

Vegetation Monitoring at Six Northwest Florida Water Management District Mitigation Sites

Fall 2022

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Funding for this project was provided by the Northwest Florida Water Management District under the agreement PO#00230059-000 with the Florida Natural Areas Inventory
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This document contains separate qualitative and quantitative vegetation monitoring reports for six mitigation sites (Figure 1) 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
- 5) Dutex West in Escambia County
- 6) Yellow River Ranch in Santa Rosa 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 (Table 1).

Table 1. Changes to scientific names adopted in 2017 from those used in the 2016 and prior reports.

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>Galactia volubilis</i> or <i>regularis</i>	<i>Galactia minor</i>	leafy milkpea
<i>Gaura angustifolia</i>	<i>Oenothera simulans</i>	southern beeblossum
<i>Gratiola pilosa</i>	<i>Sophronanthe pilosa</i>	shaggy hedgehyssop
<i>Leucothoe racemosa</i>	<i>Eubotrys racemosus</i>	swamp doghobble
<i>Licania michauxii</i>	<i>Geobalanus oblongifolius</i>	gopher apple
<i>Muhlenbergia expansa</i>	<i>Muhlenbergia capillaris</i> var. <i>trichopodes</i>	cutover muhly
<i>Myrica caroliniensis</i>	<i>Morella caroliniensis</i>	evergreen bayberry
<i>Myrica cerifera</i>	<i>Morella cerifera</i>	southern bayberry
<i>Myrica inodora</i>	<i>Morella inodora</i>	odorless 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 longifolium</i>	<i>Coleataenia longifolia</i>	ciliate redtop panicum
<i>Panicum verrucosum</i>	<i>Kellochloa verrucosa</i>	warty panicum
<i>Photinia pyrifolia</i>	<i>Aronia arbutifolia</i>	red chokeberry
<i>Pluchea rosea</i>	<i>Pluchea baccharis</i>	rosy camphorweed
<i>Polygonum punctatum</i>	<i>Persicaria punctata</i>	dotted smartweed
<i>Rubus argutus</i>	<i>Rubus pensylvanicus</i>	sawtooth blackberry
<i>Sapium sabiferum</i>	<i>Triadica sebifera</i>	Chinese tallow tree
<i>Schizachyrium scoparium</i>	<i>Schizachyrium stoloniferum</i>	creeping little bluestem

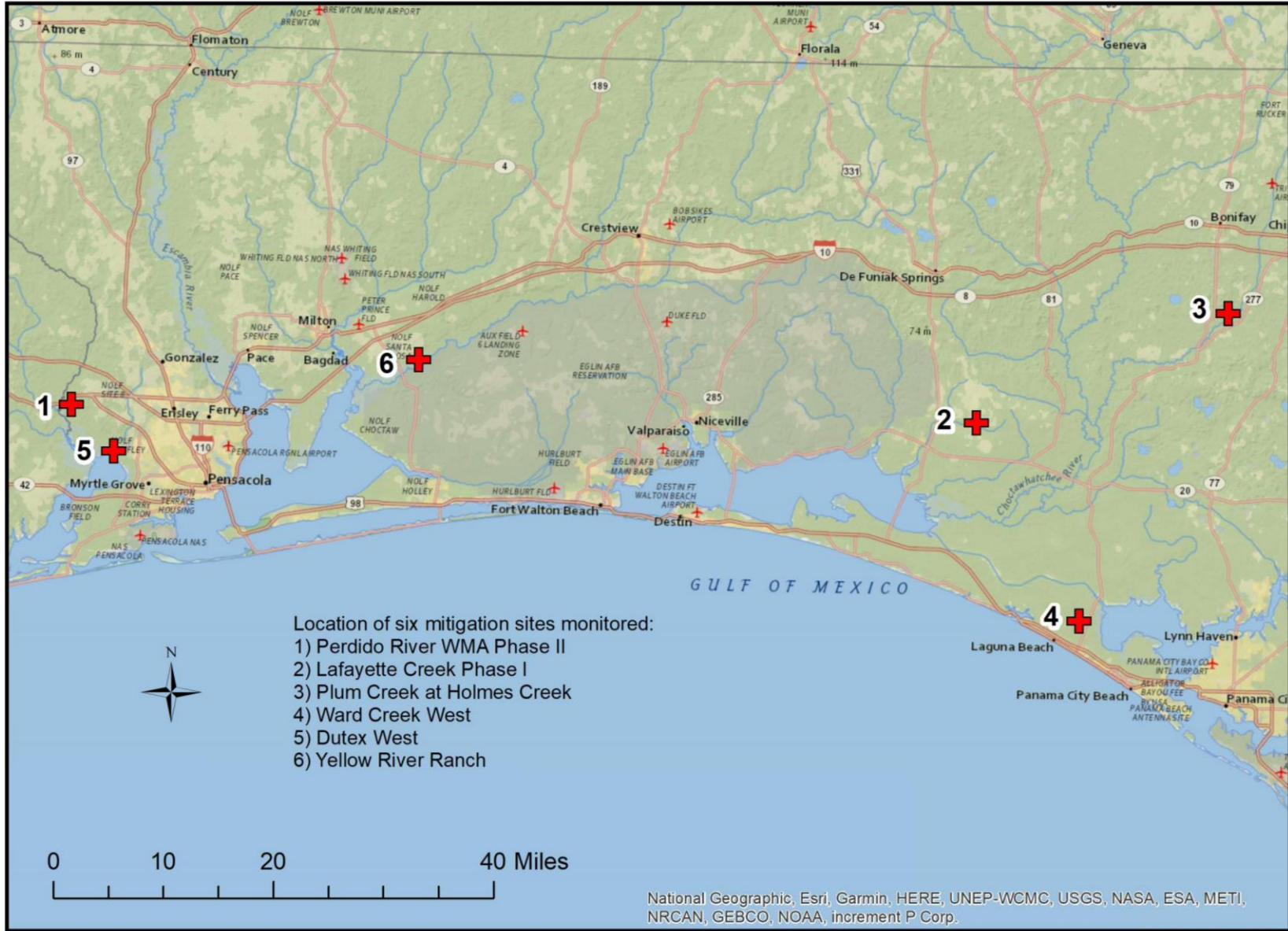


Figure 1. Location map of six NWFWM mitigation sites monitored by FNAI.

PERDIDO RIVER WATER MANAGEMENT AREA – PHASE II MITIGATION SITE

Qualitative and Quantitative Monitoring

November 2022

Perdido River Water Management Area – Phase II Mitigation Site
Qualitative and Quantitative Monitoring
October 2021

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 Wetland Forest Mixed (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 every fall from 2012 to 2021.

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, Wetland Forest Mixed, and Hydric Pine Flatwoods (Figure PR-1). Along each transect line, eight 1m x 1m quadrats were placed along the left side, beginning at 0 and then spaced every 20 feet. Data recorded in each quadrat consisted of the visually estimated percent cover of each plant species, including individuals rooted in the quadrat as well as overhanging. Canopy over 2 m in height was excluded from cover estimates. Only the lower 2 m portions of larger individuals were counted as cover, including the lower portions of tree trunks rooted in quadrats. Bare ground was estimated in each quadrat as a percentage of ground not obscured by plant cover or large woody debris. This represents a slight change in procedure from FNAI monitoring reports up to 2017 where percent bare ground was calculated by subtracting the total percent for all species from 100.

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 botanists Kim Alexander, Amy Jenkins, Ethan Hughes, and Kelly Anderson on November 29, 2022.

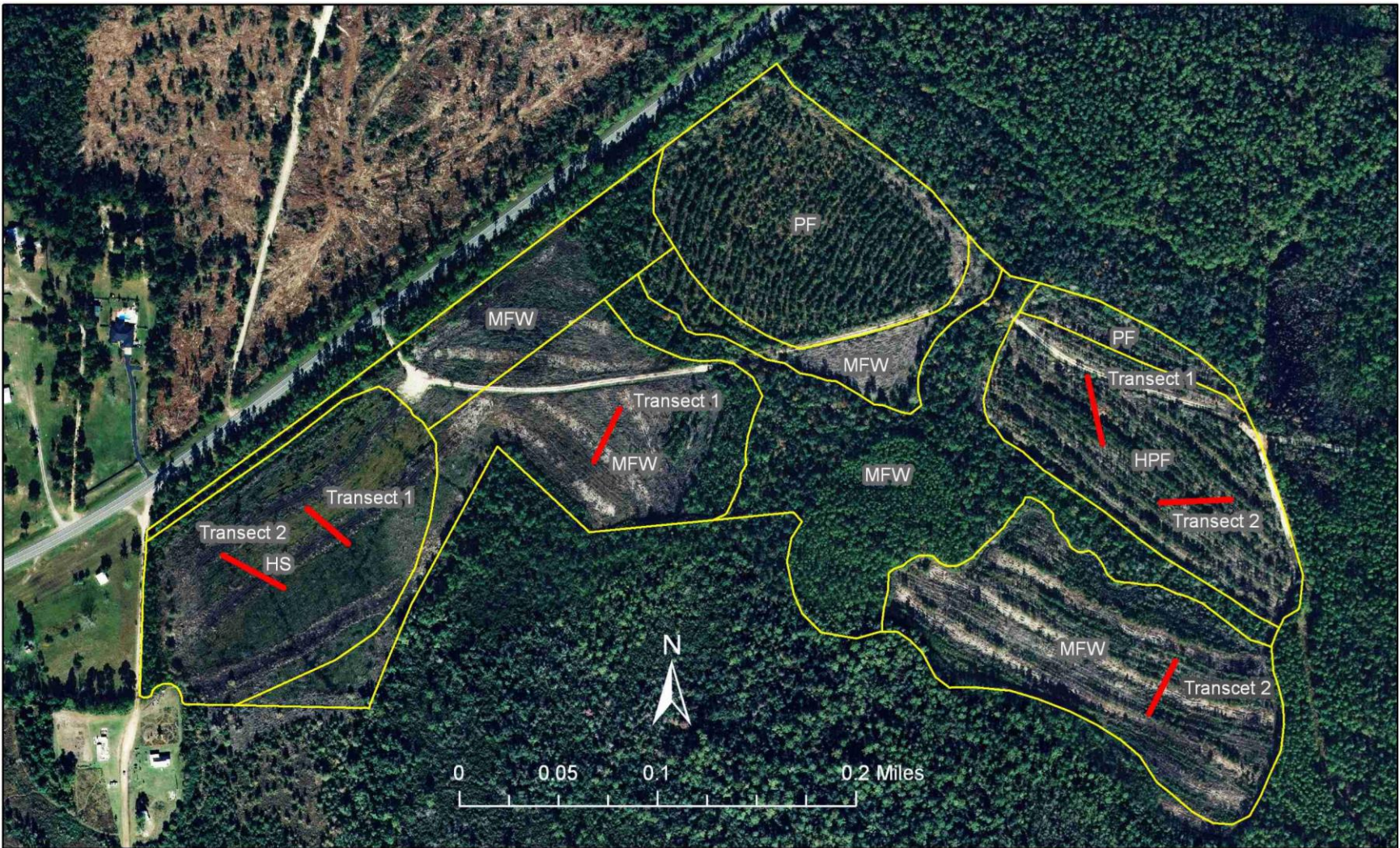


Figure PR-1. Location of permanent transects at Perdido Phase II Mitigation Site. HS=Hydric Savanna, HPF=Hydric Pine Flatwoods, MFW=Forested Wetland Mixed, PF=Pine Flatwoods.

RESULTS AND DISCUSSION

A total of 164 plant taxa were observed during the 2022 monitoring of the target communities at Perdido River Phase II (Table PR-1). Ten new taxa were noted, i.e. species or varieties not observed in any previous survey.

Table PR-1. Species observed in target communities at Perdido River WMA – Phase II Mitigation Site on November 29, 2022. (bold name = new species; bold X = new observation in community type)

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Savanna	Pine Flatwoods	Wetland Forest Mixed	Grand Total
<i>Acer rubrum</i>	red maple	X	X	X	X	4
<i>Aletris lutea</i>	yellow colic-root				X	1
<i>Andropogon arctatus</i>	pinewoods bluestem	X				1
<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	3
<i>Aristida purpurascens</i> var. <i>virgata</i>	arrowfeather threeawn			X	X	2
<i>Aristida spiciformis</i>	bottlebrush threeawn				X	1
<i>Aristida stricta</i>	wiregrass	X	X	X		3
<i>Aronia arbutifolia</i>	red chokeberry	X	X	X	X	4
<i>Arundinaria gigantea</i>	switchcane	X		X		2
<i>Axonopus fissifolius</i>	common carpetgrass	X				1
<i>Axonopus furcatus</i>	big carpetgrass	X				1
<i>Baccharis halimifolia</i>	groundsel tree		X			1
<i>Bidens mitis</i>	smallfruit beggarticks	X	X		X	3
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass	X				1
<i>Carex glaucescens</i>	clustered sedge	X	X	X	X	4
<i>Carex longii</i>	Long's sedge	X				1
<i>Carex</i> sp.	sedge			X		1
<i>Castanea pumila</i>	chinquapin			X		1
<i>Centella asiatica</i>	spadeleaf	X	X	X	X	4
<i>Chamaecyparis thyoides</i>	Atlantic white cedar		X	X	X	3
<i>Clethra alnifolia</i>	sweet pepperbush	X		X	X	3
<i>Cliftonia monophylla</i>	black titi	X	X	X	X	4
<i>Coleataenia anceps</i>	beaked panicum	X		X		2
<i>Coleataenia longifolia</i>	ciliate redtop panicum	X	X	X	X	4
<i>Ctenium aromaticum</i>	toothache grass	X				1
<i>Cyrilla racemiflora</i>	titi	X	X	X	X	4
<i>Dichanthelium acuminatum</i> var. <i>acuminatum</i>	tapered witchgrass	X				1
<i>Dichanthelium ensifolium</i>	cypress witchgrass	X		X	X	3
<i>Dichanthelium ensifolium</i> var. <i>unciphyllum</i>	cypress witchgrass			X	X	2

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Savanna	Pine Flatwoods	Wetland Forest Mixed	Grand Total
<i>Dichanthelium laxiflorum</i>	openflower witchgrass			X		1
<i>Dichanthelium leucothrix</i>	rough witchgrass			X	X	2
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	X	X	X	X	4
<i>Dichanthelium</i> sp.	witchgrass			X	X	2
<i>Dichanthelium sphaerocarpon</i>	roundseed witchgrass			X		1
<i>Dichanthelium strigosum</i>	roughhair witchgrass			X	X	2
<i>Drosera capillaris</i>	pink sundew				X	1
<i>Eleocharis tuberculosa</i>	conecup spikerush		X			1
<i>Eleocharis vivipara</i>	viviparous spikerush		X			1
<i>Elephantopus elatus</i>	tall elephantsfoot	X	X	X		3
<i>Elephantopus nudatus</i>	smooth elephantsfoot	X				1
<i>Eragrostis elliotii</i>	Elliott's lovegrass				X	1
<i>Eragrostis</i> sp.	lovegrass	X	X			2
<i>Eriocaulon compressum</i>	flattened pipewort				X	1
<i>Eriocaulon decangulare</i>	tenangle pipewort	X			X	2
<i>Eupatorium capillifolium</i>	dogfennel	X				1
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	X	X		X	3
<i>Eupatorium pilosum</i>	rough boneset			X	X	2
<i>Eupatorium semiserratum</i>	smallflower thoroughwort			X		1
<i>Euthamia caroliniana</i>	slender flattop goldenrod	X	X	X	X	4
<i>Euthamia graminifolia</i>	flattop goldenrod	X				1
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge		X		X	2
<i>Gaylussacia dumosa</i>	dwarf huckleberry				X	1
<i>Gaylussacia mosieri</i>	woolly huckleberry	X	X	X	X	4
<i>Gelsemium sempervirens</i>	yellow jessamine		X			1
<i>Helianthus angustifolius</i>	narrowleaf sunflower	X	X			2
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort		X			1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	X	X		X	3
<i>Hypericum cistifolium</i>	roundpod St. John's wort	X	X	X	X	4
<i>Hypericum crux-andreae</i>	St. Peter's wort	X	X	X	X	4
<i>Hypericum hypericoides</i>	St. Andrew's cross	X	X	X		3
<i>Hyptis alata</i>	clustered bushmint	X	X	X		3
<i>Ilex cassine</i>	dahoon				X	1
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	X	X		X	3
<i>Ilex coriacea</i>	large gallberry	X	X	X	X	4
<i>Ilex glabra</i>	gallberry	X	X	X	X	4
<i>Ilex vomitoria</i>	yaupon	X	X	X	X	4
<i>Juncus dichotomus</i>	forked rush	X				1
<i>Juncus marginatus</i>	grassleaf rush	X			X	2
<i>Juncus scirpoides</i>	needlepod rush				X	1
<i>Juncus trigonocarpus</i>	redpod rush				X	1
<i>Kalmia hirsuta</i>	hairy wicky	X	X		X	3
<i>Kelochloa verrucosa</i>	warty panicgrass	X	X	X	X	4

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Savanna	Pine Flatwoods	Wetland Forest Mixed	Grand Total
<i>Lachnanthes caroliana</i>	Carolina redroot	X	X		X	3
<i>Lachnocaulon anceps</i>	whitehead bogbutton	X			X	2
<i>Ludwigia maritima</i>	seaside primrosewillow	X	X	X	X	4
<i>Ludwigia pilosa</i>	hairy primrosewillow	X	X	X		3
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	X	X	X	X	4
<i>Lygodium japonicum</i>	Japanese climbing fern	X				1
<i>Lyonia lucida</i>	fetterbush	X	X		X	3
<i>Magnolia virginiana</i>	sweetbay	X	X	X	X	4
<i>Mitchella repens</i>	partridgeberry			X		1
<i>Morella caroliniensis</i>	evergreen bayberry			X		1
<i>Morella cerifera</i>	southern bayberry	X	X	X	X	4
<i>Nyssa biflora</i>	swamp tupelo		X			1
<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	X		3
<i>Panicum virgatum</i>	switchgrass	X				1
<i>Paspalum setaceum</i>	thin paspalum				X	1
<i>Persea palustris</i>	swamp bay	X	X	X	X	4
<i>Pinus elliotii</i>	slash pine		X		X	2
<i>Pinus taeda</i>	loblolly pine	X	X	X	X	4
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass			X		1
<i>Pluchea baccharis</i>	rosy camphorweed		X	X		2
<i>Polygala lutea</i>	orange milkwort			X		1
<i>Polytrichum commune</i>	moss				X	1
<i>Proserpinaca pectinata</i>	combleaf mermaidweed		X			1
<i>Pteridium aquilinum</i>	bracken fern	X	X	X	X	4
<i>Quercus hemisphaerica</i>	laurel oak	X		X		2
<i>Quercus michauxii</i>	swamp chestnut oak				X	1
<i>Quercus nigra</i>	water oak	X	X	X		3
<i>Quercus virginiana</i>	live oak			X	X	2
<i>Rhexia mariana</i>	pale meadowbeauty	X	X	X		3
<i>Rhexia</i> sp.	meadowbeauty				X	1
<i>Rhexia virginica</i>	handsome harry		X		X	2
<i>Rhus copallinum</i>	winged sumac	X				1
<i>Rhynchospora baldwinii</i>	Baldwin's beaksedge				X	1
<i>Rhynchospora cephalantha</i>	bunched beaksedge	X	X		X	3
<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 fascicularis</i>	fascicled beaksedge	X	X	X	X	4
<i>Rhynchospora glomerata</i>	clustered beaksedge	X				1
<i>Rhynchospora gracilentata</i>	slender beaksedge	X	X	X	X	4
<i>Rhynchospora inexpansa</i>	nodding beaksedge	X			X	2

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Savanna	Pine Flatwoods	Wetland Forest Mixed	Grand Total
<i>Rhynchospora plumosa</i>	plumed beaksedge				X	1
<i>Rhynchospora pusilla</i>	fairy beaksedge				X	1
<i>Rhynchospora</i> sp.	beaksedge	X	X		X	3
<i>Rubus cuneifolius</i>	sand blackberry	X		X		2
<i>Rubus pensilvanicus</i>	sawtooth blackberry	X	X	X	X	4
<i>Rubus trivialis</i>	southern dewberry			X		1
<i>Saccharum giganteum</i>	sugarcane plumegrass		X			1
<i>Scirpus cyperinus</i>	woolgrass		X			1
<i>Scleria ciliata</i>	fringed nutrush	X	X	X	X	4
<i>Scleria triglomerata</i>	whip nutrush	X		X		2
<i>Serenoa repens</i>	saw palmetto				X	1
<i>Smilax auriculata</i>	earleaf greenbrier	X				1
<i>Smilax glauca</i>	cat greenbrier	X		X	X	3
<i>Smilax laurifolia</i>	laurel greenbrier	X	X		X	3
<i>Smilax</i> sp.	greenbrier				X	1
<i>Solidago fistulosa</i>	pinebarren goldenrod	X	X	X	X	4
<i>Sophranathe pilosa</i>	shaggy hedgehyssop			X	X	2
<i>Sphagnum</i> sp.	sphagnum moss	X	X	X	X	4
<i>Sporobolus floridanus</i>	Florida dropseed	X		X		2
<i>Symphotrichum dumosum</i>	rice button aster	X	X	X	X	4
<i>Symphotrichum walteri</i>	Walter's aster		X			1
<i>Syngonanthus flavidulus</i>	yellow hatpins				X	1
<i>Taxodium ascendens</i>	pond cypress		X		X	2
<i>Taxodium distichum</i>	bald cypress				X	1
<i>Thelypteris palustris</i> var. <i>pubescens</i>	marsh fern		X			1
<i>Toxicodendron radicans</i>	eastern poison ivy	X	X	X		3
<i>Tridens ambiguus</i>	pinebarren fluffgrass	X				1
unknown moss	moss		X	X		2
<i>Vaccinium corymbosum</i>	highbush blueberry	X	X	X	X	4
<i>Vaccinium elliotii</i>	Elliott's blueberry	X	X	X	X	4
<i>Viburnum nudum</i>	possumhaw		X	X		2
<i>Viola lanceolata</i>	bog white violet	X			X	2
<i>Viola primulifolia</i>	primroseleaf violet	X		X	X	3
<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	3
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	X			X	2
<i>Xyris baldwiniana</i>	Baldwin's yellow-eyed grass				X	1
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass				X	1
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass				X	1
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass				X	1
<i>Xyris fimbriata</i>	fringed yellow-eyed grass		X	X		2

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Savanna	Pine Flatwoods	Wetland Forest Mixed	Grand Total
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass				X	1
<i>Xyris platylepis</i>	tall yellow-eyed grass	X	X	X	X	4
<i>Xyris</i> sp.	yellow-eyed grass	X			X	2
<i>Xyris stricta</i>	pineland yellow-eyed grass				X	1
Total number of taxa: 164		96	81	82	103	362

Hydric Savanna

Qualitative sampling. The target community of Hydric Savanna (Figure PR-1) had a total of 81 observed plant species (Table PR-1). The groundcover was dominated by a dense cover of sphagnum moss and a diversity of herbaceous species with mostly weedy species, primarily purple bluestem and pinebarren goldenrod. Pinewoods bluestem, state-listed as threatened, was seen in this community in 2020 and 2021 along the qualitative meandering transect. It was not observed this year, although it was seen in the hydric pine flatwoods. Shrubs formed less than 5% cover, primarily limited to the slightly elevated windrows formed when the land was cleared for silviculture, and consisted mainly of sweetbay, myrtle-leaved holly, and large gallberry. Occasional slash pine and red maple saplings were widely scattered.

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 a large amount of sphagnum moss underlay the other species. The dominant species were sphagnum moss, pinebarren goldenrod, purple bluestem, and sugarcane plume grass. Woody species made up around 12% average cover per quadrat. Vegetation along the transect was very similar in composition to the previous year, but with an increase in pinebarren goldenrod and a decrease in smallfruit beggarticks and viviparous spikerush, likely a combination of seasonal effect and dry conditions.

Transect 2 (Table PR-3, Figure PR-3) had a total of 24 species which covered over 100% of the area. The dominant species were sphagnum moss, purple bluestem, pinebarren goldenrod, and smallfruit beggarticks. Woody species made up about 1% average cover per quadrat. Vegetation along the transect was very similar in composition to the previous year, but with a decrease in hairy primrosewillow, likely a seasonal effect and dry conditions.

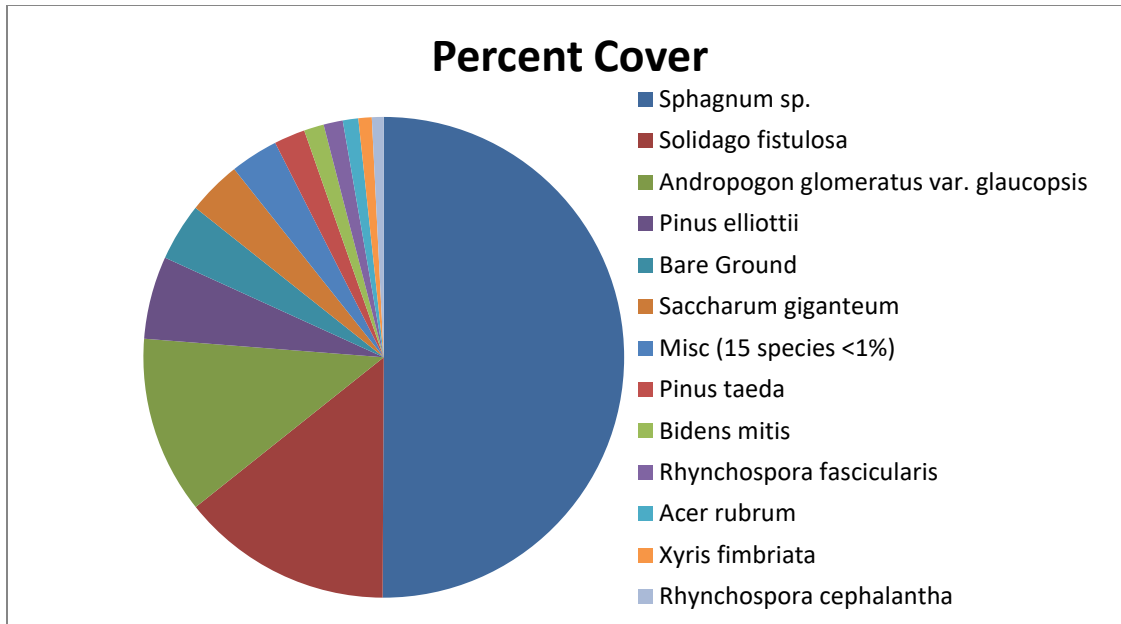


Figure PR-2. Percent of total vegetative cover for plant species in Hydric Savanna Transect 1.

Table PR-2. Percent total vegetative cover of plant species in Hydric Savanna Transect 1 sampled on November 29, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum sp.</i>	sphagnum moss	62.94
<i>Solidago fistulosa</i>	pinebarren goldenrod	17.88
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	15.00
<i>Pinus elliotii</i>	slash pine	7.00
<i>Saccharum giganteum</i>	sugarcane plumegrass	4.56
<i>Pinus taeda</i>	loblolly pine	2.63
<i>Bidens mitis</i>	smallfruit beggarticks	1.69
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	1.63
<i>Acer rubrum</i>	red maple	1.31
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	1.13
<i>Rhynchospora cephalantha</i>	bunched beaksedge	1.00
<i>Eleocharis vivipara</i>	viviparous spikerush	0.88
<i>Pteridium aquilinum</i>	bracken	0.63
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.44
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	0.44
<i>Woodwardia virginica</i>	Virginia chain fern	0.44
<i>Lachnanthes caroliana</i>	Carolina redroot	0.25
<i>Ludwigia pilosa</i>	hairy primrosewillow	0.25
<i>Ilex glabra</i>	gallberry	0.19
<i>Toxicodendron radicans</i>	eastern poison ivy	0.19
<i>Aronia arbutifolia</i>	red chokeberry	0.06
<i>Kelochloa verrucosa</i>	warty panicgrass	0.06
<i>Morella cerifera</i>	southern bayberry	0.06
<i>Persea palustris</i>	swamp bay	0.06

<i>Rhexia virginica</i>	handsome harry	0.06
<i>Rhynchospora</i> sp.	beaksedge	0.06
Bare Ground		4.88

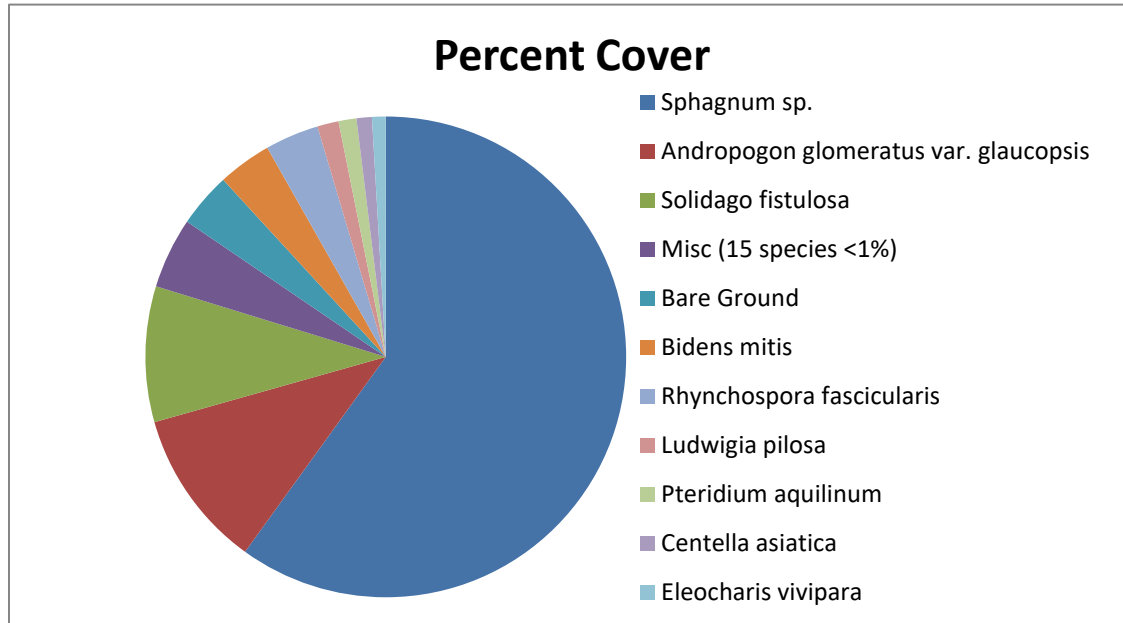


Figure PR-3. Percent of total vegetative cover for plant species in Hydric Savanna Transect 2.

Table PR-3. Percent cover of plant species in Hydric Savanna Transect 2 sampled on November 29, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum</i> sp.	sphagnum moss	65.31
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	11.63
<i>Solidago fistulosa</i>	pinebarren goldenrod	9.94
<i>Bidens mitis</i>	smallfruit beggarticks	3.94
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	3.94
<i>Ludwigia pilosa</i>	hairy primrosewillow	1.56
<i>Pteridium aquilinum</i>	bracken	1.31
<i>Centella asiatica</i>	spadeleaf	1.13
<i>Eleocharis vivipara</i>	viviparous spikerush	1.00
<i>Kelochloa verrucosa</i>	warty panicgrass	0.94
<i>Woodwardia virginica</i>	Virginia chain fern	0.88
<i>Lachnanthes caroliana</i>	Carolina redroot	0.75
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.50
<i>Rhynchospora</i> sp.	beaksedge	0.50
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	0.44
<i>Acer rubrum</i>	red maple	0.38
<i>Toxicodendron radicans</i>	eastern poison ivy	0.25
<i>Saccharum giganteum</i>	sugarcane plumegrass	0.19
<i>Aronia arbutifolia</i>	red chokeberry	0.06

<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.06
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.06
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.06
<i>Ilex coriacea</i>	large gallberry	0.06
<i>Rhexia virginica</i>	handsome harry	0.06
Bare Ground		4.00

Wetland Forest Mixed

Qualitative sampling. The target community of Wetland Forest Mixed (Figure PR-1) had a total of 103 observed plant species (Table PR-1). The vegetative cover in the western area was dominated by tall clumps of purple bluestem. Sphagnum moss and large Atlantic white cedars were common. Near the eastern transect 1 woody species, such as black titi, large gallberry, dahoon, sweetbay, fetterbush, and St. John's wort, have been reduced in recent years. The patches of muscadine observed last year appear to have been reduced. Near the western transect 2, shrubs were taller and denser and beginning to form an open, low canopy. Young slash and loblolly pines were widely scattered throughout.

