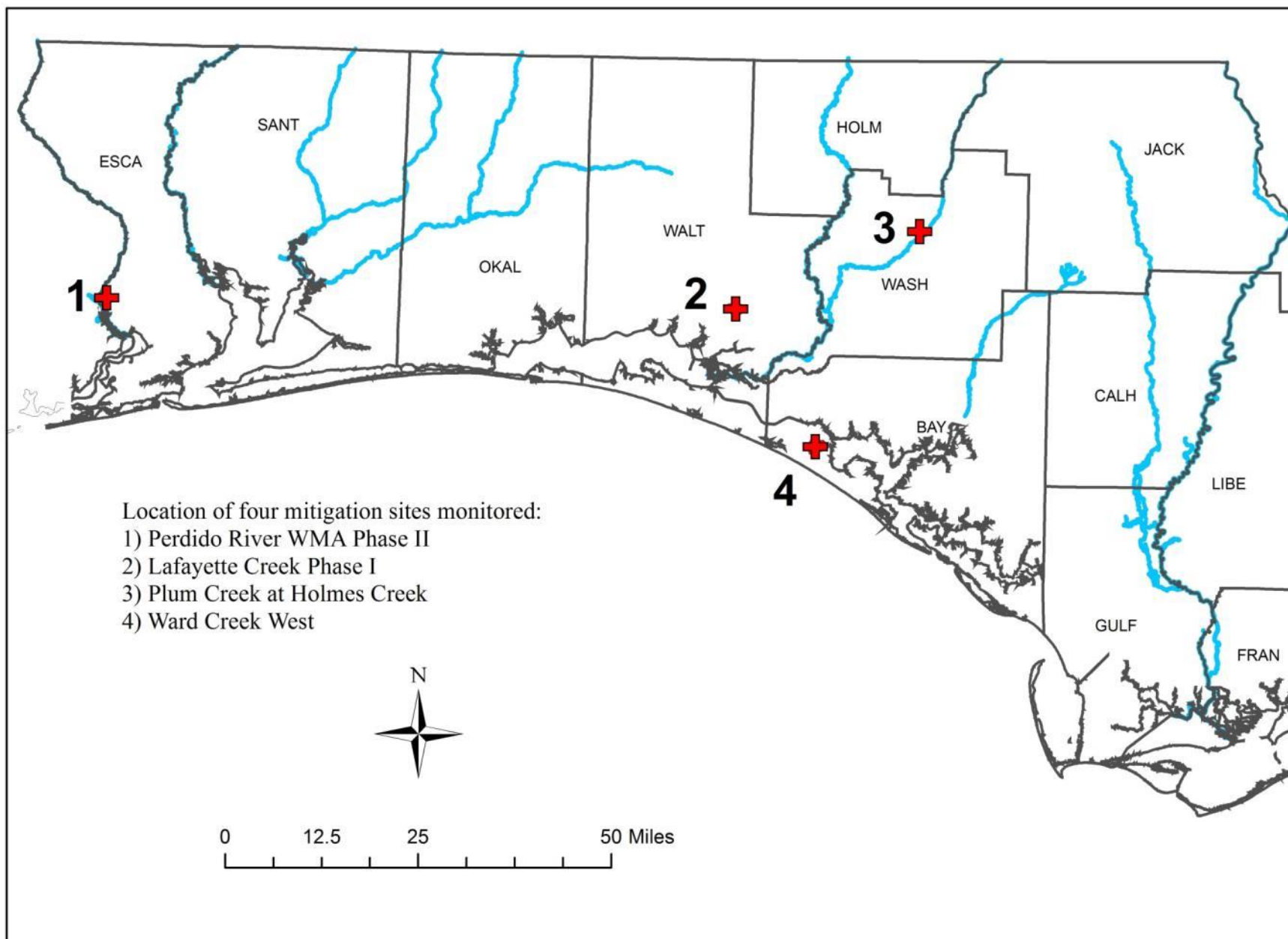
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This document contains separate qualitative and quantitative vegetation monitoring reports for four mitigation sites managed by the Northwest Florida Water Management District:

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

Except for the genus *Dichantheium*, taxonomy follows Wunderlin, R. P., B.F. Hanen, A.R. Franck, and F.B. Essig. 2016. Atlas of Florida Plants (<http://florida.plantatlas.usf.edu/>), Institute for Systematic Botany, University of South Florida, Tampa. *Dichantheium* follows the 2012 treatment by Freckman and Lelong in the Flora of North America (<http://herbarium.usu.edu/treatments/Dichantheium.htm#Dichantheium>).



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), which had been 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 2015.

METHODS

The quantitative monitoring utilized 150-foot long permanent transect lines previously marked at each end with metal t-posts during the 2012 survey. Two transects were in each targeted natural community type: hydric savanna, mixed forested wetland, and hydric pine flatwoods (Figure PR-2). Data recorded consisted of the visually estimated percent cover of each plant species in eight separate meter square quadrats. Tree trunks in quadrats were noted in comments but not recorded as cover; canopy over 2 m in height was also not recorded as cover in quadrats. The quadrats were located at 0, 20, 40, 60, 80, 100, 120, and 140 feet along the left side of the transect line as one stands at the 0-ft quadrat and faces toward the 140-ft quadrat. The qualitative monitoring consisted of recording the species and vegetation structure observed along meandering pedestrian transects through each of the three target communities plus the pine flatwoods area. Field surveys were performed by FNAI botanist Gary Schultz on October 25-26, 2016.

