Vegetation Monitoring at Six Northwest Florida Water Management District Mitigation Sites
Fall 2020

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Florida Natural Area Inventory
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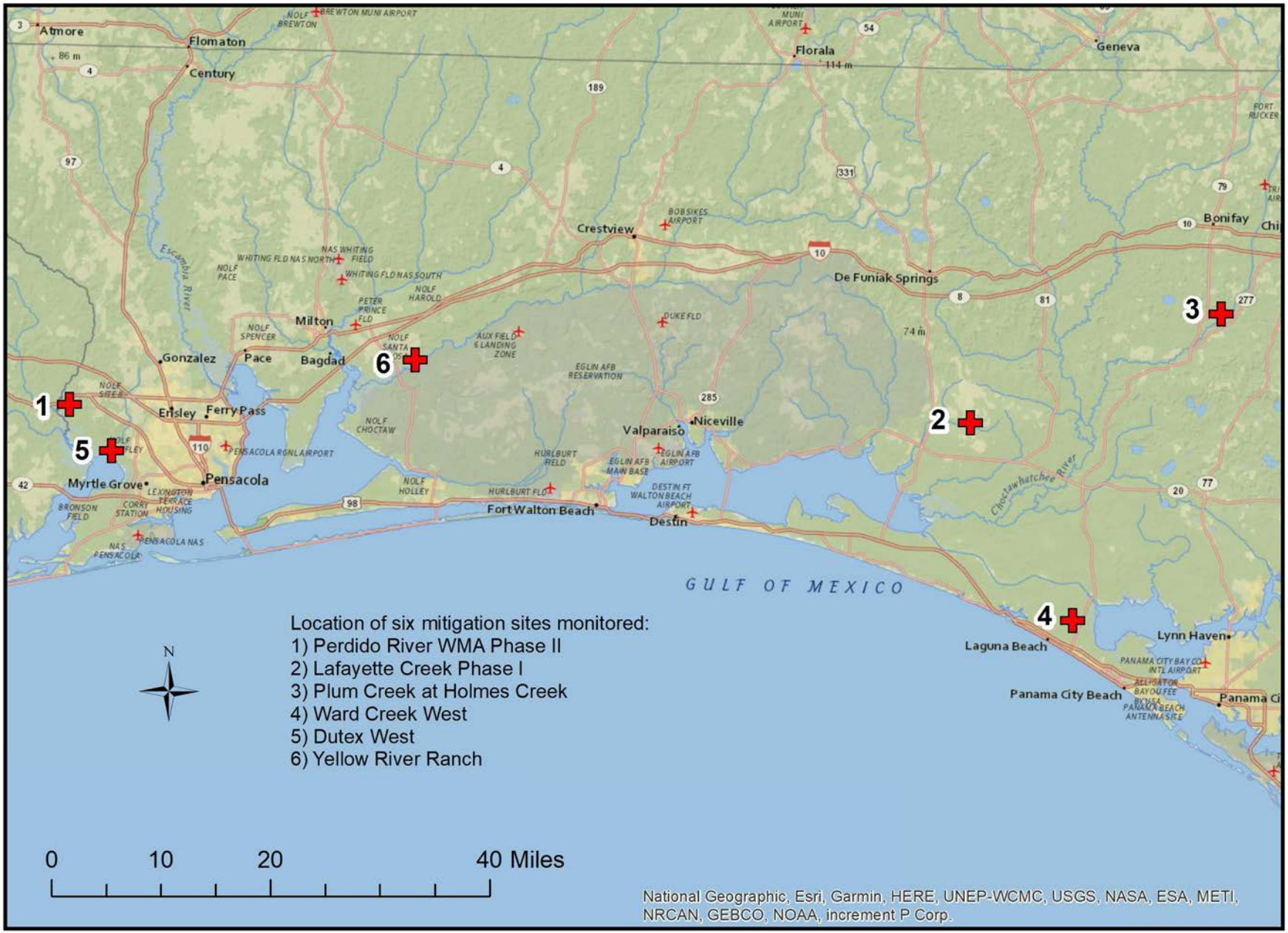
Florida State University

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

1) Perdido River Water Management Area – Phase II in Escambia County
2) Lafayette Creek – Phase I in Walton County
3) Plum Creek at Holmes Creek in Washington County
4) Ward Creek West in Bay County
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 (htpp://florida.plantatlas.usf.edu/), Institute for Systematic Botany, University of South Florida, Tampa. In the summer of 2017 the Florida Natural Areas Inventory (FNAI) incorporated recent changes in scientific plant names found on this website. The resulting changes in scientific names from those used in the 2016 and prior reports are listed below.

2016 Name	2017 Name	Common Name
Aristida stricta var. beyrichiana	*Aristida stricta*	wiregrass
Asimina angustifolia	*Asimina spatulata*	pawpaw
Cyperus retrorsus	*Cyperus ovatus*	pinebarren flatsedge
Galactia volubilis or regularis	*Galactia minor*	leafy milkpea
Gaura angustifolia	*Oenothera simulans*	southern beeblossum
Gratiola pilosa	*Sophronanthe pilosa*	shaggy hedgehyssop
Leucothoe racemosa	*Eubotrys racemosus*	swamp doghobble
Licania michauxii	*Geobalanus oblongifolius*	gopher apple
Muhlenbergia expansa	*Muhlenbergia capillaris* var. *trichopodes*	cutover muhly
Myrica caroliniensis	*Morella caroliniensis*	evergreen bayberry
Myrica cerifera	*Morella cerifera*	southern bayberry
Myrica inodora	*Morella inodora*	odorless bayberry
Osmanthus americanus	*Cartrema americana*	wild olive
Oxypolis filiformis	*Tiedemannia filiformis* ssp. *filiformis*	water dropwort
Panicum anceps	*Coleataenia anceps*	beaked panicum
Panicum hians	*Steinchisma hians*	gaping panicum
Panicum longifolium	*Coleataenia longifolia*	ciliate redtop panicum
Panicum verrucosum	*Kellochloa verrucosa*	warty panicum
Photinia pyrifolia	*Aronia arbutifolia*	red chokeberry
Pluchea rosea	*Pluchea baccharis*	rosy camphorweed
Polygonum punctatum	*Persicaria punctata*	dotted smartweed
Rubus argutus	*Rubus pensylvanicus*	sawtooth blackberry
Sapium sabiferum	*Triadica sebifera*	Chinese tallow tree
Schizachyrium scoparium	*Schizachyrium stoloniferum*	creeping little bluestem


Location of six mitigation sites monitored:
1) Perdido River WMA Phase II
2) Lafayette Creek Phase I
3) Plum Creek at Holmes Creek
4) Ward Creek West
5) Dutex West
6) Yellow River Ranch
N
0
10
20
40 Miles
GULF OF MEXICO
Atmore
Flomaton
Century
Florala
Geneva
Crestview
Bonifay
De Funiak Springs
Milton
Gonzalez
Pace
Bagdad
Ensley
Ferry Pass
Pensacola
Myrtle Grove
Valparaiso
Niceville
Fort Walton Beach
Destin
Laguna Beach
Panama City Beach
Lynn Haven
Escambia River
Choctawhatchee River
National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Perdido River Water Management Area – Phase II Mitigation Site

Qualitative and Quantitative Monitoring

October 2020

Perdido River Water Management Area – Phase II Mitigation Site
Qualitative and Quantitative Monitoring
October 2020

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 Highway10 (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 2019.

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 Hughs, and Camille Eckel on October 20, 2020.

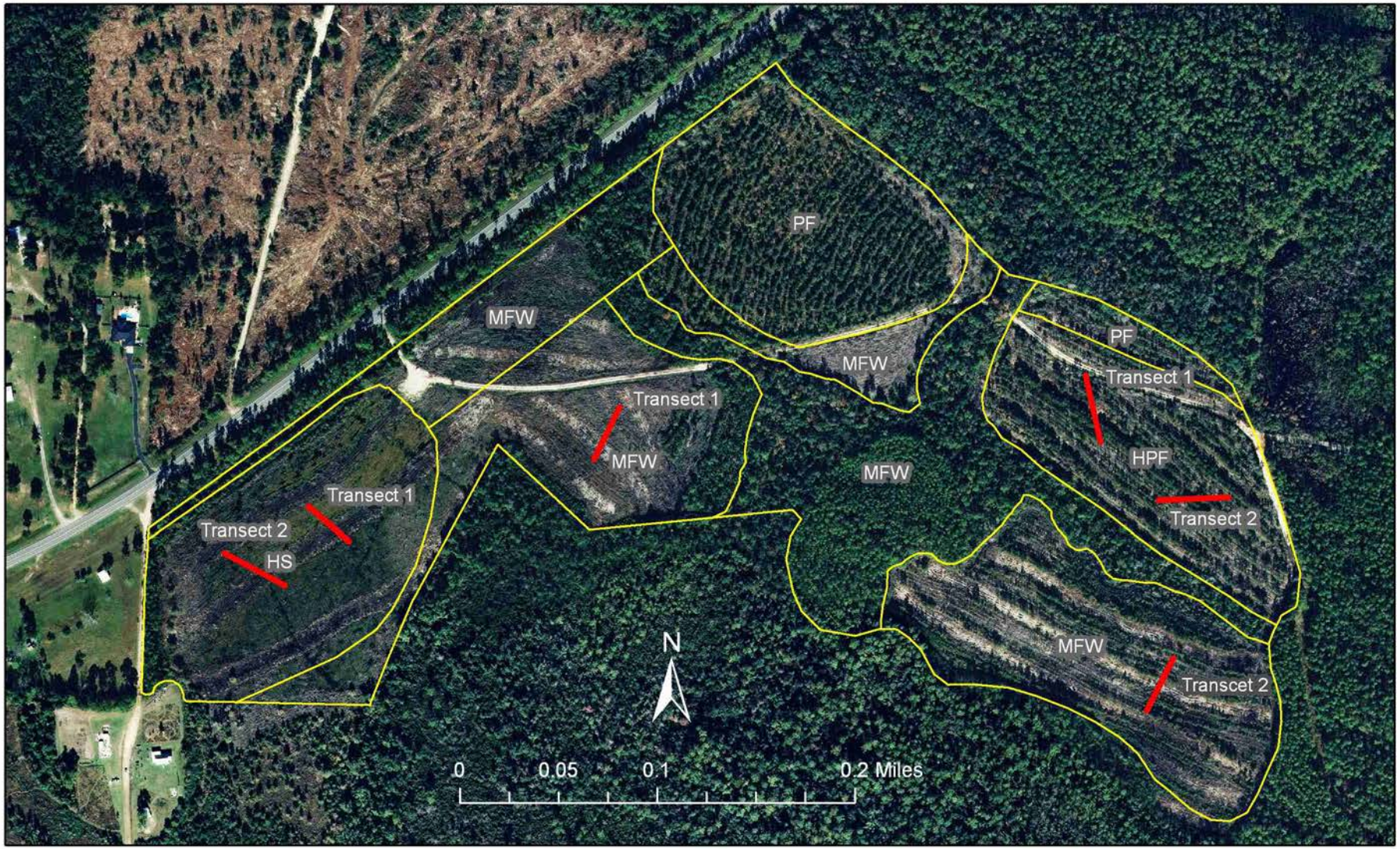


Figure PR-1. Location of permanent transects at Perdido Phase II Mitigation Site. HS=Hydric Savanna, HPF=Hydric Pine Flatwoods, MFW= Forested Wetland Mixed, PF=Pine Flatwoods.

RESULTS AND DISCUSSION

A total of 178 plant taxa were observed during the 2020 monitoring of the target communities at Perdido River Phase II (Table PR-1). Thirty-nine 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 October 20, 2020. (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
Acalypha gracilens	slender threeseed mercury	X				1
Acer rubrum	red maple	X	X	X	X	4
Agalinis fasciculata	beach false foxglove	X	X	X	X	4
Aletris lutea	yellow colic-root				X	1
Aletris sp.	colic-root				X	1
Andropogon arctatus	pinewoods bluestem		**X**			1
Andropogon glomeratus	bushy bluestem	X				1
Andropogon glomeratus var. glaucopsis	purple bluestem	X	X	X	X	4
Andropogon gyrans var. stenophyllus	Elliott's bluestem		**X**			1
Andropogon virginicus	broomsedge bluestem	X	X		X	3
Andropogon virginicus var. glaucus	chalky bluestem			X		1
Aristida purpurascens var. virgata	arrowfeather threeawn	**X**		**X**		2
Aristida spiciformis	bottlebrush threeawn				X	1
Aristida stricta	wiregrass	X	X	X		3
Aronia arbutifolia	red chokeberry	X	X		X	3
Arundinaria gigantea	switchcane	X		X		2
Baccharis halimifolia	groundsel tree	X	**X**	**X**		3
Bidens bipinnata	Spanish needles	**X**	X	**X**		3
Bidens mitis	smallfruit beggarticks	X	X	X	X	4
Calamovilfa curtissii	Curtiss' sandgrass	X				1
Carex glaucescens	clustered sedge	X	X	X	X	4
Carex longii	Long's sedge		**X**			1
Carphephorus odoratissimus	vanillaleaf				**X**	1
Centella asiatica	spadeleaf	X	X	X	X	4
Chamaecrista nictitans	sensitive pea	X		X		2
Chamaecyparis thyoides	Atlantic white cedar		X		X	2
Clethra alnifolia	sweet pepperbush	X				1
Cliftonia monophylla	black titi		X		X	2
Coleataenia anceps	beaked panicum	X	X	X	X	4
Coleataenia longifolia	ciliate redtop panicum	**X**			**X**	2
Coreopsis sp.	tickseed			**X**		1
Ctenium aromaticum	toothache grass	X		**X**		2
Cyperus croceus	Baldwin's flatsedge		**X**			1
Cyperus haspan	haspan flatsedge	**X**	X			2