Quantitative sampling. Transect 1 had a total of 39 species and 36% bare ground (Table PR-4, Figure PR-4). The dominant species was purple bluestem, with Atlantic white cedar, black titi, and sphagnum moss also contributing significant cover. The pines and other woody species are starting to form a shrubbier, more closed habitat in this area. Woody species made up around 23% average cover per quadrat, a slight decrease from 2021.

Transect 2 (Table PR-5, Figure PR-5) had a total of 53 species with 18% bare ground. The overall aspect was more open than Transect 1 and had less woody cover. Sphagnum moss, bunched beaksedge, coastalplain yellow-eyed grass, and black titi were also dominants. Woody species made up around 11% average cover per quadrat, similar to last year.

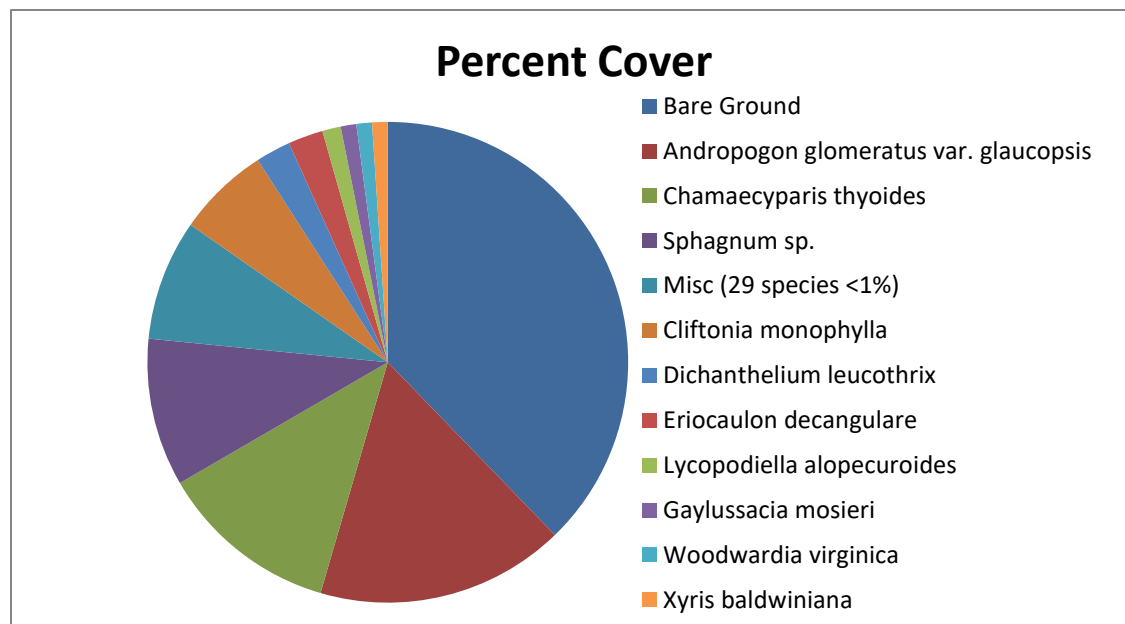


Figure PR-4. Percent of total vegetative cover for species in Mixed Forested Wetland Transect 1.

Table PR-4. Percent cover of plant species in Mixed Forested Wetland Transect 1 sampled on November 29, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	16.00
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	11.56
<i>Sphagnum</i> sp.	sphagnum moss	9.50
<i>Cliftonia monophylla</i>	black titi	5.94
<i>Dichantherium leucothrix</i>	rough witchgrass	2.25
<i>Eriocaulon decangulare</i>	tenangle pipewort	2.25
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	1.19
<i>Gaylussacia mosieri</i>	woolly huckleberry	1.00
<i>Woodwardia virginica</i>	Virginia chain fern	1.00
<i>Xyris baldwiniana</i>	Baldwin's yellow-eyed grass	1.00
<i>Lyonia lucida</i>	fetterbush	0.94
<i>Smilax glauca</i>	cat greenbrier	0.94
<i>Pinus elliotii</i>	slash pine	0.75
<i>Ilex glabra</i>	gallberry	0.69
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.63
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.50
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.44
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.25
<i>Eupatorium pilosum</i>	rough boneset	0.19
<i>Morella cerifera</i>	southern bayberry	0.19
<i>Oldenlandia uniflora</i>	clustered mille grains	0.19
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.19
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.19
<i>Taxodium ascendens</i>	pond cypress	0.19
<i>Vitis rotundifolia</i>	muscadine	0.19
<i>Woodwardia areolata</i>	netted chain fern	0.19
<i>Xyris</i> sp.	yellow-eyed grass	0.19
<i>Juncus marginatus</i>	grassleaf rush	0.13
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.13
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.13
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.06
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.06
<i>Juncus scirpoides</i>	needlepod rush	0.06
<i>Kellochloa verrucosa</i>	warty panicgrass	0.06
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.06
<i>Magnolia virginiana</i>	sweetbay	0.06
moss		0.06
<i>Scleria ciliata</i>	fringed nutrush	0.06
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass	0.06
Bare Ground		36.06

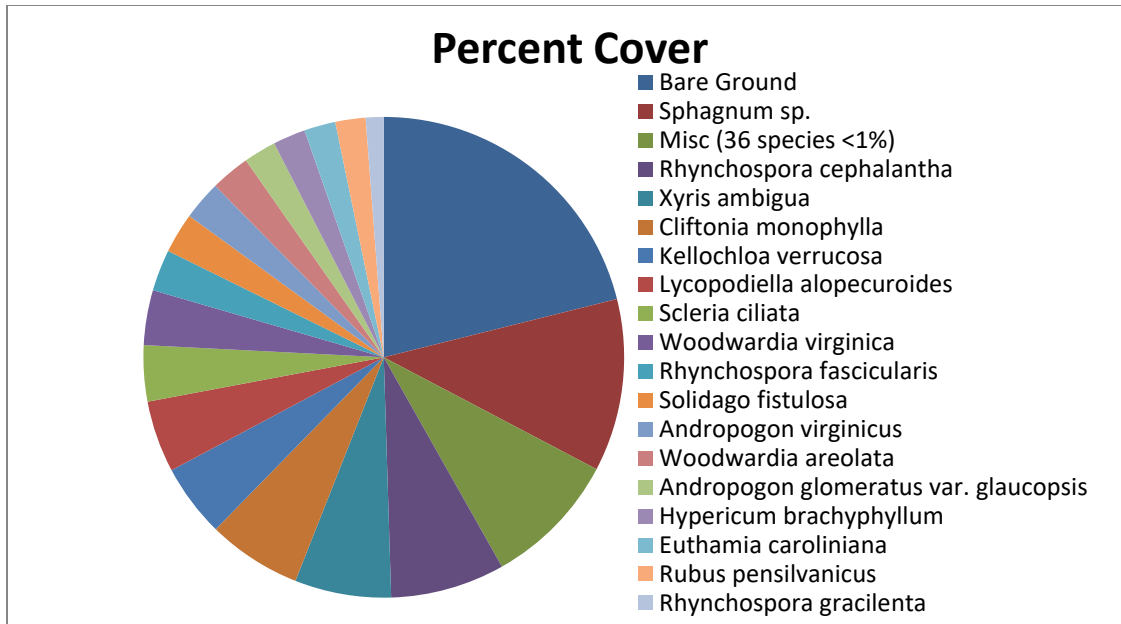


Figure PR-5. Percent of total vegetative cover for plant species in Mixed Forested Wetland Transect 2.

Table PR-5. Percent cover of plant species in Mixed Forested Wetland Transect 2 sampled on November 29, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum sp.</i>	sphagnum moss	9.63
<i>Rhynchospora cephalantha</i>	bunched beaksedge	6.38
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	5.38
<i>Cliftonia monophylla</i>	black titi	5.25
<i>Kellochloa verrucosa</i>	warty panicgrass	4.06
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	4.00
<i>Scleria ciliata</i>	fringed nutrush	3.13
<i>Woodwardia virginica</i>	Virginia chain fern	3.06
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	2.31
<i>Solidago fistulosa</i>	pinebarren goldenrod	2.25
<i>Andropogon virginicus</i>	broomsedge bluestem	2.19
<i>Woodwardia areolata</i>	netted chain fern	2.19
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	1.81
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	1.81
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.75
<i>Rubus pensilvanicus</i>	sawtooth blackberry	1.69
<i>Rhynchospora gracilentia</i>	slender beaksedge	1.00
<i>Paspalum setaceum</i>	thin paspalum	0.94
<i>Viola primulifolia</i>	primroseleaf violet	0.69
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.63
<i>Ilex cassine var. myrtifolia</i>	myrtle-leaved holly	0.44
<i>Magnolia virginiana</i>	sweetbay	0.44
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.44
<i>Oldenlandia uniflora</i>	clustered mille grains	0.38

Scientific name	Common name	Average percent cover per quadrat
<i>Smilax glauca</i>	cat greenbrier	0.31
<i>Dichantheium ensifolium</i>	cypress witchgrass	0.25
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.25
<i>Xyris</i> sp.	yellow-eyed grass	0.25
<i>Aletris lutea</i>	yellow colic-root	0.19
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.19
<i>Juncus marginatus</i>	grassleaf rush	0.19
moss		0.19
<i>Rhynchospora</i> sp.	beaksedge	0.19
<i>Eriocaulon compressum</i>	flattened pipewort	0.13
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.13
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.13
<i>Juncus scirpoides</i>	needlepod rush	0.13
<i>Persea palustris</i>	swamp bay	0.13
<i>Rhexia</i> sp.	meadowbeauty	0.13
<i>Acer rubrum</i>	red maple	0.06
<i>Bidens mitis</i>	smallfruit beggarticks	0.06
<i>Dichantheium scabriusculum</i>	woolly witchgrass	0.06
<i>Eragrostis elliottii</i>	Elliott's lovegrass	0.06
<i>Eupatorium pilosum</i>	rough boneset	0.06
<i>Ludwigia maritima</i>	seaside primrosewillow	0.06
<i>Pinus elliottii</i>	slash pine	0.06
<i>Pteridium aquilinum</i>	bracken	0.06
<i>Rhexia virginica</i>	handsome harry	0.06
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.06
<i>Rhynchospora pusilla</i>	fairy beaksedge	0.06
<i>Smilax</i> sp.	greenbrier	0.06
<i>Symphotrichum dumosum</i>	rice button aster	0.06
<i>Viola lanceolata</i>	bog white violet	0.06
Bare Ground		17.50

Hydric Pine Flatwoods

Qualitative monitoring. The target community of hydric pine flatwoods had a total of 96 plant species (Table PR-1). The 60-100 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. Recent tropical storms have felled additional trees. During the 2022 sampling effort, these logs were beginning to decompose. Vines of muscadine grape were common and often dense. Much of the ground was covered by a thick layer of pine needle litter. The herbaceous layer was dominated by cinnamon fern, broomsedge bluestem, toothache grass, and wiregrass, as well as many weedy species. Curtiss' sandgrass (*Calamovilfa curtissii*), state listed as threatened, is known from this community and was confirmed present this year.

Quantitative monitoring. Where branches of the felled pines lay across the quadrats, they were moved aside in order to view the plants beneath. This woody debris is starting to decompose. Transect 1 had a total of 32 species with 62% bare ground (Figure PR-6, Table PR-6). The dominant

species was muscadine with other species much sparser. Woody species (including muscadine) made up around 14% average cover per quadrat, a small decrease from last year.

Transect 2 (Figure PR-7, Table PR-7) had a total of 39 species with 53% bare ground. The dominant species were wiregrass and Virginia chain fern, with wiregrass showing a small increase in cover from last year. Woody species made up around 7% average cover per quadrat, slightly less than last year. A large, downed pine tree (present since 2020) at the beginning of the transect is beginning to decompose.

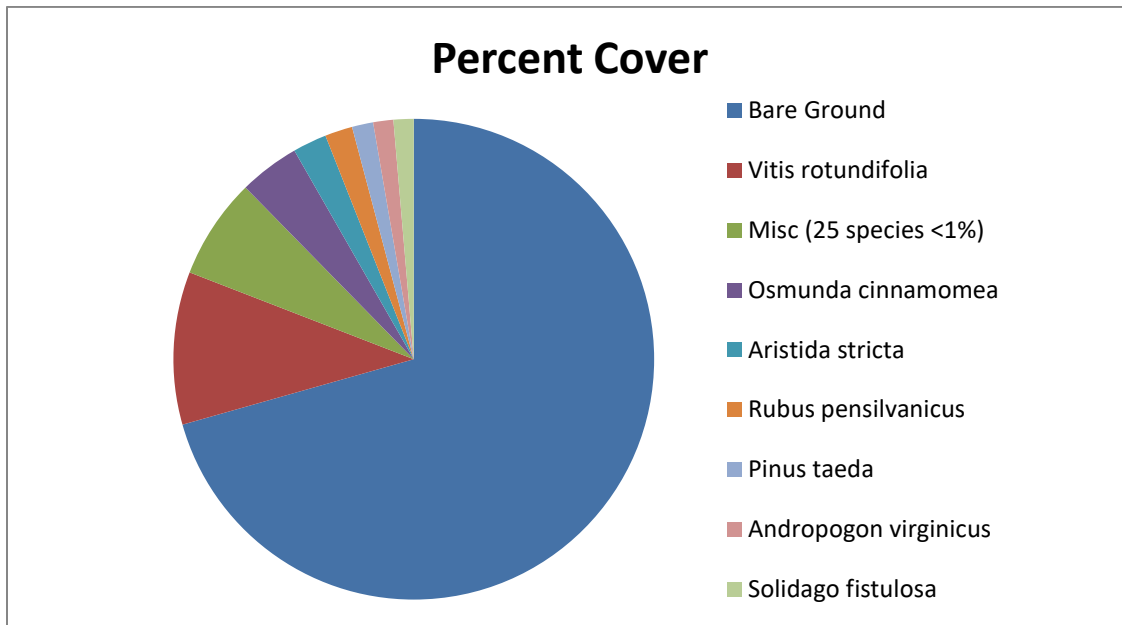


Figure PR-6. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

Table PR-6. Percent cover of species in Hydric Pine Flatwoods Transect 1 sampled on November 29, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Vitis rotundifolia</i>	muscadine	9.00
<i>Osmunda cinnamomea</i>	cinnamon fern	3.56
<i>Aristida stricta</i>	wiregrass	2.00
<i>Rubus pensilvanicus</i>	sawtooth blackberry	1.63
<i>Pinus taeda</i>	loblolly pine	1.25
<i>Andropogon virginicus</i>	broomsedge bluestem	1.19
<i>Solidago fistulosa</i>	pinebarren goldenrod	1.19
<i>Ctenium aromaticum</i>	toothache grass	0.94
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.94
<i>Centella asiatica</i>	spadeleaf	0.50
<i>Hypericum hypericoides</i>	St. Andrew's cross	0.50
<i>Scleria ciliata</i>	fringed nutrush	0.44
<i>Xyris platylepis</i>	tall yellow-eyed grass	0.44
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.25
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass	0.19

Scientific name	Common name	Average percent cover per quadrat
<i>Juncus marginatus</i>	grassleaf rush	0.19
<i>Toxicodendron radicans</i>	eastern poison ivy	0.19
<i>Viola primulifolia</i>	primroseleaf violet	0.19
<i>Xyris</i> sp.	yellow-eyed grass	0.19
<i>Elephantopus elatus</i>	tall elephantsfoot	0.13
<i>Oldenlandia uniflora</i>	clustered mille grains	0.13
<i>Symphotrichum dumosum</i>	rice button aster	0.13
<i>Acer rubrum</i>	red maple	0.06
<i>Andropogon</i> sp.	bluestem	0.06
<i>Coleataenia longifolia</i>	ciliate redtop panicum	0.06
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.06
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.06
<i>Juncus</i> sp.	rush	0.06
<i>Rubus cuneifolius</i>	sand blackberry	0.06
<i>Smilax auriculata</i>	earleaf greenbrier	0.06
<i>Smilax glauca</i>	cat greenbrier	0.06
<i>Woodwardia areolata</i>	netted chain fern	0.06
Bare Ground		61.88

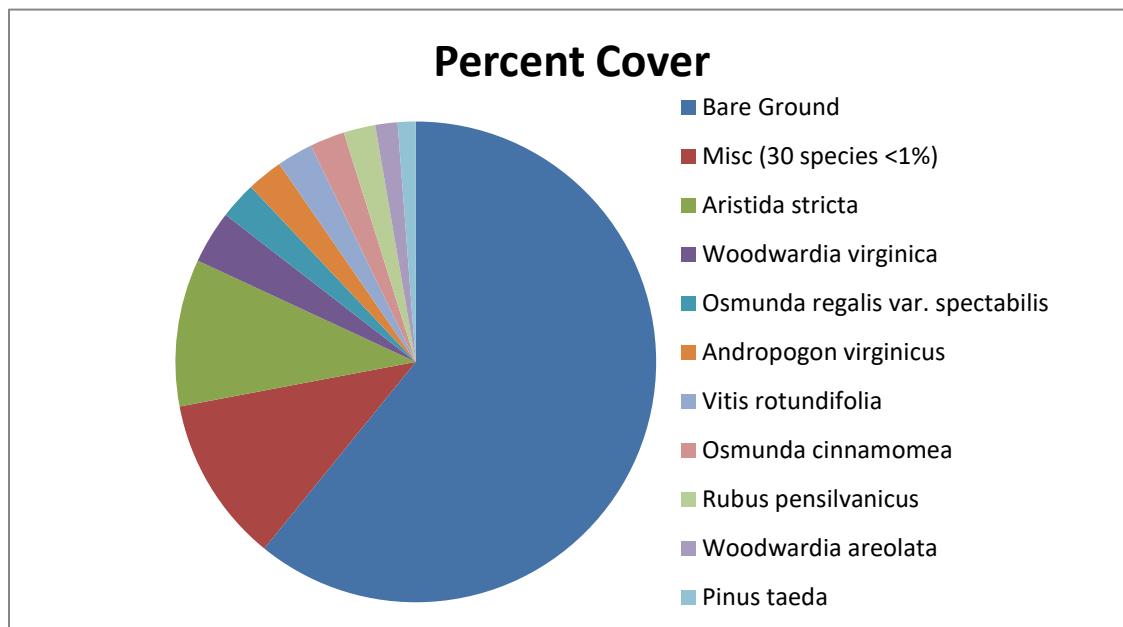


Figure PR-7. Percent cover of plant species in Hydric Pine Flatwoods Transect 2.

Table PR-7. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 sampled on November 29, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i>	wiregrass	8.69
<i>Woodwardia virginica</i>	Virginia chain fern	3.13
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	2.19
<i>Andropogon virginicus</i>	broomsedge bluestem	2.13
<i>Vitis rotundifolia</i>	muscadine	2.13
<i>Osmunda cinnamomea</i>	cinnamon fern	2.06
<i>Rubus pensilvanicus</i>	sawtooth blackberry	1.88
<i>Woodwardia areolata</i>	netted chain fern	1.31
<i>Pinus taeda</i>	loblolly pine	1.06
<i>Carex longii</i>	Long's sedge	0.94
<i>Cyrilla racemiflora</i>	titi	0.94
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.94
<i>Smilax glauca</i>	cat greenbrier	0.81
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.69
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.69
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	0.63
<i>Sphagnum</i> sp.	sphagnum moss	0.56
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.44
<i>Viola primulifolia</i>	primroseleaf violet	0.44
<i>Vaccinium elliotii</i>	Elliott's blueberry	0.31
<i>Elephantopus elatus</i>	tall elephantsfoot	0.25
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass	0.19
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.19
<i>Juncus</i> sp.	rush	0.19
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.19
<i>Oldenlandia uniflora</i>	clustered mille grains	0.19
<i>Rhynchospora inexpansa</i>	nodding beaksedge	0.19
<i>Xyris</i> sp.	yellow-eyed grass	0.19
<i>Acer rubrum</i>	red maple	0.13
<i>Ctenium aromaticum</i>	toothache grass	0.13
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.13
<i>Centella asiatica</i>	spadeleaf	0.06
<i>Dichanthelium ensifolium</i>	cypress witchgrass	0.06
<i>Juncus dichotomus</i>	forked rush	0.06
<i>Ludwigia maritima</i>	seaside primrosewillow	0.06
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.06
moss		0.06
Bare Ground		53.44

Pine Flatwoods

Qualitative monitoring. The mature 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. The hardwoods in the subcanopy had been cut down in 2014 and some stumps have re-sprouted. Muscadine vine was abundant, scrambling over and obscuring much of the remaining groundcover. There was a diverse shrub layer dominated by sweetbay, swamp bay, St. John's worts, southern bayberry, sawtooth blackberry and young loblolly pines. In the herbaceous layer were scattered clumps of wiregrass, with abundant broomsedge bluestem and pinebarren goldenrod. Several new herbs were found this year. A total of 82 species (Table PR-1) were observed in this habitat.

LAFAYETTE CREEK – PHASE I MITIGATION SITE

Qualitative and Quantitative Monitoring

October 2022

Lafayette Creek – Phase I Mitigation Site Qualitative and Quantitative Monitoring October 2022

INTRODUCTION

The Lafayette Creek Phase I Mitigation Site consisting of 509 acres was obtained to compensate for the loss of wetland function from the impacts associated with re-alignment of highway US 331 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 every fall from 2012 to 2021.

METHODS

The quantitative monitoring utilized 300-foot long permanent transect lines previously marked during the 2012 survey. Two transects were located in Sandhill and two in Hydric Savanna (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. Along each transect line, fifteen 1m x 1m quadrats were placed along the left side beginning at 0 and then spaced every 20 feet, ending at 280 feet. Data recorded in each quadrat consisted of the visually estimated percent cover of each plant species including individuals rooted in the the quadrat as well as overhanging. Canopy over 2 m in height was excluded from cover estimates. Only the lower 2 m portions of larger individuals were counted as cover, including the lower portions of tree trunks rooted in quadrats. Bare ground was estimated in each quadrat as a percentage of ground not obscured by plant cover or large woody debris. This represents a slight change in procedure from previous FNAI monitoring reports up until 2017 where percent bare ground was calculated by subtracting the total percent for all species from 100.

The qualitative monitoring consisted of recording species and vegetation structure observed along meandering pedestrian transects through the two target communities plus High Pine (HP), Bay Swamp (BS), and Stream Swamp (SS). Field surveys were performed by FNAI botanists Kim Alexander and Brenda Herring on October 18-20, 2022.

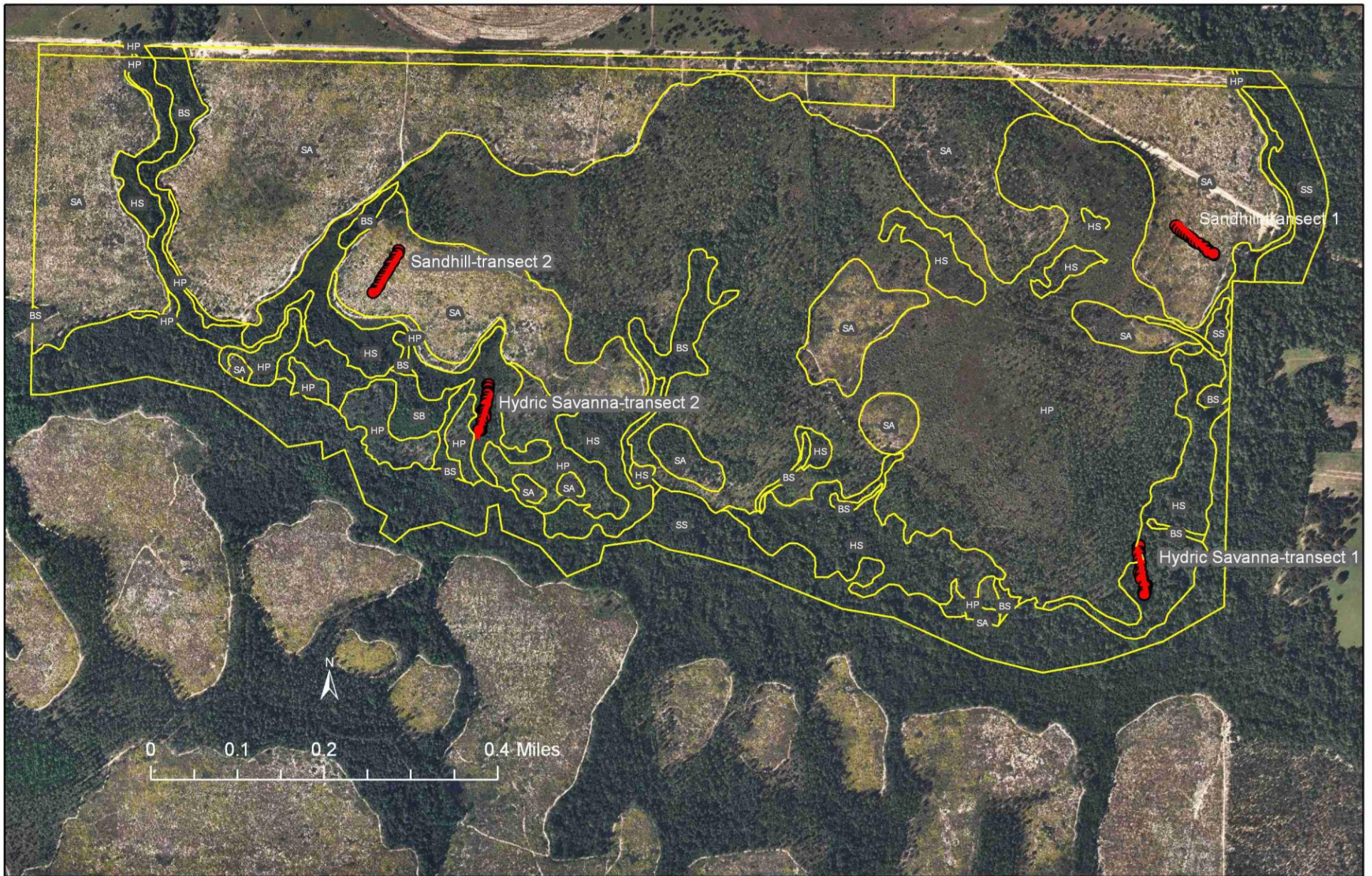


Figure LC-1. Location of permanent transects at Lafayette Creek – Phase I Mitigation Site. SA=Sandhill, HS=Hydric Savanna, HP=High Pine, BS=Bay Swamp, SS=Stream Swamp, SB=Shrub Bog.

RESULTS AND DISCUSSION

A total of 306 plant taxa were recorded in the surveyed areas of Lafayette Creek during the 2022 monitoring period (Table LC-1). Eight new taxa were found during the 2022 monitoring.

Table LC-1. Species observed in target communities at Lafayette Creek – Phase I Mitigation Site, October 18-20, 2022. (bold name = new species; bold X = new observation in community)

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	X	X	X		4
<i>Aletris lutea</i>	yellow colic-root		X	X			2
<i>Alnus serrulata</i>	hazel alder	X				X	2
<i>Amsonia ciliata</i>	fringed bluestar				X		1
<i>Andropogon arctatus</i>	pinewoods bluestem			X			1
<i>Andropogon gerardii</i>	big bluestem		X		X		2
<i>Andropogon glomeratus</i>	bushy bluestem		X	X			2
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	X	X	X			3
<i>Andropogon gyrans</i>	Elliott's bluestem		X		X		2
<i>Andropogon ternarius</i>	splitbeard bluestem		X		X		2
<i>Andropogon virginicus</i>	broomsedge bluestem	X		X	X		3
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem		X	X	X		3
<i>Aristida purpurascens</i>	arrowfeather threeawn			X	X		2
<i>Aristida</i> sp.	threeawn				X		1
<i>Aristida stricta</i>	wiregrass		X	X	X		3
<i>Arnoglossum sulcatum</i>	Georgia Indian-plantain	X		X			2
<i>Aronia arbutifolia</i>	red chokeberry		X	X		X	3
<i>Arundinaria gigantea</i>	switchcane		X	X			2
<i>Axonopus fissifolius</i>	common carpetgrass		X				1
<i>Balduina angustifolia</i>	coastalplain honeycomb-head				X		1
<i>Balduina uniflora</i>	oneflower honeycomb-head		X	X			2
<i>Baptisia lanceolata</i>	gopherweed				X		1
<i>Berlandiera pumila</i>	soft greeneyes				X		1
<i>Bidens mitis</i>	smallfruit beggarticks	X		X		X	3
<i>Bigelovia nudata</i>	pineland rayless goldenrod		X	X			2
<i>Bignonia capreolata</i>	crossvine					X	1
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge				X		1
<i>Burmannia capitata</i>	southern bluethread			X			1
<i>Callicarpa americana</i>	American beautyberry	X	X	X	X	X	5
<i>Carex glaucescens</i>	clustered sedge	X				X	2
<i>Carex</i> sp.	sedge					X	1
<i>Carphephorus odoratissimus</i>	vanillaleaf		X		X	X	3
<i>Carphephorus pseudoliatris</i>	bristleleaf chaffhead		X				1

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
<i>Cartrema americanum</i>	wild olive		X		X	X	3
<i>Ceanothus microphyllus</i>	littleleaf buckbrush		X				1
<i>Centella asiatica</i>	spadeleaf		X	X			2
<i>Cephalanthus occidentalis</i>	common buttonbush					X	1
<i>Chaptalia tomentosa</i>	pineland daisy		X				1
<i>Chasmanthium laxum</i> var. <i>sessiliflorum</i>	longleaf woodoats					X	1
<i>Chrysoma pauciflosculosa</i>	woody goldenrod		X		X		2
<i>Chrysopsis gossypina</i> var. <i>hyssopifolia</i>	cottony goldenaster		X		X		2
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster		X		X		2
<i>Chrysopsis linearifolia</i>	narrowleaf goldenaster				X		1
<i>Chrysopsis mariana</i>	Maryland 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	X	X		X	4
<i>Cliftonia monophylla</i>	black titi	X	X	X		X	4
<i>Cnidocolus stimulosus</i>	tread softly				X		1
<i>Conyza canadensis</i>	Canadian horseweed				X		1
<i>Coreopsis linifolia</i>	Texas tickseed			X			1
<i>Crocotanthemum carolinianum</i>	Carolina frostweed				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>Cyrilla racemiflora</i>	titi	X	X	X		X	4
<i>Dalea carnea</i>	whitetassels		X				1
<i>Dalea pinnata</i>	summer farewell				X		1
<i>Dichanthelium aciculare</i>	needleleaf witchgrass				X		1
<i>Dichanthelium acuminatum</i>	tapered witchgrass		X		X		2
<i>Dichanthelium commutatum</i>	variable witchgrass				X		1
<i>Dichanthelium ensifolium</i>	cypress witchgrass		X	X	X		3
<i>Dichanthelium ensifolium</i> var. <i>unciphyllum</i>	cypress witchgrass			X	X		2
<i>Dichanthelium leucothrix</i>	rough witchgrass			X	X		2
<i>Dichanthelium ovale</i>	eggleaf witchgrass		X				1
<i>Dichanthelium portoricense</i>	hemlock witchgrass				X		1
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	X		X		X	3
<i>Dichanthelium</i> sp.	witchgrass			X			1
<i>Dichanthelium strigosum</i>	roughhair witchgrass		X	X	X		3
<i>Digitaria filiformis</i>	slender crabgrass		X				1
<i>Diodia teres</i>	poor joe		X		X		2
<i>Diodia virginiana</i>	Virginia buttonweed		X	X			2
<i>Diospyros virginiana</i>	common persimmon		X	X	X	X	4
<i>Drosera capillaris</i>	pink sundew			X			1
<i>Drosera tracyi</i>	dewthreads			X			1
<i>Eleocharis flavescens</i>	yellow spikerush	X					1