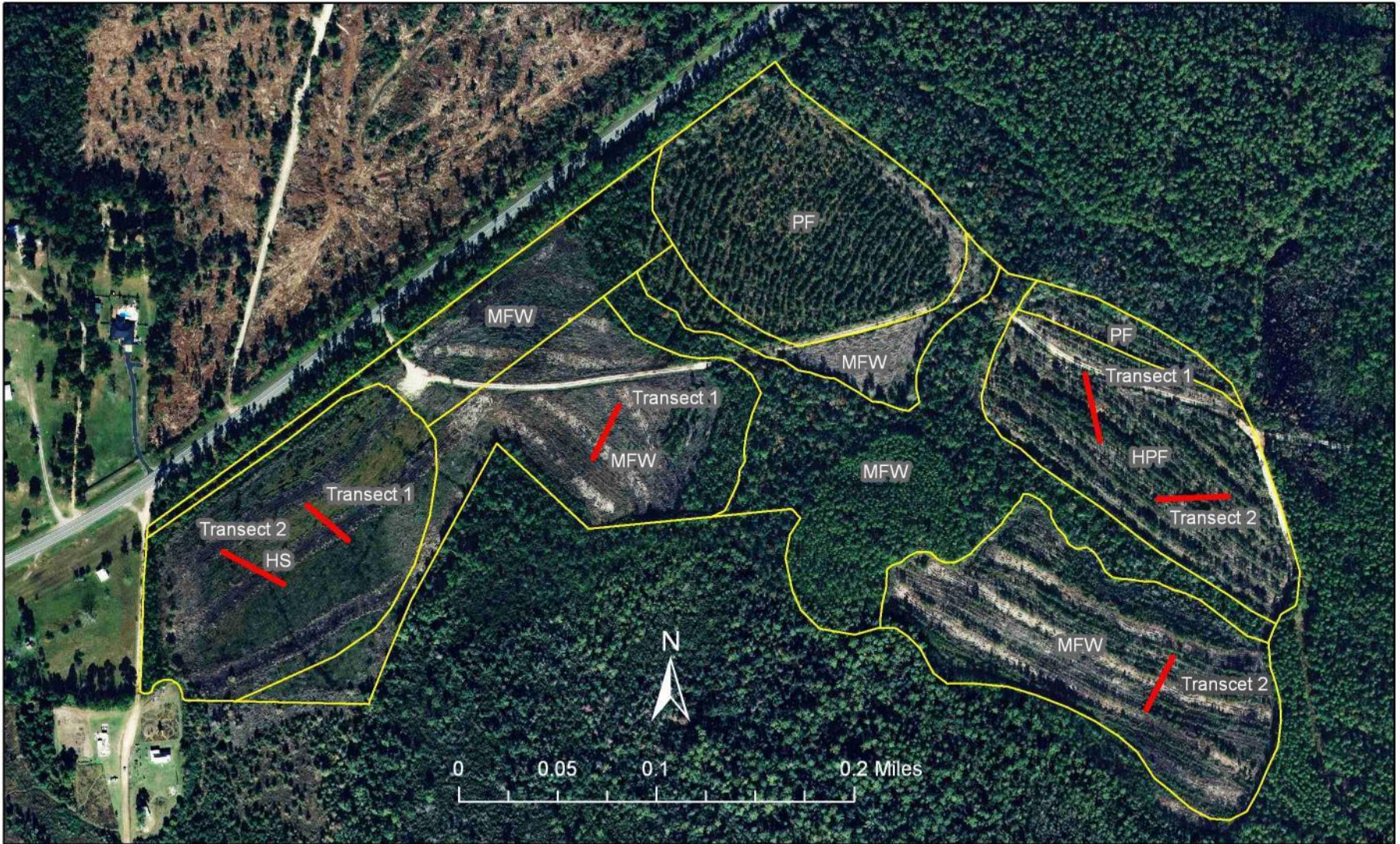


Figure PR-1. Location of permanent transects at Perdido Phase II Mitigation Site. HS=Hydric Savanna, HPF=Hydric Pine Flatwoods, MFW=Mixed Forested Wetlands, PF=Pine Flatwoods.

RESULTS AND DISCUSSION

A total of 107 plant species were observed during the 2016 monitoring of the target communities at Perdido Phase II (Table PR-1).

Table PR-1. Species observed in target communities at Perdido River WMA – Phase II Mitigation Site on October 25 and 26, 2016.

Scientific Name	Common Name	hydic pine flatwoods	hydic savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Acer rubrum</i>	red maple	X	X	X	X	4
<i>Agalinis fasciculata</i>	beach false foxglove				X	1
<i>Andropogon glomeratus</i>	bushy bluestem	X				1
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	X	X	X	X	4
<i>Andropogon virginicus</i>	broomsedge bluestem	X	X		X	3
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	X		X		2
<i>Bidens mitis</i>	smallfruit beggarticks	X	X		X	3
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass	X				1
<i>Carex verrucosa</i>	warty sedge	X		X		2
<i>Castanea pumila</i>	chinquapin			X		1
<i>Centella asiatica</i>	spadeleaf		X			1
<i>Cephalanthus occidentalis</i>	common buttonbush				X	1
<i>Chamaecyparis thyoides</i>	Atlantic white cedar				X	1
<i>Cliftonia monophylla</i>	black titi	X			X	2
<i>Ctenium aromaticum</i>	toothache grass	X				1
<i>Cyperus</i> sp.	flatsedge		X			1
<i>Cyrilla racemiflora</i>	titi	X			X	2
<i>Dichantherium leucothrix</i>	rough witchgrass	X				1
<i>Dichantherium scabriusculum</i>	woolly witchgrass				X	1
<i>Dichantherium</i> sp.	witchgrass	X			X	2
<i>Drosera brevifolia</i>	dwarf sundew				X	1
<i>Drosera capillaris</i>	pink sundew				X	1
<i>Eleocharis vivipara</i>	viviparous spikerush		X		X	2
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	X		X		2
<i>Eragrostis virginica</i>	coastal lovegrass		X		X	2
<i>Eriocaulon compressum</i>	flattened pipewort				X	1
<i>Eriocaulon decangulare</i>	tenangle pipewort				X	1
<i>Eupatorium capillifolium</i>	dogfennel		X			1
<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 flattop goldenrod	X	X	X	X	4