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Savanna	Pine Flatwoods	Wetland Forest Mixed	Grand Total
Cyperus ovatus	pinebarren flatsedge	**X**		**X**		2
Cyrilla racemiflora	titi	X			X	2
Dichanthelium acuminatum var. acuminatum	tapered witchgrass	**X**				1
Dichanthelium ensifolium	cypress witchgrass	**X**			X	2
Dichanthelium ensifolium var. unciphyllum	cypress witchgrass			**X**	**X**	2
Dichanthelium leucothrix	rough witchgrass				X	1
Dichanthelium portoricense	hemlock witchgrass			**X**	**X**	2
Dichanthelium scabriusculum	woolly witchgrass	X	X	X	X	4
Dichanthelium sp.	witchgrass	X				1
Dichanthelium strigosum	roughhair witchgrass				**X**	1
Diospyros virginiana	common persimmon	X	**X**	X	**X**	4
Drosera capillaris	pink sundew				X	1
Eleocharis vivipara	viviparous spikerush		X			1
Elephantopus elatus	tall elephantsfoot	X	**X**	X	**X**	4
Eragrostis spectabilis	purple lovegrass	X				1
Eremochloa ophiuroides	centipede grass	**X**				1
Eriocaulon compressum	flattened pipewort				X	1
Eriocaulon decangulare	tenangle pipewort	X		X	X	3
Eupatorium capillifolium	dogfennel	X	X	X	X	4
Eupatorium mohrii	Mohr's thoroughwort	X	X	X		3
Eupatorium pilosum	rough boneset	**X**	X		X	3
Eupatorium rotundifolium	roundleaf thoroughwort	X		X		2
Eupatorium semiserratum	smallflower thoroughwort			**X**		1
Euthamia caroliniana	slender flattop goldenrod	X	X	X	X	4
Fuirena squarrosa	hairy umbrellasedge		**X**			1
Gaylussacia mosieri	woolly huckleberry	X	**X**	X	X	4
Gelsemium sempervirens	yellow jessamine		**X**			1
Helianthus angustifolius	narrowleaf sunflower	X	X	X	X	4
Houstonia procumbens	roundleaf bluet			**X**		1
Hydrocotyle umbellata	manyflower marshpennywort		X	X		2
Hypericum brachyphyllum	coastalplain St. John's wort	X	X		X	3
Hypericum cistifolium	roundpod St. John's wort	X	X		X	3
Hypericum crux-andreae	St. Peter's wort	X	X	X	X	4
Hypericum hypericoides	St. Andrew's cross	X		X		2
Hyptis alata	clustered bushmint	X	X	X		3
Ilex cassine	dahoon			X		1
Ilex cassine var. myrtifolia	myrtle-leaved holly	X	X		X	3
Ilex coriacea	large gallberry	X	X		X	3
Ilex glabra	gallberry	X	X	X	X	4
Ilex vomitoria	yaupon	X		X		2
Juncus coriaceus	leathery rush		**X**			1
Juncus dichotomus	forked rush	X				1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Savanna	Pine Flatwoods	Wetland Forest Mixed	Grand Total
Juncus diffusissimus	slimpod rush	**X**				1
Juncus effusus ssp. solutus	soft rush		**X**			1
Juncus marginatus	grassleaf rush	X				1
Juncus scirpoides	needlepod rush	X				1
Kalmia hirsuta	hairy wicky				X	1
Kellochloa verrucosa	warty panicgrass	X	X	X	X	4
Lachnanthes caroliana	Carolina redroot	X	X	X	X	4
Lachnocaulon anceps	whitehead bogbutton	X		X	X	3
Lachnocaulon minus	Small's bogbutton			**X**		1
Liatris spicata	dense gayfeather			**X**		1
Liquidambar styraciflua	sweetgum				**X**	1
Lobelia brevifolia	shortleaf lobelia			X	X	2
Lobelia glandulosa	glade lobelia	X				1
Lobelia rogersii	Mcvaugh's lobelia			**X**		1
Ludwigia linearis	narrowleaf primrosewillow				X	1
Ludwigia maritima	seaside primrosewillow	X	**X**		X	3
Ludwigia pilosa	hairy primrosewillow		X		X	2
Ludwigia repens	creeping primrosewillow		X			1
Lycopodiella alopecuroides	foxtail club-moss	X	X		X	3
Lycopodiella appressa	southern club-moss				X	1
Lycopodiella cernua	nodding club-moss				**X**	1
Lycopodiella prostrata	feather-stem club-moss				**X**	1
Lycopus rubellus	taperleaf waterhorehound		X			1
Lyonia lucida	fetterbush		X		X	2
Magnolia virginiana	sweetbay	X	X	X	X	4
Mikania scandens	climbing hempvine		**X**			1
Morella cerifera	southern bayberry	X	X	X	X	4
Muhlenbergia capillaris var. trichopodes	cutover muhly	**X**				1
Oldenlandia uniflora	clustered mille graines	X	X	X	X	4
Osmunda cinnamomea	cinnamon fern	X	X	X	X	4
Osmunda regalis var. spectabilis	royal fern	X	X	X	**X**	4
Panicum virgatum	switchgrass	X				1
Parthenocissus quinquefolia	Virginia creeper			**X**		1
Paspalum setaceum	thin paspalum	**X**		**X**	X	3
Persea palustris	swamp bay	X	X	X	X	4
Persicaria hydropiperoides	mild waterpepper		**X**			1
Pinus elliottii	slash pine	X	X		X	3
Pinus taeda	loblolly pine	X	X	X	X	4
Pityopsis graminifolia	narrowleaf silkgrass	**X**		**X**		2
Pluchea baccharis	rosy camphorweed			X		1
Pluchea foetida	stinking camphorweed	X	**X**			2
Pluchea longifolia	longleaf camphorweed	X				1
Polygala brevifolia	littleleaf milkwort				**X**	1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Savanna	Pine Flatwoods	Wetland Forest Mixed	Grand Total
Polygala lutea	orange milkwort				X	1
Polypremum procumbens	rustweed	X				1
Proserpinaca pectinata	combleaf mermaidweed		X			1
Pteridium aquilinum	bracken fern			X	X	2
Quercus nigra	water oak	X	X	X	X	4
Quercus virginiana	live oak		**X**			1
Rhexia alifanus	savannah meadowbeauty		**X**			1
Rhexia mariana	pale meadowbeauty	X			X	2
Rhexia nashii	maid marian			**X**		1
Rhexia petiolata	fringed meadowbeauty		X	**X**		2
Rhexia virginica	handsome harry	X	X	X	X	4
Rhus copallinum	winged sumac	X		**X**		2
Rhynchospora baldwinii	Baldwin's beaksedge				X	1
Rhynchospora cephalantha	bunched beaksedge		X		X	2
Rhynchospora chalarocephala	loosehead beaksedge	X	X			2
Rhynchospora ciliaris	fringed beaksedge				X	1
Rhynchospora corniculata	shortbristle horned beaksedge		**X**			1
Rhynchospora curtissii	Curtiss' beaksedge				**X**	1
Rhynchospora fascicularis	fascicled beaksedge		X		X	2
Rhynchospora gracilenta	slender beaksedge		**X**		X	2
Rhynchospora plumosa	plumed beaksedge				X	1
Rhynchospora pusilla	fairy beaksedge				X	1
Rubus cuneifolius	sand blackberry	X		**X**	**X**	3
Rubus pensilvanicus	sawtooth blackberry	X	X	X	X	4
Rubus trivialis	southern dewberry	X		**X**		2
Sabatia brevifolia	shortleaf rosegentian				X	1
Sabatia difformis	lanceleaf rosegentian				**X**	1
Saccharum giganteum	sugarcane plumegrass		X		X	2
Sagittaria graminea	grassy arrowhead		**X**			1
Schizachyrium stoloniferum	creeping little bluestem	**X**				1
Scirpus cyperinus	woolgrass		X			1
Scleria ciliata	fringed nutrush	X		**X**	X	3
Scleria triglomerata	whip nutrush	X			**X**	2
Serenoa repens	saw palmetto				X	1
Smilax auriculata	earleaf greenbrier	X		X	**X**	3
Smilax glauca	cat greenbrier	X		X	X	3
Smilax laurifolia	laurel greenbrier	X	X	**X**	X	4
Smilax walteri	coral greenbrier		**X**			1
Solidago fistulosa	pinebarren goldenrod	X	X	X	X	4
Sphagnum sp.	sphagnum moss	X	X	X	X	4
Symphyotrichum dumosum	rice button aster	X	X	X	X	4
Symphyotrichum walteri	Walter's aster		X			1
Symplocos tinctoria	horse sugar	X				1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Savanna	Pine Flatwoods	Wetland Forest Mixed	Grand Total
Syngonanthus flavidulus	yellow hatpins				X	1
Taxodium ascendens	pond cypress		X		X	2
Thelypteris palustris var. pubescens	marsh fern		**X**			1
Toxicodendron radicans	eastern poison ivy	X	X	X	X	4
Vaccinium arboreum	sparkleberry	X				1
Vaccinium corymbosum	highbush blueberry	X	X			2
Vaccinium elliottii	Elliott's blueberry	X	**X**	X		3
Viola lanceolata	bog white violet	X		X	X	3
Viola primulifolia	primroseleaf violet	X		**X**	X	3
Vitis rotundifolia	muscadine	X	X	X	X	4
Woodwardia areolata	netted chain fern	X	X	X	X	4
Woodwardia virginica	Virginia chain fern	X	X	X	X	4
Xyris ambigua	coastalplain yellow-eyed grass	X	X	X	X	4
Xyris fimbriata	fringed yellow-eyed grass		X		X	2
Xyris jupicai	Richard's yellow-eyed grass		**X**			1
Xyris smalliana	Small's yellow-eyed grass		**X**			1
Total number of taxa: 178		102	93	80	100	375

Hydric Savanna

Qualitative sampling. The target community of Hydric Savanna (Figure PR-1) had a total of 93 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 for the first time in 2020 along the qualitative meandering transect. A small patch of wiregrass was observed in this community for the first time during the 2019 monitoring, located about 70 m southwest of Hydric Savanna Transect 2. 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 27 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, purple bluestem, pinebarren goldenrod, and viviparous spikerush. Woody species made up around 8% average cover per quadrat. Vegetation along the transect was very similar in composition to the previous year, but with a decrease in cover from smallfruit beggarticks, likely a seasonal effect.

Transect 2 (Table PR-3, Figure PR-3) had a total of 28 species which covered almost 100% of the area. The dominant species were sphagnum moss, purple bluestem, pinebarren goldenrod, Virginia chainfern, hairy primrosewillow, and viviparous spikerush. Woody species made up

about 3% average cover per quadrat. Vegetation along the transect was very similar in composition to the previous year, but with a decrease in cover from smallfruit beggarticks, likely a seasonal effect.

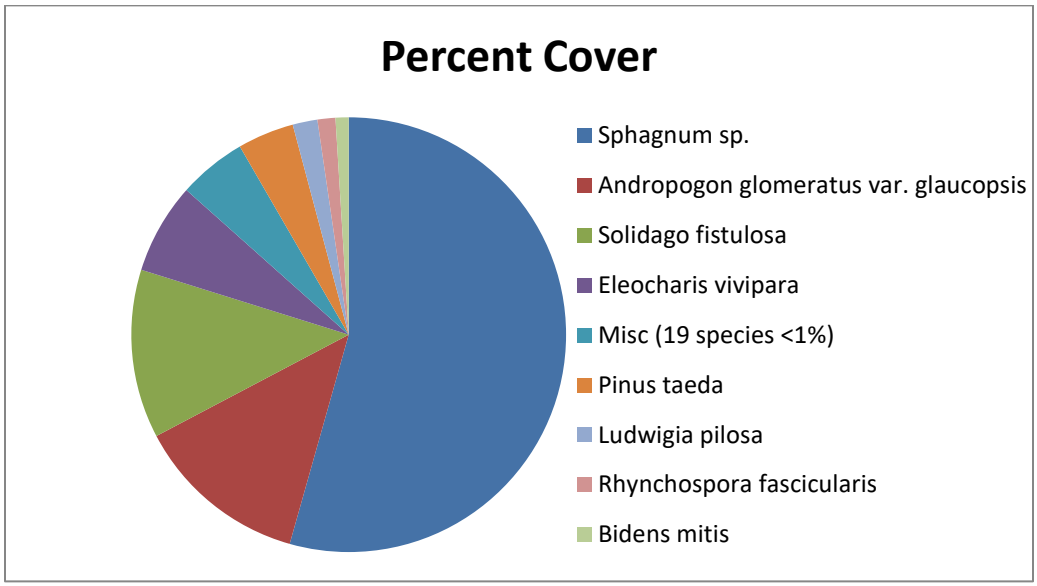


Figure PR-2. Percent of total vegetative cover for plant species in Hydric Savanna Transect 1.

Table PR-2. Percent total vegetative cover of plant species in Hydric Savanna Transect 1 sampled on October 20, 2020.