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
<i>Elephantopus elatus</i>	tall elephantsfoot		X		X	X	3
<i>Eragrostis elliottii</i>	Elliott's lovegrass		X		X		2
<i>Eragrostis</i> sp.	lovegrass	X					1
<i>Erigeron vernus</i>	early whitetop fleabane		X	X			2
<i>Eriocaulon compressum</i>	flattened pipewort			X			1
<i>Eriocaulon decangulare</i>	tenangle pipewort	X		X		X	3
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat				X		1
<i>Eryngium yuccifolium</i>	button rattlesnakemaster		X	X			2
<i>Eupatorium capillifolium</i>	dogfennel		X	X		X	3
<i>Eupatorium compositifolium</i>	yankeeweed	X	X	X	X		4
<i>Eupatorium mohrii</i>	Mohr's thoroughwort		X	X			2
<i>Eupatorium pilosum</i>	rough boneset	X	X	X			3
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort		X	X			2
<i>Eupatorium semiserratum</i>	smallflower thoroughwort			X			1
<i>Eupatorium serotinum</i>	lateflowering thoroughwort					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	X	X		4
<i>Froelichia floridana</i>	cottonweed				X		1
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge	X		X			2
<i>Fuirena squarrosa</i>	hairy umbrellasedge			X			1
<i>Galactia minor</i>	leafy milkpea				X		1
<i>Gamochaeta pensylvanica</i>	Pennsylvania everlasting		X		X		2
<i>Gaylussacia dumosa</i>	dwarf huckleberry		X	X	X		3
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry		X			X	2
<i>Gaylussacia mosieri</i>	woolly huckleberry	X	X	X		X	4
<i>Gelsemium sempervirens</i>	yellow jessamine		X			X	2
<i>Geobalanus oblongifolius</i>	gopher apple		X		X		2
<i>Gymnopogon brevifolius</i>	shortleaf skeletongrass		X				1
<i>Helianthus angustifolius</i>	narrowleaf sunflower	X	X	X			3
<i>Helianthus heterophyllus</i>	variableleaf sunflower		X	X			2
<i>Helianthus radula</i>	stiff sunflower		X		X		2
<i>Hibiscus aculeatus</i>	comfortroot		X	X			2
<i>Houstonia procumbens</i>	roundleaf bluet		X		X		2
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	X		X			2
<i>Hypericum chapmanii</i>	Chapman's 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	X			3
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	X	X	X			3
<i>Hypericum gentianoides</i>	orangegrass		X	X	X		3
<i>Hypericum hypericoides</i>	St. Andrew's cross		X		X	X	3
<i>Hypericum microsepalum</i>	flatwoods St. John's wort		X				1
<i>Hypericum suffruticosum</i>	pineland St. John's wort				X		1

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
<i>Ilex cassine</i>	dahoon			X			1
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly			X			1
<i>Ilex coriacea</i>	large gallberry	X	X	X		X	4
<i>Ilex glabra</i>	gallberry	X	X	X	X		4
<i>Ilex opaca</i>	American holly		X			X	2
<i>Ilex vomitoria</i>	yaupon	X	X	X	X		4
<i>Imperata cylindrica</i>	cogon grass				X		1
<i>Ionactis linariifolia</i>	flaxleaf aster		X				1
<i>Itea virginica</i>	Virginia willow	X				X	2
<i>Juncus effusus</i> var. <i>solutus</i>	soft rush	X					1
<i>Juncus scirpoides</i>	needlepod rush	X	X				2
<i>Juncus trigonocarpus</i>	redpod rush			X		X	2
<i>Juniperus virginiana</i>	red cedar					X	1
<i>Kalmia hirsuta</i>	hairy wicky		X				1
<i>Kellochloa verrucosa</i>	warty panicgrass	X	X	X			3
<i>Lachnanthes caroliniana</i>	Carolina redroot		X	X			2
<i>Lachnocaulon anceps</i>	whitehead bogbutton		X	X	X		3
<i>Lechea minor</i>	thymeleaf pinweed		X				1
<i>Lechea sessiliflora</i>	pineland pinweed				X		1
<i>Lespedeza hirta</i>	hairy lespedeza		X				1
<i>Leucothoe axillaris</i>	coastal doghobble					X	1
<i>Liatris elegans</i>	pinkscale gayfeather		X		X		2
<i>Liatris gracilis</i>	slender gayfeather		X		X		2
<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>Liriodendron tulipifera</i>	tuliptree	X				X	2
<i>Lobelia brevifolia</i>	shortleaf lobelia		X	X	X		3
<i>Lobelia glandulosa</i>	glade lobelia		X				1
<i>Lobelia nuttallii</i>	Nuttall's lobelia		X	X			2
<i>Lophiola aurea</i>	golden crest	X		X			2
<i>Ludwigia maritima</i>	seaside primrosewillow		X				1
<i>Ludwigia microcarpa</i>	smallfruit primrosewillow	X					1
<i>Ludwigia octovalvis</i>	Mexican primrosewillow	X					1
<i>Ludwigia peruviana</i>	Peruvian primrosewillow	X					1
<i>Ludwigia pilosa</i>	hairy primrosewillow			X		X	2
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	X	X	X			3
<i>Lycopodiella appressa</i>	southern club-moss	X					1
<i>Lycopodiella caroliniana</i>	slender club-moss			X			1
<i>Lycopus rubellus</i>	taperleaf waterhorehound	X					1
<i>Lygodium japonicum</i>	Japanese climbing fern			X		X	2
<i>Lyonia lucida</i>	fetterbush	X	X	X		X	4
<i>Magnolia grandiflora</i>	southern magnolia		X				1

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
<i>Magnolia virginiana</i>	sweetbay	X	X	X	X	X	5
<i>Mayaca fluviatilis</i>	stream bogmoss	X					1
<i>Mikania scandens</i>	climbing hempvine					X	1
<i>Mimosa quadrivalvis</i>	sensitive briar				X		1
<i>Mitchella repens</i>	partridgeberry					X	1
<i>Mitreola sessilifolia</i>	swamp hornpod		X				1
<i>Morella caroliniensis</i>	evergreen bayberry	X	X	X			3
<i>Morella cerifera</i>	southern bayberry	X	X	X	X	X	5
<i>Morella inodora</i>	odorless bayberry	X				X	2
<i>Nyssa biflora</i>	swamp tupelo	X	X	X		X	4
<i>Oclemena reticulata</i>	whitetop aster		X	X			2
<i>Oldenlandia uniflora</i>	clustered mille grains	X		X			2
<i>Opuntia humifusa</i>	pricklypear				X		1
<i>Osmunda cinnamomea</i>	cinnamon fern	X	X	X		X	4
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern					X	1
<i>Panicum hemitomon</i>	maidencane	X					1
<i>Panicum virgatum</i>	switchgrass		X	X	X		3
<i>Paspalum setaceum</i>	thin paspalum				X		1
<i>Peltandra sagittifolia</i>	spoon-flower			X		X	2
<i>Persea palustris</i>	swamp bay	X	X			X	3
<i>Pinus clausa</i>	sand pine				X		1
<i>Pinus elliotii</i>	slash pine	X	X	X	X	X	5
<i>Pinus palustris</i>	longleaf pine		X		X		2
<i>Pinus serotina</i>	pond pine	X	X	X			3
<i>Pityopsis aspera</i>	pineland silkgrass		X		X		2
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass		X		X		2
<i>Pluchea baccharis</i>	rosy camphorweed	X		X			2
<i>Pluchea foetida</i>	stinking camphorweed					X	1
<i>Polygala lutea</i>	orange milkwort			X			1
<i>Polygala nana</i>	candyroot			X	X		2
<i>Polygonella gracilis</i>	tall jointweed		X		X		2
<i>Polypremum procumbens</i>	rustweed				X		1
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting				X		1
<i>Pteridium aquilinum</i>	bracken fern		X	X	X		3
<i>Pterocaulon pycnostachyum</i>	blackroot		X				1
<i>Quercus falcata</i>	southern red oak				X		1
<i>Quercus geminata</i>	sand live oak		X	X	X		3
<i>Quercus hemisphaerica</i>	laurel oak				X		1
<i>Quercus incana</i>	bluejack oak		X		X		2
<i>Quercus laevis</i>	turkey oak		X		X		2
<i>Quercus laurifolia</i>	swamp laurel oak	X					1
<i>Quercus margarettae</i>	sand post oak		X		X		2
<i>Quercus minima</i>	dwarf live oak		X		X		2

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
<i>Quercus nigra</i>	water oak	X	X			X	3
<i>Quercus pumila</i>	runner oak		X				1
<i>Rhexia alifanus</i>	savannah meadowbeauty		X	X			2
<i>Rhexia lutea</i>	yellow meadowbeauty			X			1
<i>Rhexia mariana</i>	pale meadowbeauty			X			1
<i>Rhexia petiolata</i>	fringed meadowbeauty		X	X			2
<i>Rhexia virginica</i>	handsome harry	X					1
<i>Rhododendron canescens</i>	mountain azalea					X	1
<i>Rhus copallinum</i>	winged sumac		X	X	X		3
<i>Rhynchosia cytisoides</i>	royal snoutbean				X		1
<i>Rhynchosia reniformis</i>	dollarleaf				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	X			2
<i>Rhynchospora ciliaris</i>	fringed beaksedge			X			1
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge					X	1
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	X	X				2
<i>Rhynchospora gracilentia</i>	slender beaksedge	X		X		X	3
<i>Rhynchospora megalocarpa</i>	sandyfield beaksedge				X	X	2
<i>Rhynchospora pleiantha</i>	coastal beaksedge			X			1
<i>Rhynchospora plumosa</i>	plumed beaksedge			X			1
<i>Rhynchospora</i> sp.	beaksedge		X				1
<i>Rubus cuneifolius</i>	sand blackberry		X		X		2
<i>Rubus flagellaris</i>	northern dewberry			X			1
<i>Rubus pensilvanicus</i>	sawtooth blackberry	X	X	X		X	4
<i>Ruellia ciliosa</i>	ciliate wild petunia				X		1
<i>Sabatia brevifolia</i>	shortleaf rosegentian		X	X			2
<i>Saccharum giganteum</i>	sugarcane plumegrass	X					1
<i>Salvia azurea</i>	azure blue sage		X				1
<i>Sarracenia leucophylla</i>	white-top pitcherplant	X		X			2
<i>Schizachyrium sanguineum</i>	crimson bluestem				X		1
<i>Schizachyrium stoloniferum</i>	creeping little bluestem		X		X		2
<i>Schizachyrium tenerum</i>	slender bluestem		X	X	X		3
<i>Scleria ciliata</i>	fringed nutrush		X	X			2
<i>Scleria reticularis</i>	netted nutrush			X			1
<i>Scleria triglomerata</i>	whip nutrush		X		X		2
<i>Scoparia dulcis</i>	licoriceweed			X	X		2
<i>Serenoa repens</i>	saw palmetto	X	X	X	X	X	5
<i>Sericocarpus tortifolius</i>	whiteweed aster		X	X	X		3
<i>Seymeria cassioides</i>	yaupon blacksenna		X	X	X		3
<i>Seymeria pectinata</i>	Piedmont blacksenna				X		1
<i>Smilax auriculata</i>	earleaf greenbrier		X		X		2

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
<i>Smilax bona-nox</i>	saw greenbrier		X		X		2
<i>Smilax glauca</i>	cat greenbrier	X	X	X		X	4
<i>Smilax laurifolia</i>	laurel greenbrier	X	X	X		X	4
<i>Smilax pumila</i>	sarsaparilla vine		X	X			2
<i>Smilax tamnoides</i>	bristly greenbrier					X	1
<i>Solidago fistulosa</i>	pinebarren goldenrod	X	X	X		X	4
<i>Solidago odora</i>	sweet goldenrod		X	X	X		3
<i>Solidago puberula</i> var. <i>pulverulenta</i>	downy goldenrod	X	X				2
<i>Solidago stricta</i>	wand goldenrod		X	X			2
<i>Sophronanthe pilosa</i>	shaggy hedgehyssop			X			1
<i>Sorghastrum elliottii</i>	slender indiagrass				X		1
<i>Sorghastrum secundum</i>	lopsided indiagrass				X		1
<i>Sphagnum</i> sp.	sphagnum moss	X		X		X	3
<i>Stillingia sylvatica</i>	queen's delight		X		X		2
<i>Stipulicida setacea</i>	pineland scalypink				X		1
<i>Stylisma patens</i>	coastalplain dawnflower				X		1
<i>Styrax grandifolius</i>	bigleaf snowbell					X	1
<i>Symphotrichum adnatum</i>	scaleleaf aster		X		X		2
<i>Symphotrichum concolor</i>	eastern silver aster		X		X		2
<i>Symphotrichum dumosum</i>	rice button aster		X	X	X		3
<i>Symphotrichum</i> sp.	aster	X					1
<i>Symplocos tinctoria</i>	horse sugar		X				1
<i>Taxodium ascendens</i>	pond cypress					X	1
<i>Tephrosia chrysophylla</i>	scurf hoary-pea				X		1
<i>Tephrosia florida</i>	Florida hoary-pea		X				1
<i>Tephrosia mohrii</i>	pineland hoary-pea				X		1
<i>Thelypteris kunthii</i>	southern shield fern					X	1
<i>Tiedemannia filiformis</i> var. <i>filiformis</i>	water cowbane			X			1
<i>Toxicodendron radicans</i>	eastern poison ivy	X					1
<i>Tragia smallii</i>	Small's noseburn		X		X		2
<i>Tragia urens</i>	wavyleaf noseburn				X		1
<i>Triadenum virginicum</i>	Virginia marsh St. John's wort	X				X	2
<i>Trichostema dichotomum</i>	forked bluecurls		X		X		2
<i>Triplasis americana</i>	perennial sandgrass				X		1
<i>Utricularia juncea</i>	southern bladderwort			X			1
<i>Vaccinium arboreum</i>	sparkleberry		X		X		2
<i>Vaccinium corymbosum</i>	highbush blueberry	X	X	X		X	4
<i>Vaccinium darrowii</i>	Darrow's blueberry				X		1
<i>Vaccinium elliottii</i>	Elliott's blueberry		X	X		X	3
<i>Vaccinium myrsinites</i>	shiny blueberry		X		X		2
<i>Viburnum nudum</i>	possumhaw	X					1
<i>Viola palmata</i>	early blue violet			X			1
<i>Viola primulifolia</i>	primroseleaf violet			X		X	2
<i>Vitis rotundifolia</i>	muscadine	X	X	X	X	X	5

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
<i>Woodwardia areolata</i>	netted chain fern	X				X	2
<i>Woodwardia virginica</i>	Virginia chain fern	X	X	X			3
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	X		X			2
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass			X			1
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass		X	X	X		3
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass			X			1
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	X		X		X	3
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass			X			1
<i>Xyris platylepis</i>	tall yellow-eyed grass			X			1
<i>Xyris</i> sp.	yellow-eyed grass		X	X			2
<i>Xyris stricta</i>	pineland yellow-eyed grass	X				X	2
<i>Yucca filamentosa</i>	Adam's needle		X		X		2
Total number of taxa: 306		79	159	138	127	72	575

Sandhill

Qualitative sampling. The sandhill natural community has been degraded by past silviculture activities but retains many characteristic species. Both gopher tortoise and pocket gopher activity were noted during the 2021 site visit, and there was much exposed, bare sand. The diverse but somewhat sparse groundcover was dominated by wiregrass, with Lynn Haven goldenaster and woody goldenrod 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 but nicely spaced, ranging from 1 to 20 feet tall, and a few mature sand pines were mixed in the canopy layer. The state-listed threatened pineland hoary-pea (*Tephrosia mohrii*) was observed in both the eastern and far northwestern sections of sandhill. A total of 127 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 48 species with 36% average bare ground cover. Species cover was just over half herbaceous. Wiregrass increased slightly from last year and was the most abundant species, with saw palmetto and sand live oak about equally abundant. Woody species made up around 22% average cover per quadrat. Vegetation composition along the transect was very similar to that measured in 2021. Fruticose lichens were observed in one quadrat.

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 45% average bare ground cover. Dominant species were almost entirely herbaceous. Wiregrass and Lynn Haven goldenaster were the dominant herbs. Woody species made up around 4% average cover per quadrat. Although not recorded in cover, fruticose lichens were observed in two quadrats. There was an increase in the amount of wiregrass cover recorded, but otherwise, vegetation composition along the transect was very similar to that measured in 2021.

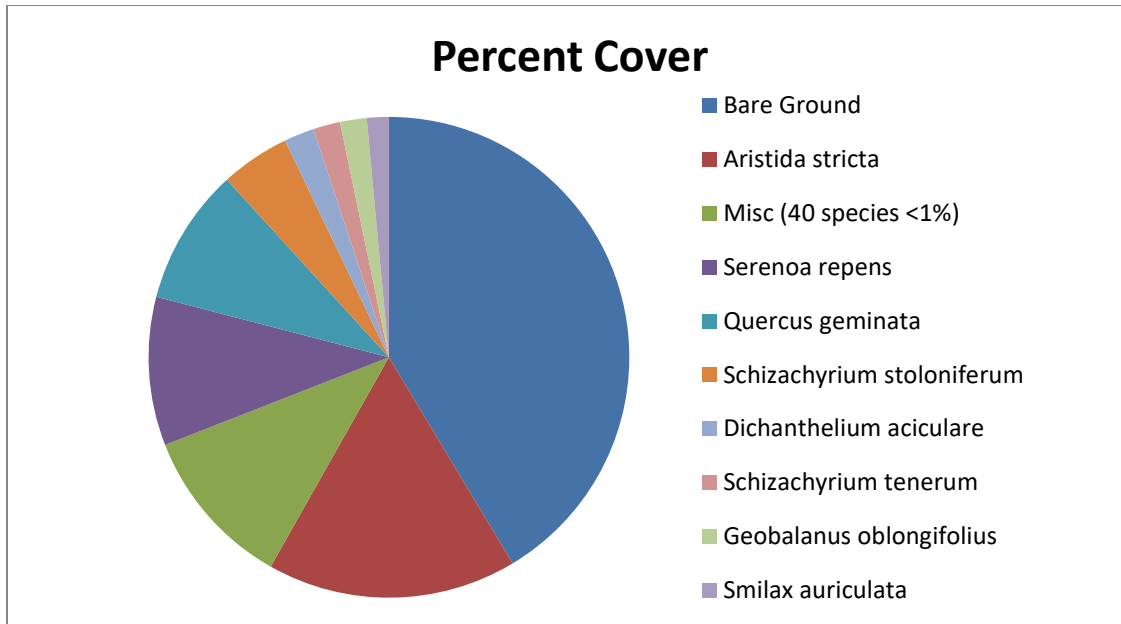


Figure LC-2. Percent cover of plant species in Sandhill Transect 1.

Table LC-2. Percent cover of plant species in Sandhill Transect 1 sampled on October 19, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i>	wiregrass	14.40
<i>Serenoa repens</i>	saw palmetto	8.57
<i>Quercus geminata</i>	sand live oak	7.87
<i>Schizachyrium stoloniferum</i>	creeping little bluestem	4.00
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	1.73
<i>Schizachyrium tenerum</i>	slender bluestem	1.57
<i>Geobalanus oblongifolius</i>	gopher apple	1.53
<i>Smilax auriculata</i>	earleaf greenbrier	1.27
<i>Rhus copallinum</i>	winged sumac	0.83
<i>Andropogon virginicus</i>	broomsedge bluestem	0.80
<i>Pinus palustris</i>	longleaf pine	0.73
<i>Dichanthelium strigosum</i>	roughhair witchgrass	0.63
<i>Quercus minima</i>	dwarf live oak	0.60
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	0.57
<i>Paspalum setaceum</i>	thin paspalum	0.57
<i>Panicum virgatum</i>	switchgrass	0.53
<i>Pityopsis aspera</i>	pineland silkgrass	0.53
<i>Solidago odora</i>	sweet goldenrod	0.43
<i>Andropogon gyrans</i>	Elliott's bluestem	0.37
<i>Eragrostis elliottii</i>	Elliott's lovegrass	0.33
<i>Liatris tenuifolia</i>	shortleaf gayfeather	0.27
<i>Rubus cuneifolius</i>	sand blackberry	0.27
<i>Dichanthelium leucothrix</i>	rough witchgrass	0.23
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.17
<i>Polygonella gracilis</i>	tall jointweed	0.13

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon ternarius</i>	splitbeard bluestem	0.10
<i>Aristida</i> sp.	threeawn	0.10
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	0.10
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.10
<i>Dichantherium ensifolium</i> var. <i>unciphyllum</i>	cypress witchgrass	0.10
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather	0.10
<i>Agalinis divaricata</i>	pineland false foxglove	0.07
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.07
<i>Eupatorium compositifolium</i>	yankeeweed	0.07
<i>Hypericum gentianoides</i>	orangegrass	0.07
<i>Rhynchosia cytisoides</i>	royal snoutbean	0.07
<i>Balduina angustifolia</i>	coastalplain honeycomb-head	0.03
<i>Diospyros virginiana</i>	common persimmon	0.03
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.03
<i>Galactia minor</i>	leafy milkpea	0.03
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.03
<i>Houstonia procumbens</i>	roundleaf bluet	0.03
<i>Lechea sessiliflora</i>	pineland pinweed	0.03
<i>Mimosa quadrivalvis</i>	sensitive brier	0.03
<i>Schizachyrium sanguineum</i>	crimson bluestem	0.03
<i>Scleria triglomerata</i>	whip nutrush	0.03
<i>Tephrosia chrysophylla</i>	scurf hoary-pea	0.03
<i>Tragia urens</i>	wavyleaf noseburn	0.03
Bare Ground		35.50

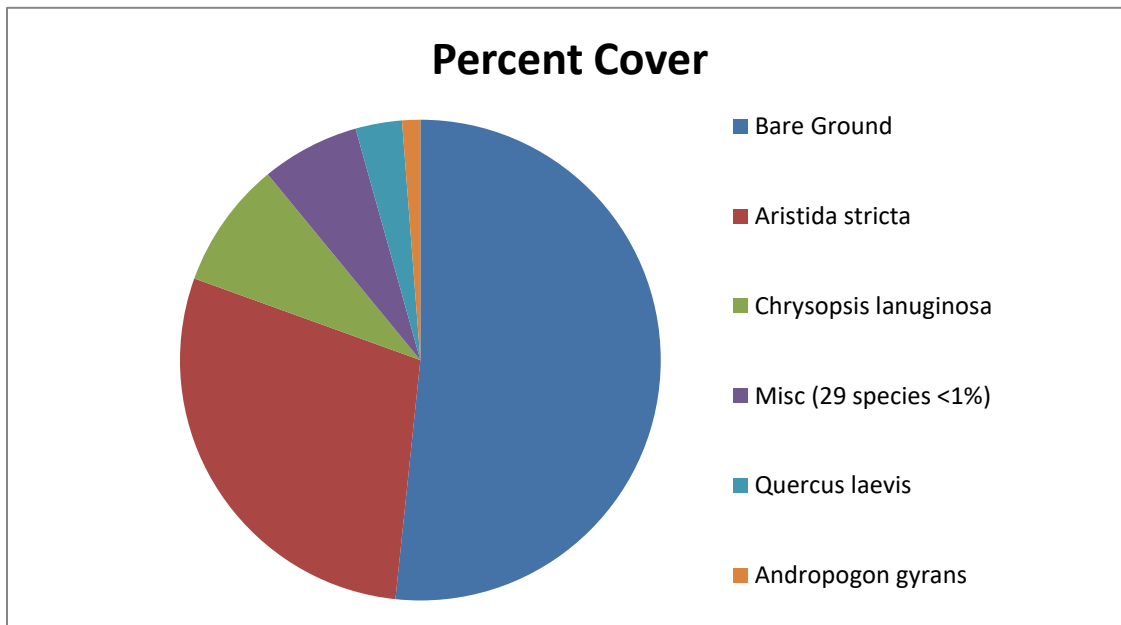


Figure LC-3. Percent cover of plant species in Sandhill Transect 2.

Table LC-3. Percent cover of plant species in Sandhill Transect 2 sampled on October 18, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i>	wiregrass	25.23
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	7.47
<i>Quercus laevis</i>	turkey oak	2.73
<i>Andropogon gyrans</i>	Elliott's bluestem	1.07
<i>Smilax auriculata</i>	earleaf greenbrier	0.93
<i>Schizachyrium stoloniferum</i>	creeping little bluestem	0.60
<i>Dichantherium aciculare</i>	needleleaf witchgrass	0.47
<i>Andropogon virginicus</i>	broomsedge bluestem	0.40
<i>Andropogon ternarius</i>	splitbeard bluestem	0.27
<i>Dichantherium strigosum</i>	roughhair witchgrass	0.27
<i>Pinus palustris</i>	longleaf pine	0.27
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.23
<i>Galactia minor</i>	leafy milkpea	0.23
<i>Geobalanus oblongifolius</i>	gopher apple	0.23
<i>Hypericum gentianoides</i>	orangegrass	0.23
<i>Eupatorium compositifolium</i>	yankeeweed	0.17
<i>Liatris pauciflora</i> var. <i>secunda</i>	Piedmont gayfeather	0.17
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	0.13
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.13
<i>Andropogon virginicus</i> var. <i>glauca</i>	chalky bluestem	0.10
<i>Dalea pinnata</i>	summer farewell	0.10
<i>Dichantherium acuminatum</i>	tapered witchgrass	0.10
<i>Dichantherium portoricense</i>	hemlock witchgrass	0.10
<i>Euphorbia floridana</i>	greater Florida spurge	0.10
<i>Triplasis americana</i>	perennial sandgrass	0.10
<i>Balduina angustifolia</i>	coastalplain honeycomb-head	0.07
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.07
<i>Mimosa quadrivalvis</i>	sensitive brier	0.07
<i>Polygonella gracilis</i>	tall jointweed	0.07
<i>Rubus cuneifolius</i>	sand blackberry	0.07
<i>Dichantherium leucothrix</i>	rough witchgrass	0.03
<i>Lechea sessiliflora</i>	pineland pinweed	0.03
<i>Tragia urens</i>	wavyleaf noseburn	0.03
Bare Ground		45.17

Hydric Savanna

Qualitative sampling. The restoration of the fire-suppressed hydric savanna was begun in 2010 by mowing down the 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. Fires and hog rooting have created continual shifts in the herbaceous vegetation, primarily in the lowest, wettest portions of the community. A wide variety of herbs have been observed colonizing the area, with mainly beaksedges and warty panicum dominating in the wetter sections and wiregrass in the drier parts, although purple bluestem remains a dominant in the driest areas in the vicinity of Transect 2. In addition to the state-endangered white-top pitcherplant found most years including 2022, the state-threatened Gulf purple

pitcherplant was detected for the first time during the 2021 sampling effort, but not seen this year. Scattered shrubs included black titi, large gallberry, sweet pepperbush, and gallberry. A total of 138 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 69 species with 17% average bare ground cover. Herbaceous species made up most of the transect cover, and wiregrass cover was similar to the 2021 sample. The southern end of the transect remained heavily damaged from hog rooting. Warty panicum, a species that can shift dramatically in cover from year to year, was much reduced compared to the 2021 sample. Woody species made up around 5% average cover per quadrat, the same as last year.

The western Transect 2 (Table LC-5, Figure LC-5) was also on a south facing slope. It had a total of 66 species with 29% average bare ground cover. 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 more disturbed from hog rooting and largely dominated by beaksedges. Vegetation composition and cover was similar to the 2021 sample. Woody species made up around 8% average cover per quadrat.

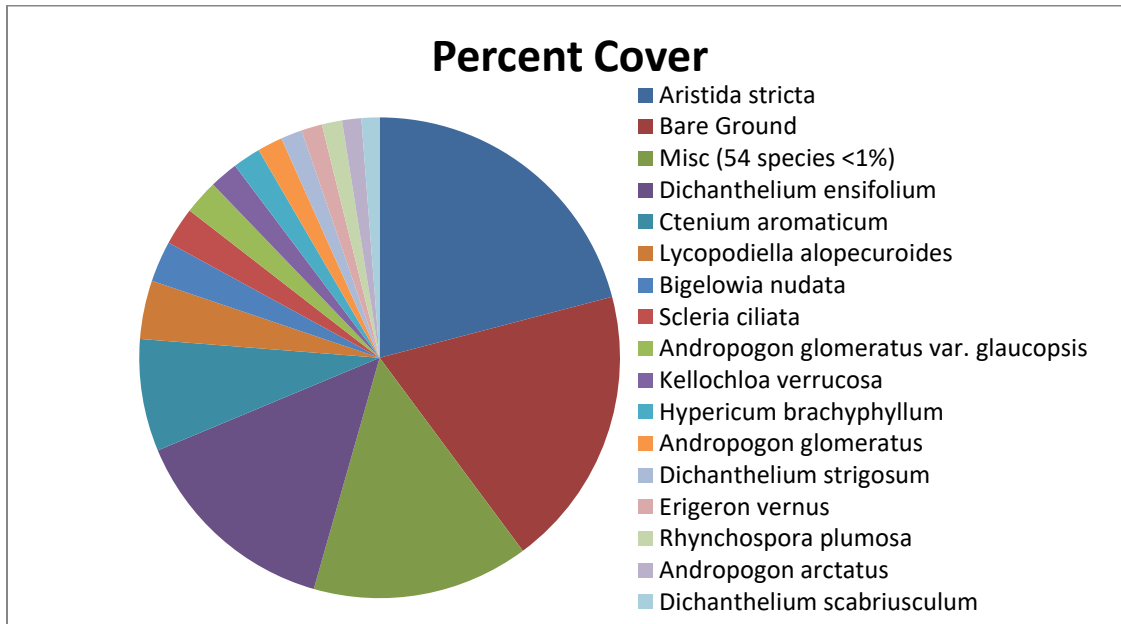


Figure LC-4. Percent cover of plant species in Hydric Savanna Transect 1.