Scientific Name	Common Name	hydric pine flatwoods	hydric savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Gaylussacia mosieri</i>	woolly huckleberry			X	X	2
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	X	X			2
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort		X			1
<i>Hypericum cistifolium</i>	roundpod St. John's wort	X			X	2
<i>Hypericum crux-andreae</i>	St. Peter's Wort	X			X	2
<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>Ilex cassine</i>	dahoon		X		X	2
<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	1
<i>Ilex vomitoria</i>	yaupon			X		1
<i>Juncus dichotomus</i>	forked rush		X			1
<i>Juncus diffusissimus</i>	slimpod rush		X			1
<i>Juniperus virginiana</i>	red cedar		X		X	2
<i>Lachnanthes caroliniana</i>	Carolina redroot		X		X	2
<i>Lachnocaulon anceps</i>	whitehead bogbutton	X			X	2
<i>Ludwigia linearis</i>	narrowleaf primrosewillow				X	1
<i>Ludwigia maritima</i>	seaside primrosewillow	X				1
<i>Ludwigia</i> sp.	primrosewillow				X	1
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow		X			1
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	X	X		X	3
<i>Lycopus rubellus</i>	taperleaf waterhorehound	X				1
<i>Lyonia lucida</i>	fetterbush				X	1
<i>Magnolia virginiana</i>	sweetbay		X	X	X	3
<i>Myrica cerifera</i>	wax myrtle		X	X	X	3
<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>Panicum anceps</i>	beaked panicum			X		1
<i>Panicum verrucosum</i>	warty panicgrass	X	X	X	X	4
<i>Persea borbonia</i>	red bay			X		1
<i>Persea palustris</i>	swamp bay	X	X	X	X	4
<i>Photinia pyrifolia</i>	red chokeberry		X		X	2
<i>Pinus elliotii</i>	slash pine		X		X	2
<i>Pinus glabra</i>	spruce pine				X	1

Scientific Name	Common Name	hydric pine flatwoods	hydric savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Pinus taeda</i>	loblolly pine	X		X	X	3
<i>Proserpinaca pectinata</i>	combleaf mermaidweed		X			1
<i>Pteridium aquilinum</i>	bracken fern				X	1
<i>Quercus michauxii</i>	swamp chestnut oak				X	1
<i>Quercus nigra</i>	water oak	X		X	X	3
<i>Rhexia</i> sp.	meadowbeauty				X	1
<i>Rhexia virginica</i>	handsome harry	X	X		X	3
<i>Rhynchospora cephalantha</i>	bunched beaksedge		X		X	2
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge				X	1
<i>Rhynchospora fascicularis</i>	fascicled beaksedge		X		X	2
<i>Rhynchospora</i> sp.	beaksedge	X	X		X	3
<i>Rubus pensilvanicus</i>	sawtooth blackberry	X	X		X	3
<i>Rubus trivialis</i>	southern dewberry	X				1
<i>Saccharum giganteum</i>	sugarcane plumegrass		X			1
<i>Scirpus cyperinus</i>	woolgrass		X			1
<i>Serenoa repens</i>	saw palmetto				X	1
<i>Sesbania vesicaria</i>	bladderpod				X	1
<i>Smilax glauca</i>	cat greenbrier	X			X	2
<i>Smilax laurifolia</i>	laurel greenbrier				X	1
<i>Solidago fistulosa</i>	pinebarren goldenrod	X	X	X	X	4
<i>Sphagnum</i> sp.	sphagnum moss	X	X		X	3
<i>Symphyotrichum dumosum</i>	rice button aster	X				1
<i>Taxodium ascendens</i>	pond cypress		X		X	2
<i>Taxodium distichum</i>	bald cypress		X		X	2
<i>Toxicodendron radicans</i>	eastern poison ivy	X	X			2
unknown moss	unknown moss		X	X	X	3
<i>Vaccinium corymbosum</i>	highbush blueberry	X	X	X		3
<i>Vaccinium elliotii</i>	Elliott's blueberry			X		1
<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				1
<i>Vitis rotundifolia</i>	muscadine	X	X	X	X	4
<i>Woodwardia areolata</i>	netted chain fern	X	X	X	X	4
<i>Woodwardia virginica</i>	Virginia chain fern	X	X	X	X	4
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	X			X	2
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass				X	1
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass				X	1

Scientific Name	Common Name	hydric pine flatwoods	hydric savanna	pine flatwoods	mixed forested wetland	Grand Total
<i>Xyris fimbriata</i>	fringed yellow-eyed grass		X			1
<i>Xyris</i> sp.	yellow-eyed grass				X	1
Total number of species: 107		48	48	32	72	200

Hydric Savanna

Qualitative sampling. The disturbed hydric savanna restoration area was dominated by sphagnum moss, purple bluestem, pinebarren goldenrod, and viviparous spikerush. Shrubs were primarily coastalplain St. John’s wort, sawtooth blackberry, and swamp bay growing along the slightly elevated windrows formed when the land was cleared for silviculture. Occasional slash pine and red maple saplings were widely scattered. Table PR-1 provides a comprehensive list of the 48 plant species identified in this community.