Scientific name	Common name	Average percent cover per quadrat
Sphagnum sp.	sphagnum moss	66.38
Andropogon glomeratus var. *glaucopsis*	purple bluestem	15.75
Solidago fistulosa	pinebarren goldenrod	15.31
Eleocharis vivipara	viviparous spikerush	8.25
Pinus taeda	loblolly pine	5.13
Ludwigia pilosa	hairy primrosewillow	2.25
Rhynchospora fascicularis	fascicled beaksedge	1.63
Bidens mitis	smallfruit beggarticks	1.19
Hypericum brachyphyllum	coastalplain St. John's wort	0.94
Saccharum giganteum	sugarcane plumegrass	0.81
Toxicodendron radicans	eastern poison ivy	0.69
Pinus elliottii	slash pine	0.63
Rhynchospora cephalantha	bunched beaksedge	0.63
Acer rubrum	red maple	0.38
Eupatorium mohrii	Mohr's thoroughwort	0.31
Carex longii	Long's sedge	0.25
Hydrocotyle umbellata	manyflower marshpennywort	0.25
Rhexia virginica	handsome harry	0.25
Woodwardia virginica	Virginia chain fern	0.25
Kellochloa verrucosa	warty panicgrass	0.19
Vitis rotundifolia	muscadine	0.19

Scientific name	Common name	Average percent cover per quadrat
Lachnanthes caroliana	Carolina redroot	0.13
Aristida stricta	wiregrass	0.06
Aronia arbutifolia	red chokeberry	0.06
Coleataenia anceps	beaked panicum	0.06
Persea palustris	swamp bay	0.06
Xyris fimbriata	fringed yellow-eyed grass	0.06
Bare Ground		0.06

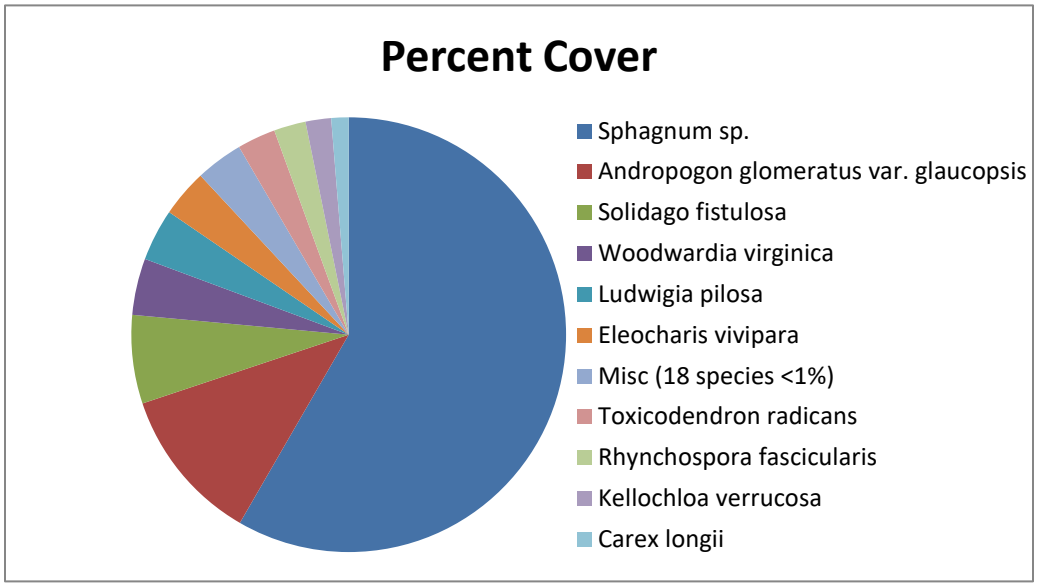


Figure PR-3. Percent of total vegetative cover for plant species in Hydric Savanna Transect 2.

Table PR-3. Percent cover of plant species in Hydric Savanna Transect 2 sampled on October 20, 2020.

Scientific name	Common name	Average percent cover per quadrat
Sphagnum sp.	sphagnum moss	53.75
Andropogon glomeratus var. *glaucopsis*	purple bluestem	10.63
Solidago fistulosa	pinebarren goldenrod	6.06
Woodwardia virginica	Virginia chain fern	3.88
Ludwigia pilosa	hairy primrosewillow	3.56
Eleocharis vivipara	viviparous spikerush	3.25
Toxicodendron radicans	eastern poison ivy	2.63
Rhynchospora fascicularis	fascicled beaksedge	2.19
Kellochloa verrucosa	warty panicgrass	1.75
Carex longii	Long's sedge	1.19
Proserpinaca pectinata	combleaf mermaidweed	0.50
Rhexia virginica	handsome harry	0.44

Scientific name	Common name	Average percent cover per quadrat
Woodwardia areolata	netted chain fern	0.38
Acer rubrum	red maple	0.31
Oldenlandia uniflora	clustered mille graines	0.25
Centella asiatica	spadeleaf	0.19
Hydrocotyle umbellata	manyflower marshpennywort	0.19
Rhynchospora cephalantha	bunched beaksedge	0.19
Bidens mitis	smallfruit beggarticks	0.13
Eupatorium mohrii	Mohr's thoroughwort	0.13
Lachnanthes caroliana	Carolina redroot	0.13
Eupatorium pilosum	rough boneset	0.06
Euthamia caroliniana	slender flattop goldenrod	0.06
Hypericum crux-andreae	St. Peter's wort	0.06
Ilex coriacea	large gallberry	0.06
Juncus sp.	rush	0.06
Rubus pensilvanicus	sawtooth blackberry	0.06
Vitis rotundifolia	muscadine	0.06
Bare Ground		0.19

Wetland Forest Mixed

Qualitative sampling. The target community of Wetland Forest Mixed (Figure PR-1) had a total of 100 observed plant species (Table PR-1). The vegetative cover was dominated by tall clumps of purple bluestem. Sphagnum moss, pinebarren goldenrod, and fascicled beakrush were common. In the vicinity of the eastern transect woody species, such as black titi, large gallberry, dahoon, sweetbay, fetterbush, and St. John's wort, were mainly on slightly elevated windrows from past silviculture activities, generally short and forming about 16 to 25% cover. Dense patches of muscadine were observed scattered in this community. In the vicinity of the western transect, shrubs were taller and denser. Young slash and loblolly pines were widely scattered throughout.

Quantitative sampling. Transect 1 had a total of 35 species and 23% bare ground (Table PR-4, Figure PR-4). The dominant species was purple bluestem, with sphagnum moss and Atlantic white cedar 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 22% average cover per quadrat, a small increase from 2019.

Transect 2 (Table PR-5, Figure PR-5) had a total of 37 species with 7% bare ground. The overall aspect was more open than Transect 1, but with somewhat more purple bluestem. Black titi, sphagnum moss, foxtail club-moss, purple bluestem, and warty panic grass were also dominants. Woody species made up around 15% average cover per quadrat, similar to last year.

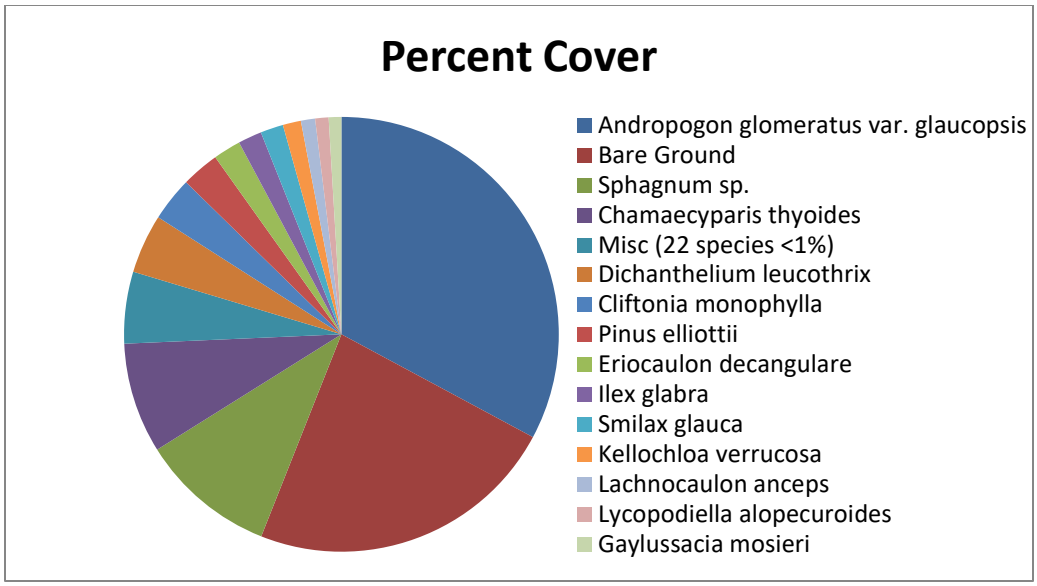


Figure PR-4. Percent of total vegetative cover for species in Mixed Forested Wetland Transect 1.

Table PR-4. Percent cover of plant species in Mixed Forested Wetland Transect 1 sampled on October 20, 2020.

Scientific name	Common name	Average percent cover per quadrat
Andropogon glomeratus var. *glaucopsis*	purple bluestem	35.00
Sphagnum sp.	sphagnum moss	10.75
Chamaecyparis thyoides	Atlantic white cedar	8.75
Dichanthelium leucothrix	rough witchgrass	4.69
Cliftonia monophylla	black titi	3.50
Pinus elliottii	slash pine	3.00
Eriocaulon decangulare	tenangle pipewort	2.19
Ilex glabra	gallberry	1.88
Smilax glauca	cat greenbrier	1.81
Kellochloa verrucosa	warty panicgrass	1.44
Lachnocaulon anceps	whitehead bogbutton	1.13
Lycopodiella alopecuroides	foxtail club-moss	1.06
Gaylussacia mosieri	woolly huckleberry	1.00
Rubus pensilvanicus	sawtooth blackberry	0.69
Rhynchospora gracilenta	slender beaksedge	0.63
Woodwardia areolata	netted chain fern	0.50
Lyonia lucida	fetterbush	0.44
Magnolia virginiana	sweetbay	0.44
Rhynchospora cephalantha	bunched beaksedge	0.44
Solidago fistulosa	pinebarren goldenrod	0.31
Euthamia caroliniana	slender flattop goldenrod	0.25
Woodwardia virginica	Virginia chain fern	0.25
Andropogon virginicus	broomsedge bluestem	0.19
Eupatorium pilosum	rough boneset	0.19
Osmunda cinnamomea	cinnamon fern	0.19

Scientific name	Common name	Average percent cover per quadrat
Rhynchospora fascicularis	fascicled beaksedge	0.19
Taxodium ascendens	pond cypress	0.19
Acer rubrum	red maple	0.13
Aronia arbutifolia	red chokeberry	0.13
Lachnanthes caroliana	Carolina redroot	0.13
Oldenlandia uniflora	clustered mille graines	0.13
Rhexia virginica	handsome harry	0.13
Coleataenia anceps	beaked panicum	0.06
Drosera capillaris	pink sundew	0.06
Viola lanceolata	bog white violet	0.06
Bare Ground		24.69

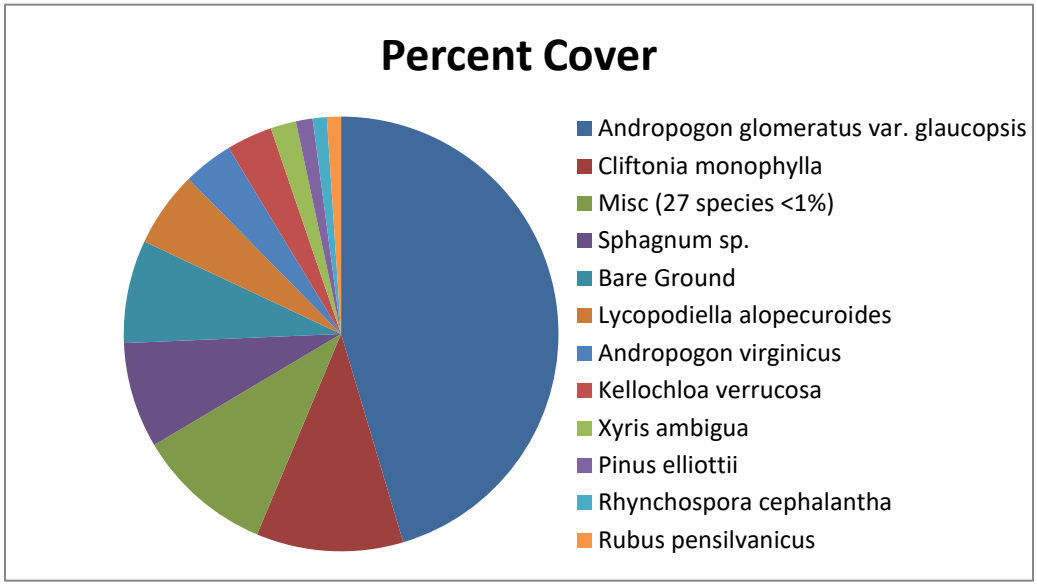


Figure PR-5. Percent of total vegetative cover for plant species in Mixed Forested Wetland Transect 2.

Table PR-5. Percent cover of plant species in Mixed Forested Wetland Transect 2 sampled on October 20, 2020.

Scientific name	Common name	Average percent cover per quadrat
Andropogon glomeratus var. *glaucopsis*	purple bluestem	43.31
Cliftonia monophylla	black titi	10.44
Sphagnum sp.	sphagnum moss	7.50
Lycopodiella alopecuroides	foxtail club-moss	5.38
Andropogon virginicus	broomsedge bluestem	3.56
Kellochloa verrucosa	warty panicgrass	3.25
Xyris ambigua	coastalplain yellow-eyed grass	1.81
Pinus elliottii	slash pine	1.19

Scientific name	Common name	Average percent cover per quadrat
Rhynchospora cephalantha	bunched beaksedge	1.00
Rubus pensilvanicus	sawtooth blackberry	1.00
Hypericum brachyphyllum	coastalplain St. John's wort	0.94
Paspalum setaceum	thin paspalum	0.94
Rhynchospora gracilenta	slender beaksedge	0.94
Woodwardia areolata	netted chain fern	0.94
Woodwardia virginica	Virginia chain fern	0.88
Euthamia caroliniana	slender flattop goldenrod	0.75
Solidago fistulosa	pinebarren goldenrod	0.75
Eupatorium pilosum	rough boneset	0.44
Ilex cassine var. *myrtifolia*	myrtle-leaved holly	0.44
Magnolia virginiana	sweetbay	0.44
Dichanthelium ensifolium var. *ensifolium*	cypress witchgrass	0.25
Hypericum crux-andreae	St. Peter's wort	0.25
Xyris fimbriata	fringed yellow-eyed grass	0.25
Aletris lutea	yellow colic-root	0.19
Scleria ciliata	fringed nutrush	0.19
Smilax laurifolia	laurel greenbrier	0.19
Acer rubrum	red maple	0.13
Polygala lutea	orange milkwort	0.13
Rhexia virginica	handsome harry	0.13
Viola primulifolia	primroseleaf violet	0.13
Lachnocaulon anceps	whitehead bogbutton	0.06
Ludwigia maritima	seaside primrosewillow	0.06
Lycopodiella cernua	nodding club-moss	0.06
Oldenlandia uniflora	clustered mille graines	0.06
Persea palustris	swamp bay	0.06
Rhynchospora pusilla	fairy beaksedge	0.06
Viola lanceolata	bog white violet	0.06
Bare Ground		7.31

Hydric Pine Flatwoods

Qualitative monitoring. The target community of hydric pine flatwoods had a total of 102 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. 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, toothache grass with occasional wiregrass, as well as many weedy species. Curtiss' sandgrass (*Calamovilfa curtissii*), state listed as threatened, was noted in this community.