Table LC-4. Percent cover of plant species in Hydric Savanna Transect 1 sampled on October 19, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Aristida stricta</i>	wiregrass	18.93
<i>Dichantherium ensifolium</i>	cypress witchgrass	12.93
<i>Ctenium aromaticum</i>	toothache grass	6.83
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	3.57
<i>Bigelowia nudata</i>	pineland rayless goldenrod	2.50
<i>Scleria ciliata</i>	fringed nutrush	2.30

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	2.10
<i>Kelochloa verrucosa</i>	warty panicgrass	1.73
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	1.70
<i>Andropogon glomeratus</i>	bushy bluestem	1.53
<i>Dichanthelium strigosum</i>	roughhair witchgrass	1.30
<i>Erigeron vernus</i>	early whitetop fleabane	1.27
<i>Rhynchospora plumosa</i>	plumed beaksedge	1.23
<i>Andropogon arctatus</i>	pinewoods bluestem	1.17
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	1.10
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.87
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.83
<i>Scleria reticularis</i>	netted nutrush	0.83
<i>Andropogon virginicus</i>	broomsedge bluestem	0.80
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.57
<i>Aletris lutea</i>	yellow colic-root	0.53
<i>Eupatorium pilosum</i>	rough boneset	0.53
<i>Ilex coriacea</i>	large gallberry	0.53
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.50
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.47
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.43
<i>Smilax glauca</i>	cat greenbrier	0.43
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.37
<i>Liatris spicata</i>	dense gayfeather	0.33
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.33
<i>Cliftonia monophylla</i>	black titi	0.30
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.30
<i>Diodia virginiana</i>	Virginia buttonweed	0.27
<i>Tiedemannia filiformis</i> ssp. <i>filiformis</i>	water cowbane	0.27
<i>Coreopsis linifolia</i>	Texas tickseed	0.23
<i>Juncus trigonocarpus</i>	redpod rush	0.23
<i>Lycopodiella caroliniana</i>	slender club-moss	0.23
<i>Rhexia alifanus</i>	savannah meadowbeauty	0.23
<i>Sphagnum</i> sp.	sphagnum moss	0.23
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort	0.20
<i>Helianthus angustifolius</i>	narrowleaf sunflower	0.20
<i>Pinus elliotii</i>	slash pine	0.20
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.13
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.13
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	0.13
<i>Lophiola aurea</i>	golden crest	0.13
<i>Seymeria cassioides</i>	yaupon blacksenna	0.13
<i>Centella asiatica</i>	spadeleaf	0.10
<i>Eriocaulon compressum</i>	flattened pipewort	0.10
<i>Ilex glabra</i>	gallberry	0.10
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.10
<i>Solidago odora</i>	sweet goldenrod	0.10
<i>Viola primulifolia</i>	primroseleaf violet	0.10

Scientific name	Common name	Average percent cover per quadrat
<i>Xyris</i> sp.	yellow-eyed grass	0.10
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.07
<i>Rhynchospora pleiantha</i>	coastal beaksedge	0.07
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Drosera capillaris</i>	pink sundew	0.03
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge	0.03
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.03
<i>Ilex vomitoria</i>	yaupon	0.03
<i>Lachnanthes carolina</i>	Carolina redroot	0.03
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.03
<i>Polygala lutea</i>	orange milkwort	0.03
<i>Rhexia lutea</i>	yellow meadowbeauty	0.03
<i>Smilax laurifolia</i>	laurel greenbrier	0.03
<i>Sophronanthe pilosa</i>	shaggy hedgehyssop	0.03
<i>Viola palmata</i>	early blue violet	0.03
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass	0.03
Bare Ground		17.13

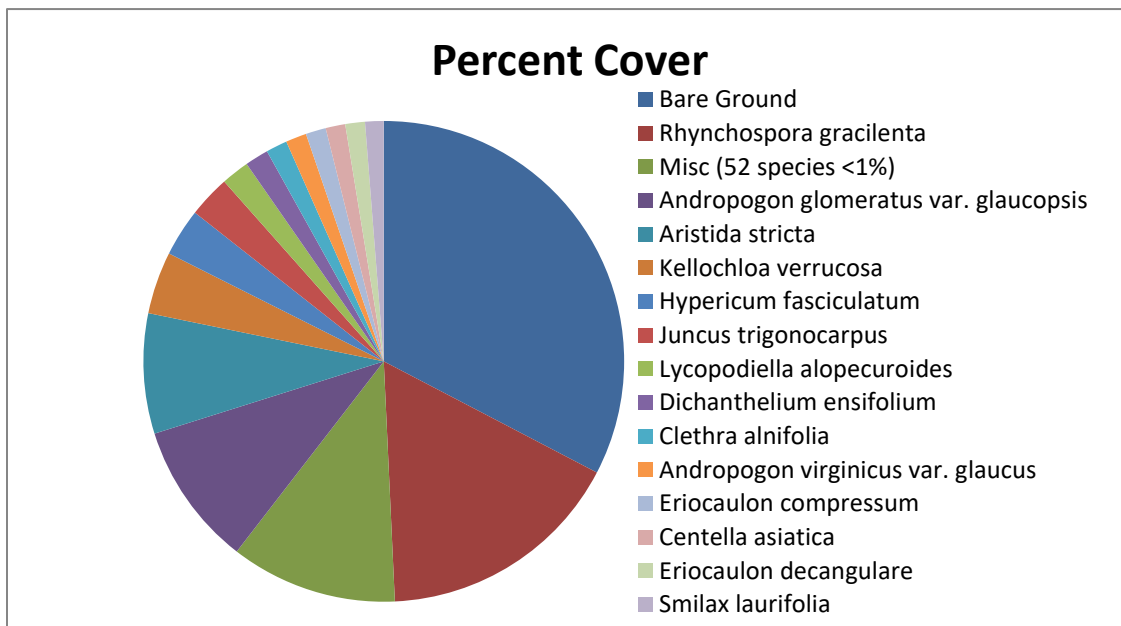


Figure LC-5. Percent cover of plant species in Hydric Savanna Transect 2.

Table LC-5. Percent cover of plant species in Hydric Savanna Transect 2 sampled on October 18, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Rhynchospora gracilentata</i>	slender beaksedge	14.67
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	8.53
<i>Aristida stricta</i>	wiregrass	7.13
<i>Kellochloa verrucosa</i>	warty panicgrass	3.70

Scientific name	Common name	Average percent cover per quadrat
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	2.83
<i>Juncus trigonocarpus</i>	redpod rush	2.50
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	1.67
<i>Dichantherium ensifolium</i>	cypress witchgrass	1.40
<i>Clethra alnifolia</i>	sweet pepperbush	1.27
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	1.23
<i>Eriocaulon compressum</i>	flattened pipewort	1.20
<i>Centella asiatica</i>	spadeleaf	1.17
<i>Eriocaulon decangulare</i>	tenangle pipewort	1.17
<i>Smilax laurifolia</i>	laurel greenbrier	1.10
<i>Pteridium aquilinum</i>	bracken	0.73
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.67
<i>Smilax glauca</i>	cat greenbrier	0.57
<i>Andropogon glomeratus</i>	bushy bluestem	0.53
<i>Magnolia virginiana</i>	sweetbay	0.53
<i>Nyssa biflora</i>	swamp tupelo	0.53
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.53
<i>Andropogon virginicus</i>	broomsedge bluestem	0.50
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.33
<i>Scleria ciliata</i>	fringed nutrush	0.33
<i>Xyris</i> sp.	yellow-eyed grass	0.33
<i>Dichantherium strigosum</i>	roughhair witchgrass	0.30
<i>Rhexia alifanus</i>	savannah meadowbeauty	0.30
<i>Dichantherium leucothrix</i>	rough witchgrass	0.23
<i>Rubus flagellaris</i>	northern dewberry	0.23
<i>Sphagnum</i> sp.	sphagnum moss	0.23
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass	0.23
<i>Ilex glabra</i>	gallberry	0.20
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.20
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.20
<i>Dichantherium scabriusculum</i>	woolly witchgrass	0.17
<i>Scleria reticularis</i>	netted nutrush	0.13
<i>Utricularia juncea</i>	southern bladderwort	0.13
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.13
<i>Ctenium aromaticum</i>	toothache grass	0.10
<i>Dichantherium ensifolium</i> var. <i>unciphyllum</i>	cypress witchgrass	0.10
<i>Drosera capillaris</i>	pink sundew	0.10
<i>Eupatorium compositifolium</i>	yankeeweed	0.10
<i>Ludwigia pilosa</i>	hairy primrosewillow	0.10
<i>Pinus elliotii</i>	slash pine	0.10
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.10
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.07
<i>Fuirena squarrosa</i>	hairy umbrellasedge	0.07
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.07
<i>Oldenlandia uniflora</i>	clustered mille grains	0.07
<i>Pinus serotina</i>	pond pine	0.07
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.07
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.03

Scientific name	Common name	Average percent cover per quadrat
<i>Burmannia capitata</i>	southern bluethread	0.03
<i>Callicarpa americana</i>	American beautyberry	0.03
<i>Cliftonia monophylla</i>	black titi	0.03
<i>Dichantherium</i> sp.	witchgrass	0.03
<i>Eupatorium pilosum</i>	rough boneset	0.03
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.03
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.03
<i>Ilex vomitoria</i>	yaupon	0.03
<i>Lobelia brevifolia</i>	shortleaf lobelia	0.03
<i>Lyonia lucida</i>	fetterbush	0.03
<i>Osmunda cinnamomea</i>	cinnamon fern	0.03
<i>Polygala lutea</i>	orange milkwort	0.03
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.03
<i>Viola primulifolia</i>	primroseleaf violet	0.03
Bare Ground		28.83

High Pine

Qualitative sampling. Mature slash pine plantation once covered most of the area being restored to high pine, but pine thinning and prescribed fire have much improved the community from even four years ago. The canopy is now very open with a basal area of around 20 ft² per acre. Shrubs are shorter, and herbs and grasses more prevalent throughout. Much of the high pine had been burned two years ago. The understory may be either shrub dominated, usually by yaupon, or an open grassy groundlayer of wiregrass with widely scattered saw palmetto and gallberry, neither of which exceed 5% cover. Nearer the ecotone with hydric savanna and in open, flat areas of the community, many other herbs are found with the wiregrass, including pinkscale gayfeather, narrowleaf silkgrass, sweet goldenrod, scaleleaf aster, and rough boneset. The total number of species observed in this community was 159 (Table LC-1).

Bay Swamp

Qualitative sampling. This natural community occurs as a narrow band along the small stream tributaries to Lafayette Creek. The open to dense canopy consisted of sweetbay, titi, and swamp tupelo. The frequently dense and tall shrub layers were primarily composed of fetterbush, dahoon holly, large gallberry, and black titi. The herb stratum is relatively sparse in more shaded areas with clustered sedge and cinnamon fern seen most frequently. However, cleared areas of bay swamp along road crossings contain many more herb species that tend to be weedy. The narrow bay swamp in the vicinity of Hydric Savanna Transect 2 burned through several years ago and lost most of its canopy components. In the northwest corner of the property, Peruvian primrosewillow, a FISC Category I invasive non-native plant species, was observed growing on the west side of the stream not far from the road. Laurel greenbrier was a common vine. The total number of species observed in this community was 79 (Table LC-1).

Stream Swamp

Qualitative sampling. This relatively undisturbed natural community occurs along the narrow floodplain of Lafayette Creek and its major tributary, Wolf Creek. On the west side of the site, the closed canopy was composed of mature red maple, swamp tupelo, water oak, and sweetbay. The often dense shrubs consisted of coastal doghobble, yaupon holly, sweet pepperbush, titi, black titi, and large gallberry. Sphagnum moss and cinnamon fern made up most of the sparse groundcover. Water levels were fairly low during the site visit, allowing easy access to the swamp just south of Hydric Savanna Transect 2. The total number of species observed in this community was 72 (Table LC-1).

PLUM CREEK AT HOLMES CREEK MITIGATION SITE

Qualitative and Quantitative Monitoring

October 2022

Plum Creek at Holmes Creek Mitigation Site

Qualitative and Quantitative Monitoring

October 2022

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 gained 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 Wetland Forest Mixed (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 every fall from 2012 to 2021.

METHODS

The quantitative monitoring utilized 300-foot long permanent transect lines previously marked during the 2012 survey. Two transects were located in the Sandhill community, one in the Restoration Wetland Forest Mixed, and one in the Preserved Wetland Forest Mixed (Figure PC-1). In 2013, metal T-posts were installed at the ends of each transect to provide more permanent reference points. Along each transect line, fifteen 1m x 1m quadrats were placed along the left side beginning at 0 and then spaced every 20 feet, ending at 280 feet. Data recorded in each quadrat consisted of the visually estimated percent cover of each plant species including individuals rooted in the quadrat as well as overhanging. Canopy over 2 m in height was excluded from cover estimates. Only the lower 2 m portions of larger individuals were counted as cover, including the lower portions of tree trunks rooted in quadrats. Bare ground was estimated in each quadrat as a percentage of ground not obscured by plant cover or large woody debris. This represents a slight change in procedure from FNAI monitoring reports from 2012 to 2017 where percent bare ground was calculated by subtracting the total percent for all species from 100.

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 Kim Alexander, Jenna Annis, Camille Eckel, Brenda Herring, and Kelly Anderson on October 6 and 20, 2022.

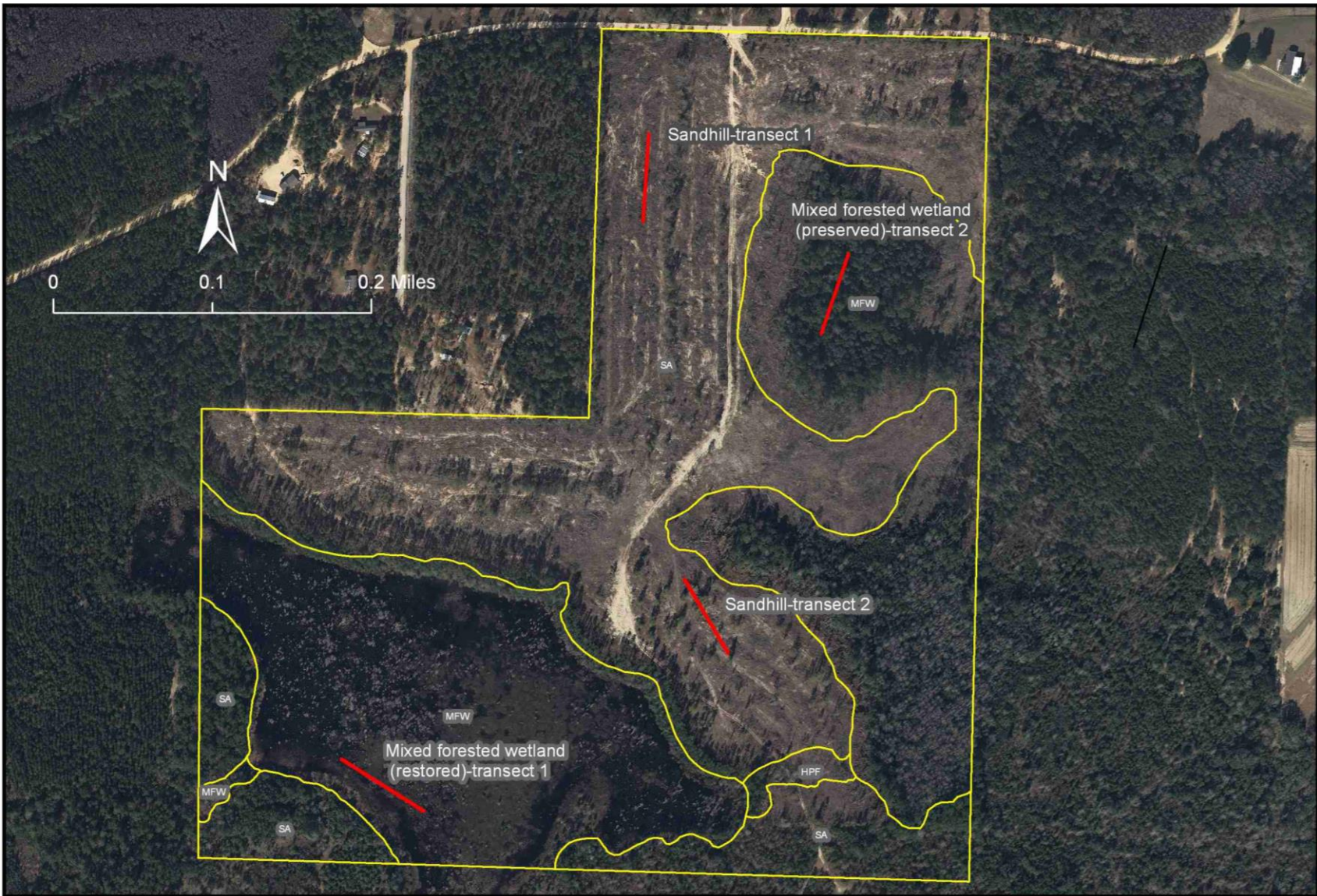


Figure PC-1. Location of permanent transects at Plum Creek at Holmes Creek Mitigation Site in Sandhill and Mixed Forested Wetland.

RESULTS AND DISCUSSION

A total of 230 plant taxa were observed during the 2022 monitoring period in the target communities at Plum Creek at Holmes Creek Mitigation Site (Table PC-1). Nineteen new taxa were found during the 2022 monitoring.

Table PC-1. Plant species observed in target communities at Plum Creek at Holmes Creek Mitigation Site on October 6 and 20, 2022 (bold name = new species; bold X = new observation in community type)

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
<i>Acalypha gracilens</i>	slender threeseed mercury	X			1
<i>Acer rubrum</i>	red maple		X	X	2
<i>Agalinis divaricata</i>	pineland false foxglove	X			1
<i>Agalinis fasciculata</i>	beach false foxglove	X			1
<i>Agalinis plukenetii</i>	Plukenet's false foxglove	X			1
<i>Ambrosia artemisiifolia</i>	common ragweed	X			1
<i>Andropogon glomeratus</i>	bushy bluestem	X			1
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	X	X	X	3
<i>Andropogon</i> sp.	bluestem	X	X	X	3
<i>Andropogon ternarius</i>	splitbeard bluestem	X			1
<i>Andropogon virginicus</i>	broomsedge bluestem	X	X	X	3
<i>Apteria aphylla</i>	nodding nixie			X	1
<i>Aristida purpurascens</i>	arrowfeather threeawn	X			1
<i>Aristida simpliciflora</i>	southern threeawn grass	X			1
<i>Aristida stricta</i>	wiregrass	X			1
<i>Aronia arbutifolia</i>	red chokeberry	X		X	2
<i>Asimina spatulata</i>	paw paw	X			1
<i>Asplenium platyneuron</i>	ebony spleenwort			X	1
<i>Baptisia lanceolata</i>	gopherweed	X			1
<i>Berlandiera pumila</i>	soft greeneyes	X			1
<i>Bidens mitis</i>	smallfruit beggarticks		X	X	2
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	X			1
<i>Callicarpa americana</i>	American beautyberry	X			1
<i>Carex glaucescens</i>	clustered sedge		X	X	2
<i>Carex striata</i>	Walter's sedge		X	X	2
<i>Cartrema americanum</i>	wild olive	X		X	2
<i>Centella asiatica</i>	spadeleaf	X			1
<i>Chamaecrista fasciculata</i>	partridge pea	X			1
<i>Chamaecrista nictitans</i>	sensitive pea	X			1
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	X			1
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	X			1
<i>Chrysopsis mariana</i>	Maryland goldenaster	X			1
<i>Cirsium horridulum</i>	purple thistle	X			1

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
<i>Clethra alnifolia</i>	sweet pepperbush	X	X	X	3
<i>Cliftonia monophylla</i>	black titi		X	X	2
<i>Cnidocolus stimulosus</i>	tread softly	X			1
<i>Conoclinium coelestinum</i>	blue mistflower			X	1
<i>Conyza canadensis</i>	Canadian horseweed	X			1
<i>Coreopsis tripteris</i>	tall tickseed		X		1
<i>Crocotanthemum carolinianum</i>	Carolina frostweed	X			1
<i>Croptilon divaricatum</i>	slender scratchdaisy	X			1
<i>Croton argyranthemus</i>	silver croton	X			1
<i>Croton glandulosus</i>	vente conmigo	X			1
<i>Ctenium aromaticum</i>	toothache grass	X			1
<i>Cyperus haspan</i>	haspan flatsedge			X	1
<i>Cyperus ovatus</i>	pinebarren flatsedge		X		1
<i>Cyrilla racemiflora</i>	titi		X	X	2
<i>Dalea pinnata</i>	summer farewell	X			1
<i>Decodon verticillatus</i>	willow herb		X		1
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	X			1
<i>Dichanthelium acuminatum</i>	tapered witchgrass	X			1
<i>Dichanthelium commutatum</i>	variable witchgrass	X			1
<i>Dichanthelium ovale</i>	eggleaf witchgrass	X			1
<i>Dichanthelium portoricense</i>	hemlock witchgrass	X			1
<i>Dichanthelium</i> sp.	witchgrass	X			1
<i>Dichanthelium sphaerocarpon</i>	roundseed witchgrass	X			1
<i>Dichanthelium strigosum</i>	roughhair witchgrass	X			1
<i>Dichondra carolinensis</i>	Carolina ponyfoot	X			1
<i>Digitaria filiformis</i> var. <i>filiformis</i>	slender crabgrass	X			1
<i>Diodia teres</i>	poor joe	X			1
<i>Diodia virginiana</i>	Virginia buttonweed	X			1
<i>Diospyros virginiana</i>	common persimmon	X			1
<i>Drosera capillaris</i>	pink sundew			X	1
<i>Dulichium arundinaceum</i>	threeway sedge		X		1
<i>Eleocharis equisetoides</i>	jointed spikerush		X		1
<i>Elephantopus elatus</i>	tall elephantsfoot	X			1
<i>Eragrostis eliottii</i>	Elliott's lovegrass	X			1
<i>Eremochloa ophiuroides</i>	centipede grass	X			1
<i>Eriocaulon decangulare</i>	tenangle pipewort		X	X	2
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	X			1
<i>Eubotrys racemosus</i>	swamp doghobble			X	1
<i>Eupatorium album</i>	white thoroughwort	X			1
<i>Eupatorium capillifolium</i>	dogfennel	X	X	X	3
<i>Eupatorium compositifolium</i>	yankeeweed	X			1
<i>Eupatorium mohrii</i>	Mohr's thoroughwort		X	X	2
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort	X		X	2

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
<i>Eupatorium semiserratum</i>	smallflower thoroughwort		X	X	2
<i>Euphorbia discoidalis</i>	summer spurge	X			1
<i>Euphorbia floridana</i>	greater Florida spurge	X			1
<i>Euthamia caroliniana</i>	slender flattop goldenrod	X	X	X	3
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge		X	X	2
<i>Fuirena scirpoidea</i>	southern umbrellasedge			X	1
<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>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			1
<i>Habenaria repens</i>	waterspider false rein orchid		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	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 galioides</i>	bedstraw 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> 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 opaca</i>	American holly			X	1
<i>Ilex vomitoria</i>	yaupon	X		X	2
<i>Itea virginica</i>	Virginia willow		X		1
<i>Iva microcephala</i>	Piedmont marshelder	X		X	2
<i>Juncus canadensis</i>	Canadian rush		X		1
<i>Juncus marginatus</i>	grassleaf rush			X	1
<i>Juncus scirpoides</i>	needlepod rush		X		1
<i>Juniperus virginiana</i>	red cedar	X			1
<i>Kellochloa verrucosa</i>	warty panicgrass	X	X	X	3
<i>Lachnanthes caroliniana</i>	Carolina redroot		X		1
<i>Lechea minor</i>	thymeleaf pinweed	X			1
<i>Lechea sessiliflora</i>	pineland pinweed	X			1
<i>Lechea</i> sp.	pinweed	X			1
<i>Lespedeza capitata</i>	roundhead lespedeza	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 tenuifolia</i>	shortleaf gayfeather	X			1

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
<i>Liquidambar styraciflua</i>	sweetgum		X	X	2
<i>Lobelia brevifolia</i>	shortleaf lobelia	X			1
<i>Lobelia glandulosa</i>	glade lobelia			X	1
<i>Ludwigia linearis</i>	narrowleaf primrosewillow		X	X	2
<i>Ludwigia pilosa</i>	hairy primrosewillow		X	X	2
<i>Ludwigia sphaerocarpa</i>	globefruit primrosewillow		X		1
<i>Lycopodiella alopecuroides</i>	foxtail club-moss		X	X	2
<i>Lycopodiella caroliniana</i>	slender club-moss			X	1
<i>Lycopus rubellus</i>	taperleaf waterhorehound		X		1
<i>Lygodium japonicum</i>	Japanese climbing fern	X		X	2
<i>Lyonia lucida</i>	fetterbush	X	X	X	3
<i>Magnolia virginiana</i>	sweetbay		X	X	2
<i>Mitreola sessilifolia</i>	swamp hornpod			X	1
<i>Morella caroliniensis</i>	evergreen bayberry			X	1
<i>Morella cerifera</i>	southern bayberry	X	X	X	3
<i>Morella inodora</i>	odorless bayberry			X	1
<i>Muhlenbergia capillaris</i> var. <i>trichopodes</i>	cutover muhly	X			1
<i>Nymphaea odorata</i>	white waterlily		X		1
<i>Nyssa biflora</i>	swamp tupelo		X	X	2
<i>Oenothera filipes</i>	slenderstalk beeblossom	X			1
<i>Oldenlandia uniflora</i>	clustered mille grains	X	X	X	3
<i>Opuntia humifusa</i>	pricklypear	X			1
<i>Osmunda cinnamomea</i>	cinnamon fern			X	1
<i>Panicum hemitomon</i>	maidencane		X	X	2
<i>Panicum virgatum</i>	switchgrass	X			1
<i>Paspalum setaceum</i>	thin paspalum	X			1
<i>Persea palustris</i>	swamp bay		X	X	2
<i>Pieris phyllireifolia</i>	climbing fetterbush		X		1
<i>Pinus clausa</i>	sand pine	X			1
<i>Pinus elliotii</i>	slash pine	X	X	X	3
<i>Pinus palustris</i>	longleaf pine	X		X	2
<i>Pityopsis aspera</i>	pineland silkgrass	X			1
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass	X			1
<i>Pluchea baccharis</i>	rosy camphorweed		X		1
<i>Pluchea foetida</i>	stinking camphorweed			X	1
<i>Polygala nana</i>	candyroot	X			1
<i>Polygonella gracilis</i>	tall jointweed	X			1
<i>Polygonella polygama</i>	october flower	X			1
<i>Polypremum procumbens</i>	rustweed	X			1
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	X			1
<i>Pteridium aquilinum</i>	bracken fern	X			1
<i>Quercus falcata</i>	southern red oak	X			1
<i>Quercus geminata</i>	sand live oak	X			1

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
<i>Quercus hemisphaerica</i>	laurel oak	X			1
<i>Quercus incana</i>	bluejack oak	X			1
<i>Quercus laevis</i>	turkey oak	X			1
<i>Quercus margarettae</i>	sand post oak	X			1
<i>Quercus nigra</i>	water oak			X	1
<i>Quercus virginiana</i>	live oak	X			1
<i>Rhexia mariana</i>	pale meadowbeauty	X	X	X	3
<i>Rhexia petiolata</i>	fringed meadowbeauty			X	1
<i>Rhexia virginica</i>	handsome harry		X	X	2
<i>Rhododendron viscosum</i>	swamp azalea			X	1
<i>Rhus copallinum</i>	winged sumac	X			1
<i>Rhynchosia reniformis</i>	dollarleaf	X			1
<i>Rhynchospora cephalantha</i>	bunched beaksedge		X		1
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge		X	X	2
<i>Rhynchospora gracilentia</i>	slender beaksedge		X	X	2
<i>Rhynchospora leptocarpa</i>	brownish beaksedge			X	1
<i>Rhynchospora microcephala</i>	bunched beaksedge			X	1
<i>Rhynchospora scirpoides</i>	longbeak beaksedge		X		1
<i>Rhynchospora</i> sp.	beaksedge	X			1
<i>Rubus cuneifolius</i>	sand blackberry	X			1
<i>Rubus pensilvanicus</i>	sawtooth blackberry	X		X	2
<i>Sabatia brevifolia</i>	shortleaf rosegentian			X	1
<i>Saccharum giganteum</i>	sugarcane plumegrass		X	X	2
<i>Schizachyrium sanguineum</i>	crimson bluestem	X			1
<i>Schizachyrium stoloniferum</i>	creeping little bluestem	X			1
<i>Schizachyrium tenerum</i>	slender bluestem	X			1
<i>Scirpus cyperinus</i>	woolgrass			X	1
<i>Scleria ciliata</i>	fringed nutrush	X			1
<i>Scleria</i> sp.	nutrush		X		1
<i>Scleria triglomerata</i>	whip nutrush	X			1
<i>Serenoa repens</i>	saw palmetto	X			1
<i>Sericocarpus tortifolius</i>	whitetop aster	X			1
<i>Seymeria cassioides</i>	yaupon blacksenna	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>Solidago petiolaris</i>	downy ragged goldenrod	X		X	2
<i>Sphagnum</i> sp.	sphagnum moss		X	X	2

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
<i>Stipulicida setacea</i>	pineland scalypink	X			1
<i>Symphotrichum concolor</i>	eastern silver aster	X			1
<i>Symphotrichum dumosum</i>	rice button aster	X		X	2
<i>Taxodium ascendens</i>	pond cypress		X	X	2
<i>Tillandsia usneoides</i>	Spanish moss		X		1
<i>Tragia smallii</i>	Small's 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
<i>Tridens flavus var. flavus</i>	tall redtop	X			1
<i>Utricularia cornuta</i>	horned 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>Viburnum nudum</i>	possumhaw			X	1
<i>Viola sp.</i>	violet	X			1
<i>Vitis rotundifolia</i>	muscadine	X		X	2
<i>Woodwardia areolata</i>	netted chain fern			X	1
<i>Woodwardia virginica</i>	Virginia chain fern		X	X	2
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass		X	X	2
<i>Xyris fimbriata</i>	fringed yellow-eyed grass		X	X	2
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass		X	X	2
<i>Yucca filamentosa</i>	Adam's needle	X			1
Total number of taxa: 230		149	67	86	302

Sandhill

Qualitative sampling. The sandhill natural community has been degraded by past silviculture activities but retains many characteristic species. Young planted longleaf pines ca. 20 feet tall were widely spaced over the hillside. These trees are starting to produce good needle cast that will help to carry prescribed burns on the property. The diverse but somewhat sparse groundcover is dominated by a mix of broomsedge bluestem and wiregrass, with many other species scattered throughout, including Lynn Haven goldenaster, yankeeweed, and witchgrasses. Wiregrass, although dominant, 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. Earleaf greenbriar and yellow jessamine vines were common. A total of 149 plant taxa 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 59 species with 45% bare ground. The ground layer consisted of mainly herbaceous species with scattered shrubs. Broomsedge bluestem had the the highest percent cover,

followed by wiregrass, yaupon, longleaf pine, and earleaf greenbrier. Wiregrass was present at around 10% cover, an increase from 2021. Woody species made up around 19% average cover per quadrat, mostly due to clumps of yaupon on the south end of the transect. Overall, vegetation measurements were very similar to last year.

The southern Transect 2 (Table PC-3, Figure PC-3) was situated near the top of a low ridge. It had a total of 50 species with 46% bare ground. The highest herbaceous cover contributions were from pineland silkgrass and broomsedge bluestem. Yellow jessamine, saw palmetto, laurel oak, and earleaf greenbrier formed most of the woody cover which made up around 32% average cover per quadrat, an increase from 2021 owing mostly to an increase in yellow jessamine vines. Although not recorded as cover, fruticose lichens were observed in two quadrats.

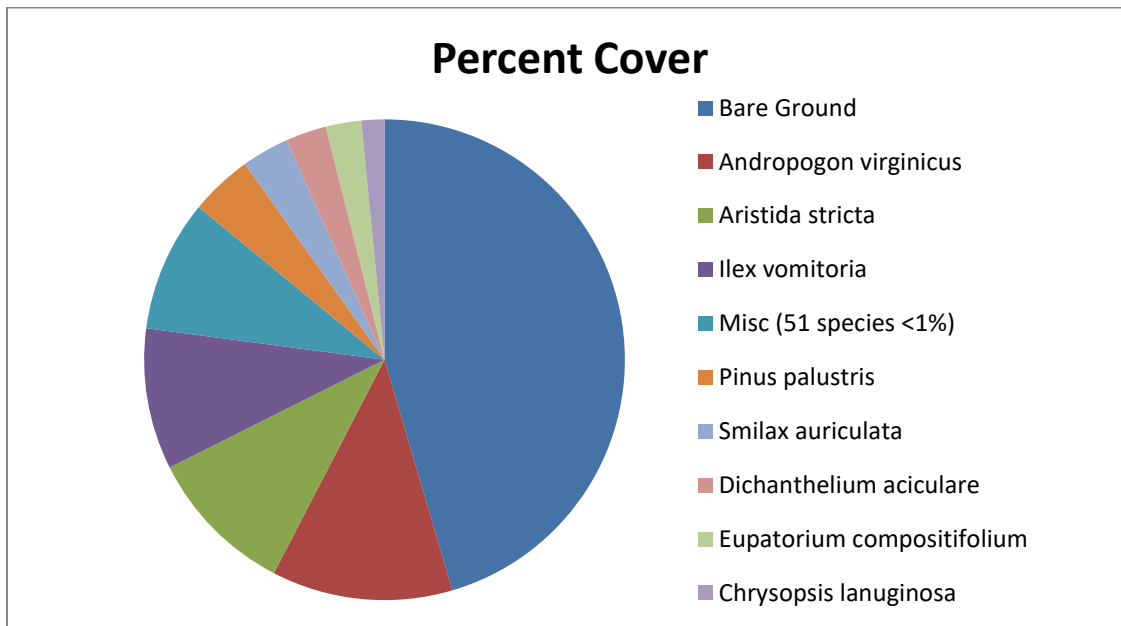


Figure PC-2. Percent cover of plant species in Sandhill Transect 1.