Quantitative sampling. Transect 1 (Table PR-2, Figure PR-2) had a total of 26 species. Their total cover made up more than 100% of the area since sphagnum moss underlay the other species. In order to represent relative species cover in Figure PR-2 below, percent of total vegetative cover 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, purple bluestem, and handsome harry. Transect 2 (Table PR-3, Figure PR-3) had a total of 27 species which also covered more than 100% of the area. The dominant species were sphagnum moss, Virginia chainfern, Carolina redroot, smallfruit beggarticks, purple bluestem, and pinebarren goldenrod.

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

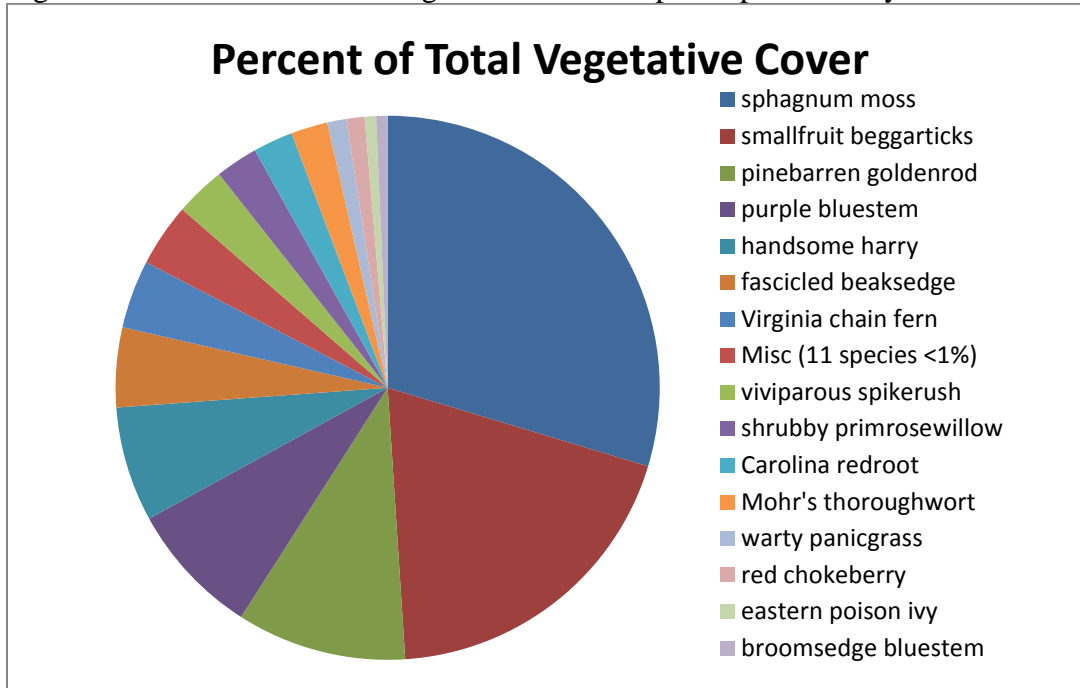


Table PR-2. Percent total vegetative cover of plant species in Hydric Savanna Transect 1 when sampled on October 25, 2016.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum</i> sp.	sphagnum moss	60.31
<i>Bidens mitis</i>	smallfruit beggarticks	39.25
<i>Solidago fistulosa</i>	pinebarren goldenrod	20.50
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	16.19
<i>Rhexia virginica</i>	handsome harry	13.88
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	9.63
<i>Woodwardia virginica</i>	Virginia chain fern	8.25
<i>Eleocharis vivipara</i>	viviparous spikerush	6.06
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	5.13
<i>Lachnanthes caroliana</i>	Carolina redroot	4.81
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	4.44
<i>Panicum verrucosum</i>	warty panicgrass	2.31
<i>Photinia pyrifolia</i>	red chokeberry	2.19
<i>Toxicodendron radicans</i>	eastern poison ivy	1.38
<i>Andropogon virginicus</i>	broomsedge bluestem	1.38
<i>Vitis rotundifolia</i>	muscadine	0.94
<i>Persea palustris</i>	swamp bay	0.94
<i>Rhynchospora</i> sp.	beaksedge	0.81
<i>Saccharum giganteum</i>	sugarcane plumegrass	0.44

Scientific name	Common name	Average percent cover per quadrat
<i>Juncus dichotomus</i>	forked rush	0.44
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.38
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	0.31
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.19
<i>Eragrostis virginica</i>	coastal lovegrass	0.19
<i>Acer rubrum</i>	red maple	0.19
<i>Oldenlandia uniflora</i>	clustered mille grains	0.06
	Bare ground	0.00