Quantitative monitoring. Where branches of the felled pines lay across the quadrats, they were removed in order to view the plants beneath. Transect 1 had a total of 31 species with 50% bare ground (Figure PR-6, Table PR-6). The dominant species was muscadine with other

species much more sparse. Woody species (including muscadine) made up around 28% average cover per quadrat.

Transect 2 (Figure PR-7, Table PR-7) had a total of 34 species with 56% bare ground. The dominant species were muscadine and cinnamon fern. Woody species made up around 14% average cover per quadrat. A large downed pine tree at the beginning of the transect made sampling difficult.

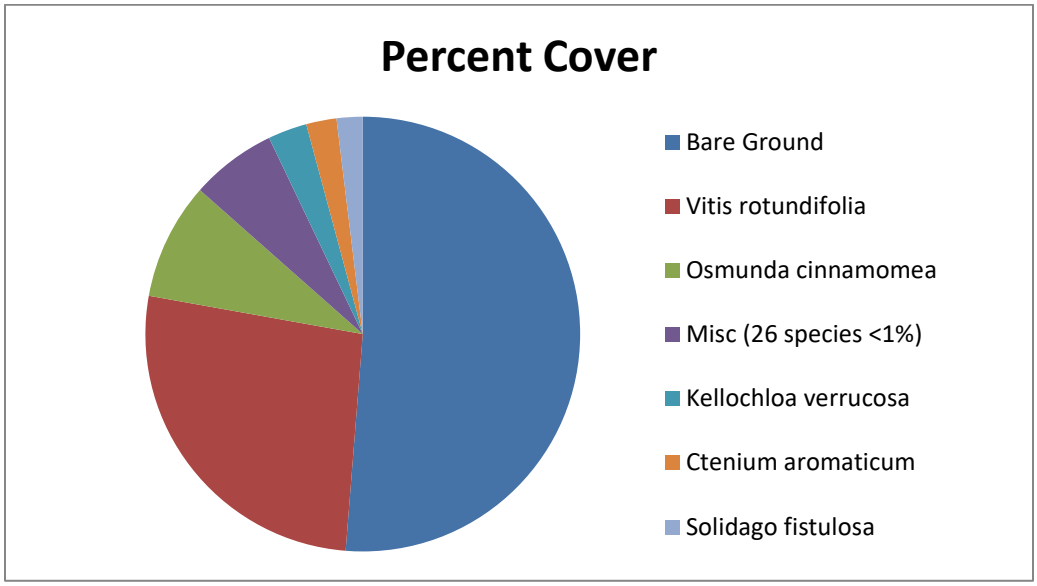


Figure PR-6. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

Table PR-6. Percent cover of species in Hydric Pine Flatwoods Transect 1 sampled on October 20, 2020.

Scientific name	Common name	Average percent cover per quadrat
Vitis rotundifolia	muscadine	25.75
Osmunda cinnamomea	cinnamon fern	8.44
Kellochloa verrucosa	warty panicgrass	2.81
Ctenium aromaticum	toothache grass	2.19
Solidago fistulosa	pinebarren goldenrod	1.88
Elephantopus elatus	tall elephantsfoot	0.94
Euthamia caroliniana	slender flattop goldenrod	0.94
Toxicodendron radicans	eastern poison ivy	0.75
Rubus cuneifolius	sand blackberry	0.50
Andropogon virginicus	broomsedge bluestem	0.38
Eupatorium mohrii	Mohr's thoroughwort	0.38
Rubus trivialis	southern dewberry	0.38
Aristida stricta	wiregrass	0.25
Centella asiatica	spadeleaf	0.19
Pinus taeda	loblolly pine	0.19
Scleria ciliata	fringed nutrush	0.19
Smilax auriculata	earleaf greenbrier	0.19

Scientific name	Common name	Average percent cover per quadrat
Symphyotrichum dumosum	rice button aster	0.13
Acalypha gracilens	slender threeseed mercury	0.06
Cyperus ovatus	pinebarren flatsedge	0.06
Eupatorium capillifolium	dogfennel	0.06
Hypericum cistifolium	roundpod St. John's wort	0.06
Juncus dichotomus	forked rush	0.06
Ludwigia maritima	seaside primrosewillow	0.06
Oldenlandia uniflora	clustered mille graines	0.06
Pluchea longifolia	longleaf camphorweed	0.06
Rubus pensilvanicus	sawtooth blackberry	0.06
Smilax glauca	cat greenbrier	0.06
Vaccinium elliottii	Elliott's blueberry	0.06
Viola primulifolia	primroseleaf violet	0.06
Woodwardia areolata	netted chain fern	0.06
Bare Ground		49.69

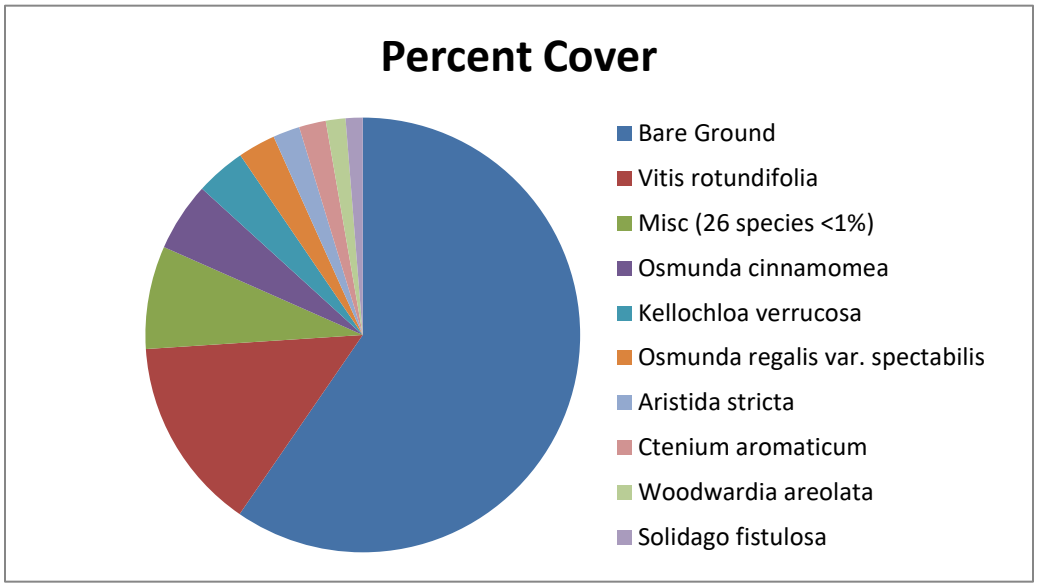


Figure PR-7. Percent cover of plant species in Hydric Pine Flatwoods Transect 2.

Table PR-7. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 sampled on October 20, 2020.

Scientific name	Common name	Average percent cover per quadrat
Vitis rotundifolia	muscadine	13.50
Osmunda cinnamomea	cinnamon fern	4.81
Kellochloa verrucosa	warty panicgrass	3.50
Osmunda regalis var. *spectabilis*	royal fern	2.63
Aristida stricta	wiregrass	1.88
Ctenium aromaticum	toothache grass	1.88
Woodwardia areolata	netted chain fern	1.38
Solidago fistulosa	pinebarren goldenrod	1.19
Lachnocaulon anceps	whitehead bogbutton	0.94
Woodwardia virginica	Virginia chain fern	0.75
Andropogon virginicus	broomsedge bluestem	0.69
Euthamia caroliniana	slender flattop goldenrod	0.69
Sphagnum sp.	sphagnum moss	0.50
Andropogon glomeratus	bushy bluestem	0.44
Elephantopus elatus	tall elephantsfoot	0.44
Eupatorium mohrii	Mohr's thoroughwort	0.38
Ludwigia maritima	seaside primrosewillow	0.38
Pinus taeda	loblolly pine	0.31
Oldenlandia uniflora	clustered mille graines	0.25
Andropogon glomeratus var. *glaucopsis*	purple bluestem	0.19
Hypericum crux-andreae	St. Peter's wort	0.19
Rhynchospora chalarocephala	loosehead beaksedge	0.19
Smilax glauca	cat greenbrier	0.13
Toxicodendron radicans	eastern poison ivy	0.13
Centella asiatica	spadeleaf	0.06
Cyrilla racemiflora	titi	0.06
Dichanthelium sp.	witchgrass	0.06
Helianthus angustifolius	narrowleaf sunflower	0.06
Lycopodiella alopecuroides	foxtail club-moss	0.06
Rhexia mariana	pale meadowbeauty	0.06
Rhexia virginica	handsome harry	0.06
Rubus sp.	blackberry	0.06
Symphyotrichum dumosum	rice button aster	0.06
Vaccinium elliottii	Elliott's blueberry	0.06
Bare Ground		55.94

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 had re-sprouted. Muscadine vine was abundant, scrambling over and obscuring much of the remaining groundcover. The diverse shrub layer formed up to 25% cover and was 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. A total of 80 species (Table PR-1) were observed in this habitat.

Lafayette Creek – Phase I Mitigation Site

Qualitative and Quantitative Monitoring

October 2020

Lafayette Creek – Phase I Mitigation Site
Qualitative and Quantitative Monitoring
October 2020

INTRODUCTION

The Lafayette Creek Phase I Mitigation Site of 509 acres was obtained to compensate for the loss of wetland function from the impacts associated with re-alignment of highway US331 in Freeport. The site is located north of SR 20 and Lafayette Creek. Access to the site is via Hollington Road, which is located 4.5 miles east of US 331. The gate to the site is at the north end of Hollington Road. The Phase I Mitigation Project aims to restore Sandhill (SA) to areas formerly planted with sand pine plantation and Hydric Savanna (HS) to areas formerly covered by wetland shrubs (Figure LC-1). Quantitative and qualitative monitoring documented the current plant species composition and vegetation structure of these targeted communities. Qualitative monitoring was used to document areas of slash pine plantation being restored to High Pine (HP) as well as the intact Bay Swamp (BS) and Stream Swamp (SS). The site vegetation was previously monitored by FNAI biologists every fall from 2012 to 2019.

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 Amy Jenkins on October 5-6, 2020.

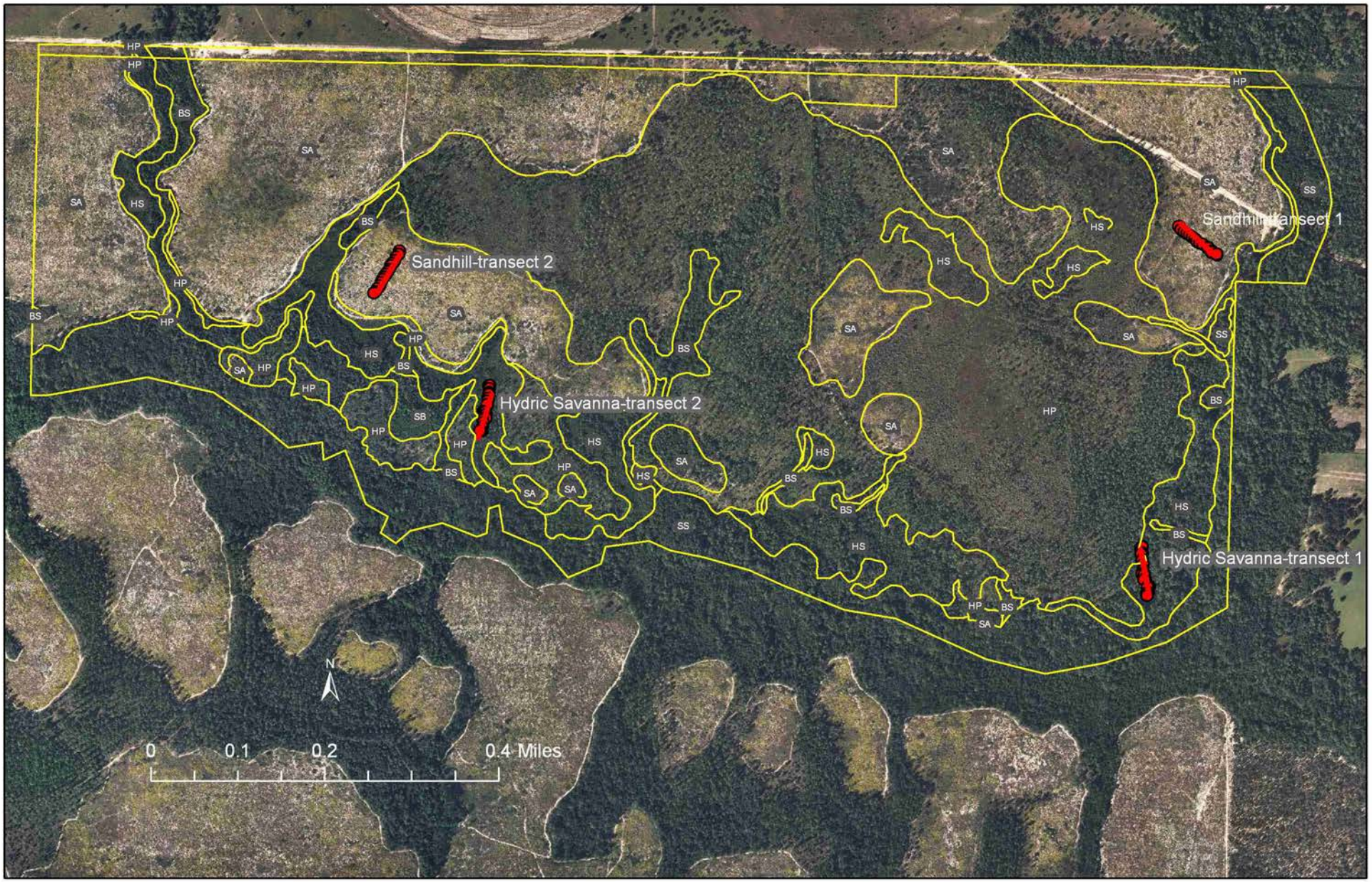


Figure LC-1. Location of permanent transects at Lafayette Creek – Phase I Mitigation Site. SA=Sandhill, HS=Hydric Savanna, HP=High Pine, BS=Bay Swamp, SS=Stream Swamp, SB=Shrub Bog.