Table PC-2. Percent cover of plant species in Sandhill Transect 1 sampled on October 6, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon virginicus</i>	broomsedge bluestem	12.10
<i>Aristida stricta</i>	wiregrass	9.93
<i>Ilex vomitoria</i>	yaupon	9.43
<i>Pinus palustris</i>	longleaf pine	4.17
<i>Smilax auriculata</i>	earleaf greenbrier	3.17
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	2.73
<i>Eupatorium compositifolium</i>	yankeeweed	2.37
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	1.53
<i>Dichanthelium ovale</i>	eggleaf witchgrass	0.70
<i>Gelsemium sempervirens</i>	yellow jessamine	0.70
<i>Scleria ciliata</i>	fringed nutrush	0.67
<i>Rubus cuneifolius</i>	sand blackberry	0.60

Scientific name	Common name	Average percent cover per quadrat
<i>Smilax glauca</i>	cat greenbrier	0.53
<i>Andropogon ternarius</i>	splitbeard bluestem	0.50
<i>Panicum virgatum</i>	switchgrass	0.50
<i>Pityopsis aspera</i>	pineland silkgrass	0.50
<i>Solidago odora</i>	sweet goldenrod	0.37
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.23
<i>Baptisia lanceolata</i>	gopherweed	0.23
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.23
<i>Schizachyrium stoloniferum</i>	creeping little bluestem	0.23
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.20
<i>Galactia minor</i>	leafy milkpea	0.17
<i>Trichostema dichotomum</i>	forked bluecurls	0.17
<i>Houstonia procumbens</i>	roundleaf bluet	0.13
<i>Hypericum hypericoides</i>	St. Andrew's cross	0.13
<i>Polypremum procumbens</i>	rustweed	0.13
<i>Pteridium aquilinum</i>	bracken	0.13
<i>Berlandiera pumila</i>	soft greeneyes	0.10
<i>Ctenium aromaticum</i>	toothache grass	0.10
<i>Elephantopus elatus</i>	tall elephantsfoot	0.10
<i>Oenothera filipes</i>	slenderstalk beeblossom	0.10
<i>Quercus margarettae</i>	sand post oak	0.10
<i>Sericocarpus tortifolius</i>	whiteweed aster	0.10
<i>Smilax pumila</i>	sarsaparilla vine	0.10
<i>Vitis rotundifolia</i>	muscadine	0.10
<i>Dalea pinnata</i>	summer farewell	0.07
<i>Eragrostis elliottii</i>	Elliott's lovegrass	0.07
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	0.07
Unknown woody		0.07
<i>Vaccinium stamineum</i>	deerberry	0.07
<i>Acalypha gracilens</i>	slender threeseed mercury	0.03
<i>Asimina spatulata</i>	paw paw	0.03
<i>Croptilon divaricatum</i>	slender scratchdaisy	0.03
<i>Digitaria filiformis</i> var. <i>filiformis</i>	slender crabgrass	0.03
<i>Euphorbia discoidalis</i>	summer spurge	0.03
<i>Euphorbia floridana</i>	greater Florida spurge	0.03
<i>Galium hispidulum</i>	coastal bedstraw	0.03
<i>Hibiscus aculeatus</i>	comfortroot	0.03
<i>Hypericum gentianoides</i>	orangegrass	0.03
<i>Lechea</i> sp.	pinweed	0.03
<i>Polygala nana</i>	candyroot	0.03
<i>Polygonella gracilis</i>	tall jointweed	0.03
<i>Rhynchosia reniformis</i>	dollarleaf	0.03
<i>Rhynchospora</i> sp.	beaksedge	0.03
<i>Solidago petiolaris</i>	downy ragged goldenrod	0.03
<i>Tragia smallii</i>	Small's noseburn	0.03
Unknown herb		0.03
<i>Viola</i> sp.	violet	0.03
Bare Ground		45.17

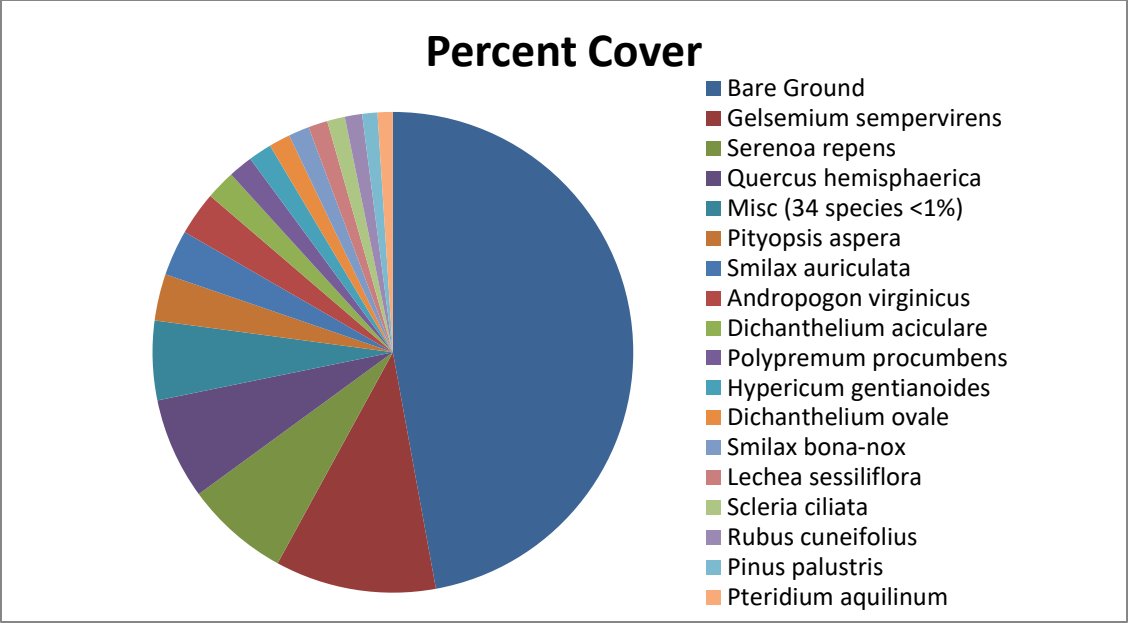


Figure PC-3. Percent species cover in Sandhill Transect 2.

Table PC-3. Percent cover of plant species in Sandhill Transect 2 sampled on October 21, 2021.

Scientific name	Common name	Average percent cover per quadrat
<i>Gelsemium sempervirens</i>	yellow jessamine	10.57
<i>Serenoa repens</i>	saw palmetto	6.83
<i>Quercus hemisphaerica</i>	laurel oak	6.67
<i>Pityopsis aspera</i>	pineland silkgrass	3.07
<i>Smilax auriculata</i>	earleaf greenbrier	3.00
<i>Andropogon virginicus</i>	broomsedge bluestem	2.87
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	1.93
<i>Polypremum procumbens</i>	rustweed	1.60
<i>Hypericum gentianoides</i>	orangegrass	1.53
<i>Dichanthelium ovale</i>	eggleaf witchgrass	1.40
<i>Smilax bona-nox</i>	saw greenbrier	1.37
<i>Lechea sessiliflora</i>	pineland pinweed	1.27
<i>Scleria ciliata</i>	fringed nutrush	1.17
<i>Rubus cuneifolius</i>	sand blackberry	1.13
<i>Pinus palustris</i>	longleaf pine	1.00
<i>Pteridium aquilinum</i>	bracken	1.00
<i>Hibiscus aculeatus</i>	comfortroot	0.77
<i>Diospyros virginiana</i>	common persimmon	0.53
<i>Aristida stricta</i>	wiregrass	0.37
<i>Houstonia procumbens</i>	roundleaf bluet	0.37
<i>Aristida purpurascens</i>	arrowfeather threeawn	0.33
<i>Smilax glauca</i>	cat greenbrier	0.33
<i>Hypericum hypericoides</i>	St. Andrew's cross	0.30
<i>Eupatorium compositifolium</i>	yankeeweed	0.27
<i>Solidago odora</i>	sweet goldenrod	0.23

Scientific name	Common name	Average percent cover per quadrat
<i>Dichanthelium commutatum</i>	variable witchgrass	0.20
<i>Trichostema dichotomum</i>	forked bluecurls	0.17
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	0.13
<i>Crocanthemum carolinianum</i>	Carolina frostweed	0.13
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.13
<i>Vaccinium arboreum</i>	sparkleberry	0.13
<i>Croton glandulosus</i>	vente conmigo	0.10
<i>Smilax pumila</i>	sarsaparilla vine	0.10
<i>Symphotrichum dumosum</i>	rice button aster	0.07
<i>Acalypha gracilens</i>	slender threeseed mercury	0.03
<i>Andropogon</i> sp.	bluestem	0.03
<i>Andropogon ternarius</i>	splitbeard bluestem	0.03
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	0.03
<i>Chamaecrista fasciculata</i>	partridge pea	0.03
<i>Dichanthelium</i> sp.	witchgrass	0.03
<i>Dichanthelium sphaerocarpon</i>	roundseed witchgrass	0.03
<i>Dichanthelium strigosum</i>	roughhair witchgrass	0.03
<i>Dichondra carolinensis</i>	Carolina ponysfoot	0.03
<i>Digitaria filiformis</i> var. <i>filiformis</i>	slender crabgrass	0.03
<i>Euphorbia discoidalis</i>	summer spurge	0.03
<i>Galactia minor</i>	leafy milkpea	0.03
<i>Lechea minor</i>	thymeleaf pinweed	0.03
<i>Liatris gracilis</i>	slender gayfeather	0.03
<i>Paspalum setaceum</i>	thin paspalum	0.03
<i>Pinus elliotii</i>	slash pine	0.03
Bare Ground		46.00

Wetland Forest Mixed (Restoration)

Qualitative sampling. The Wetland Forest Mixed Restoration area (Figure PC-1) resembled a marsh due to its sparse tree cover. The muck soil of the former beaver pond was mostly dry at the time of the survey. The vegetative cover in the central portions in the vicinity of the transect consisted primarily of hairy primrosewillow. Willow herb, a low shrub with woody base and herbaceous stems that arch over to form a nearly impenetrable interlacing thicket, was somewhat reduced this year, possibly owing to the drier conditions. White waterlily is common, but only in the deepest, frequently inundated parts of the marsh. Interspersed with the low groundcover were patches of young cypress 2 to 8 feet tall 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. Shrubs and small trees dominated the ecotone to the adjacent uplands. Hog damage was observed throughout the area. The total number of species observed in this community was 67 (Table PC-1).

Quantitative sampling. Transect 1 (Table PC-4, Figure PC-4) had a total of 23 species with 23% bare ground). The area was quite dry during the 2022 sampling effort, with no standing water along the transect. In general, the western end of the transect is shallower than the eastern end where hummocks

are common. The highest percent cover was hairy primrosewillow, followed by loosehead beaksedge, slender beaksedge, taperleaf waterhorehound, and willow herb. The much lower water levels this year seem to have led to a decrease in willow herb and white waterlily and an increase in hairy primrosewillow. Woody species made around 6% average cover per quadrat, mainly attributable to a decrease in willow herb from last year.

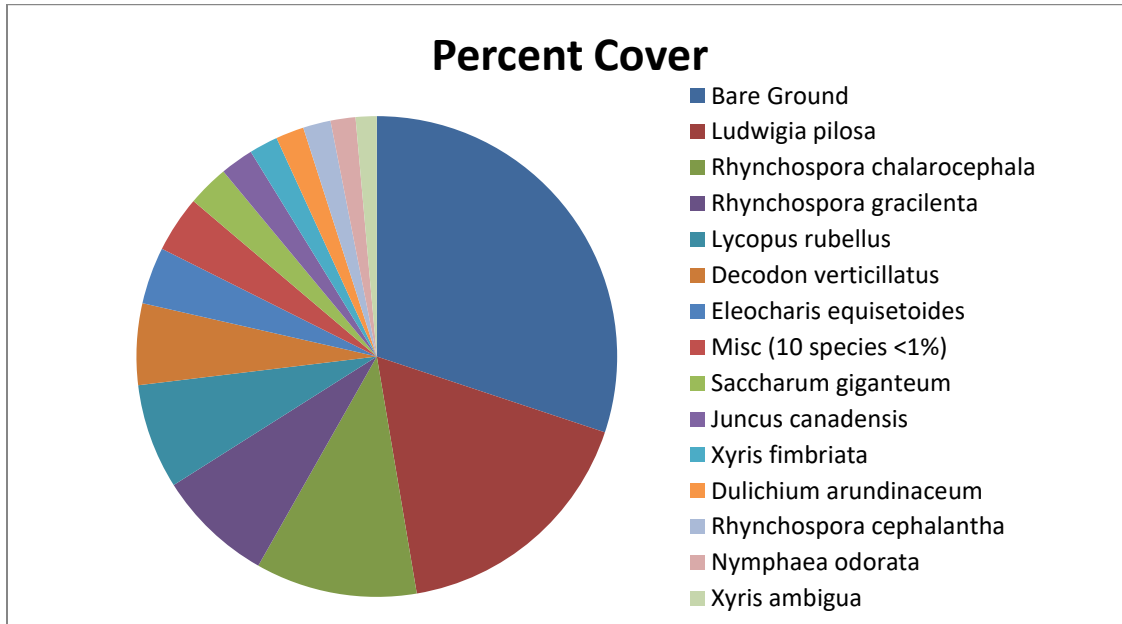


Figure PC-4. Percent cover of plant species in Mixed Forested Wetland (Restored) Transect 1.

Table PC-4. Percent cover of plant species in Mixed Forested Wetland (Restored) Transect 1 sampled on October 6, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Ludwigia pilosa</i>	hairy primrosewillow	15.43
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	9.73
<i>Rhynchospora gracilentia</i>	slender beaksedge	7.00
<i>Lycopus rubellus</i>	taperleaf waterhorehound	6.33
<i>Decodon verticillatus</i>	willow herb	4.90
<i>Eleocharis equisetoides</i>	jointed spikerush	3.43
<i>Saccharum giganteum</i>	sugarcane plumegrass	2.50
<i>Juncus canadensis</i>	Canadian rush	2.00
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	1.73
<i>Dulichium arundinaceum</i>	threeway sedge	1.70
<i>Rhynchospora cephalantha</i>	bunched beaksedge	1.67
<i>Nymphaea odorata</i>	white waterlily	1.50
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	1.27
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.73
<i>Rhynchospora scirpoides</i>	longbeak beaksedge	0.60
<i>Andropogon sp.</i>	bluestem	0.50
<i>Ludwigia sphaerocarpa</i>	globefruit primrosewillow	0.50

<i>Taxodium ascendens</i>	pond cypress	0.47
<i>Itea virginica</i>	Virginia willow	0.23
<i>Nyssa biflora</i>	swamp tupelo	0.13
<i>Cyperus ovatus</i>	pinebarren flatsedge	0.10
<i>Juncus scirpoides</i>	needlepod rush	0.10
<i>Triadenum virginicum</i>	Virginia marsh St. John's wort	0.03
Bare Ground		26.97

Wetland Forest Mixed (Preserved)

Qualitative sampling. The Preserved Wetland Forest Mixed (Figure PC-1) was a mature baygall forest still in recovery from storm damage 4 years ago. The tall canopy of large trees formed dense shade with occasional openings. Following Hurricane Michael in 2018, many trees and limbs were down in this community. Dominant species were sweetbay and swamp tupelo. 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 total number of species observed in this community was 86 (Table PC-1). Many of the new species encountered in recent years are on the open, mostly herbaceous slope that is mapped as part of this community.

Quantitative sampling. Transect 2 (Table PC-5, Figure PC-5) had a total of 28 species with 44% bare ground. The dominant shrubs were fetterbush, large gallberry, and sweet pepperbush. Woody species made around 39% average cover per quadrat, accounting for almost ¾ of the total cover observed. Sphagnum moss formed most of the sparse herbaceous cover.

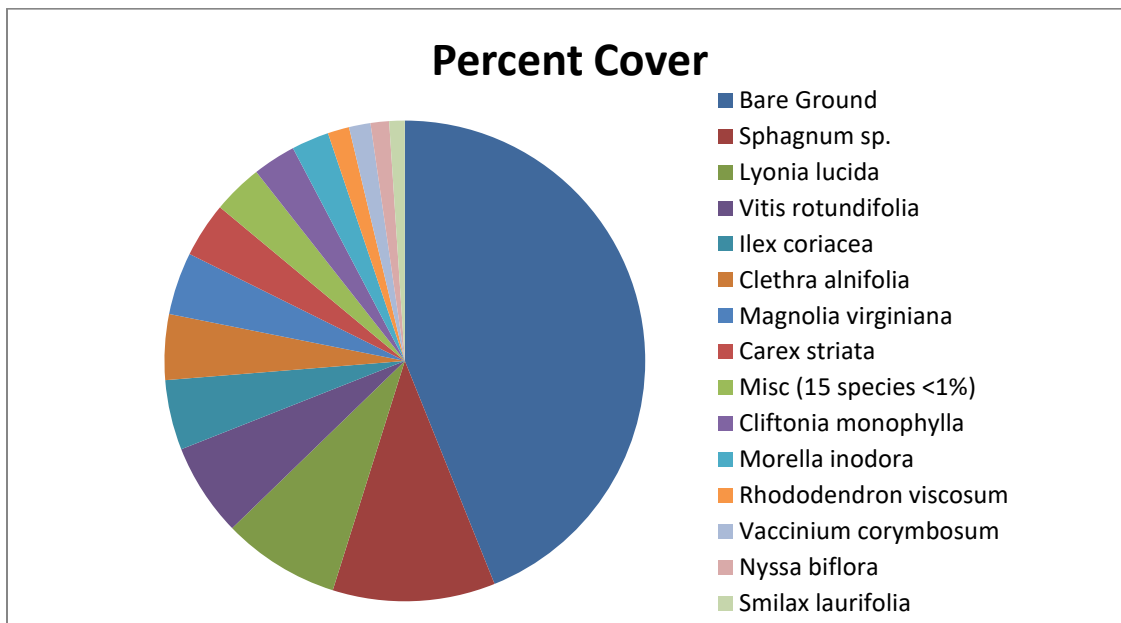


Figure PC-5. Percent cover of plant species in Mixed Forested Wetland (Preserved) Transect 2.

Table PC-5. Percent cover of plant species in Mixed Forested Wetland (Preserved) Transect 2 sampled on October 6, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Sphagnum</i> sp.	sphagnum moss	10.83
<i>Lyonia lucida</i>	fetterbush	7.83
<i>Vitis rotundifolia</i>	muscadine	6.20
<i>Ilex coriacea</i>	large gallberry	4.67
<i>Clethra alnifolia</i>	sweet pepperbush	4.37
<i>Magnolia virginiana</i>	sweetbay	4.17
<i>Carex striata</i>	Walter's sedge	3.67
<i>Cliftonia monophylla</i>	black titi	2.87
<i>Morella inodora</i>	odorless bayberry	2.50
<i>Rhododendron viscosum</i>	swamp azalea	1.43
<i>Vaccinium corymbosum</i>	highbush blueberry	1.43
<i>Nyssa biflora</i>	swamp tupelo	1.23
<i>Smilax laurifolia</i>	laurel greenbrier	1.03
<i>Rhynchospora leptocarpa</i>	brownish beaksedge	0.90
<i>Woodwardia areolata</i>	netted chain fern	0.77
<i>Viburnum nudum</i>	possumhaw	0.60
moss		0.33
<i>Osmunda cinnamomea</i>	cinnamon fern	0.23
<i>Eubotrys racemosus</i>	swamp doghobble	0.10
<i>Woodwardia virginica</i>	Virginia chain fern	0.10
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	0.07
<i>Andropogon</i> sp.	bluestem	0.03
<i>Apteria aphylla</i>	nodding nixie	0.03
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Bidens mitis</i>	smallfruit beggarticks	0.03
<i>Eupatorium capillifolium</i>	dogfennel	0.03
<i>Persea palustris</i>	swamp bay	0.03
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.03
Bare Ground		43.50

WARD CREEK WEST MITIGATION SITE

Qualitative and Quantitative Monitoring

October 2022

Ward Creek West Mitigation Site
Qualitative and Quantitative Monitoring
October 2022

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 2021.

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 transect 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). Along each transect line, fifteen 1m x 1m quadrats were placed along the left side beginning at 0 and then spaced every 20 feet, ending at 280 feet. Data recorded in each quadrat consisted of the visually estimated percent cover of each plant species including individuals rooted in the the quadrat as well as overhanging. Canopy over 2 m in height was excluded from cover estimates. Only the lower 2 m portions of larger individuals were counted as cover, including the lower portions of tree trunks rooted in quadrats. Bare ground was estimated in each quadrat as a percentage of ground not obscured by plant cover or large woody debris. This represents a slight change in procedure from FNAI monitoring reports from 2012 to 2017 where percent bare ground was calculated by subtracting the total percent for all species from 100.

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 Jenna Annis and Camille Eckel on October 3-4, 2022.

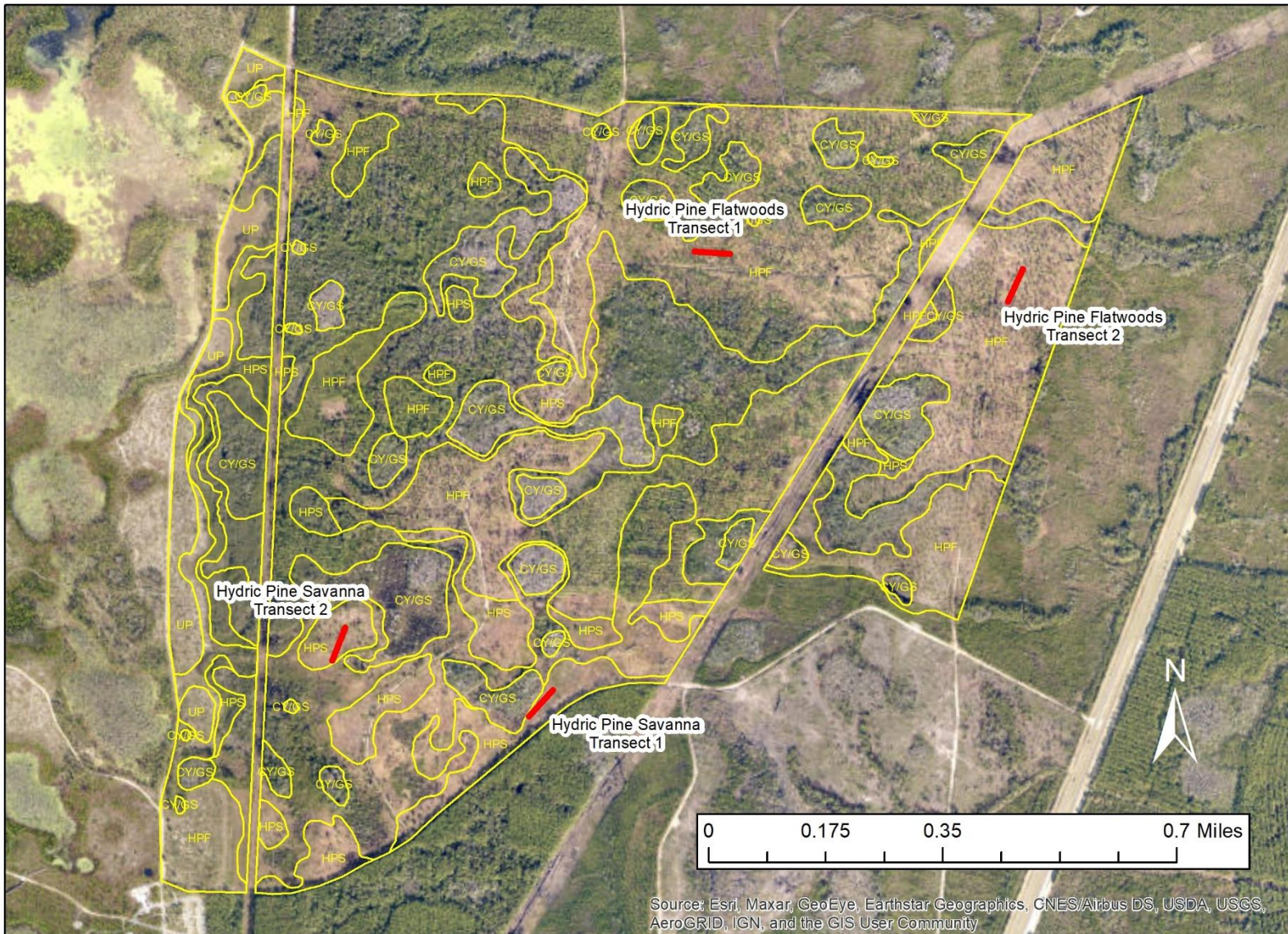


Figure WC-1. Location of permanent transects at Ward Creek West Mitigation Site. CY=Cypress, UP=Upland Pine, HPF=Hydrich Pine Flatwoods, HPS=Hydrich Pine Savanna, GS=Gum Swamp.

RESULTS AND DISCUSSION

A total of 191 plant taxa were recorded during the 2022 monitoring period in the target communities at Ward Creek West (Table WC-1). Eighteen new taxa were recorded during the 2022 monitoring.

Table WC-1. Plant species observed in the target communities at Ward Creek West Mitigation Site on October 3-4, 2022. (bold name = new species; bold X = new observation in community type)

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
<i>Agalinis fasciculata</i>	beach false foxglove		X		1
<i>Ambrosia artemisiifolia</i>	common ragweed		X		1
<i>Amphicarpum muehlenbergianum</i>	blue maidencane		X	X	2
<i>Andropogon arctatus</i>	pinewoods bluestem		X		1
<i>Andropogon glomeratus</i>	bushy bluestem		X	X	2
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	X	X	X	3
<i>Andropogon virginicus</i>	broomsedge bluestem		X	X	2
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	X	X	X	3
<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>Arundinaria gigantea</i>	switchcane		X		1
<i>Baccharis halimifolia</i>	groundsel tree		X		1
<i>Balduina uniflora</i>	oneflower honeycomb-head			X	1
<i>Bidens mitis</i>	smallfruit beggarticks		X	X	2
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass			X	1
<i>Carex glaucescens</i>	clustered sedge	X		X	2
<i>Carphephorus odoratissimus</i>	vanillaleaf		X	X	2
<i>Centella asiatica</i>	spadeleaf		X	X	2
<i>Cephalanthus occidentalis</i>	common buttonbush	X			1
<i>Chamaecrista fasciculata</i>	partridge pea		X		1
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster		X	X	2
<i>Chrysopsis mariana</i>	Maryland goldenaster		X		1
<i>Chrysopsis</i> sp.	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 anceps</i>	beaked panicum		X	X	2
<i>Conradina canescens</i>	false rosemary		X		1
<i>Conyza canadensis</i>	Canadian horseweed		X		1
<i>Coreopsis floridana</i>	Florida tickseed		X	X	2
<i>Cyperus haspan</i>	haspan flatsedge	X		X	2
<i>Cyperus ovatus</i>	pinebarren flatsedge		X	X	2
<i>Cyrilla racemiflora</i>	titi	X	X	X	3
<i>Dichanthelium ensifolium</i>	cypress witchgrass		X	X	2
<i>Dichanthelium oligoanthes</i>	Heller's witchgrass		X		1
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	X	X	X	3

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
<i>Dichanthelium sphaerocarpon</i>	roundseed witchgrass		X		1
<i>Diodia virginiana</i>	Virginia buttonweed		X	X	2
<i>Diospyros virginiana</i>	common persimmon	X	X		2
<i>Drosera capillaris</i>	pink sundew	X	X	X	3
<i>Drosera intermedia</i>	spoon-leaved sundew	X			1
<i>Eragrostis elliotii</i>	Elliott's lovegrass			X	1
<i>Erechtites hieraciifolius</i>	fireweed		X	X	2
<i>Eriocaulon decangulare</i>	tenangle pipewort	X	X	X	3
<i>Eubotrys racemosus</i>	swamp doghobble	X			1
<i>Eupatorium capillifolium</i>	dogfennel	X	X		2
<i>Eupatorium compositifolium</i>	yankeeweed		X		1
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	X	X	X	3
<i>Eupatorium pilosum</i>	rough boneset			X	1
Eustachys sp.	fingergrass		X		1
<i>Euthamia caroliniana</i>	slender flattop goldenrod		X	X	2
Euthamia graminifolia	flattop goldenrod		X	X	2
Fimbristylis sp.	fimbry		X		1
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge		X	X	2
<i>Fuirena scirpoidea</i>	southern umbrellasedge	X	X		2
<i>Gaylussacia dumosa</i>	dwarf huckleberry		X	X	2
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry		X	X	2
<i>Gaylussacia mosieri</i>	woolly huckleberry		X	X	2
<i>Gelsemium sempervirens</i>	yellow jessamine		X	X	2
<i>Helianthus angustifolius</i>	narrowleaf sunflower			X	1
<i>Helianthus heterophyllus</i>	variableleaf sunflower		X		1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort		X	X	2
<i>Hypericum cistifolium</i>	roundpod St. John's wort	X	X	X	3
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	X	X	X	3
<i>Hypericum gentianoides</i>	orangegrass		X		1
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	X	X	X	3
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort		X	X	2
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	X	X	X	3
<i>Ilex coriacea</i>	large gallberry	X	X	X	3
<i>Ilex glabra</i>	gallberry	X	X	X	3
<i>Ilex vomitoria</i>	yaupon	X	X	X	3
<i>Juncus scirpoides</i>	needlepod rush	X	X	X	3
<i>Kalmia hirsuta</i>	hairy wicky		X	X	2
<i>Kellochloa verrucosa</i>	warty panicgrass		X	X	2
<i>Lachnanthes caroliniana</i>	Carolina redroot	X	X	X	3
<i>Lachnocaulon anceps</i>	whitehead bogbutton	X	X	X	3
<i>Lechea pulchella</i> var. <i>ramosissima</i>	Leggett's pinweed		X		1
<i>Liatris spicata</i>	dense gayfeather		X	X	2
<i>Lobelia brevifolia</i>	shortleaf lobelia		X	X	2
<i>Lophiola aurea</i>	golden crest	X		X	2

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
<i>Ludwigia linifolia</i>	southeastern primrosewillow			X	1
<i>Ludwigia pilosa</i>	hairy primrosewillow	X	X	X	3
<i>Lycopodiella alopecuroides</i>	foxtail club-moss		X	X	2
<i>Lycopodiella appressa</i>	southern club-moss	X	X	X	3
<i>Lycopodiella caroliniana</i>	slender club-moss			X	1
<i>Lyonia ferruginea</i>	rusty staggerbush		X	X	2
<i>Lyonia fruticosa</i>	coastalplain staggerbush			X	1
<i>Lyonia lucida</i>	fetterbush	X	X	X	3
<i>Magnolia virginiana</i>	sweetbay	X	X	X	3
Mimosa quadrivalvis	sensitive briar		X		1
<i>Morella caroliniensis</i>	evergreen bayberry		X		1
<i>Morella cerifera</i>	southern bayberry		X	X	2
<i>Morella inodora</i>	odorless bayberry	X			1
<i>Muhlenbergia capillaris</i> var. <i>trichopodes</i>	cutover muhly			X	1
Nymphaea odorata	white waterlily	X			1
<i>Nyssa biflora</i>	swamp tupelo	X			1
<i>Nyssa ogeche</i>	ogeechee tupelo	X			1
<i>Oldenlandia uniflora</i>	clustered mille grains	X	X	X	3
<i>Osmunda cinnamomea</i>	cinnamon fern	X	X		2
<i>Panicum hemitomon</i>	maidencane	X	X		2
<i>Panicum repens</i>	torpedo grass		X	X	2
<i>Panicum virgatum</i>	switchgrass		X	X	2
<i>Persea palustris</i>	swamp bay	X	X	X	3
<i>Pieris phyllireifolia</i>	climbing fetterbush	X		X	2
<i>Pinus elliotii</i>	slash pine	X	X	X	3
<i>Pinus palustris</i>	longleaf pine	X			1
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass		X		1
<i>Pluchea baccharis</i>	rosy camphorweed		X		1
<i>Pluchea foetida</i>	stinking camphorweed			X	1
Pluchea longifolia	longleaf camphorweed		X		1
<i>Polygala brevifolia</i>	littleleaf milkwort			X	1
<i>Polygala cruciata</i>	drumheads		X	X	2
<i>Polygala cymosa</i>	tall pinebarren milkwort		X		1
<i>Polygala lutea</i>	orange milkwort		X	X	2
<i>Polygonella gracilis</i>	tall jointweed		X		1
<i>Polygonella polygama</i>	october flower		X	X	2
Polypremum procumbens	rustweed		X		1
<i>Proserpinaca pectinata</i>	combleaf mermaidweed		X	X	2
Pseudognaphalium obtusifolium	sweet everlasting		X		1
<i>Pteridium aquilinum</i>	bracken fern		X	X	2
<i>Pterocaulon pycnostachyum</i>	blackroot		X		1
<i>Quercus geminata</i>	sand live oak		X	X	2
<i>Quercus hemisphaerica</i>	laurel oak		X	X	2
<i>Quercus minima</i>	dwarf live oak		X	X	2