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

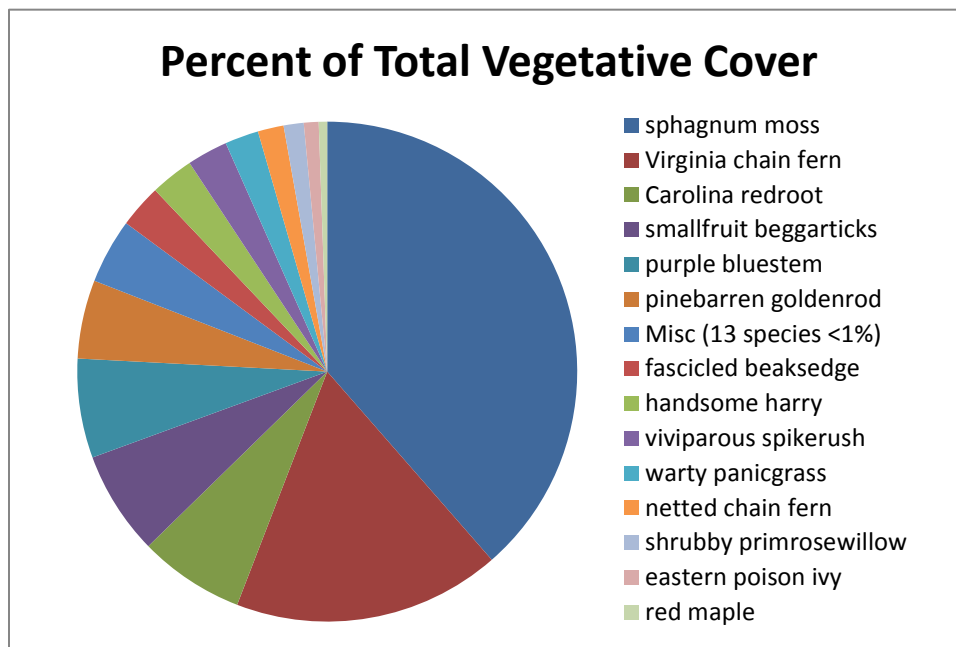


Table PR-3. Percent cover of plant species in Hydric Savanna Transect 2 when sampled on October 25, 2016.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum</i> sp.	sphagnum moss	70.63
<i>Woodwardia virginica</i>	Virginia chain fern	31.69
<i>Lachnanthes caroliniana</i>	Carolina redroot	12.50
<i>Bidens mitis</i>	smallfruit beggarticks	12.31
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	11.75
<i>Solidago fistulosa</i>	pinebarren goldenrod	9.31
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	5.13
<i>Rhexia virginica</i>	handsome harry	5.13
<i>Eleocharis vivipara</i>	viviparous spikerush	4.81

Scientific name	Common name	Average percent cover per quadrat
<i>Panicum verrucosum</i>	warty panicgrass	4.00
<i>Woodwardia areolata</i>	netted chain fern	3.06
<i>Ludwigia suffruticosa</i>	shrubby primrosewillow	2.38
<i>Toxicodendron radicans</i>	eastern poison ivy	1.75
<i>Acer rubrum</i>	red maple	1.00
<i>Andropogon virginicus</i>	broomsedge bluestem	0.94
<i>Oldenlandia uniflora</i>	clustered mille grains	0.94
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	0.56
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.50
<i>Cyperus</i> sp.	flatsedge	0.50
<i>Saccharum giganteum</i>	sugarcane plumegrass	0.44
<i>Centella asiatica</i>	spadeleaf	0.38
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.19
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.19
<i>Proserpinaca pectinata</i>	combleaf mermaidweed	0.13
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.06
<i>Juncus diffusissimus</i>	slimpod rush	0.06
<i>Juncus dichotomus</i>	forked rush	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 71 observed plant species (Table PR-1). The vegetative cover was dominated by the tall grasses purple bluestem and broomsedge bluestem. Sphagnum moss, pinebarren goldenrod, beakrush, and witchgrass were common. The shrubs black titi, fetterbush, and sawtooth blackberry were mainly on slightly elevated windrows from past silviculture activities. Sapling slash and spruce pines were widely scattered throughout.

Quantitative sampling. Transect 1 had a total of 47 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, spruce pine, and sawtooth blackberry. Transect 2 (Table PR-5, Figure PR-5) had a total of 32 species with no bare ground. The highest percent cover was by purple bluestem, followed by loblolly pine saplings, and smaller amounts of sphagnum moss, sawtooth blackberry, and black titi.