RESULTS AND DISCUSSION

A total of 292 plant taxa were recorded in the surveyed areas of Lafayette Creek during the 2020 monitoring period (Table LC-1). Nineteen new taxa were found during the 2020 monitoring, including one new invasive exotic species, cogon grass (*Imperata cylindrica*).

Table LC-1. Species observed in target communities at Lafayette Creek – Phase I Mitigation Site, October 5-6, 2020. (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
Acalypha gracilens	slender threeseed mercury		**X**				1
Acer rubrum	red maple	X				X	2
Agalinis divaricata	pineland false foxglove		X		X		2
Agalinis fasciculata	beach false foxglove		X	X	X		3
Aletris lutea	yellow colic-root			X			1
Alnus serrulata	hazel alder	X				X	2
Amsonia ciliata	fringed bluestar				X		1
Andropogon glomeratus	bushy bluestem			X			1
Andropogon glomeratus var. glaucopsis	purple bluestem	X	X	X			3
Andropogon gyrans	Elliott's bluestem				X		1
Andropogon sp.	bluestem			X			1
Andropogon ternarius	splitbeard bluestem		X		X		2
Andropogon virginicus	broomsedge bluestem	**X**	X	X	X		4
Andropogon virginicus var. glaucus	chalky bluestem			X	X		2
Aristida purpurascens	arrowfeather threeawn				X		1
Aristida sp.	threeawn				X		1
Aristida stricta	wiregrass		X	X	X		3
Aronia arbutifolia	red chokeberry			X			1
Arundinaria gigantea	switchcane			X			1
Asclepias obovata	pineland milkweed		X	**X**			2
Axonopus fissifolius	common carpetgrass		X				1
Balduina angustifolia	coastalplain honeycomb-head				X		1
Balduina uniflora	oneflower honeycomb-head		**X**	**X**			2
Baptisia lanceolata	gopherweed				X		1
Berlandiera pumila	soft greeneyes		**X**		X		2
Bidens mitis	smallfruit beggarticks	X		X		X	3
Bigelowia nudata	pineland rayless goldenrod		X	X			2
Bignonia capreolata	crossvine		X			X	2
Bulbostylis ciliatifolia	capillary hairsedge				X		1
Burmannia capitata	southern bluethread			**X**			1
Calamintha coccinea	scarlet calamint				X		1
Callicarpa americana	American beautyberry	X	X	X	X		4
Carex glaucescens	clustered sedge					X	1
Carphephorus odoratissimus	vanillaleaf		X	X			2

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
Cartrema americanum	wild olive				X		1
Castanea pumila	chinquapin		**X**				1
Centella asiatica	spadeleaf			X			1
Chamaecrista fasciculata	partridge pea				**X**		1
Chamaecrista nictitans	sensitive pea		**X**				1
Chaptalia tomentosa	pineland daisy		X				1
Chasmanthium laxum var. sessiliflorum	longleaf woodoats					X	1
Chrysoma pauciflosculosa	woody goldenrod		**X**		X		2
Chrysopsis gossypina ssp. hyssopifolia	cottony goldenaster				X		1
Chrysopsis lanuginosa	Lynn Haven goldenaster				X		1
Chrysopsis linearifolia	narrowleaf goldenaster				X		1
Chrysopsis mariana	Maryland goldenaster		X				1
Cladonia leporina	cup lichen				X		1
Clematis reticulata	netleaf leather flower		X				1
Clethra alnifolia	sweet pepperbush	X	X	X		X	4
Cliftonia monophylla	black titi	X		X		X	3
Cnidoscolus stimulosus	tread softly				X		1
Coleataenia longifolia	ciliate redtop panicum			X			1
Conyza canadensis	Canadian horseweed				X		1
Coreopsis linifolia	Texas tickseed			X			1
Crocanthemum carolinianum	Carolina frostweed				**X**		1
Crotalaria rotundifolia	rabbitbells		**X**				1
Croton argyranthemus	silver croton				X		1
Ctenium aromaticum	toothache grass		X	X			2
Cyperus sp.	flatsedge				X		1
Cyrilla racemiflora	titi	X				X	2
Dalea pinnata	summer farewell				X		1
Desmodium lineatum	sand tick-trefoil		**X**				1
Desmodium sp.	tick-trefoil		X				1
Dichanthelium aciculare	needleleaf witchgrass				X		1
Dichanthelium acuminatum	tapered witchgrass				X		1
Dichanthelium ensifolium	cypress witchgrass			X			1
Dichanthelium leucothrix	rough witchgrass				**X**		1
Dichanthelium portoricense	hemlock witchgrass				X		1
Dichanthelium scabriusculum	woolly witchgrass	X		X		X	3
Dichanthelium strigosum	roughhair witchgrass		X	X	X	**X**	4
Diodia teres	poor joe		X		X		2
Diodia virginiana	Virginia buttonweed		X	X	**X**		3
Diospyros virginiana	common persimmon		X		X		2
Drosera capillaris	pink sundew			X			1
Drosera tracyi	dewthreads			**X**			1
Elephantopus elatus	tall elephantsfoot		X				1

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
Eragrostis elliottii	Elliott's lovegrass		X		X		2
Eragrostis sp.	lovegrass	X		X			2
Eragrostis virginica	coastal lovegrass				X		1
Erechtites hieraciifolius	fireweed			**X**			1
Erigeron vernus	early whitetop fleabane			X			1
Eriocaulon compressum	flattened pipewort			X			1
Eriocaulon decangulare	tenangle pipewort			X			1
Eriogonum tomentosum	dogtongue wild buckwheat				X		1
Eryngium yuccifolium	button rattlesnakemaster				X		1
Eupatorium capillifolium	dogfennel	X	**X**	X			3
Eupatorium compositifolium	yankeeweed	**X**	X	X	X		4
Eupatorium mohrii	Mohr's thoroughwort		X	X			2
Eupatorium pilosum	rough boneset	**X**	X	X			3
Eupatorium rotundifolium	roundleaf thoroughwort		X	X			2
Euphorbia discoidalis	summer spurge		X		X		2
Euphorbia floridana	greater Florida spurge				X		1
Eurybia eryngiifolia	thistleleaf aster		X				1
Euthamia caroliniana	slender flattop goldenrod	**X**	X	X			3
Froelichia floridana	cottonweed				X		1
Fuirena breviseta	saltmarsh umbrellasedge	X					1
Gaillardia aestivalis	lanceleaf blanketflower				X		1
Galactia minor	leafy milkpea		**X**		X		2
Gamochaeta pensylvanica	Pennsylvania everlasting		**X**		**X**		2
Gaylussacia dumosa	dwarf huckleberry		X	X	X		3
Gaylussacia frondosa var. tomentosa	blue huckleberry		X				1
Gaylussacia mosieri	woolly huckleberry	X		X			2
Gelsemium sempervirens	yellow jessamine		X				1
Geobalanus oblongifolius	gopher apple		X		X		2
Gymnopogon ambiguus	bearded skeletongrass				X		1
Helianthus angustifolius	narrowleaf sunflower	X	X	X			3
Helianthus heterophyllus	variableleaf sunflower		X	X			2
Helianthus radula	stiff sunflower		X		X		2
Hibiscus aculeatus	comfortroot		X	X			2
Hieracium gronovii	queen-devil		**X**		**X**		2
Houstonia procumbens	roundleaf bluet		**X**		X		2
Hypericum brachyphyllum	coastalplain St. John's wort			X			1
Hypericum cistifolium	roundpod St. John's wort		X	X			2
Hypericum crux-andreae	St. Peter's wort	X	X	X			3
Hypericum fasciculatum	peelbark St. John's wort	X		X			2
Hypericum gentianoides	orangegrass		**X**	**X**	X		3
Hypericum hypericoides	St. Andrew's cross				X	X	2
Hypericum suffruticosum	pineland St. John's wort				X		1

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
Ilex cassine	dahoon			X		X	2
Ilex coriacea	large gallberry	X	X	X		X	4
Ilex glabra	gallberry		X	X	X	X	4
Ilex opaca	American holly					X	1
Ilex vomitoria	yaupon	X	X		X	X	4
Imperata cylindrica	cogon grass		**X**		**X**		2
Ionactis linariifolia	flaxleaf aster		X				1
Itea virginica	Virginia willow					X	1
Juncus effusus ssp. solutus	soft rush	**X**					1
Juncus scirpoides	needlepod rush	X					1
Juncus trigonocarpus	redpod rush	X		X			2
Kalmia hirsuta	hairy wicky			**X**			1
Kellochloa verrucosa	warty panicgrass			X			1
Lachnanthes caroliana	Carolina redroot			X			1
Lachnocaulon anceps	whitehead bogbutton		X		X		2
Lechea sessiliflora	pineland pinweed				X		1
Lespedeza cuneata	Chinese lespedeza					X	1
Lespedeza hirta	hairy lespedeza				X		1
Leucothoe axillaris	coastal doghobble					X	1
Liatris elegans	pinkscale gayfeather		X		X		2
Liatris gracilis	slender gayfeather		X		X		2
Liatris pauciflora var. secunda	Piedmont gayfeather				X		1
Liatris spicata	dense gayfeather		X				1
Liatris tenuifolia	shortleaf gayfeather		X		X		2
Linum sp.	flax		X				1
Liriodendron tulipifera	tuliptree	X		X			2
Lobelia glandulosa	glade lobelia		X	X			2
Lobelia nuttallii	Nuttall's lobelia		**X**	**X**			2
Ludwigia maritima	seaside primrosewillow		X				1
Ludwigia octovalvis	Mexican primrosewillow	X					1
Ludwigia peruviana	Peruvian primrosewillow	X					1
Ludwigia pilosa	hairy primrosewillow	X					1
Ludwigia sp.	primrosewillow			X			1
Lupinus diffusus	skyblue lupine				X		1
Lycopodiella alopecuroides	foxtail club-moss		X	X			2
Lycopodiella appressa	southern club-moss	X					1
Lycopus rubellus	taperleaf waterhorehound	X					1
Lygodium japonicum	Japanese climbing fern	**X**	X				2
Lyonia lucida	fetterbush	X		X		X	3
Magnolia grandiflora	southern magnolia		X		**X**	**X**	3
Magnolia virginiana	sweetbay	X	X	X		X	4
Mayaca fluviatilis	stream bogmoss	X					1

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
Mikania scandens	climbing hempvine					X	1
Mimosa quadrivalvis	sensitive briar		**X**		X		2
Mitchella repens	partridgeberry					X	1
Mitreola sessilifolia	swamp hornpod		X				1
Morella caroliniensis	evergreen bayberry	X		**X**		X	3
Morella cerifera	southern bayberry	X	X			X	3
Morella inodora	odorless bayberry	X					1
Nyssa biflora	swamp tupelo	X				X	2
Oldenlandia uniflora	clustered mille graines	X		X			2
Opuntia humifusa	pricklypear		X		X		2
Osmunda cinnamomea	cinnamon fern	X	X	X		X	4
Osmunda regalis var. spectabilis	royal fern			X		X	2
Oxydendrum arboreum	sourwood					X	1
Panicum hemitomon	maidencane		**X**				1
Panicum virgatum	switchgrass		X		X		2
Paronychia patula	pineland nailwort				X		1
Paspalum setaceum	thin paspalum				X		1
Peltandra sagittifolia	spoon-flower					X	1
Persea palustris	swamp bay	X	X			X	3
Pinus clausa	sand pine				X		1
Pinus elliottii	slash pine	X	X	X	X	X	5
Pinus palustris	longleaf pine		X		X		2
Pinus serotina	pond pine	X		X			2
Pinus sp.	pine			X			1
Pinus taeda	loblolly pine					X	1
Pityopsis aspera	pineland silkgrass		X		X		2
Pityopsis graminifolia	narrowleaf silkgrass		X		X		2
Pluchea baccharis	rosy camphorweed	**X**		X			2
Polygala incarnata	procession flower		**X**				1
Polygala lutea	orange milkwort			X			1
Polygala polygama	racemed milkwort				**X**		1
Polygonella gracilis	tall jointweed				X		1
Polypremum procumbens	rustweed				X		1
Pseudognaphalium obtusifolium	sweet everlasting				X		1
Pteridium aquilinum	bracken fern		X	X	X	X	4
Pterocaulon pycnostachyum	blackroot		X				1
Quercus falcata	southern red oak				X		1
Quercus geminata	sand live oak		X	X	X		3
Quercus hemisphaerica	laurel oak				X		1
Quercus incana	bluejack oak				X		1
Quercus laevis	turkey oak				X		1
Quercus laurifolia	swamp laurel oak	X				X	2