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	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 lutea</i>	yellow meadowbeauty			X	1
<i>Rhexia mariana</i>	pale meadowbeauty	X	X	X	3
<i>Rhexia nuttallii</i>	Nuttall's meadowbeauty	X	X	X	3
<i>Rhexia petiolata</i>	fringed meadowbeauty		X	X	2
<i>Rhexia virginica</i>	handsome harry	X	X	X	3
<i>Rhododendron canescens</i>	mountain azalea	X			1
<i>Rhus copallinum</i>	winged sumac		X	X	2
<i>Rhynchospora baldwinii</i>	Baldwin's beaksedge			X	1
<i>Rhynchospora cephalantha</i>	bunched beaksedge	X	X	X	3
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	X	X	X	3
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge		X	X	2
<i>Rhynchospora ciliaris</i>	fringed beaksedge	X	X	X	3
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge			X	1
<i>Rhynchospora debilis</i>	savannah beaksedge		X		1
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	X	X	X	3
<i>Rhynchospora fernaldii</i>	Fernald's beaksedge		X	X	2
<i>Rhynchospora gracilentia</i>	slender beaksedge		X	X	2
<i>Rhynchospora inundata</i>	narrowfruit horned beaksedge	X		X	2
<i>Rhynchospora oligantha</i>	featherbristle beaksedge			X	1
<i>Rhynchospora plumosa</i>	plumed beaksedge		X	X	2
<i>Rubus pensilvanicus</i>	sawtooth blackberry		X	X	2
<i>Sabatia brevifolia</i>	shortleaf rosegentian		X	X	2
<i>Saccharum giganteum</i>	sugarcane plumegrass			X	1
<i>Sagittaria sp.</i>	arrowhead	X			1
<i>Sarracenia flava</i>	yellow pitcherplant			X	1
<i>Schizachyrium stoloniferum</i>	creeping little bluestem		X		1
<i>Scleria ciliata</i>	fringed nutrush		X	X	2
<i>Scleria reticularis</i>	netted nutrush			X	1
<i>Scleria triglomerata</i>	whip nutrush	X	X		2
<i>Scoparia dulcis</i>	licoriceweed		X		1
<i>Serenoa repens</i>	saw palmetto		X	X	2
<i>Sericocarpus tortifolius</i>	whitetop aster		X		1
<i>Smilax auriculata</i>	earleaf greenbrier		X	X	2
<i>Smilax bona-nox</i>	saw greenbrier		X	X	2
<i>Smilax glauca</i>	cat greenbrier		X		1
<i>Smilax laurifolia</i>	laurel greenbrier	X	X	X	3
<i>Smilax pumila</i>	sarsaparilla vine		X	X	2
<i>Solidago fistulosa</i>	pinebarren goldenrod		X	X	2
<i>Solidago odora</i>	sweet goldenrod		X	X	2
<i>Sophronanthe hispida</i>	rough hedgehyssop		X		1
<i>Sphagnum sp.</i>	sphagnum moss	X	X	X	3

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
<i>Stillingia aquatica</i>	water toothleaf		X		1
<i>Syngonanthus flavidulus</i>	yellow hatpins		X	X	2
<i>Taxodium ascendens</i>	pond cypress	X		X	2
<i>Tiedemannia filiformis</i> var. <i>filiformis</i>	water cowbane			X	1
<i>Tillandsia usneoides</i>	Spanish moss	X			1
<i>Utricularia cornuta</i>	horned bladderwort	X	X	X	3
<i>Utricularia juncea</i>	southern bladderwort			X	1
<i>Utricularia purpurea</i>	eastern purple bladderwort	X		X	2
<i>Utricularia subulata</i>	zigzag bladderwort		X	X	2
<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>Woodwardia areolata</i>	netted chain fern	X	X	X	3
<i>Woodwardia virginica</i>	Virginia chain fern	X	X	X	3
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	X	X	X	3
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass		X	X	2
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass		X	X	2
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass	X	X	X	3
<i>Xyris fimbriata</i>	fringed yellow-eyed grass			X	1
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass		X	X	2
<i>Yucca filamentosa</i>	Adam's needle		X		1
Total number of taxa: 191		66	151	133	350

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 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. In the past, the eastern section near Transect 2 had more saw palmetto and gallberry and a diverse herbaceous cover with scattered patches of wiregrass and beaksedges. Recent shrub reduction efforts (chopping and chemical treatment) seem to have drastically altered this area, with less saw palmetto and even runner oak, and an increase in weedy purple bluestem. The state-endangered Fernald's pogonia was detected in hydric pine flatwoods for the first time in 2021 but was not seen this year. The total number of species observed in this community was 151 (Table WC-1).

Quantitative sampling. The western Transect 1 (Table WC-2, Figure WC-2) had a total of 38 species with 35% bare ground. Numerous slash pines had fallen in the area of the transect due to past storms. Woody species (black titi and large gallberry) contributed the most cover, followed by purple bluestem. Woody species made around 48% average cover per quadrat. The transect was largely unchanged from last year.

The eastern Transect 2 (Table WC-3, Figure WC-3) had a total of 47 species with 23% bare ground. Woody species, primarily saw palmetto and flatwoods St. John's wort, contributed about one third of the total cover (around 25% average cover per quadrat). Purple bluestem, sphagnum moss, bushy bluestem, and creeping little bluestem made up most of the herbaceous cover. Since 2018, dwarf live oak and shortleaf yellow-eyed grass, once dominants, are now only trace components, at most, while weedy purple bluestem is now the most abundant species.

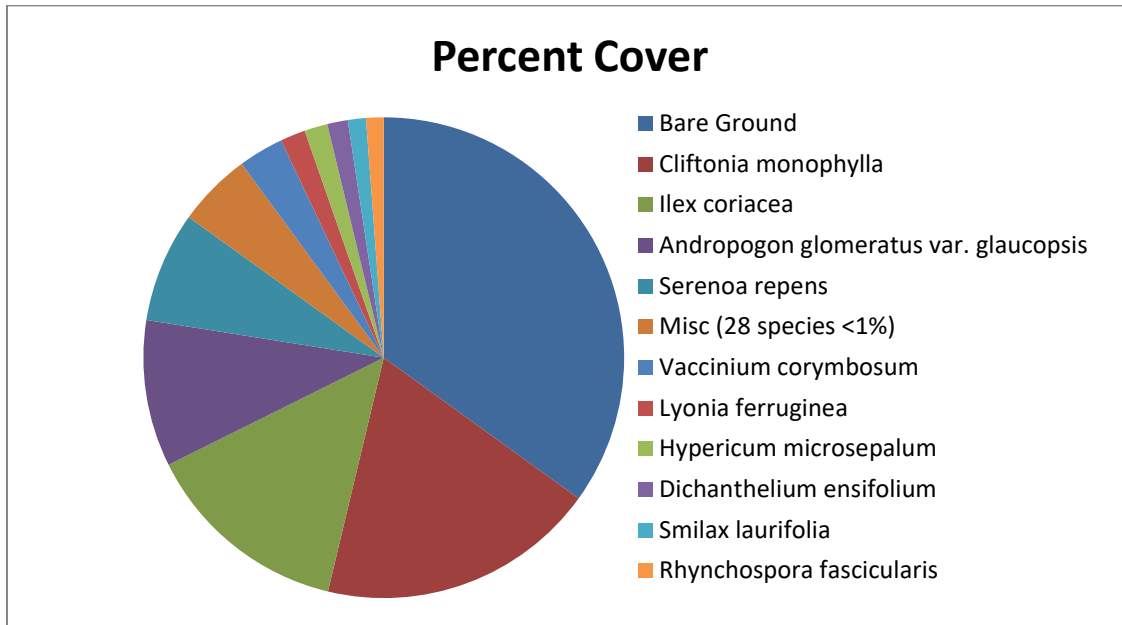


Figure WC-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

Table WC-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 sampled on October 3, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Cliftonia monophylla</i>	black titi	18.53
<i>Ilex coriacea</i>	large gallberry	13.73
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	9.73
<i>Serenoa repens</i>	saw palmetto	7.33
<i>Vaccinium corymbosum</i>	highbush blueberry	3.00
<i>Lyonia ferruginea</i>	rusty staggerbush	1.67
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	1.53
<i>Dichantherium ensifolium</i>	cypress witchgrass	1.37
<i>Smilax laurifolia</i>	laurel greenbrier	1.20
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	1.17
<i>Sphagnum sp.</i>	sphagnum moss	0.93
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.50
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.40
<i>Pinus elliotii</i>	slash pine	0.33
<i>Clethra alnifolia</i>	sweet pepperbush	0.27
<i>Lachnanthes caroliana</i>	Carolina redroot	0.23

Scientific name	Common name	Average percent cover per quadrat
<i>Kelochloa verrucosa</i>	warty panicgrass	0.20
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.20
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.17
<i>Vitis rotundifolia</i>	muscadine	0.17
<i>Carphephorus odoratissimus</i>	vanillaleaf	0.13
<i>Cyrilla racemiflora</i>	titi	0.13
<i>Rhynchospora fernaldii</i>	Fernald's beaksedge	0.13
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.13
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.13
<i>Ludwigia pilosa</i>	hairy primrosewillow	0.10
<i>Persea palustris</i>	swamp bay	0.10
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.10
<i>Scleria ciliata</i>	fringed nutrush	0.10
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass	0.10
<i>Dichanthelium sphaerocarpon</i>	roundseed witchgrass	0.07
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.07
<i>Oldenlandia uniflora</i>	clustered mille grains	0.07
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Cleistes bifaria</i>	Fernald's pogonia	0.03
<i>Kalmia hirsuta</i>	hairy wicky	0.03
<i>Polygala lutea</i>	orange milkwort	0.03
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.03
Bare Ground		34.50

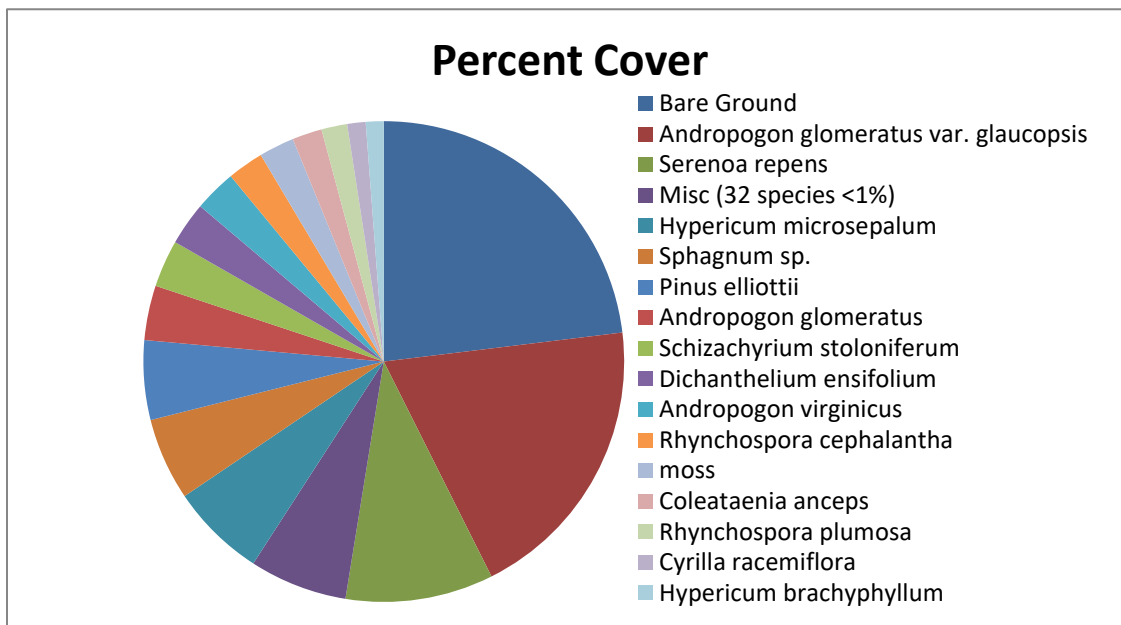


Figure WC-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2.

Table WC-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 sampled on October 4, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	19.50
<i>Serenoa repens</i>	saw palmetto	9.93
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	6.40
<i>Sphagnum</i> sp.	sphagnum moss	5.53
<i>Pinus elliotii</i>	slash pine	5.33
<i>Andropogon glomeratus</i>	bushy bluestem	3.67
<i>Schizachyrium stoloniferum</i>	creeping little bluestem	3.17
<i>Dichantherium ensifolium</i>	cypress witchgrass	2.90
<i>Andropogon virginicus</i>	broomsedge bluestem	2.83
<i>Rhynchospora cephalantha</i>	bunched beaksedge	2.43
moss		2.37
<i>Coleataenia anceps</i>	beaked panicum	2.00
<i>Rhynchospora plumosa</i>	plumed beaksedge	1.73
<i>Cyrilla racemiflora</i>	titi	1.23
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	1.20
<i>Juncus scirpoides</i>	needlepod rush	0.83
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.73
<i>Kelochloa verrucosa</i>	warty panicgrass	0.63
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.43
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.37
<i>Dichantherium oligoanthes</i>	Heller's witchgrass	0.33
<i>Oldenlandia uniflora</i>	clustered mille grains	0.30
<i>Carphephorus odoratissimus</i>	vanillaleaf	0.27
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.27
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.27
<i>Smilax auriculata</i>	earleaf greenbrier	0.27
<i>Aristida spiciformis</i>	bottlebrush threeawn	0.23
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.23
<i>Rhynchospora debilis</i>	savannah beaksedge	0.20
<i>Rhexia virginica</i>	handsome harry	0.17
<i>Ilex glabra</i>	gallberry	0.13
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.13
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.10
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.10
<i>Woodwardia virginica</i>	Virginia chain fern	0.10
<i>Cliftonia monophylla</i>	black titi	0.07
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.07
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.03
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort	0.03
<i>Kalmia hirsuta</i>	hairy wicky	0.03
<i>Pluchea baccharis</i>	rosy camphorweed	0.03
<i>Polygala lutea</i>	orange milkwort	0.03
<i>Sophronanthe hispida</i>	rough hedgehyssop	0.03
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.03

Scientific name	Common name	Average percent cover per quadrat
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass	0.03
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.03
Bare Ground		23.03

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 shrubby clumps of fetterbush, titi and black titi occur throughout. Three state-listed species are known from this community, the threatened Curtiss’ sandgrass (*Calamovilfa curtissii*) and red-flowered pitcher plant (*Sarracenia rubra*), plus the endangered upland spreading pogonia (*Cleistis bifaria*). However, only Curtiss’ sandgrass and spreading pogonia were observed in 2022. The total number of plant species observed in this community was 133 (Table WC-1).

Quantitative sampling. Transect 1 (Table WC-4, Figure WC-4) had a total of 40 species and 24% bare ground. Groundcover was heavily dominated by purple bluestem, followed by fetterbush. Broomsedge bluestem, slender beaksedge, and black titi also contributed significant cover. Woody species made up almost a third of the overall plant cover, around 21% average cover per quadrat, a slight increase from last year. Elliott’s yellow-eyed grass was much reduced. Otherwise, vegetation along the transect was largely unchanged from last year.

Transect 2 (Table WC-5, Figure WC-5) had a total of 37 species and 11% bare ground. The vegetation was dominated by purple bluestem followed by black titi shrubs. The next most abundant species were fetterbush, tenangle pipewort, titi, and wiregrass. Woody species made up over one third of the overall plant cover, around 41% average cover per quadrat. Overall, the measured vegetation along this transect was similar to last year. Shrub cover increased slightly, while wiregrass cover remained the same.

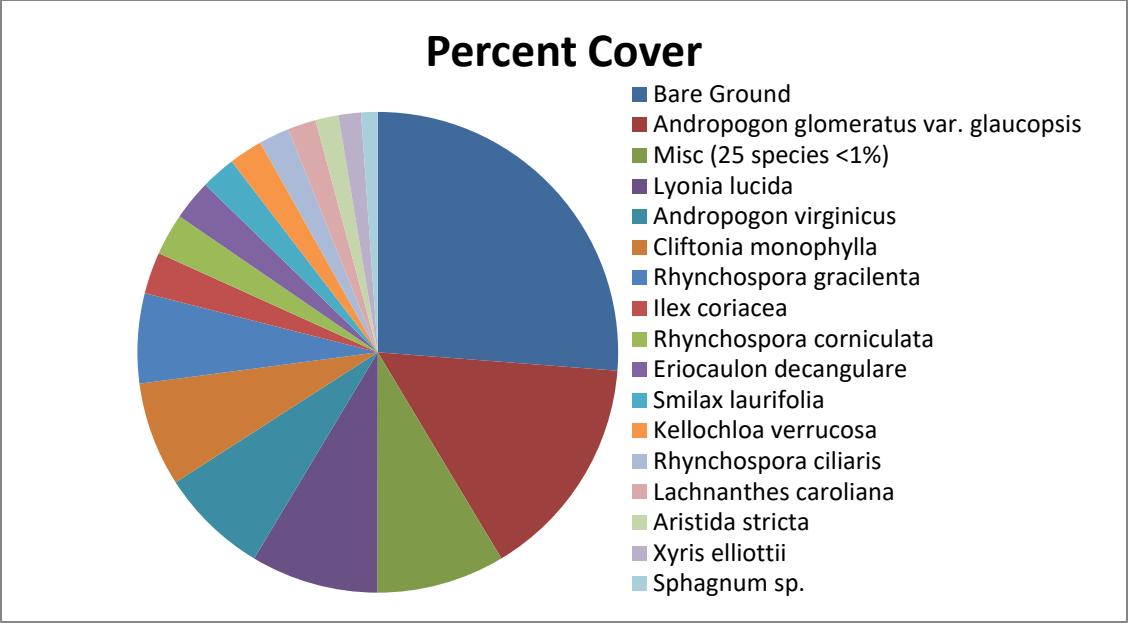


Figure WC-4. Percent cover of plant species in Hydric Pine Savanna Transect 1.

Table WC-4. Percent cover of species in Hydric Pine Savanna Transect 1 sampled on October 4, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	14.07
<i>Lyonia lucida</i>	fetterbush	7.93
<i>Andropogon virginicus</i>	broomsedge bluestem	6.77
<i>Cliftonia monophylla</i>	black titi	6.50
<i>Rhynchospora gracilentia</i>	slender beaksedge	5.60
<i>Ilex coriacea</i>	large gallberry	2.60
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge	2.60
<i>Eriocaulon decangulare</i>	tenangle pipewort	2.50
<i>Smilax laurifolia</i>	laurel greenbrier	2.17
<i>Kellochloa verrucosa</i>	warty panicgrass	2.10
<i>Rhynchospora ciliaris</i>	fringed beaksedge	1.90
<i>Lachnanthes caroliana</i>	Carolina redroot	1.77
<i>Aristida stricta</i>	wiregrass	1.43
<i>Xyris elliottii</i>	Elliott's yellow-eyed grass	1.40
<i>Sphagnum sp.</i>	sphagnum moss	1.03
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.90
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	0.87
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.80
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.60
<i>Rhynchospora baldwinii</i>	Baldwin's beaksedge	0.57
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.50
<i>Cyrilla racemiflora</i>	titi	0.47
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.43
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.40
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.33
<i>Andropogon glomeratus</i>	bushy bluestem	0.23

Scientific name	Common name	Average percent cover per quadrat
<i>Polygala brevifolia</i>	littleleaf milkwort	0.23
<i>Sarracenia flava</i>	yellow pitcherplant	0.23
<i>Drosera capillaris</i>	pink sundew	0.20
<i>Eupatorium pilosum</i>	rough boneset	0.20
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.20
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.17
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.13
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.10
<i>Pinus elliotii</i>	slash pine	0.10
<i>Rhexia nuttallii</i>	Nuttall's meadowbeauty	0.10
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.10
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.07
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	0.03
<i>Oldenlandia uniflora</i>	clustered mille grains	0.03
Bare Ground		24.30

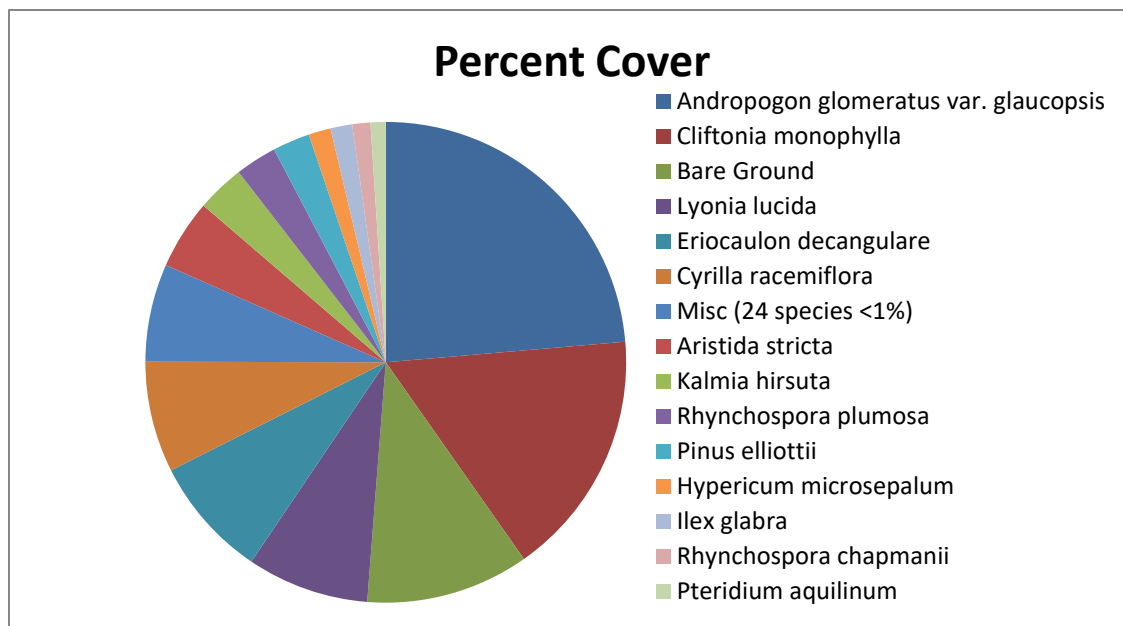


Figure WC-5. Percent cover of plant species in Hydric Pine Savanna Transect 2.

Table WC-5. Percent cover of plant species in Hydric Pine Savanna Transect 2 sampled on October 3, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	23.23
<i>Cliftonia monophylla</i>	black titi	16.33
<i>Lyonia lucida</i>	fetterbush	8.07
<i>Eriocaulon decangulare</i>	tenangle pipewort	8.00
<i>Cyrilla racemiflora</i>	titi	7.33
<i>Aristida stricta</i>	wiregrass	4.60

Scientific name	Common name	Average percent cover per quadrat
<i>Kalmia hirsuta</i>	hairy wicky	3.17
<i>Rhynchospora plumosa</i>	plumed beaksedge	2.73
<i>Pinus elliotii</i>	slash pine	2.47
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	1.47
<i>Ilex glabra</i>	gallberry	1.43
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	1.20
<i>Pteridium aquilinum</i>	bracken	1.00
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.90
<i>Sphagnum</i> sp.	sphagnum moss	0.77
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.70
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.60
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.53
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.47
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.40
<i>Lachnanthes carolina</i>	Carolina redroot	0.30
<i>Juncus scirpoides</i>	needlepod rush	0.23
<i>Rhynchospora oligantha</i>	featherbristle beaksedge	0.23
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass	0.23
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.20
<i>Smilax laurifolia</i>	laurel greenbrier	0.20
<i>Polygala brevifolia</i>	littleleaf milkwort	0.10
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.10
<i>Rhynchospora fernaldii</i>	Fernald's beaksedge	0.10
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.07
<i>Oldenlandia uniflora</i>	clustered mille grains	0.07
<i>Polygala cruciata</i>	drumheads	0.07
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.07
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.03
<i>Kelochloa verrucosa</i>	warty panicgrass	0.03
<i>Pluchea foetida</i>	stinking camphorweed	0.03
<i>Sabatia brevifolia</i>	shortleaf rosegentian	0.03
Bare Ground		10.80

Cypress

Qualitative sampling. The cypress target community was visited at several sites (Figure WC-1). The canopy was around 45-60 feet tall and dominated by pond cypress and sweetbay, with smaller sweetbay, titi, and swamp bay in the subcanopy and tall shrub layers. Shorter shrubs included sweet pepperbush, swamp bay, sweetbay, and climbing fetterbush. A dense perimeter of shrubs and vines limited access to two of the swamps. Areas of hog digging were common. The total number of species observed in this community was 66 (Table WC-1).

DUTEX WEST RESTORATION SITE
Qualitative and Quantitative Monitoring
November 2022

**Dutex West Restoration Site
Qualitative and Quantitative Monitoring
November 2022**

INTRODUCTION

The Dutex Restoration Site consists of 820 acres in Escambia County managed by the Northwest Florida Water Management District. It is located on Perdido Bay, just to the southwest of Saufley Field. This site mitigates current and future Florida Department of Transportation (FDOT) wetland impacts. Only the western tract has been monitored by FNAI from 2018-2021. This tract is accessed by taking Saufley Pines Road west from North Blue Angel Parkway and then turning south onto Wyndotte Road. The NFWFMD goal is to return the Dutex Restoration Site to pre-disturbance conditions. Target communities include Hydric Pine Flatwoods (HPF), Hydric Pine Savanna (HPS), Bay Swamp (BS), Mesic Flatwoods (MF), Freshwater Marsh (FM), and Salt Marsh. (Figure DW-1). Quantitative and qualitative monitoring was used to document the current plant species composition and vegetation structure of these targeted communities. FNAI began annual monitoring in October 2018. Prior to 2018, the site vegetation was monitored by Ecological Resource Consultants, Inc. (ERC).

METHODS

The quantitative monitoring utilized 300-foot long permanent transect lines previously marked in surveys conducted by ERC. Two transects were located in the Hydric Pine Flatwoods target community and two in Hydric Pine Savanna (Figure DW-1). In 2018 during the first year of monitoring by FNAI, only the northern post was relocated for the HPS Transect 3, so the southern point was re-established and marked with a metal T-post. The HPS Transect 2 was also re-established and marked at the north and south ends, although the transect line did intersect the center marking post established by ERC. Along each transect line, fifteen 1m x 1m quadrats were placed along the left side beginning at 0 and then spaced every 20 feet, ending at 280 feet. Data recorded in each quadrat consisted of the visually estimated percent cover of each plant species including individuals rooted in the the quadrat as well as overhanging. Canopy over 2 m in height was excluded from cover estimates. Only the lower 2 m portions of larger individuals were counted as cover, including the lower portions of tree trunks rooted in quadrats. Bare ground was estimated in each quadrat as a percentage of ground not obscured by plant cover or large woody debris.

The qualitative monitoring consisted of recording the species and vegetation structure observed along meandering pedestrian transects through each of the two target communities plus Bay Swamp, Mesic Flatwoods, Freshwater Marsh, and Salt Marsh. The field surveys were performed by FNAI botanists Kim Alexander, Amy Jenkins, Ethan Hughes, and Kelly Anderson on November 29-30, 2022.



Figure DW-1. Location of permanent transects at Dutex Restoration Site – West Tract. HPF=Hydric Pine Flatwoods, HPS=Hydric Pine Savanna, MF=Mesic Flatwoods, BS=Bay Swamp, FM=Freshwater Marsh, SM=Salt Marsh.

RESULTS AND DISCUSSION

A total of 188 plant taxa were recorded during the 2022 monitoring period in the target communities at Dutex West (Table DW-1). Eleven new species were recorded during the 2022 monitoring.