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

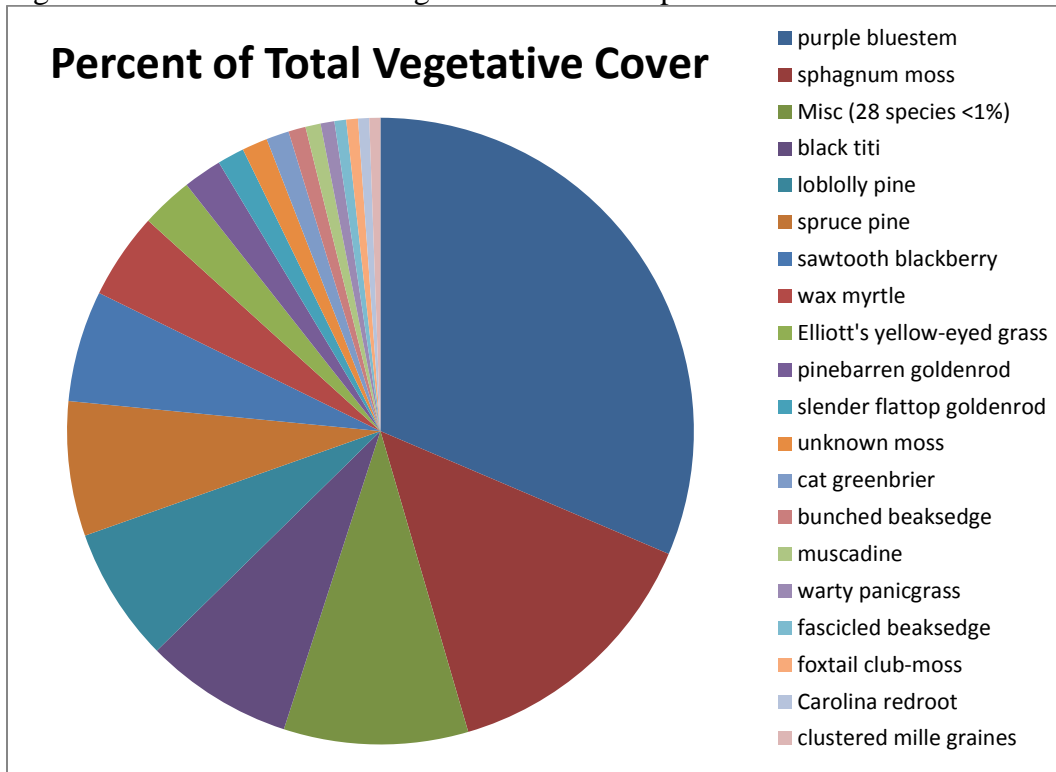


Table PR-4. Percent cover of plant species in Mixed Forested Wetland Transect 1 when sampled on October 26, 2016.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	55.13
<i>Sphagnum</i> sp.	sphagnum moss	24.69
<i>Cliftonia monophylla</i>	black titi	13.44
<i>Pinus taeda</i>	loblolly pine	12.19
<i>Pinus glabra</i>	spruce pine	12.19
<i>Rubus pensilvanicus</i>	sawtooth blackberry	10.06
<i>Myrica cerifera</i>	wax myrtle	7.81
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass	4.69
<i>Solidago fistulosa</i>	pinebarren goldenrod	3.50
<i>Euthamia caroliniana</i>	slender flattop goldenrod	2.44
unknown moss	unknown moss	2.31
<i>Smilax glauca</i>	cat greenbrier	2.06
<i>Rhynchospora cephalantha</i>	bunched beaksedge	1.56
<i>Vitis rotundifolia</i>	muscadine	1.38
<i>Panicum verrucosum</i>	warty panicgrass	1.25
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	1.06

Scientific name	Common name	Average percent cover per quadrat
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	1.06
<i>Lachnanthes caroliana</i>	Carolina redroot	1.00
<i>Oldenlandia uniflora</i>	clustered mille grains	1.00
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.94
<i>Ludwigia</i> sp.	primrosewillow	0.94
<i>Rhexia virginica</i>	handsome harry	0.63
<i>Woodwardia virginica</i>	Virginia chain fern	0.50
<i>Dichantherium</i> sp.	witchgrass	0.44
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.44
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort	0.44
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	0.44
<i>Andropogon virginicus</i>	broomsedge bluestem	0.44
<i>Ilex glabra</i>	gallberry	0.44
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	0.44
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.25
<i>Eleocharis vivipara</i>	viviparous spikerush	0.19
<i>Eragrostis virginica</i>	coastal lovegrass	0.19
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.19
<i>Taxodium distichum</i>	bald cypress	0.19
<i>Cephalanthus occidentalis</i>	common buttonbush	0.19
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.19
<i>Osmunda cinnamomea</i>	cinnamon fern	0.19
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.19
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.13
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.06
<i>Drosera brevifolia</i>	dwarf sundew	0.06
<i>Xyris</i> sp.	yellow-eyed grass	0.06
<i>Rhynchospora</i> sp.	beaksedge	0.06
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	0.06
<i>Eriocaulon compressum</i>	flattened pipewort	0.06
<i>Drosera capillaris</i>	pink sundew	0.06
	Bare ground	0.00