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
Quercus margarettae	sand post oak				X		1
Quercus minima	dwarf live oak				X		1
Quercus myrtifolia	myrtle oak		**X**				1
Quercus nigra	water oak	X	X	**X**	**X**	X	5
Quercus pumila	runner oak		X				1
Rhexia alifanus	savannah meadowbeauty		X	X			2
Rhexia mariana	pale meadowbeauty		X	X			2
Rhexia petiolata	fringed meadowbeauty			X			1
Rhododendron canescens	mountain azalea					X	1
Rhus copallinum	winged sumac		X	**X**	X		3
Rhynchosia cytisoides	royal snoutbean				X		1
Rhynchosia reniformis	dollarleaf		**X**		X		2
Rhynchospora cephalantha	bunched beaksedge			X			1
Rhynchospora chalarocephala	loosehead beaksedge			X			1
Rhynchospora chapmanii	Chapman's beaksedge		**X**	X			2
Rhynchospora ciliaris	fringed beaksedge			X			1
Rhynchospora compressa	flatfruit beaksedge		**X**				1
Rhynchospora corniculata	shortbristle horned beaksedge					X	1
Rhynchospora gracilenta	slender beaksedge	X		X			2
Rhynchospora megalocarpa	sandyfield beaksedge					**X**	1
Rhynchospora plumosa	plumed beaksedge			X			1
Rhynchospora sp.	beaksedge		X				1
Rubus cuneifolius	sand blackberry		X		X		2
Rubus pensilvanicus	sawtooth blackberry	X	**X**	X		X	4
Sabatia brevifolia	shortleaf rosegentian		X	**X**			2
Saccharum giganteum	sugarcane plumegrass	X					1
Salvia azurea	azure blue sage		X		X		2
Sarracenia leucophylla	white-top pitcherplant			X			1
Schizachyrium sanguineum	crimson bluestem				X		1
Schizachyrium stoloniferum	creeping little bluestem		X		X		2
Schizachyrium tenerum	slender bluestem				X		1
Scleria ciliata	fringed nutrush			X	X		2
Scleria reticularis	netted nutrush			X			1
Scleria sp.	nutrush			X			1
Scleria triglomerata	whip nutrush		X				1
Scoparia dulcis	licoriceweed			X			1
Serenoa repens	saw palmetto	X	X	X	X	X	5
Sericocarpus tortifolius	whitetop aster		X	X	X		3
Seymeria cassioides	yaupon blacksenna		X	X	X		3
Seymeria pectinata	Piedmont blacksenna				X		1
Smilax auriculata	earleaf greenbrier		X		X		2
Smilax bona-nox	saw greenbrier		X		**X**		2

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
Smilax glauca	cat greenbrier	X	X	X		X	4
Smilax laurifolia	laurel greenbrier	X	X	X	X	X	5
Smilax pumila	sarsaparilla vine		X		**X**		2
Smilax tamnoides	bristly greenbrier		X		**X**		2
Solidago fistulosa	pinebarren goldenrod	X	X	X			3
Solidago odora	sweet goldenrod		X		X		2
Solidago puberula var. pulverulenta	downy goldenrod		**X**				1
Solidago stricta	wand goldenrod		X				1
Sophronanthe pilosa	shaggy hedgehyssop			**X**			1
Sorghastrum nutans	yellow indiangrass		X				1
Sorghastrum secundum	lopsided indiangrass				X		1
Sphagnum sp.	sphagnum moss	X		X		X	3
Stillingia sylvatica	queen's delight		X				1
Stylisma patens	coastalplain dawnflower				X		1
Stylosanthes biflora	sidebeak pencil flower		X				1
Symphyotrichum adnatum	scaleleaf aster		X				1
Symphyotrichum concolor	eastern silver aster				X		1
Symphyotrichum dumosum	rice button aster		X	X	X		3
Symplocos tinctoria	horse sugar					X	1
Syngonanthus flavidulus	yellow hatpins			X			1
Taxodium ascendens	pond cypress					X	1
Tephrosia chrysophylla	scurf hoary-pea				X		1
Tephrosia florida	Florida hoary-pea		X				1
Tephrosia mohrii	pineland hoary-pea				X		1
Tiedemannia filiformis ssp. filiformis	water cowbane			**X**			1
Toxicodendron radicans	eastern poison ivy		X				1
Tragia smallii	Small's noseburn		X		X		2
Trichostema dichotomum	forked bluecurls		**X**		X		2
Triplasis americana	perennial sandgrass				X		1
Utricularia subulata	zigzag bladderwort			X			1
Vaccinium arboreum	sparkleberry		X		X		2
Vaccinium corymbosum	highbush blueberry	X					1
Vaccinium darrowii	Darrow's blueberry				X		1
Vaccinium elliottii	Elliott's blueberry			**X**	X	X	3
Vaccinium myrsinites	shiny blueberry		X		X		2
Viburnum nudum	possumhaw	X		X		X	3
Viola lanceolata	bog white violet			X			1
Viola primulifolia	primroseleaf violet		X	X			2
Vitis rotundifolia	muscadine	X	X	X	X	X	5
Wahlenbergia marginata	southern rockbell				**X**		1
Woodwardia areolata	netted chain fern			**X**		X	2
Woodwardia virginica	Virginia chain fern	X	X				2

Scientific Name	Common Name	Bay Swamp	High Pine	Hydric Savanna	Sandhill	Stream Swamp	Grand Total
Xyris ambigua	coastalplain yellow-eyed grass			X			1
Xyris caroliniana	Carolina yellow-eyed grass		X	X			2
Xyris fimbriata	fringed yellow-eyed grass	X		X			2
Xyris flabelliformis	savannah yellow-eyed grass			X			1
Xyris sp.	yellow-eyed grass			X			1
Yucca filamentosa	Adam's needle		X		X		2
Total number of taxa: 292		60	134	116	127	52	489

Sandhill

Qualitative sampling. The sandhill natural community has been degraded by past silviculture activities but retains many characteristic species. The diverse but somewhat sparse groundcover was dominated by wiregrass, with Lynn Haven goldenaster and yankeeweed also frequent. The groundcover was yellow with the frequent blooms of coastalplain honeycomb-head and woody goldenrod. 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. 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 53 species with 33% bare ground. Species cover was just over half herbaceous. Wiregrass was the most abundant species, with saw palmetto and sand live oak about equally abundant. Woody species made up around 21% average cover per quadrat. Vegetation composition along the transect was very similar to that measured in 2019.

The western Transect 2 (Table LC-3, Figure LC-3) was situated near the top of a ridge. It had a total of 40 species with 48% bare ground. Dominant species were almost entirely herbaceous. Wiregrass and Lynn Haven goldenaster were the dominant herbs. Woody species made up around 3% average cover per quadrat. Although not recorded in cover, fruticose lichens were observed in two quadrats. There was a decline in the amount of wiregrass cover recorded, but otherwise, vegetation composition along the transect was very similar to that measured in 2019.

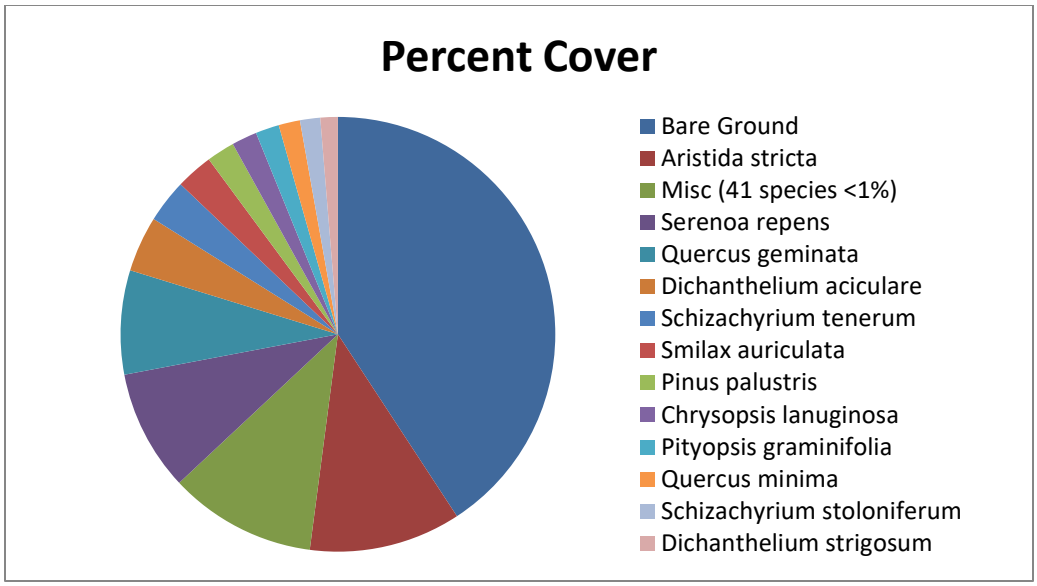


Figure LC-2. Percent cover of plant species in Sandhill Transect 1.

Table LC-2. Percent cover of plant species in Sandhill Transect 1 sampled on October 5, 2020.

Scientific name	Common name	Average percent cover per quadrat
Aristida stricta	wiregrass	9.00
Serenoa repens	saw palmetto	7.17
Quercus geminata	sand live oak	6.17
Dichanthelium aciculare	needleleaf witchgrass	3.30
Schizachyrium tenerum	slender bluestem	2.57
Smilax auriculata	earleaf greenbrier	2.20
Pinus palustris	longleaf pine	1.67
Chrysopsis lanuginosa	Lynn Haven goldenaster	1.50
Pityopsis graminifolia	narrowleaf silkgrass	1.40
Quercus minima	dwarf live oak	1.27
Schizachyrium stoloniferum	creeping little bluestem	1.20
Dichanthelium strigosum	roughhair witchgrass	1.03
Andropogon virginicus	broomsedge bluestem	0.80
Rhus copallinum	winged sumac	0.77
Rubus cuneifolius	sand blackberry	0.67
Geobalanus oblongifolius	gopher apple	0.60
Eragrostis elliottii	Elliott's lovegrass	0.57
Hypericum gentianoides	orangegrass	0.53
Dichanthelium leucothrix	rough witchgrass	0.47
Solidago odora	sweet goldenrod	0.47
Pityopsis aspera	pineland silkgrass	0.43
Paspalum setaceum	thin paspalum	0.30
Eupatorium compositifolium	yankeeweed	0.27
Ilex vomitoria	yaupon	0.27
Polygonella gracilis	tall jointweed	0.27
Chrysoma pauciflosculosa	woody goldenrod	0.23

Scientific name	Common name	Average percent cover per quadrat
Agalinis divaricata	pineland false foxglove	0.20
Aristida purpurascens	arrowfeather threeawn	0.13
Diospyros virginiana	common persimmon	0.13
Liatris pauciflora var. *secunda*	Piedmont gayfeather	0.13
Rhynchosia cytisoides	royal snoutbean	0.13
Andropogon gyrans	Elliott's bluestem	0.10
Bulbostylis ciliatifolia	capillary hairsedge	0.10
Galactia minor	leafy milkpea	0.10
Gaylussacia dumosa	dwarf huckleberry	0.10
Gymnopogon ambiguus	bearded skeletongrass	0.10
Mimosa quadrivalvis	sensitive briar	0.10
Panicum virgatum	switchgrass	0.10
Quercus hemisphaerica	laurel oak	0.10
Tephrosia chrysophylla	scurf hoary-pea	0.10
Schizachyrium sanguineum	crimson bluestem	0.07
Aristida sp.	threeawn	0.03
Chrysopsis linearifolia	narrowleaf goldenaster	0.03
Crocanthemum carolinianum	Carolina frostweed	0.03
Eragrostis virginica	coastal lovegrass	0.03
Eriogonum tomentosum	dogtongue wild buckwheat	0.03
Euphorbia discoidalis	summer spurge	0.03
Houstonia procumbens	roundleaf bluet	0.03
Lechea sessiliflora	pineland pinweed	0.03
Liatris gracilis	slender gayfeather	0.03
Seymeria pectinata	Piedmont blacksenna	0.03
Smilax laurifolia	laurel greenbrier	0.03
Stylisma patens	coastalplain dawnflower	0.03
Bare Ground		32.50

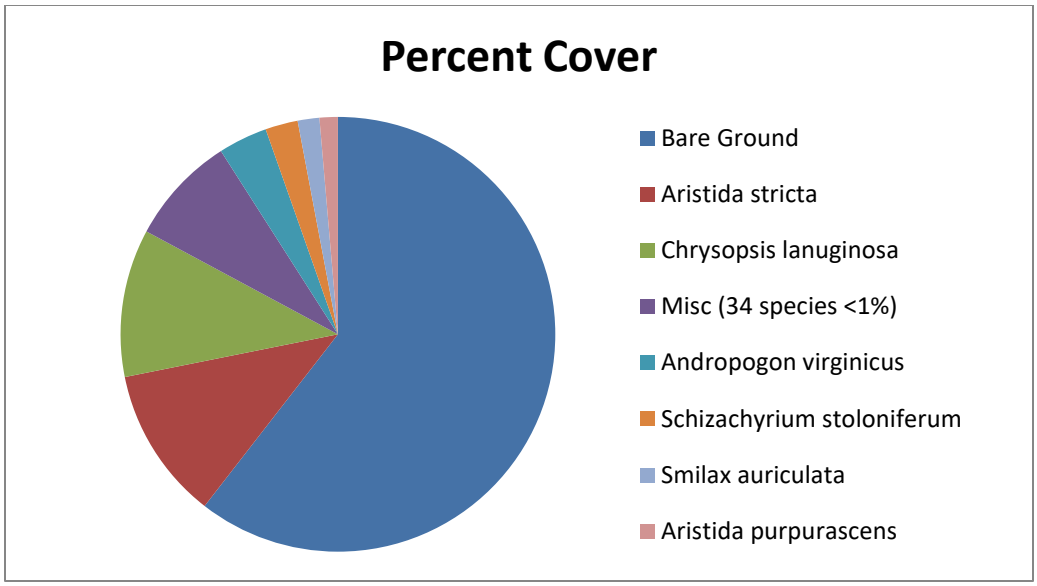


Figure LC-3. Percent cover of plant species in Sandhill Transect 2.