Table DW-1. Plant species observed in the target communities at Dutex West Mitigation Site on November 29-30, 2022. (bold name = new species; bold X = new observation in community type)

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Acer rubrum</i>	red maple	X	X	X		X		4
<i>Amphicarpum muehlenbergianum</i>	blue maidencane	X						1
<i>Andropogon arctatus</i>	pinewoods bluestem	X	X		X			3
<i>Andropogon glomeratus</i>	bushy bluestem	X			X	X		3
<i>Andropogon glomeratus</i> var. <i>glaucoopsis</i>	purple bluestem	X	X	X	X			4
<i>Andropogon virginicus</i>	broomsedge bluestem	X			X			2
<i>Anthraenantia rufa</i>	purple silkyscale	X	X					2
<i>Aristida palustris</i>	longleaf threeawn	X						1
<i>Aristida purpurascens</i> var. <i>virgata</i>	arrowfeather threeawn				X			1
<i>Aristida stricta</i>	wiregrass	X	X		X			3
<i>Aronia arbutifolia</i>	red chokeberry	X		X	X			3
<i>Arundinaria gigantea</i>	switchcane			X				1
<i>Asclepias lanceolata</i>	fewflower milkweed					X		1
<i>Baccharis halimifolia</i>	groundsel tree	X				X		2
<i>Bacopa monnieri</i>	herb-of-grace					X		1
<i>Bidens mitis</i>	smallfruit beggarticks	X	X	X		X		4
<i>Callicarpa americana</i>	American beautyberry				X			1
<i>Carex glaucescens</i>	clustered sedge	X	X	X	X			4
<i>Carphephorus odoratissimus</i>	vanillaleaf				X			1
<i>Centella asiatica</i>	spadeleaf	X		X				2
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	X		X				2
<i>Chasmanthium laxum</i> var. <i>laxum</i>	slender woodoats	X						1
<i>Cladium jamaicense</i>	sawgrass			X		X	X	3
<i>Clethra alnifolia</i>	sweet pepperbush				X			1
<i>Cliftonia monophylla</i>	black titi	X	X	X	X			4
<i>Coleataenia anceps</i>	beaked panicum	X						1
<i>Coleataenia longifolia</i>	ciliate redtop panicum			X				1
<i>Coleataenia tenera</i>	bluejoint panicum			X				1
<i>Conoclinium coelestinum</i>	blue mistflower			X				1
<i>Conyza canadensis</i>	Canadian horseweed				X			1
<i>Crinum americanum</i>	string lily			X				1
<i>Ctenium aromaticum</i>	toothache grass	X	X					2
<i>Cyperus haspan</i>	haspan flatsedge	X						1
<i>Cyperus ovatus</i>	pinebarren flatsedge				X			1
<i>Cyrilla racemiflora</i>	titi	X	X	X				3

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Dichanthelium acuminatum</i> var. <i>acuminatum</i>	tapered witchgrass	X						1
<i>Dichanthelium dichotomum</i>	cypress witchgrass						X	1
<i>Dichanthelium ensifolium</i>	cypress witchgrass	X	X	X	X			4
<i>Dichanthelium ensifolium</i> var. <i>unciphyllum</i>	cypress witchgrass				X			1
<i>Dichanthelium leucothrix</i>	rough witchgrass	X			X			2
<i>Dichanthelium ovale</i>	eggleaf witchgrass				X			1
<i>Dichanthelium portoricense</i>	hemlock witchgrass	X			X			2
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	X	X	X	X			4
<i>Dichanthelium</i> sp.	witchgrass		X					1
<i>Dichanthelium strigosum</i>	roughhair witchgrass				X			1
<i>Drosera capillaris</i>	pink sundew	X			X			2
<i>Dulichium arundinaceum</i>	threeway sedge			X				1
<i>Echinodorus</i> sp.	burrhead			X				1
<i>Eichhornia crassipes</i>	water hyacinth			X				1
<i>Eleocharis</i> sp.	spikerush					X		1
<i>Eleocharis tuberculosa</i>	conecup spikerush	X						1
<i>Eriocaulon compressum</i>	flattened pipewort		X	X				2
<i>Eriocaulon decangulare</i>	tenangle pipewort	X	X	X				3
<i>Eupatorium capillifolium</i>	dogfennel				X			1
<i>Eupatorium compositifolium</i>	yankeeweed	X						1
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	X						1
<i>Eupatorium rotundifolium</i>	roundleaf thoroughwort				X			1
<i>Eupatorium serotinum</i>	lateflowering thoroughwort					X		1
<i>Eupatorium x pinnatifidum</i>	throughwort				X			1
<i>Euthamia caroliniana</i>	slender flatterop goldenrod	X	X		X			3
<i>Euthamia graminifolia</i>	flatterop goldenrod	X	X	X		X		4
<i>Fimbristylis spadicea</i>	marsh fimbry					X		1
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge	X	X					2
<i>Fuirena scirpoidea</i>	southern umbrellasedge			X				1
<i>Gaylussacia mosieri</i>	woolly huckleberry	X	X	X	X			4
<i>Gelsemium sempervirens</i>	yellow jessamine				X			1
<i>Houstonia procumbens</i>	roundleaf bluet				X			1
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort			X				1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	X	X	X	X			4
<i>Hypericum cistifolium</i>	roundpod St. John's wort	X	X	X	X			4
<i>Hypericum crux-andreae</i>	St. Peter's wort	X	X		X			3
<i>Hypericum gentianoides</i>	orangegrass				X			1
<i>Hypericum hypericoides</i>	St. Andrew's cross			X	X			2
<i>Hyptis alata</i>	clustered bushmint	X		X				2
<i>Ilex cassine</i>	dahoon	X		X			X	3
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	X		X	X	X		4

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Ilex coriacea</i>	large gallberry	X	X	X	X			4
<i>Ilex glabra</i>	gallberry	X	X	X	X			4
<i>Ilex vomitoria</i>	yaupon	X		X		X		3
<i>Ipomoea sagittata</i>	saltmarsh morning glory						X	1
<i>Iris</i> sp.	iris			X				1
<i>Itea virginica</i>	Virginia willow			X				1
<i>Juncus pelocarpus</i>	annual rush			X				1
<i>Juncus roemerianus</i>	needle rush			X		X	X	3
<i>Juncus trigonocarpus</i>	redpod rush	X		X				2
<i>Kalmia hirsuta</i>	hairy wicky				X			1
<i>Kelochloa verrucosa</i>	warty panicgrass	X	X	X				3
<i>Lachnanthes caroliniana</i>	Carolina redroot	X	X		X			3
<i>Lachnocaulon anceps</i>	whitehead bogbutton		X					1
<i>Lechea pulchella</i> var. <i>ramosissima</i>	Leggett's pinweed				X			1
<i>Liatris spicata</i>	dense gayfeather				X			1
<i>Lophiola aurea</i>	golden crest		X					1
<i>Ludwigia maritima</i>	seaside primrosewillow	X						1
<i>Ludwigia pilosa</i>	hairy primrosewillow	X	X	X				3
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	X						1
<i>Lycopodiella caroliniana</i>	slender club-moss		X					1
<i>Lycopus rubellus</i>	taperleaf waterhorehound	X						1
<i>Lyonia lucida</i>	fetterbush	X	X	X	X			4
<i>Lythrum lineare</i>	wand loosestrife					X		1
<i>Magnolia grandiflora</i>	southern magnolia				X			1
<i>Magnolia virginiana</i>	sweetbay	X		X	X	X		4
<i>Mikania scandens</i>	climbing hempvine	X				X		2
<i>Morella caroliniensis</i>	evergreen bayberry		X	X				2
<i>Morella cerifera</i>	southern bayberry	X	X	X	X	X		5
<i>Muhlenbergia capillaris</i>	hairawn muhly				X			1
<i>Nymphaea odorata</i>	white waterlily			X				1
<i>Nyssa biflora</i>	swamp tupelo			X				1
<i>Oldenlandia uniflora</i>	clustered mille grains	X						1
<i>Osmunda cinnamomea</i>	cinnamon fern		X	X		X		3
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	X		X		X		3
<i>Panicum repens</i>	torpedo grass		X	X		X		3
<i>Panicum virgatum</i>	switchgrass	X	X	X		X		4
<i>Peltandra sagittifolia</i>	spoon-flower			X				1
<i>Persea palustris</i>	swamp bay	X		X	X	X	X	5
<i>Phragmites berlandieri</i>	common reed					X		1
<i>Pinus elliotii</i>	slash pine	X	X	X	X	X		5
<i>Pinus palustris</i>	longleaf pine				X			1
<i>Pluchea foetida</i>	stinking camphorweed	X		X				2

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Polygala lutea</i>	orange milkwort		X		X			2
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting				X			1
<i>Pteridium aquilinum</i>	bracken fern	X	X		X			3
<i>Quercus hemisphaerica</i>	laurel oak				X			1
<i>Quercus virginiana</i>	live oak				X			1
<i>Rhexia petiolata</i>	fringed meadowbeauty	X						1
<i>Rhexia</i> sp.	meadowbeauty	X	X					2
<i>Rhexia virginica</i>	handsome harry		X					1
<i>Rhododendron viscosum</i>	swamp azalea			X				1
<i>Rhynchospora baldwinii</i>	Baldwin's beaksedge	X	X		X			3
<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	X		X			3
<i>Rhynchospora ciliaris</i>	fringed beaksedge		X		X			2
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge		X	X				2
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	X			X			2
<i>Rhynchospora gracilentata</i>	slender beaksedge	X	X	X				3
<i>Rhynchospora inundata</i>	narrowfruit horned beaksedge	X		X				2
<i>Rhynchospora plumosa</i>	plumed beaksedge	X						1
<i>Rhynchospora rariflora</i>	fewflower beaksedge	X	X					2
<i>Rhynchospora</i> sp.	beaksedge	X		X				2
<i>Rosa laevigata</i>	Cherokee rose	X						1
<i>Rubus pensilvanicus</i>	sawtooth blackberry	X	X	X	X			4
<i>Rubus trivialis</i>	southern dewberry				X	X		2
<i>Rumex verticillatus</i>	swamp dock					X		1
<i>Sabal minor</i>	bluestem palmetto	X				X		2
<i>Sabatia brevifolia</i>	shortleaf rosegentian				X			1
<i>Sabatia macrophylla</i>	largeleaf rosegentian			X				1
<i>Sagittaria lancifolia</i>	bulltongue arrowhead					X		1
<i>Sarracenia leucophylla</i>	white-top pitcherplant	X	X					2
<i>Saururus cernuus</i>	lizard's tail			X				1
<i>Schizachyrium sanguineum</i>	crimson bluestem	X				X		2
<i>Schizachyrium stoloniferum</i>	creeping little bluestem				X			1
<i>Scleria ciliata</i>	fringed nutrush	X			X			2
<i>Serenoa repens</i>	saw palmetto	X	X		X			3
<i>Sesbania punicea</i>	purple sesban					X		1
<i>Setaria</i> sp.	foxtail					X		1
<i>Smilax auriculata</i>	earleaf greenbrier	X			X			2
<i>Smilax bona-nox</i>	saw greenbrier					X		1
<i>Smilax glauca</i>	cat greenbrier	X	X	X	X			4
<i>Smilax laurifolia</i>	laurel greenbrier	X	X	X				3
<i>Smilax pumila</i>	sarsaparilla vine				X			1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Solidago canadensis</i> var. <i>scabra</i>	Canada goldenrod				X			1
<i>Solidago fistulosa</i>	pinebarren goldenrod	X	X	X	X			4
<i>Solidago sempervirens</i>	seaside goldenrod					X		1
<i>Sophronanthe pilosa</i>	shaggy hedgehyssop	X	X					2
<i>Spartina patens</i>	saltmeadow cordgrass					X		1
<i>Sphagnum</i> sp.	sphagnum moss	X	X	X				3
<i>Sporobolus junceus</i>	pineywoods dropseed		X		X			2
<i>Symphotrichum dumosum</i>	rice button aster			X		X		2
<i>Taxodium ascendens</i>	pond cypress	X	X	X		X		4
<i>Tiedemannia filiformis</i> var. <i>filiformis</i>	water cowbane		X	X				2
<i>Toxicodendron radicans</i>	eastern poison ivy			X		X		2
<i>Typha latifolia</i>	broadleaf cattail					X		1
<i>Vaccinium corymbosum</i>	highbush blueberry	X		X	X			3
<i>Vaccinium darrowii</i>	Darrow's blueberry				X			1
<i>Vaccinium elliotii</i>	Elliott's blueberry				X			1
<i>Vaccinium myrsinites</i>	shiny blueberry				X			1
<i>Viburnum nudum</i>	possumhaw			X				1
<i>Viola primulifolia</i>	primroseleaf violet		X	X	X			3
<i>Vitis rotundifolia</i>	muscadine			X	X			2
<i>Woodwardia areolata</i>	netted chain fern	X	X	X		X		4
<i>Woodwardia virginica</i>	Virginia chain fern	X		X	X			3
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	X	X					2
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	X		X				2
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass				X			1
<i>Xyris floridana</i>	Florida yellow-eyed grass	X						1
<i>Xyris serotina</i>	acid swamp yellow-eyed grass	X						1
<i>Xyris</i> sp.	yellow-eyed grass	X						1
<i>Xyris stricta</i>	pineland yellow-eyed grass			X				1
Total number of taxa: 188		96	62	80	78	40	6	362

Hydric Pine Flatwoods

Qualitative sampling. Hydric Pine Flatwoods in the vicinities of Transect 1 (eastern) and 4 (western) were accessed to create a species list (Figure DW-1). The eastern area had an open canopy (26-35% cover) of mature slash pines. The ground layer was mainly herbaceous, although short shrubs and sprawling laurel greenbrier vines were dense in many areas. Purple bluestem and Carolina redroot were dominant along with a mix of other, mostly weedy species. Shrubs were mostly black titi, but also included large gallberry, coastalplain St. John's wort, sweetbay, and highbush blueberry. The western flatwoods is only accessible by traversing a large bay swamp and does not appear to be actively managed. The canopy is denser and groundcover sparser than the eastern area. The total number of species observed in this community was 96 (Table DW-1).

Quantitative sampling. The eastern Transect 1 (Table DW-2, Figure DW-2) had a total of 35 species with 27% bare ground. Laurel greenbrier, purple bluestem, Carolina redroot, and fascicled beaksedge contributed the most cover. Woody species made up about 22% average cover per quadrat, a slight increase from last year. Laurel greenbrier appears to be increasing along the transect, while warty panicgrass, a species that often dramatically shifts in cover from year to year, is much reduced.

The western Transect 4 (Table DW-3, Figure DW-3) had a total of 30 species with 58% bare ground. Blue maidencane, switchgrass, swamp bay, and slash pine contributed the most cover. Woody species made up about 13% average cover per quadrat, similar to last year. This transect has flooded over the past few years.

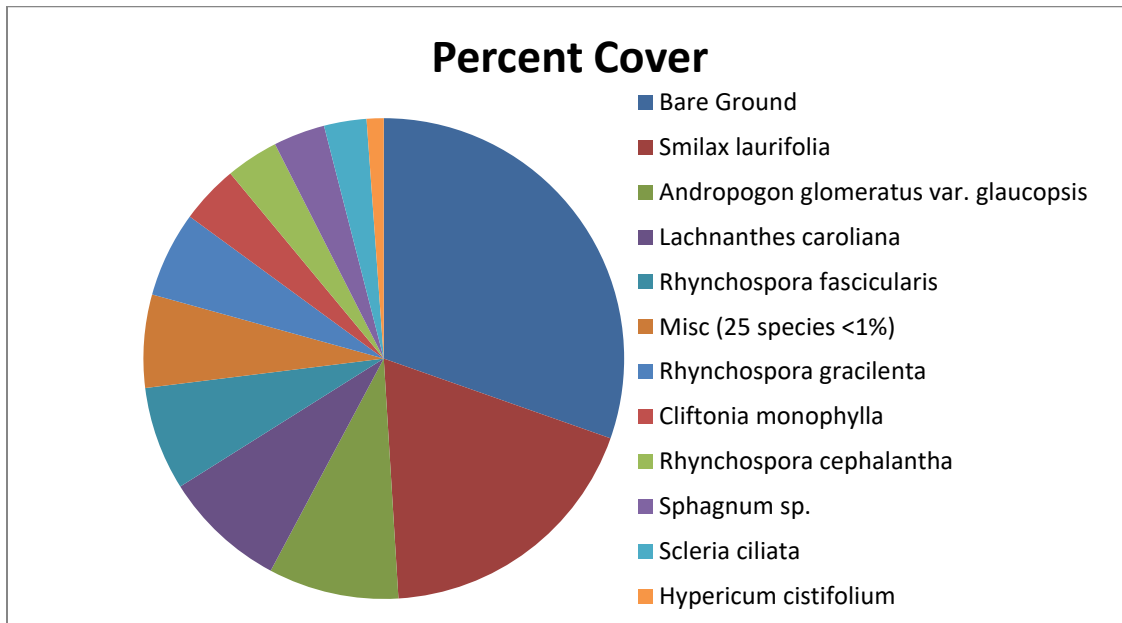


Figure DW-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

Table DW-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 sampled on November 30, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Smilax laurifolia</i>	laurel greenbrier	16.30
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	7.67
<i>Lachnanthes caroliana</i>	Carolina redroot	7.23
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	6.10
<i>Rhynchospora gracilentia</i>	slender beaksedge	5.03
<i>Cliftonia monophylla</i>	black titi	3.43
<i>Rhynchospora cephalantha</i>	bunched beaksedge	3.10
<i>Sphagnum sp.</i>	sphagnum moss	3.03
<i>Scleria ciliata</i>	fringed nutrush	2.50
<i>Hypericum cistifolium</i>	roundpod St. John's wort	1.00
<i>Woodwardia virginica</i>	Virginia chain fern	0.70
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.60

Scientific name	Common name	Average percent cover per quadrat
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.60
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.50
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.50
<i>Andropogon virginicus</i>	broomsedge bluestem	0.47
<i>Lyonia lucida</i>	fetterbush	0.47
<i>Carex glaucescens</i>	clustered sedge	0.23
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.23
<i>Pinus elliottii</i>	slash pine	0.17
<i>Drosera capillaris</i>	pink sundew	0.13
<i>Cyrilla racemiflora</i>	titi	0.10
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.10
<i>Oldenlandia uniflora</i>	clustered mille grains	0.10
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.10
<i>Xyris</i> sp.	yellow-eyed grass	0.10
<i>Dichantherium leucothrix</i>	rough witchgrass	0.07
<i>Xyris floridana</i>	Florida yellow-eyed grass	0.07
<i>Dichantherium scabriusculum</i>	woolly witchgrass	0.03
<i>Dichantherium</i> sp.	witchgrass	0.03
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.03
<i>Kelochloa verrucosa</i>	warty panicgrass	0.03
<i>Rhexia virginica</i>	handsome harry	0.03
Unknown herb		0.03
<i>Utricularia</i> sp.	bladderwort	0.03
Bare Ground		26.57

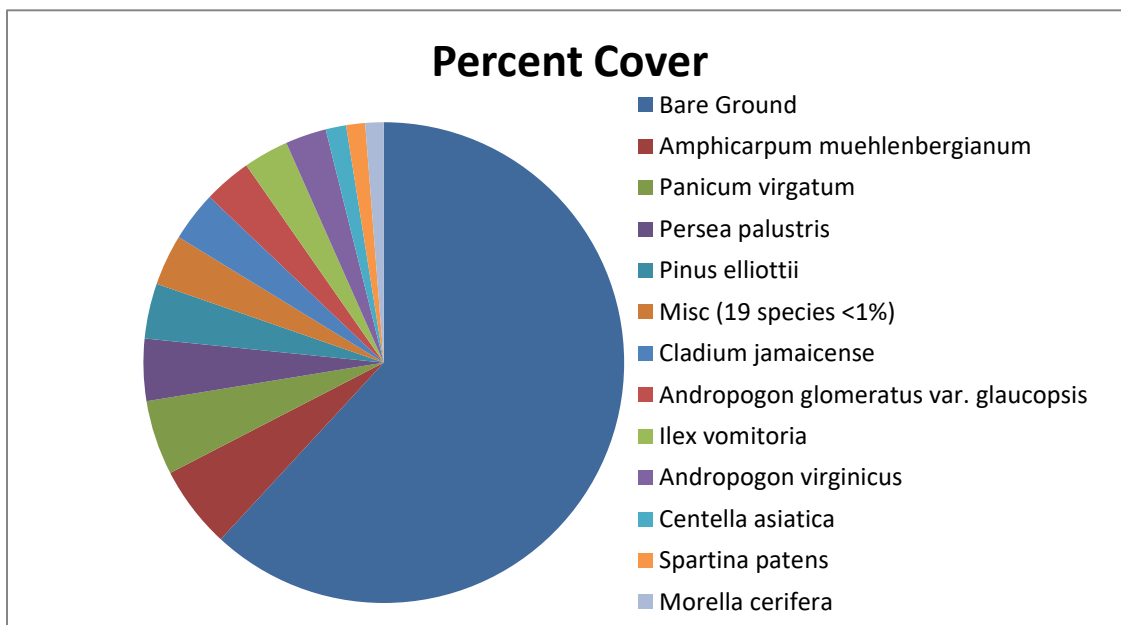


Figure DW-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 4.

Table DW-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 4 sampled on November 29, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Amphicarpum muehlenbergianum</i>	blue maidencane	5.23
<i>Panicum virgatum</i>	switchgrass	4.73
<i>Persea palustris</i>	swamp bay	3.93
<i>Pinus elliotii</i>	slash pine	3.50
<i>Cladium jamaicense</i>	sawgrass	3.17
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	3.03
<i>Ilex vomitoria</i>	yaupon	2.87
<i>Andropogon virginicus</i>	broomsedge bluestem	2.60
<i>Centella asiatica</i>	spadeleaf	1.30
<i>Spartina patens</i>	saltmeadow cordgrass	1.20
<i>Morella cerifera</i>	southern bayberry	1.17
<i>Nyssa biflora</i>	swamp tupelo	0.50
<i>Rubus trivialis</i>	southern dewberry	0.50
<i>Taxodium ascendens</i>	pond cypress	0.50
<i>Carex glaucescens</i>	clustered sedge	0.23
<i>Eleocharis tuberculosa</i>	conecup spikerush	0.23
<i>Osmunda cinnamomea</i>	cinnamon fern	0.23
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.23
<i>Acer rubrum</i>	red maple	0.13
<i>Toxicodendron radicans</i>	eastern poison ivy	0.13
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	0.10
<i>Smilax glauca</i>	cat greenbrier	0.10
<i>Baccharis halimifolia</i>	groundsel tree	0.07
<i>Scutellaria integrifolia</i>	helmet skullcap	0.07
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	0.03
<i>Dichanthelium leucothrix</i>	rough witchgrass	0.03
<i>Dichanthelium</i> sp.	witchgrass	0.03
<i>Ipomoea sagittata</i>	saltmarsh morning glory	0.03
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.03
<i>Scleria ciliata</i>	fringed nutrush	0.03
Bare Ground		58.33

Hydric Pine Savanna

Qualitative sampling. Hydric Pine Savanna was accessed in an area between Transects 2 and 3 to create a species list (Figure DW-1). This area had an open canopy of mature slash pines. The ground layer was mostly herbaceous with hairy primrosewillow and woolly witchgrass dominant along with a mix of other species including various beaksedges, tenangle pipewort, yellow-eyed grass, slender flattop goldenrod, and wiregrass. Shrubs included coastalplain St. John’s wort, titi, gallberry, sweet pepperbush, and southern bayberry. The savanna in the vicinity of Transect 2 has been mechanically and chemically treated to produce dramatic shrub reduction since 2017. This area is much more heavily dominated by weedy purple bluestem. The state-listed endangered whitetop pitcherplant is known from Transect 3

and was observed this year. The total number of plant species observed in this community was 62 (Table DW-1).

Quantitative sampling. The southern Transect 2 (Table DW-4, Figure DW-4) had a total of 41 species and 67% bare ground. Until 2019, Transect 2 was dominated by a thicket of tall, woody species. The area was mechanically treated to reduce shrubs, and the 2019 monitoring transect recorded the very open habitat that resulted from this treatment. All shrubs had been mowed to the ground which was covered in the resulting mulch. Herb cover has been increasing since that treatment, and woody cover was likewise increasing. Since last year’s sampling, the woody species have been further treated, resulting in reductions in titi, black titi, and gallberry cover. Woody species made up about 5% average cover per quadrat.

The northern Transect 3 (Table DW-5, Figure DW-5) had a total of 58 species and 18% bare ground. Laurel greenbrier, woolly witchgrass, hairy primrosewillow, tenangle pipewort, and coastalplain St. John’s wort contributed the most cover. Woody species made up about 27% average cover per quadrat, the same as last year. Woolly witchgrass and hairy primrosewillow, both of which had been decreasing in cover over the past 2 years, were markedly increased this year. Otherwise, vegetation along the transect is very similar to 2021. The state listed endangered whitetop pitcherplant was seen again this year along Transect 3.

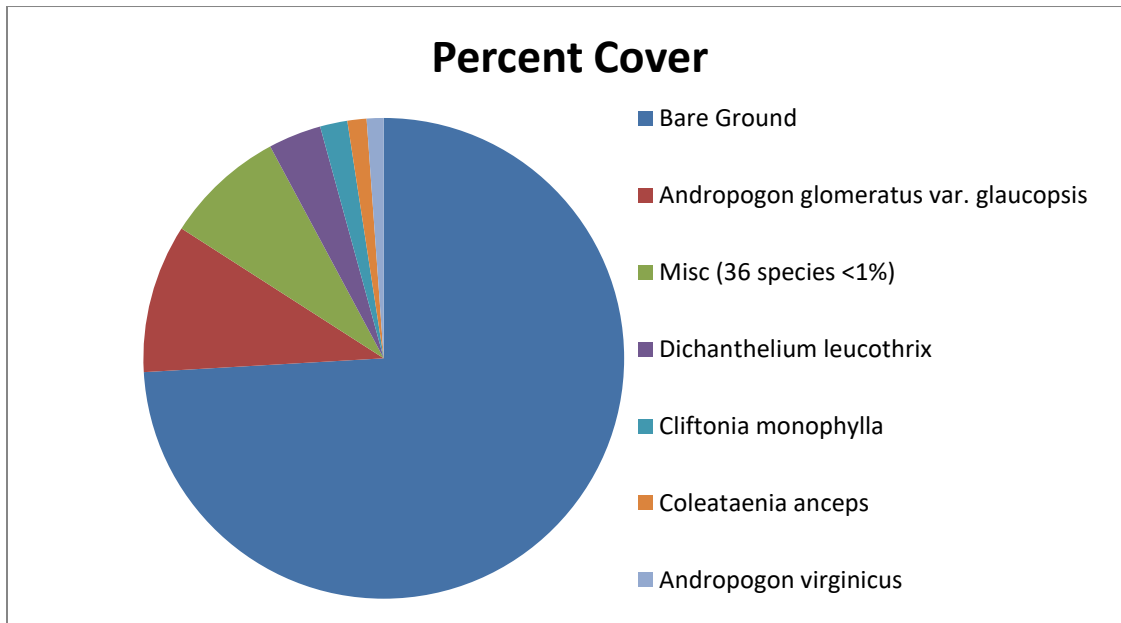


Figure DW-4. Percent cover of plant species in Hydric Pine Savanna Transect 2.

Table DW-4. Percent cover of species in Hydric Pine Savanna Transect 2 sampled on November 29, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	9.07
<i>Dichanthelium leucothrix</i>	rough witchgrass	3.23

Scientific name	Common name	Average percent cover per quadrat
<i>Cliftonia monophylla</i>	black titi	1.67
<i>Coleataenia anceps</i>	beaked panicum	1.17
<i>Andropogon virginicus</i>	broomsedge bluestem	1.03
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.70
<i>Ilex coriacea</i>	large gallberry	0.63
<i>Ilex glabra</i>	gallberry	0.60
<i>Scleria ciliata</i>	fringed nutrush	0.60
<i>Aristida stricta</i>	wiregrass	0.53
<i>Cyrilla racemiflora</i>	titi	0.53
<i>Andropogon arctatus</i>	pinewoods bluestem	0.50
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.40
<i>Smilax laurifolia</i>	laurel greenbrier	0.40
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.37
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.33
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.23
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.17
<i>Pinus elliotii</i>	slash pine	0.13
<i>Dichantherium portoricense</i>	hemlock witchgrass	0.10
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge	0.10
<i>Kelochloa verrucosa</i>	warty panicgrass	0.10
<i>Serenoa repens</i>	saw palmetto	0.10
<i>Xyris</i> sp.	yellow-eyed grass	0.10
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.07
<i>Magnolia virginiana</i>	sweetbay	0.07
<i>Smilax glauca</i>	cat greenbrier	0.07
<i>Xyris floridana</i>	Florida yellow-eyed grass	0.07
<i>Acer rubrum</i>	red maple	0.03
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.03
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.03
<i>Oldenlandia uniflora</i>	clustered mille graines	0.03
<i>Persea palustris</i>	swamp bay	0.03
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.03
<i>Rhexia</i> sp.	meadowbeauty	0.03
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.03
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.03
<i>Smilax auriculata</i>	earleaf greenbrier	0.03
<i>Sophronanthe pilosa</i>	shaggy hedgehyssop	0.03
<i>Woodwardia virginica</i>	Virginia chain fern	0.03
Bare Ground		67.17

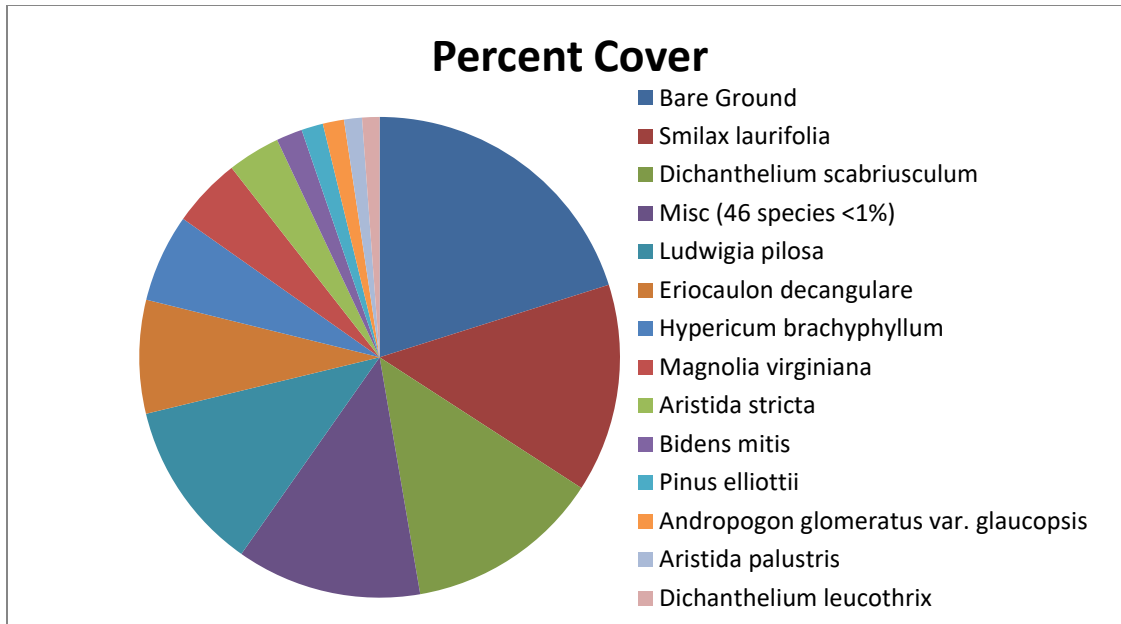


Figure DW-5. Percent cover of plant species in Hydric Pine Savanna Transect 3.

Table DW-5. Percent cover of plant species in Hydric Pine Savanna Transect 3 sampled on November 30, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Smilax laurifolia</i>	laurel greenbrier	12.80
<i>Dichantheium scabriusculum</i>	woolly witchgrass	12.00
<i>Ludwigia pilosa</i>	hairy primrosewillow	10.47
<i>Eriocaulon decangulare</i>	tenangle pipewort	6.97
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	5.40
<i>Magnolia virginiana</i>	sweetbay	4.27
<i>Aristida stricta</i>	wiregrass	3.23
<i>Bidens mitis</i>	smallfruit beggarticks	1.60
<i>Pinus elliotii</i>	slash pine	1.33
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	1.30
<i>Aristida palustris</i>	longleaf threeawn	1.10
<i>Dichantheium leucothrix</i>	rough witchgrass	1.07
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.80
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.77
<i>Rhynchospora rariflora</i>	fewflower beaksedge	0.77
<i>Andropogon virginicus</i>	broomsedge bluestem	0.60
<i>Cyrilla racemiflora</i>	titi	0.60
<i>Morella cerifera</i>	southern bayberry	0.53
<i>Rhynchospora sp.</i>	beaksedge	0.53
<i>Ilex coriacea</i>	large gallberry	0.50
<i>Smilax auriculata</i>	earleaf greenbrier	0.50
<i>Carex glaucescens</i>	clustered sedge	0.40
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.40
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.40

Scientific name	Common name	Average percent cover per quadrat
<i>Eleocharis tuberculosa</i>	conecup spikerush	0.37
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.37
<i>Ilex glabra</i>	gallberry	0.33
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.33
<i>Cyperus haspan</i>	haspan flatsedge	0.27
<i>Juncus trigonocarpus</i>	redpod rush	0.27
<i>Andropogon glomeratus</i>	bushy bluestem	0.23
<i>Ctenium aromaticum</i>	toothache grass	0.23
<i>Persea palustris</i>	swamp bay	0.23
<i>Sarracenia leucophylla</i>	white-top pitcherplant	0.23
<i>Sphagnum</i> sp.	sphagnum moss	0.23
<i>Cliftonia monophylla</i>	black titi	0.20
<i>Mikania scandens</i>	climbing hempvine	0.17
<i>Lycopus rubellus</i>	taperleaf waterhorehound	0.13
<i>Eupatorium compositifolium</i>	yankeeweed	0.10
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.10
<i>Taxodium ascendens</i>	pond cypress	0.10
<i>Woodwardia areolata</i>	netted chain fern	0.10
<i>Lachnanthes caroliana</i>	Carolina redroot	0.07
<i>Anthaenantia rufa</i>	purple silkyscale	0.03
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Centella asiatica</i>	spadeleaf	0.03
<i>Dichanthelium ensifolium</i>	cypress witchgrass	0.03
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.03
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge	0.03
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.03
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.03
<i>Ilex cassine</i>	dahoon	0.03
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	0.03
<i>Ludwigia maritima</i>	seaside primrosewillow	0.03
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	0.03
<i>Pluchea foetida</i>	stinking camphorweed	0.03
<i>Rhexia</i> sp.	meadowbeauty	0.03
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.03
Bare Ground		18.37

Bay Swamp

Qualitative sampling. An area of Bay Swamp south of the Hydric Pine Savanna Transect 2 was sampled in fall 2022. Species were also noted while walking across the restored bay swamp that separates the two main areas of pine flatwoods (Figure DW-1). This community is more similar to a freshwater tidal swamp or basin marsh than a typical bay swamp. Following large scale titi reductions in the savannas and flatwoods adjacent to the bay swamp in the vicinity of Hydric Pine Savanna Transect 2, the Perdido River can now be seen through the open canopy. There is a seepy ecotone from the Hydric Pine Savanna to the swamp. The majority of the community was a mix of trees and shrubs with patches of herbs typical of marshes. The ground was mucky with pools of ankle deep water, large patches of sphagnum

moss, and numerous hummocks. In the southern bay swamp, the canopy is more stunted and composed of slash pine, pond cypress, and swamp tupelo to about 45 feet tall. A subcanopy and tall shrub layer was composed of canopy species plus red maple, sweetbay, southern bayberry, and swamp bay. The short shrub (under 6 feet tall) was composed of black titi, southern bayberry, and swamp bay. The patchy herbaceous layer consisted mostly of sawgrass, cinnamon fern, and clustered sedge. The state-listed endangered Panhandle lily is known from the western bay swamp along the former road that was removed for hydrology restoration. The same clumps were observed in 2019 to 2021, but stems were not present during the late-November 2022 survey. The total number of species observed in this community was 80 (Table DW-1).