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

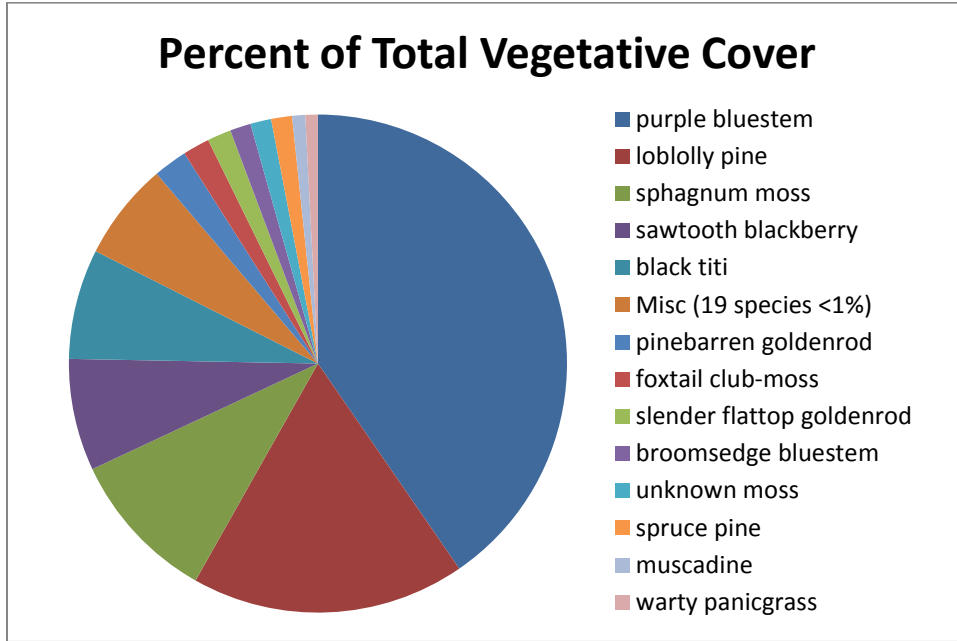


Table PR-5. Percent cover of plant species in Mixed Forested Wetland Transect 2 when sampled on October 25, 2016.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	65.31
<i>Pinus taeda</i>	loblolly pine	28.75
<i>Sphagnum</i> sp.	sphagnum moss	15.94
<i>Rubus pensilvanicus</i>	sawtooth blackberry	11.75
<i>Cliftonia monophylla</i>	black titi	11.56
<i>Solidago fistulosa</i>	pinebarren goldenrod	3.56
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	2.81
<i>Euthamia caroliniana</i>	slender flattop goldenrod	2.50
<i>Andropogon virginicus</i>	broomsedge bluestem	2.19
unknown moss	unknown moss	2.19
<i>Pinus glabra</i>	spruce pine	2.19
<i>Vitis rotundifolia</i>	muscadine	1.38
<i>Panicum verrucosum</i>	warty panicgrass	1.31
<i>Persea palustris</i>	swamp bay	0.94
<i>Woodwardia areolata</i>	netted chain fern	0.94
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.75
<i>Acer rubrum</i>	red maple	0.63
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.44
<i>Ilex cassine</i>	dahoon	0.44

Scientific name	Common name	Average percent cover per quadrat
<i>Viola primulifolia</i>	primroseleaf violet	0.44
<i>Osmunda cinnamomea</i>	cinnamon fern	0.44
<i>Ilex coriacea</i>	large gallberry	0.44
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.44
<i>Oldenlandia uniflora</i>	clustered mille grains	0.38
<i>Smilax glauca</i>	cat greenbrier	0.25
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.19
<i>Eragrostis virginica</i>	coastal lovegrass	0.19
<i>Smilax laurifolia</i>	laurel greenbrier	0.19
<i>Rhynchospora</i> sp.	beaksedge	0.19
<i>Magnolia virginiana</i>	sweetbay	0.19
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.06
<i>Rhexia</i> sp.	meadowbeauty	0.06
	Bare ground	0.00

Hydric Pine Flatwoods

Qualitative monitoring. The target community of hydric pine flatwoods had a total of 48 plant species (Table PR-1). The nearly closed canopy of planted loblolly pines was about 30 feet tall. The open shrub layer consisted mainly of sawtooth blackberry and swamp bay. Vines of muscadine grape were common. The bedded ground frequently had patches bare of vegetation and covered by pine needle litter. The herbaceous layer was dominated by wiregrass, warty panicum, sphagnum, and broomsedge bluestem. Loblolly pine seedlings were common throughout. Several plants of Curtiss' sandgrass (*Calamovilfa curtissii*), state listed as threatened, were noted in this community in both 2015 and 2016.

Quantitative monitoring. Transect 1 had a total of 25 species with 29% bare ground (i.e., unvegetated ground; Figure PR-6, Table PR-6). Muscadine, warty panicum, and wiregrass were the most abundant herbs. Transect 2 (Figure PR-7, Table PR-7) had a total of 35 species with 47% bare ground. Wiregrass was the dominant cover followed by cinnamon fern with lesser amounts of muscadine and netted chain fern. Drought in the fall of 2016 combined with the late survey date may account for the increase in bare ground and lack of sphagnum moss in this transect compared to 2015.

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

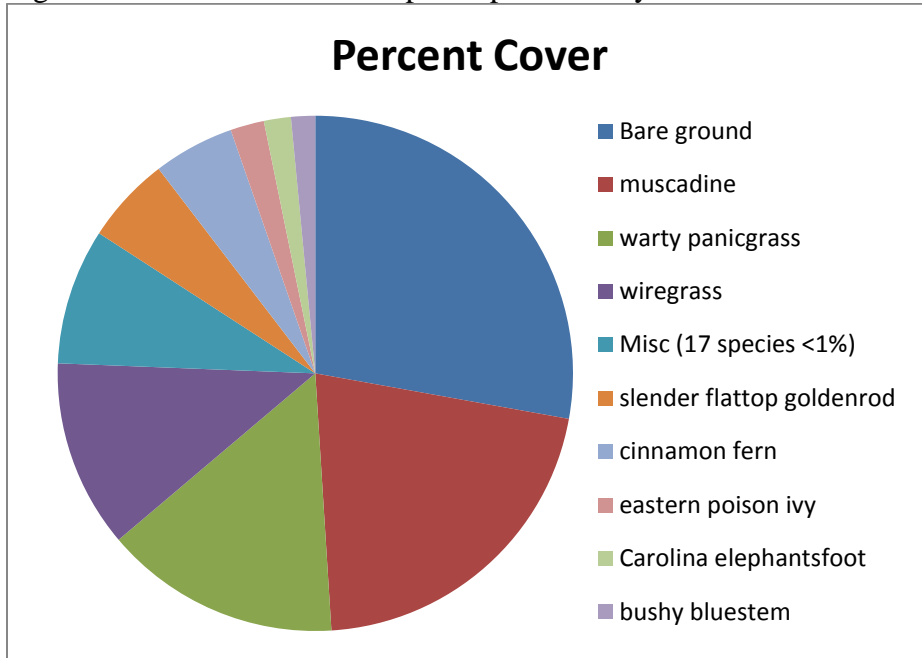


Table PR-6. Percent cover of species in Hydric Pine Flatwoods Transect 1 when sampled on October 26, 2016.