Table LC-3. Percent cover of plant species in Sandhill Transect 2 sampled on October 5, 2020.

Scientific name	Common name	Average percent cover per quadrat
Aristida stricta	wiregrass	8.90
Chrysopsis lanuginosa	Lynn Haven goldenaster	8.63
Andropogon virginicus	broomsedge bluestem	2.87
Schizachyrium stoloniferum	creeping little bluestem	1.90
Smilax auriculata	earleaf greenbrier	1.27
Aristida purpurascens	arrowfeather threeawn	1.07
Pinus palustris	longleaf pine	0.93
Dichanthelium aciculare	needleleaf witchgrass	0.80
Dichanthelium strigosum	roughhair witchgrass	0.63
Quercus laevis	turkey oak	0.50
Eupatorium compositifolium	yankeeweed	0.37
Hypericum gentianoides	orangegrass	0.37
Chrysopsis linearifolia	narrowleaf goldenaster	0.33
Liatris pauciflora var. *secunda*	Piedmont gayfeather	0.27
Schizachyrium sanguineum	crimson bluestem	0.27
Dichanthelium portoricense	hemlock witchgrass	0.23
Geobalanus oblongifolius	gopher apple	0.23
Bulbostylis ciliatifolia	capillary hairsedge	0.20
Galactia minor	leafy milkpea	0.20
Eriogonum tomentosum	dogtongue wild buckwheat	0.17
Croton argyranthemus	silver croton	0.10
Dalea pinnata	summer farewell	0.10
Dichanthelium leucothrix	rough witchgrass	0.07
Rhynchosia cytisoides	royal snoutbean	0.07
Andropogon gyrans	Elliott's bluestem	0.03
Andropogon virginicus var. *glaucus*	chalky bluestem	0.03

Scientific name	Common name	Average percent cover per quadrat
Balduina angustifolia	coastalplain honeycomb-head	0.03
Chrysoma pauciflosculosa	woody goldenrod	0.03
Cyperus sp.	flatsedge	0.03
Euphorbia floridana	greater Florida spurge	0.03
Gaylussacia dumosa	dwarf huckleberry	0.03
Lechea sessiliflora	pineland pinweed	0.03
Polygala polygama	racemed milkwort	0.03
Polygonella gracilis	tall jointweed	0.03
Quercus hemisphaerica	laurel oak	0.03
Rubus cuneifolius	sand blackberry	0.03
Serenoa repens	saw palmetto	0.03
Solidago odora	sweet goldenrod	0.03
Tephrosia chrysophylla	scurf hoary-pea	0.03
Triplasis americana	perennial sandgrass	0.03
Bare Ground		47.50

Hydric Savanna

Qualitative sampling. The restoration of the fire-suppressed hydric savanna was begun in 2010 by mowing down the often dense shrubs with a Gyro-Trac machine. Follow-up prescribed burning further reduced the shrub strata. As a result, much of the ground was bare or sparsely vegetated and there was some disturbance by vehicle tracks in the two sampling periods prior to 2014. Fires and hog rooting have created continual shifts in the herbaceous vegetation. 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. Scattered shrubs included black titi, large gallberry, sweet pepperbush, and gallberry. A total of 116 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 65 species with 11% bare ground. Herbaceous species made up most of the transect cover, and wiregrass and toothache grass cover both increased slightly from the 2019 sample. The southern end of the transect remained heavily damaged from hog rooting. Warty panicum, a species the can shift dramatically in cover from year to year, was markedly reduced from 2019, while weedy bluestem cover was slightly reduced. Woody species made up around 4% average cover per quadrat.

The western Transect 2 (Table LC-5, Figure LC-5) was also on a south facing slope. It had a total of 44 species with 48% bare ground. The drier north end had abundant purple bluestem and wiregrass and was shaded by pond pine, while the wetter and more open south end was more disturbed from hog rooting and largely dominated by beaksedges. Both warty panicum and weedy bluestem cover increased compared to the 2019 sample. Woody species made up around 4% average cover per quadrat.

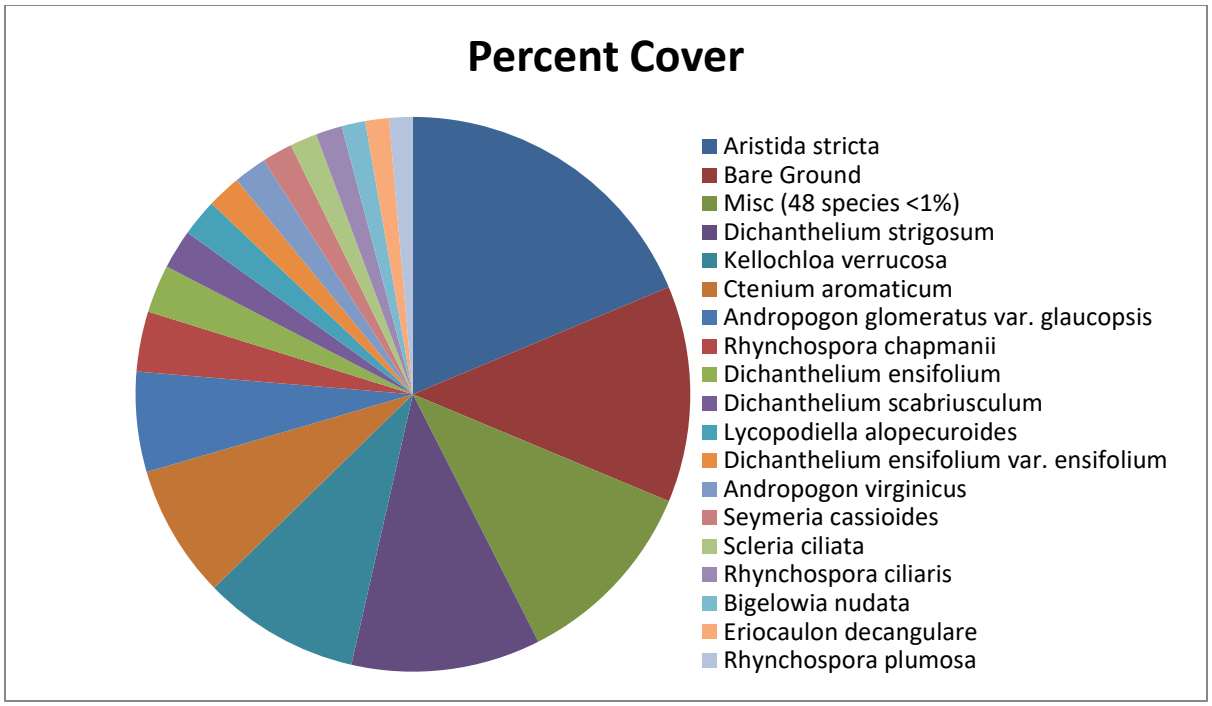


Figure LC-4. Percent cover of plant species in Hydric Savanna Transect 1.

Table LC-4. Percent cover of plant species in Hydric Savanna Transect 1 sampled on October 6, 2020.

Scientific name	Common name	Average percent cover per quadrat
Aristida stricta	wiregrass	15.80
Dichanthelium strigosum	roughhair witchgrass	9.33
Kellochloa verrucosa	warty panicgrass	7.73
Ctenium aromaticum	toothache grass	6.57
Andropogon glomeratus var. *glaucopsis*	purple bluestem	4.93
Rhynchospora chapmanii	Chapman's beaksedge	2.97
Dichanthelium ensifolium	cypress witchgrass	2.37
Dichanthelium scabriusculum	woolly witchgrass	1.93
Lycopodiella alopecuroides	foxtail club-moss	1.83
Dichanthelium ensifolium var. *ensifolium*	cypress witchgrass	1.67
Andropogon virginicus	broomsedge bluestem	1.63
Seymeria cassioides	yaupon blacksenna	1.50
Scleria ciliata	fringed nutrush	1.33
Rhynchospora ciliaris	fringed beaksedge	1.30
Bigelowia nudata	pineland rayless goldenrod	1.17
Eriocaulon decangulare	tenangle pipewort	1.17
Rhynchospora plumosa	plumed beaksedge	1.17
Smilax glauca	cat greenbrier	0.90
Helianthus angustifolius	narrowleaf sunflower	0.70
Rhynchospora gracilenta	slender beaksedge	0.57
Cliftonia monophylla	black titi	0.53
Aletris lutea	yellow colic-root	0.50

Scientific name	Common name	Average percent cover per quadrat
Diodia virginiana	Virginia buttonweed	0.47
Rhynchospora cephalantha	bunched beaksedge	0.43
Eupatorium pilosum	rough boneset	0.37
Erigeron vernus	early whitetop fleabane	0.33
Hypericum brachyphyllum	coastalplain St. John's wort	0.33
Eupatorium rotundifolium	roundleaf thoroughwort	0.30
Rubus pensilvanicus	sawtooth blackberry	0.30
Euthamia caroliniana	slender flattop goldenrod	0.27
Pinus elliottii	slash pine	0.27
Ilex coriacea	large gallberry	0.23
Lycopodiella caroliniana	slender club-moss	0.23
Pinus sp.	pine	0.23
Liatris spicata	dense gayfeather	0.20
Gaylussacia mosieri	woolly huckleberry	0.17
Hypericum crux-andreae	St. Peter's wort	0.17
Centella asiatica	spadeleaf	0.13
Lophiola aurea	golden crest	0.13
Rhexia alifanus	savannah meadowbeauty	0.13
Andropogon glomeratus	bushy bluestem	0.10
Arundinaria gigantea	switchcane	0.10
Eragrostis sp.	lovegrass	0.10
Gaylussacia dumosa	dwarf huckleberry	0.10
Ilex glabra	gallberry	0.10
Oldenlandia uniflora	clustered mille graines	0.10
Scleria reticularis	netted nutrush	0.10
Smilax laurifolia	laurel greenbrier	0.10
Tiedemannia filiformis ssp. *filiformis*	water cowbane	0.10
Hypericum fasciculatum	peelbark St. John's wort	0.07
Hypericum gentianoides	orangegrass	0.07
Lachnanthes caroliana	Carolina redroot	0.07
Xyris ambigua	coastalplain yellow-eyed grass	0.07
Xyris sp.	yellow-eyed grass	0.07
Agalinis fasciculata	beach false foxglove	0.03
Burmannia capitata	southern bluethread	0.03
Drosera capillaris	pink sundew	0.03
Eriocaulon compressum	flattened pipewort	0.03
Eupatorium mohrii	Mohr's thoroughwort	0.03
Rhexia petiolata	fringed meadowbeauty	0.03
Scleria sp.	nutrush	0.03
Sophronanthe pilosa	shaggy hedgehyssop	0.03
unknown		0.03
Viburnum nudum	possumhaw	0.03
Viola lanceolata	bog white violet	0.03
Bare Ground		10.67

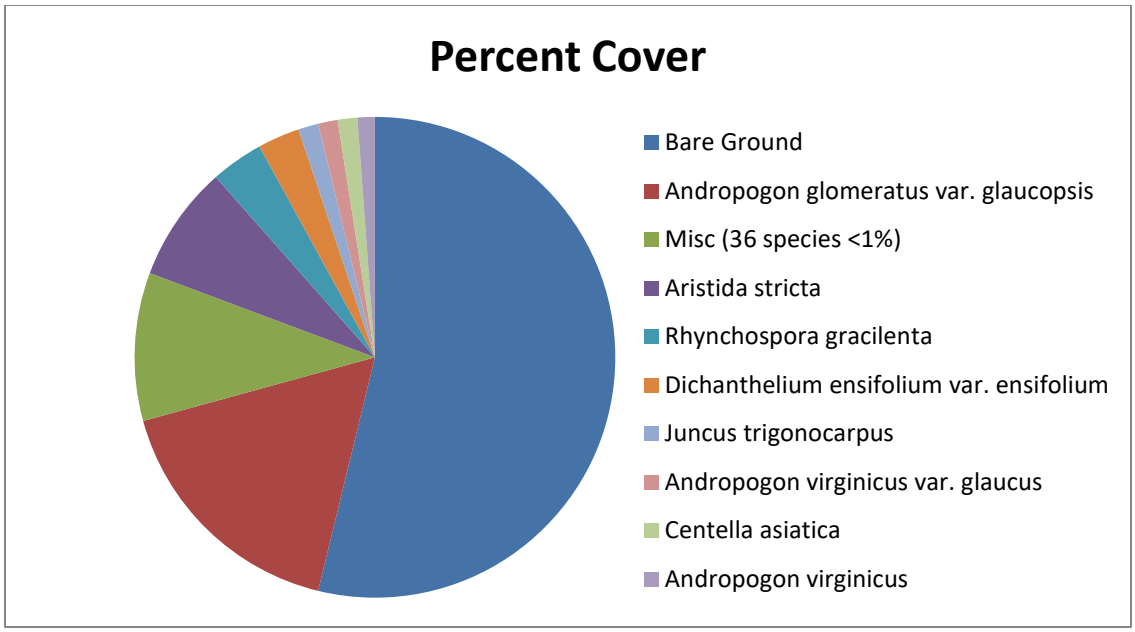


Figure LC-5. Percent cover of plant species in Hydric Savanna Transect 2.