Mesic Flatwoods

Qualitative sampling. Two areas of Mesic Flatwoods were sampled, one on the eastern side of the property between Hydric Pine Flatwoods Transect 1 and the main road through the Dutex West property, and the other southwest of Hydric Pine Savanna Transect 3 (Figure DW-1). The eastern area has a canopy of mature slash pine and an open layer of shrubs intermixed with patches of herbaceous species and open ground. Shrubs were mainly saw palmetto, shiny blueberry, and dwarf huckleberry with a diversity of other species present. Wiregrass was common, along with weedy species, such as purple bluestem, and typical flatwoods species. The total number of species observed in this community was 78 (Table DW-1).

Freshwater Marsh

Qualitative sampling. The Freshwater Marsh target community was accessed along the Perdido River southwest of the Hydric Pine Flatwoods 1 Transect (Figure DW-1). The community was mostly an open, solid stand of sawgrass with patches of other herbs. Shrubs were mainly tall individuals of swamp bay, southern bayberry, yaupon, and groundsel tree. The total number of species observed in this community was 40 (Table DW-1).

Salt Marsh

Qualitative sampling. The Salt Marsh target community was accessed by walking south from the Hydric Pine Flatwoods Transect 4 (Figure DW-1). The community was largely herbaceous, dominated by sawgrass with patches of needle rush. Small patches of shrubs consisted of dahoon and swamp bay. The invasive non-native Japanese climbing fern (*Lygodium japonicum*), Chinese tallow tree, and purple sesban have been observed in prior years invading in the ecotone between the hydric pine flatwoods and the salt marsh, but were not seen in 2022. The total number of species observed in this community was 6 (Table DW-1).

YELLOW RIVER RANCH

Qualitative and Quantitative Monitoring

November 2022

Yellow River Ranch

Qualitative and Quantitative Monitoring

November 2022

INTRODUCTION

The Yellow River Ranch consists of 275 acres in Santa Rosa County managed by the Northwest Florida Water Management District. It is located just north of the Yellow River adjacent to the floodplain and mitigates current and future wetland impacts by the Florida Department of Transportation (FDOT). The NFWMD goal is to return the Yellow River Ranch to pre-disturbance conditions in former Hydric Pine Flatwoods (HPS), Bottomland Forest, and Cypress through ditch plugging, breaching of dikes, prescribed fire, herbicide treatment, and planting of native species while preserving intact Bottomland Forest in the floodplain (Figure YRR-1). Quantitative and qualitative monitoring was used to document the current plant species composition and vegetation structure of Hydric Pine Flatwoods, and belt transects were used to measure tree species composition and structure in restoration Bottomland Forest and Cypress areas with planted saplings. FNAI began annual monitoring in October 2018. Prior to 2018, the site vegetation was monitored by Ecological Resource Consultants, Inc. (ERC).

METHODS

The quantitative monitoring utilized 150-foot long permanent transect lines previously marked with metal posts in surveys conducted by Ecological Resource Consultants (ERC). Two transects were located in the Hydric Pine Flatwoods target community (Figure YRR-1). Along each transect line, eight 1m x 1m quadrats were placed along the left side beginning at 0 and then spaced every 20 feet, ending at 140 feet. Data recorded in each quadrat consisted of the visually estimated percent cover of each plant species including individuals rooted in the the quadrat as well as overhanging. Canopy over 2 m in height was excluded from cover estimates. Only the lower 2 m portions of larger individuals were counted as cover, including the lower portions of tree trunks rooted in quadrats. Bare ground was estimated in each quadrat as a percentage of ground not obscured by plant cover or large woody debris.

The qualitative monitoring consisted of recording the species and vegetation structure observed along meandering pedestrian transects through Hydric Pine Flatwoods. The field surveys were performed by FNAI botanists Kim Alexander, Amy Jenkins, Ethan Hughes, and Kelly Anderson on November 28, 2022.

To measure the success of tree plantings in Cypress and Bottomland Forest areas, belt transects measuring 20 feet by 150 feet were utilized. These were previously marked with metal posts by ERC. Two transects are placed in Cypress, and two in Bottomland Forest. Belt Transect #3 in Cypress was moved to a new location in 2018 on the recommendation of project manager David Clayton (NFWMD). Within each transect, all tree species were tallied by height class. The total trees per acre were calculated by multiplying the tally of individuals by 14.28.

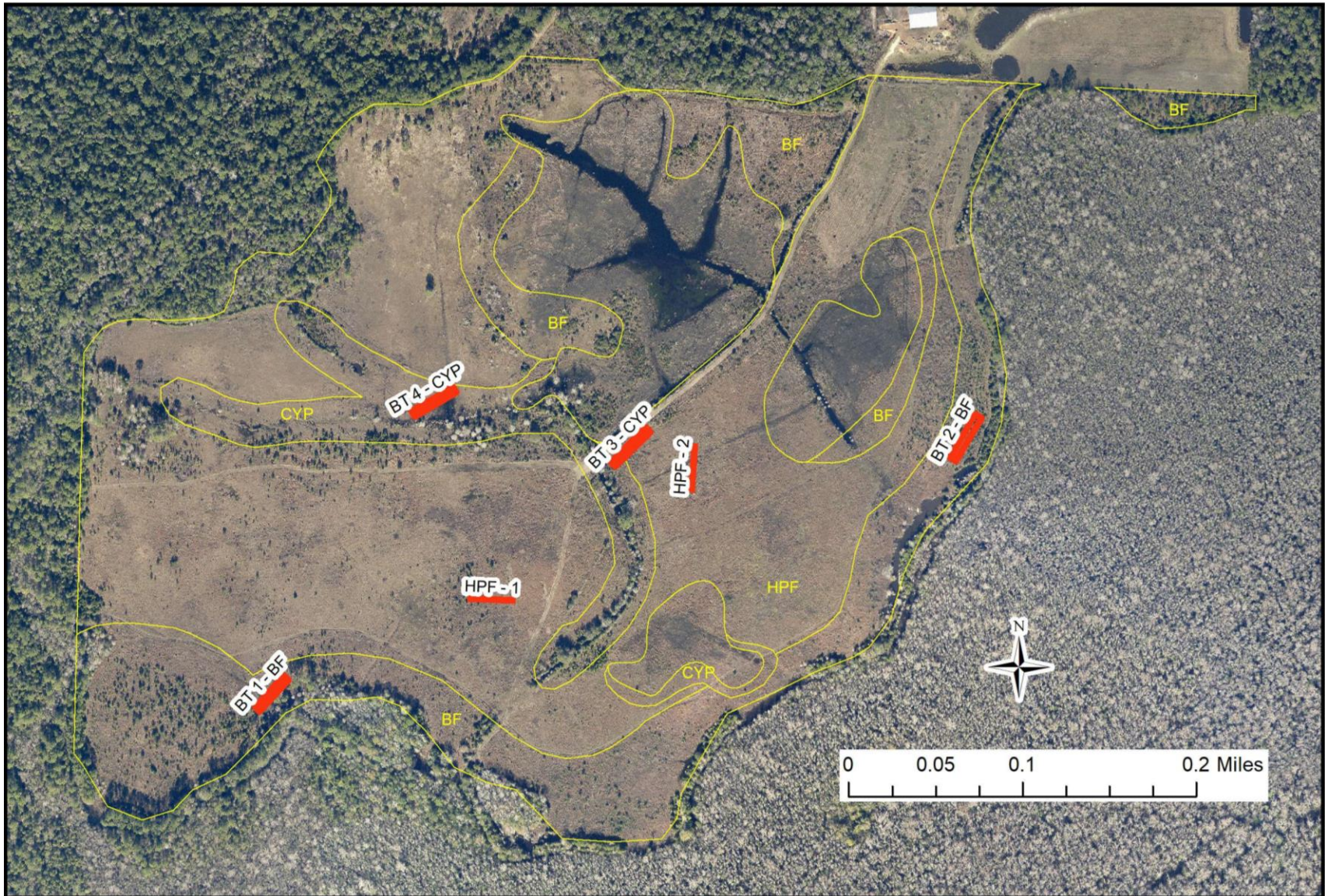


Figure YRR-1. Location of permanent transects at Yellow River Ranch. HPF=Hydric Pine Flatwoods, CYP=Cypress, BF=Bottomland Forest, BT=Belt Transect.

RESULTS AND DISCUSSION

A total of 103 plant taxa were recorded during the Fall 2022 monitoring in Hydric Pine Flatwoods at Yellow River Ranch (Table YRR-1). Seven new taxa were recorded during the 2022 monitoring.

Table YRR-1. Plant species observed in Hydric Pine Flatwoods at Yellow River Ranch Mitigation Site on November 28, 2022. (bold name = new species)

Scientific Name	Common Name
<i>Acer rubrum</i>	red maple
<i>Agalinis fasciculata</i>	beach false foxglove
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem
<i>Andropogon</i> sp.	bluestem
<i>Andropogon virginicus</i>	broomsedge bluestem
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem
<i>Aristida stricta</i>	wiregrass
<i>Axonopus fissifolius</i>	common carpetgrass
<i>Baccharis halimifolia</i>	groundsel tree
<i>Bidens mitis</i>	smallfruit beggarticks
<i>Carex glaucescens</i>	clustered sedge
<i>Centella asiatica</i>	spadeleaf
<i>Cephalanthus occidentalis</i>	common buttonbush
<i>Chamaecyparis thyoides</i>	Atlantic white cedar
<i>Coleataenia anceps</i>	beaked panicum
<i>Coleataenia longifolia</i>	ciliate redtop panicum
<i>Ctenium aromaticum</i>	toothache grass
<i>Cuphea carthagenensis</i>	Colombian waxweed
<i>Cyperus haspan</i>	haspan flatsedge
<i>Cyperus</i> sp.	flatsedge
<i>Cyrilla racemiflora</i>	titi
<i>Dichanthelium leucothrix</i>	rough witchgrass
<i>Dichanthelium scabriusculum</i>	woolly witchgrass
<i>Dichanthelium sphaerocarpon</i>	roundseed witchgrass
<i>Dichondra carolinensis</i>	Carolina ponysfoot
<i>Diospyros virginiana</i>	common persimmon
<i>Eleocharis tuberculosa</i>	conecup spikerush
<i>Eragrostis elliotii</i>	Elliott's lovegrass
<i>Eriocaulon decangulare</i>	tenangle pipewort
<i>Eupatorium capillifolium</i>	dogfennel
<i>Eupatorium compositifolium</i>	yankeeweed
<i>Eupatorium leptophyllum</i>	falsefennel
<i>Eupatorium semiserratum</i>	smallflower thoroughwort
<i>Eupatorium</i> sp.	thoroughwort
<i>Euthamia caroliniana</i>	slender flattop goldenrod
<i>Euthamia graminifolia</i>	flattop goldenrod

Scientific Name	Common Name
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge
<i>Gelsemium sempervirens</i>	yellow jessamine
<i>Helianthus angustifolius</i>	narrowleaf sunflower
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort
<i>Hypericum cistifolium</i>	roundpod St. John's wort
<i>Hypericum crux-andreae</i>	St. Peter's wort
<i>Hypericum fasciculatum</i>	peelbark St. John's wort
<i>Hypericum hypericoides</i>	St. Andrew's cross
<i>Hypericum</i> sp.	St. John's wort
<i>Hyptis alata</i>	clustered bushmint
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly
<i>Ilex coriacea</i>	large gallberry
<i>Ilex glabra</i>	gallberry
<i>Ilex verticillata</i>	common winterberry
<i>Ilex vomitoria</i>	yaupon
<i>Juncus dichotomus</i>	forked rush
<i>Juncus marginatus</i>	grassleaf rush
<i>Juncus scirpoides</i>	needlepod rush
<i>Kelochloa verrucosa</i>	warty panicgrass
<i>Lachnanthes caroliana</i>	Carolina redroot
<i>Ligustrum sinense</i>	Chinese privet
<i>Ludwigia pilosa</i>	hairy primrosewillow
<i>Lycopus rubellus</i>	taperleaf waterhorehound
<i>Lycopus</i> sp.	waterhorehound
<i>Magnolia virginiana</i>	sweetbay
<i>Morella cerifera</i>	southern bayberry
<i>Nyssa biflora</i>	swamp tupelo
<i>Oldenlandia uniflora</i>	clustered mille grains
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern
<i>Oxalis</i> sp.	woodsorrel
<i>Paspalum notatum</i>	bahiagrass
<i>Persea palustris</i>	swamp bay
<i>Pinus elliotii</i>	slash pine
<i>Pluchea baccharis</i>	rosy camphorweed
<i>Pluchea</i> sp.	camphorweed
<i>Polypremum procumbens</i>	rustweed
<i>Proserpinaca pectinata</i>	combleaf mermaidweed
<i>Rhexia mariana</i>	pale meadowbeauty
<i>Rhexia virginica</i>	handsome harry
<i>Rhynchospora cephalantha</i>	bunched beaksedge
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge
<i>Rhynchospora debilis</i>	savannah beaksedge
<i>Rhynchospora elliotii</i>	Elliott's beaksedge
<i>Rhynchospora fascicularis</i>	fascicled beaksedge

Scientific Name	Common Name
<i>Rhynchospora microcarpa</i>	southern beaksedge
<i>Rhynchospora rariflora</i>	fewflower beaksedge
<i>Rhynchospora</i> sp.	beaksedge
<i>Rubus cuneifolius</i>	sand blackberry
<i>Rubus pensilvanicus</i>	sawtooth blackberry
<i>Rubus trivialis</i>	southern dewberry
<i>Saccharum giganteum</i>	sugarcane plumegrass
<i>Scleria ciliata</i>	fringed nutrush
<i>Scoparia dulcis</i>	licoriceweed
<i>Scutellaria</i> sp.	skullcap
<i>Solidago fistulosa</i>	pinebarren goldenrod
<i>Solidago</i> sp.	goldenrod
<i>Sphagnum</i> sp.	sphagnum moss
<i>Symphotrichum dumosum</i>	rice button aster
<i>Taxodium ascendens</i>	pond cypress
<i>Thelypteris</i> sp.	maiden fern
<i>Triadica sebifera</i>	Chinese tallow tree
<i>Vaccinium corymbosum</i>	highbush blueberry
<i>Viola lanceolata</i>	bog white violet
<i>Woodwardia areolata</i>	netted chain fern
<i>Xyris fimbriata</i>	fringed yellow-eyed grass
<i>Xyris</i> sp.	yellow-eyed grass
<i>Xyris stricta</i>	pineland yellow-eyed grass
Total number of taxa: 103	

Hydric Pine Flatwoods

Qualitative sampling. The Hydric Pine Flatwoods in the vicinity of Transect 2 was accessed to create a species list (Figure YRR-1). This area had a very sparse canopy of young slash pines around 30 feet high. Shrubs have been growing quickly since the last fire. Common species included sawtooth blackberry, groundsel tree, southern bayberry, myrtle holly, gallberry, young slash pine, Atlantic white cedar, and swamp tupelo. The ground layer was mostly herbaceous and weedy with rice button aster, woolly witchgrass, Carolina redroot, beaksedges, and broomsedge bluestem. Wiregrass was present, but very sparse and concentrated in the western area. The total number of species observed in this community was 103 (Table YRR-1).

Quantitative sampling. The western Transect 1 (Table YRR-2, Figure YRR-2) had a total of 46 species with 41% bare ground. Southern bayberry, Atlantic white cedar, broomsedge bluestem, and slash pine contributed the most cover. Woody species made up about 36% average cover per quadrat, similar to last year. Dead canes of blackberry were common along the transect but were not counted as cover. Rice button aster was somewhat decreased, possibly owing to the later sampling date. Otherwise, vegetation along the the transect was similar to last year.

The eastern Transect 2 (Table YRR-3, Figure YRR-3) had a total of 41 species with 25% bare ground. Woolly witchgrass, loosehead beaksedge, rice button aster, and swamp tupelo contributed the most cover. Woody species made up about 14% average cover per quadrat, similar to last year. Woolly witchgrass which has been decreasing in cover over the past 2 years, increased from 3% last year to 14% this year. Otherwise, the vegetation was similar to last year.

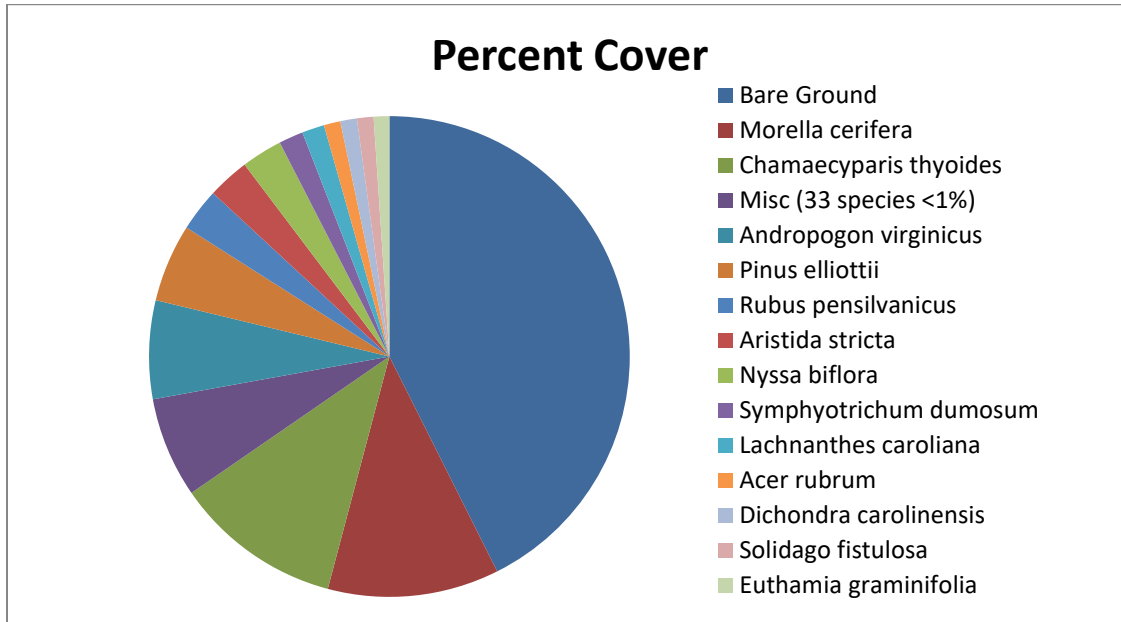


Figure YRR-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

Table YRR-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 sampled on November 28, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Morella cerifera</i>	southern bayberry	11.00
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	10.75
<i>Andropogon virginicus</i>	broomsedge bluestem	6.31
<i>Pinus elliottii</i>	slash pine	5.00
<i>Rubus pensilvanicus</i>	sawtooth blackberry	2.75
<i>Aristida stricta</i>	wiregrass	2.69
<i>Nyssa biflora</i>	swamp tupelo	2.63
<i>Symphyotrichum dumosum</i>	rice button aster	1.56
<i>Lachnanthes caroliana</i>	Carolina redroot	1.44
<i>Acer rubrum</i>	red maple	1.06
<i>Dichondra carolinensis</i>	Carolina ponysfoot	1.06
<i>Solidago fistulosa</i>	pinebarren goldenrod	1.06
<i>Euthamia graminifolia</i>	flattop goldenrod	1.00
<i>Ilex vomitoria</i>	yaupon	0.94
<i>Coleataenia anceps</i>	beaked panicum	0.44
<i>Hypericum hypericoides</i>	St. Andrew's cross	0.44
<i>Persea palustris</i>	swamp bay	0.44
<i>Eupatorium capillifolium</i>	dogfennel	0.38

Scientific name	Common name	Average percent cover per quadrat
<i>Ilex glabra</i>	gallberry	0.38
<i>Centella asiatica</i>	spadeleaf	0.31
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.31
<i>Lycopus rubellus</i>	taperleaf waterhorehound	0.25
<i>Oldenlandia uniflora</i>	clustered mille graines	0.25
<i>Cyperaceae</i>	sedge	0.19
<i>Ludwigia pilosa</i>	hairy primrosewillow	0.19
<i>Rhexia virginica</i>	handsome harry	0.19
<i>Rhynchospora rariflora</i>	fewflower beaksedge	0.19
<i>Cuphea carthagenensis</i>	Colombian waxweed	0.13
<i>Hydrocotyle umbellata</i>	manyflower marshpennywort	0.13
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.13
<i>Juncus marginatus</i>	grassleaf rush	0.13
<i>Kellochloa verrucosa</i>	warty panicgrass	0.13
<i>Viola lanceolata</i>	bog white violet	0.13
<i>Baccharis halimifolia</i>	groundsel tree	0.06
<i>Bidens mitis</i>	smallfruit beggarticks	0.06
<i>Carex glaucescens</i>	clustered sedge	0.06
<i>Cyrilla racemiflora</i>	titi	0.06
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.06
<i>Eupatorium sp.</i>	thoroughwort	0.06
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.06
<i>Juncus dichotomus</i>	forked rush	0.06
moss		0.06
<i>Osmunda regalis var. spectabilis</i>	royal fern	0.06
<i>Rhynchospora sp.</i>	beaksedge	0.06
<i>Scleria ciliata</i>	fringed nutrush	0.06
<i>Woodwardia areolata</i>	netted chain fern	0.06
<i>Morella cerifera</i>	southern bayberry	11.00
<i>Chamaecyparis thyoides</i>	Atlantic white cedar	10.75
<i>Andropogon virginicus</i>	broomsedge bluestem	6.31
<i>Pinus elliotii</i>	slash pine	5.00
<i>Rubus pensilvanicus</i>	sawtooth blackberry	2.75
Bare Ground		40.63

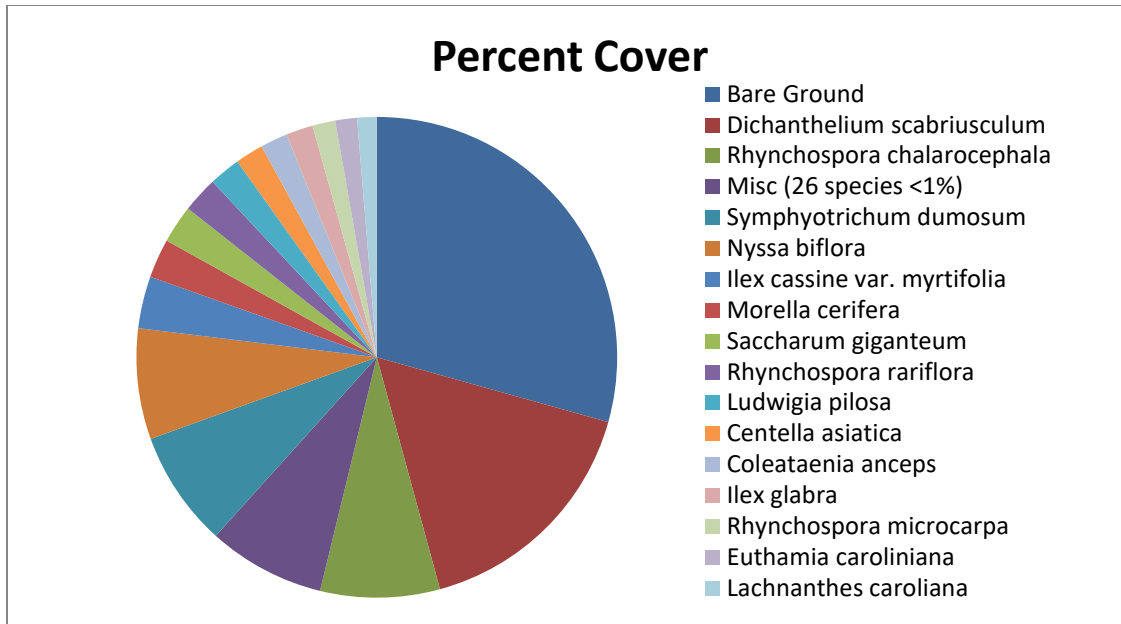


Figure YRR-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2.

Table YRR-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 sampled on November 28, 2022.

Scientific name	Common name	Average percent cover per quadrat
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	14.06
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	6.88
<i>Symphyotrichum dumosum</i>	rice button aster	6.69
<i>Nyssa biflora</i>	swamp tupelo	6.38
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	3.00
<i>Morella cerifera</i>	southern bayberry	2.25
<i>Saccharum giganteum</i>	sugarcane plumegrass	2.19
<i>Rhynchospora rariflora</i>	fewflower beaksedge	2.06
<i>Ludwigia pilosa</i>	hairy primrosewillow	1.81
<i>Centella asiatica</i>	spadeleaf	1.63
<i>Coleataenia anceps</i>	beaked panicum	1.56
<i>Ilex glabra</i>	gallberry	1.56
<i>Rhynchospora microcarpa</i>	southern beaksedge	1.31
<i>Euthamia caroliniana</i>	slender flattop goldenrod	1.25
<i>Lachnanthes caroliana</i>	Carolina redroot	1.13
<i>Andropogon virginicus</i>	broomsedge bluestem	0.94
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge	0.88
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.63
<i>Bidens mitis</i>	smallfruit beggarticks	0.56
<i>Pinus elliotii</i>	slash pine	0.44
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.38
<i>Proserpinaca pectinata</i>	combleaf mermaidweed	0.31
<i>Viola lanceolata</i>	bog white violet	0.31
<i>Eragrostis elliotii</i>	Elliott's lovegrass	0.25
<i>Acer rubrum</i>	red maple	0.19
<i>Dichanthelium leucothrix</i>	rough witchgrass	0.19

Scientific name	Common name	Average percent cover per quadrat
<i>Eupatorium compositifolium</i>	yankeeweed	0.19
<i>Eupatorium</i> sp.	thoroughwort	0.19
<i>Hypericum hypericoides</i>	St. Andrew's cross	0.19
<i>Juncus scirpoides</i>	needlepod rush	0.19
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.19
<i>Andropogon</i> sp.	bluestem	0.13
<i>Solidago</i> sp.	goldenrod	0.13
<i>Cyperus haspan</i>	haspan flatsedge	0.06
<i>Hypericum</i> sp.	St. John's wort	0.06
<i>Lycopus rubellus</i>	taperleaf waterhorehound	0.06
<i>Pluchea</i> sp.	camphorweed	0.06
<i>Rhexia mariana</i>	pale meadowbeauty	0.06
<i>Rhynchospora debilis</i>	savannah beaksedge	0.06
<i>Rhynchospora</i> sp.	beaksedge	0.06
<i>Xyris</i> sp.	yellow-eyed grass	0.06
<i>Dichanthelium scabriusculum</i>	woolly witchgrass	14.06
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	6.88
<i>Symphyotrichum dumosum</i>	rice button aster	6.69
Bare Ground		25.13

Bottomland Forest

Quantitative sampling. Belt transect 1 contained a mix of mostly red maple, slash pine, and cypress, with a few additional species occurring only occasionally (Table YRR-4). Slash pines, red maples, and Atlantic white cedar were mostly taller. Both bald cypress and pond cypress stems were recorded in, but juvenile similarities between these two types make them difficult to distinguish when young, and many taxonomists consider them to be a single species. The invasive non-native Chinese tallow tree was recorded along the transect for the first time in 2020 but was not seen this year or last. There was a decrease in the number of stems, but the later sampling date may have made some deciduous species more difficult to spot.

Belt Transect 2 consisted of a mix of larger Atlantic white cedars with many small, regenerating cedars and red maples (Table YRR-5). This transect had a dense thicket of sawtooth blackberry in 2018 that has been slowly opening up over the last three years. Only one stem of the invasive non-native Chinese tallow tree was spotted along the transect, although the late sampling date made deciduous species more difficult to detect. Overall, stems decreased slightly.

Cypress

Quantitative sampling. Belt transect 3 is located adjacent to the elevated road through the site in an area that was previously planted with native trees. Trees consisted of mainly larger swamp tupelo and pond cypress with a fair number of Atlantic white cedars and a mix of other species (Table YRR-6). The number of stems decreased somewhat this year. This may be in part attributable to the later sampling date which made deciduous species more difficult to detect.

Belt Transect 4 was quite open and contained mostly young pond cypress. Swamp tupelos are continuing to grow vigorously, with 29 stems now taller than 6 feet (Table YRR-7). Cypress on the transect appear to be maturing well. The slight decrease in stems (mostly tupelo) may be partly attributable to the late sampling date which made deciduous species more difficult to detect.

Table YRR-4. Belt Transect Summary for Bottomland Forest Transect 1 (YRR-BT1-630) sampled on November 28, 2022.

Species	Total Number of Stems	0-1'	>1'-2'	>2'-3'	>3'-4'	>4'-5'	>5'-6'	>6'	Condition
<i>Acer rubrum</i>	234	39	22	23	37	29	25	59	
<i>Cephalanthus occidentalis</i>	4	3			1				
<i>Chamaecyparis thyoides</i>	10	1	3		2	1		3	
<i>Ilex myrtifolia</i>	3		1		1	1			
<i>Nyssa biflora</i>	29	2	3	3	5	3		13	
<i>Pinus elliotii</i>	66							66	
<i>Styrax americana</i>	43	37	6						
<i>Taxodium ascendens</i>	14		3					11	
<i>Taxodium distichum</i>	9				1		2	6	
<i>Triadica sebifera</i>	0								new in plot in Fall 2020
<i>Ilex verticillata</i>	1	1							
Total Number All Species	413								
Number of Saplings/Acre	5898								

Table YRR-5. Belt Transect Summary for Bottomland Forest Transect 2 (YRR-BT2-630) sampled on November 28, 2022.

Species	Total Number	0-1'	>1'-2'	>2'-3'	>3'-4'	>4'-5'	>5'-6'	>6'	Condition
<i>Acer rubrum</i>	44	18	10	3	5	2	1	5	
<i>Chamaecyparis thyoides</i>	112	57	17	4			1	33	Likely more seedlings in NE corner
<i>Cornus florida</i>	2			1		1			
<i>Diospyros virginiana</i>	1	1							
<i>Ilex opaca</i>	3				1			2	
<i>Juniperus virginiana</i>	1							1	Two stems from the same base
<i>Magnolia virginiana</i>	2							2	
<i>Nyssa biflora</i>	0								
<i>Pinus palustris</i>	1							1	
<i>Pinus elliotii</i>	2					1		1	
<i>Quercus laurifolia</i>	2							2	
<i>Triadica sebifera</i>	1					1			
<i>Taxodium ascendens</i>	2			1	1				
<i>Persea palustris</i>	2		1	1					
Total Number All Species	176								
Number of Saplings/Acre	2513								

*Lots of Lygodium present; possibly missed *Acer rubrum* seedlings due to lack of leaves from abscission at time of survey; several broken.

Table YRR-6. Belt Transect Summary for Cypress Transect 3 (YR-BT3-621) sampled on November 28, 2022.

Species	Total Number	0-1'	>1'-2'	>2'-3'	>3'-4'	>4'-5'	>5'-6'	>6'	Condition
<i>Acer rubrum</i>	58	8	9	19	8	5	7	2	
<i>Chamaecyparis thyoides</i>	62	4	4	2	1	2	6	43	
<i>Cyrilla racemiflora</i>	1	1							
<i>Ilex myrtifolia</i>	17		1			1	1	14	
<i>Ilex verticillata</i>	4				1	1	1	1	
<i>Magnolia virginiana</i>	12	1				1		10	
<i>Nyssa biflora</i>	255							255	
<i>Pinus elliotii</i>	19				1	1		17	
<i>Taxodium ascendens</i>	60							60	
Total Number All Species	488								
Number of Saplings/Acre	6969								

Table YRR-7. Belt Transect Summary for Cypress Transect 4 (YR-BT4-621) sampled November 28, 2022.

Species	Total Number	0-1'	>1'-2'	>2'-3'	>3'-4'	>4'-5'	>5'-6'	>6'	Condition
<i>Chamaecyparis thyoides</i>	3		1	1			1		
<i>Cyrilla racemiflora</i>	8				1	6	1		
<i>Magnolia virginiana</i>	6				4	1	1		
<i>Nyssa biflora</i>	59				12	9	9	29	
<i>Pinus elliotii</i>	1				1				
<i>Taxodium ascendens</i>	139	1	2		7	8	10	111	
<i>Acer rubrum</i>	17	9	6		1		1		
<i>Persea palustris</i>	0								
<i>Ilex myrtifolia</i>	2				1	1			
Total Number All Species	235								
Number of Saplings/Acre	3356								