Scientific name	Common name	Average percent cover per quadrat
<i>Vitis rotundifolia</i>	muscadine	21.88
<i>Panicum verrucosum</i>	warty panicgrass	15.31
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	12.19
<i>Euthamia caroliniana</i>	slender flattop goldenrod	5.63
<i>Osmunda cinnamomea</i>	cinnamon fern	5.25
<i>Toxicodendron radicans</i>	eastern poison ivy	2.19
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	1.75
<i>Andropogon glomeratus</i>	bushy bluestem	1.56
<i>Sphagnum</i> sp.	sphagnum moss	0.88
<i>Pinus taeda</i>	loblolly pine	0.88
<i>Oldenlandia uniflora</i>	clustered mille graines	0.63
<i>Andropogon virginicus</i>	broomsedge bluestem	0.63
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.63
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.50
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	0.38
<i>Dichanthelium leucothrix</i>	rough witchgrass	0.19
<i>Smilax glauca</i>	cat greenbrier	0.19
<i>Symphyotrichum dumosum</i>	rice button aster	0.19
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.06
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.06

Scientific name	Common name	Average percent cover per quadrat
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.06
<i>Vaccinium corymbosum</i>	highbush blueberry	0.06
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	0.06
<i>Viola lanceolata</i>	bog white violet	0.06
<i>Viola sororia</i>	common blue violet	0.06
	Bare ground	28.75

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

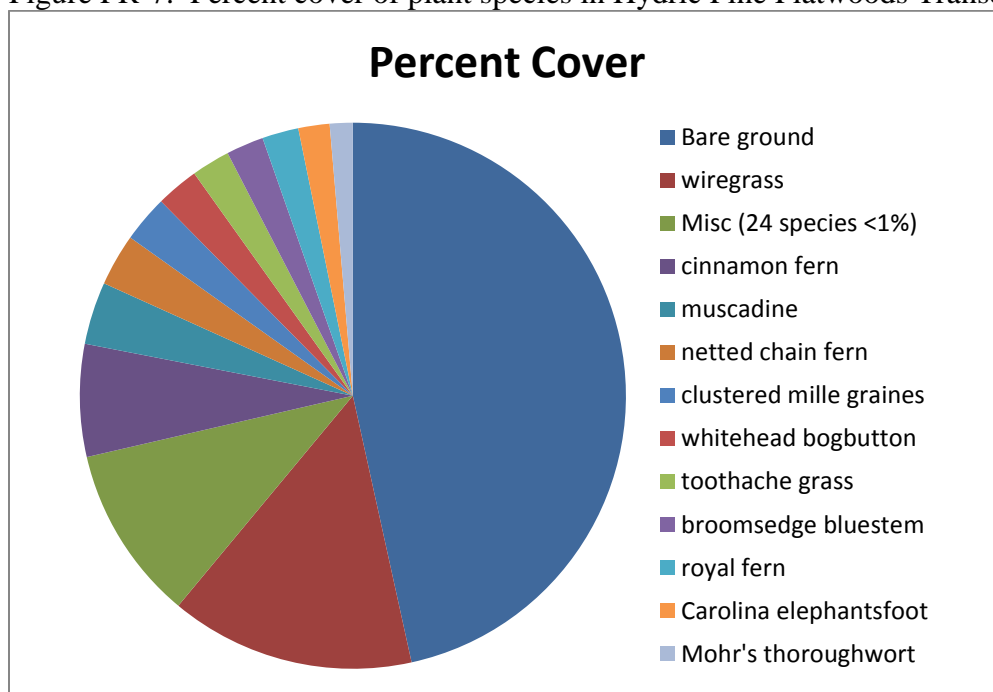


Table PR-7. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 when sampled on October 25, 2016.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	14.69
<i>Osmunda cinnamomea</i>	cinnamon fern	6.75
<i>Vitis rotundifolia</i>	muscadine	3.75
<i>Woodwardia areolata</i>	netted chain fern	3.13
<i>Oldenlandia uniflora</i>	clustered mille grains	2.81
<i>Lachnocaulon anceps</i>	whitehead bogbutton	2.56
<i>Ctenium aromaticum</i>	toothache grass	2.31

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon virginicus</i>	broomsedge bluestem	2.25
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	2.19
<i>Elephantopus carolinianus</i>	Carolina elephantsfoot	1.88
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	1.38
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.94
<i>Dichanthelium</i> sp.	witchgrass	0.88
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	0.81
<i>Smilax glauca</i>	cat greenbrier	0.75
<i>Toxicodendron radicans</i>	eastern poison ivy	0.69
<i>Vaccinium corymbosum</i>	highbush blueberry	0.63
<i>Viola primulifolia</i>	primroseleaf violet	0.44
<i>Persea palustris</i>	swamp bay	0.44
<i>Pinus taeda</i>	loblolly pine	0.44
<i>Cyrilla racemiflora</i>	titi	0.44
<i>Rubus trivialis</i>	southern dewberry	0.44
<i>Woodwardia virginica</i>	Virginia chain fern	0.44
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.44
<i>Viola lanceolata</i>	bog white violet	0.25
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.19
<i>Rhynchospora</i> sp.	beaksedge	0.19
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.19
<i>Quercus nigra</i>	water oak	0.19
<i>Ludwigia maritima</i>	seaside primrosewillow	0.06
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	0.06
<i>Viola sororia</i>	common blue violet	0.06
<i>Acer rubrum</i>	red maple	0.06
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.06
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.06
	Bare ground	47.19

Pine Flatwoods

Qualitative monitoring. A total of 32 species (Table PR-1) were observed in the pine flatwoods area. The open canopy was dominated by mature loblolly pines 30-50 feet tall. The hardwoods in the subcanopy had been cut down in 2014 and the logs remained on the ground. 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, along with royal fern, cinnamon fern, netted chain fern, and Virginia chain fern.