Table LC-5. Percent cover of plant species in Hydric Savanna Transect 2 sampled on October 5, 2020.

Scientific name	Common name	Average percent cover per quadrat
Andropogon glomeratus var. *glaucopsis*	purple bluestem	15.00
Aristida stricta	wiregrass	6.90
Rhynchospora gracilenta	slender beaksedge	3.13
Dichanthelium ensifolium var. *ensifolium*	cypress witchgrass	2.50
Juncus trigonocarpus	redpod rush	1.20
Andropogon virginicus var. *glaucus*	chalky bluestem	1.17
Centella asiatica	spadeleaf	1.17
Andropogon virginicus	broomsedge bluestem	1.03
Smilax laurifolia	laurel greenbrier	0.93
Kellochloa verrucosa	warty panicgrass	0.77
Magnolia virginiana	sweetbay	0.73
Viola primulifolia	primroseleaf violet	0.73
Smilax glauca	cat greenbrier	0.70
Lycopodiella alopecuroides	foxtail club-moss	0.60
Hypericum fasciculatum	peelbark St. John's wort	0.53
Clethra alnifolia	sweet pepperbush	0.50
Rhynchospora chapmanii	Chapman's beaksedge	0.43
Dichanthelium strigosum	roughhair witchgrass	0.33
Pteridium aquilinum	bracken fern	0.33
Eupatorium pilosum	rough boneset	0.27
Xyris ambigua	coastalplain yellow-eyed grass	0.27
Euthamia caroliniana	slender flattop goldenrod	0.23
Pinus serotina	pond pine	0.20
Eriocaulon compressum	flattened pipewort	0.17

Scientific name	Common name	Average percent cover per quadrat
Cliftonia monophylla	black titi	0.13
Rhynchospora ciliaris	fringed beaksedge	0.13
Dichanthelium scabriusculum	woolly witchgrass	0.10
Xyris fimbriata	fringed yellow-eyed grass	0.10
Pinus sp.	pine	0.07
Rhexia alifanus	savannah meadowbeauty	0.07
Scleria ciliata	fringed nutrush	0.07
Andropogon sp.	bluestem	0.03
Coleataenia longifolia	ciliate redtop panicum	0.03
Dichanthelium sp.	witchgrass	0.03
Drosera capillaris	pink sundew	0.03
Eupatorium compositifolium	yankeeweed	0.03
Gaylussacia dumosa	dwarf huckleberry	0.03
Lachnanthes caroliana	Carolina redroot	0.03
Ludwigia sp.	primrosewillow	0.03
Lyonia lucida	fetterbush	0.03
Osmunda cinnamomea	cinnamon fern	0.03
Rhynchospora cephalantha	bunched beaksedge	0.03
Rhynchospora chalarocephala	loosehead beaksedge	0.03
Xyris sp.	yellow-eyed grass	0.03
Bare Ground		47.67

High Pine

Qualitative sampling. Mature slash pine plantation still covers most of the area being restored to high pine. Thinning of the pines and prescribed fire have opened up the canopy in some sections, and shrubs have been reduced since 2018. The understory may be either shrub dominated, usually by yaupon, or an open grassy groundlayer of wiregrass with scattered saw palmetto and gallberry. Nearer the ecotone with hydric savanna and also 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 134 (Table LC-1).

Bay Swamp

Qualitative sampling. This relatively undisturbed natural community occurs as a narrow band along the small stream tributaries to Lafayette Creek. The 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. In the northwest corner of the property, Peruvian primrosewillow, a FLEPPC Category I invasive exotic 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 60 (Table LC-1).

Stream Swamp

Qualitative sampling. This relatively undisturbed natural community occurred along the narrow floodplain of Lafayette Creek and its major tributary, Wolf Creek. 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. The total number of species observed in this community was 52 (Table LC-1).

Plum Creek at Holmes Creek Mitigation Site

Qualitative and Quantitative Monitoring

October 2020

Plum Creek at Holmes Creek Mitigation Site
Qualitative and Quantitative Monitoring
October 2020

INTRODUCTION

The Plum Creek at Holmes Creek Mitigation Site compensates for the loss of wetland function due to the impact of the SR 79 Open Creek Bridge in Washington County, Florida. The 130-acre tract lies just north of Holmes Creek and is contiguous with other Northwest Florida Water Management District holdings along the creek. Access is by going south on SR 79 for 6.3 miles from I-10 to Johnson Road. Head east on Johnson Road to the gate on the south side of the winding road. The Plum Creek Mitigation project aims to restore Sandhill (SA) from pine plantation and 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 2019.

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 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 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, Amy Jenkins, Ethan Hughes, and Camille Eckel on October 22-23, 2020.

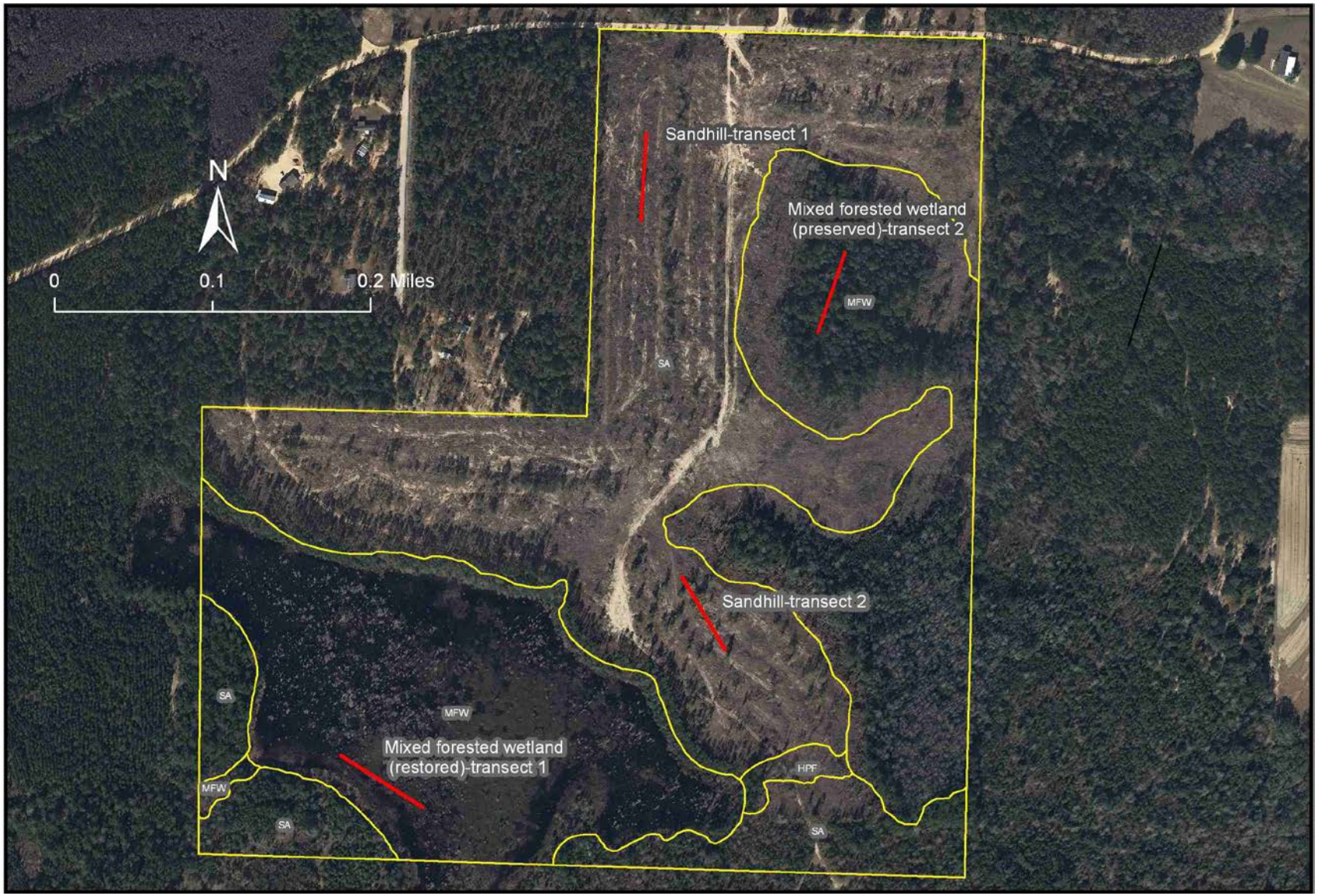


Figure PC-1. Location of permanent transects at Plum Creek at Holmes Creek Mitigation Site in Sandhill and Mixed Forested Wetland.

RESULTS AND DISCUSSION

A total of 205 plant taxa were observed during the 2020 monitoring period in the target communities at Plum Creek at Holmes Creek Mitigation Site (Table PC-1). Twenty-five new taxa were found during the 2020 monitoring.

Table PC-1. Plant species observed in target communities at Plum Creek at Holmes Creek Mitigation Site on October 22-23, 2020 (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
Acalypha gracilens	slender threeseed mercury	X			1
Acer rubrum	red maple	**X**		X	2
Agalinis fasciculata	beach false foxglove	X			1
Ambrosia artemisiifolia	common ragweed	X			1
Andropogon glomeratus var. glaucopsis	purple bluestem	X	X	X	3
Andropogon gyrans var. stenophyllus	Elliott's bluestem		**X**		1
Andropogon ternarius	splitbeard bluestem	X		X	2
Andropogon virginicus	broomsedge bluestem	X	X		2
Aristida purpurascens	arrowfeather threeawn	X			1
Aristida stricta	wiregrass	X			1
Aronia arbutifolia	red chokeberry	**X**	X	X	3
Asimina spatulata	paw paw	X			1
Baccharis halimifolia	groundsel tree	X			1
Baptisia lanceolata	gopherweed	X			1
Berlandiera pumila	soft greeneyes	X			1
Bidens mitis	smallfruit beggarticks		X	**X**	2
Bulbostylis ciliatifolia	capillary hairsedge	X	**X**		2
Callicarpa americana	American beautyberry	X		**X**	2
Carex glaucescens	clustered sedge		**X**	X	2
Carex striata	Walter's sedge		X	X	2
Carphephorus odoratissimus	vanillaleaf	X			1
Cartrema americanum	wild olive			X	1
Chamaecrista nictitans	sensitive pea	X			1
Chrysoma pauciflosculosa	woody goldenrod	X			1
Chrysopsis lanuginosa	Lynn Haven goldenaster	X			1
Cirsium sp.	thistle	X			1
Cladina evansii	Evans' reindeer lichen	X			1
Clethra alnifolia	sweet pepperbush	**X**	X	X	3
Cliftonia monophylla	black titi			X	1
Cnidoscolus stimulosus	tread softly	X			1
Conyza canadensis	Canadian horseweed	X			1
Crocanthemum carolinianum	Carolina frostweed	X			1

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
Croptilon divaricatum	slender scratchdaisy	X			1
Crotalaria rotundifolia	rabbitbells	X			1
Croton argyranthemus	silver croton	X			1
Croton glandulosus	vente conmigo	X			1
Cyperus ovatus	pinebarren flatsedge	X			1
Cyrilla racemiflora	titi		X	X	2
Dalea pinnata	summer farewell	X			1
Decodon verticillatus	willow herb		X		1
Dichanthelium aciculare	needleleaf witchgrass	X			1
Dichanthelium acuminatum	tapered witchgrass	X			1
Dichanthelium commutatum	variable witchgrass	X			1
Dichanthelium ensifolium var. unciphyllum	cypress witchgrass	**X**			1
Dichanthelium ovale	eggleaf witchgrass	X			1
Dichanthelium sphaerocarpon	roundseed witchgrass	X			1
Dichanthelium strigosum	roughhair witchgrass	X			1
Dichondra carolinensis	Carolina ponysfoot	**X**			1
Digitaria filiformis var. filiformis	slender crabgrass	**X**			1
Diodia teres	poor joe	X			1
Diodia virginiana	Virginia buttonweed	X			1
Diospyros virginiana	common persimmon	X			1
Dulichium arundinaceum	threeway sedge		X	**X**	2
Eleocharis equisetoides	jointed spikerush		X		1
Elephantopus elatus	tall elephantsfoot	X			1
Eragrostis elliottii	Elliott's lovegrass	X			1
Eremochloa ophiuroides	centipede grass	X			1
Erigeron strigosus	prairie fleabane	**X**			1
Eriogonum tomentosum	dogtongue wild buckwheat	X			1
Eupatorium album	white thoroughwort	**X**			1
Eupatorium capillifolium	dogfennel	X	X		2
Eupatorium compositifolium	yankeeweed	X			1
Eupatorium leptophyllum	falsefennel		**X**		1
Eupatorium mohrii	Mohr's thoroughwort	X	X		2
Eupatorium rotundifolium	roundleaf thoroughwort	X			1
Eupatorium semiserratum	smallflower thoroughwort		**X**		1
Euphorbia curtisii	Curtis' spurge	X			1
Euphorbia floridana	greater Florida spurge	X			1
Euthamia caroliniana	slender flattop goldenrod	X	X	**X**	3
Galactia minor	leafy milkpea	X			1
Galium hispidulum	coastal bedstraw	X			1
Gamochaeta antillana	Caribbean purple everlasting	**X**			1
Gaylussacia dumosa	dwarf huckleberry	X			1

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
Gelsemium sempervirens	yellow jessamine	X			1
Geobalanus oblongifolius	gopher apple	X			1
Gymnopogon ambiguus	bearded skeletongrass	X			1
Hibiscus aculeatus	comfortroot	X			1
Hieracium megacephalon	coastalplain hawkweed	X			1
Houstonia procumbens	roundleaf bluet	X			1
Hypericum brachyphyllum	coastalplain St. John's wort		X		1
Hypericum gentianoides	orangegrass	X			1
Hypericum hypericoides	St. Andrew's cross	X			1
Hypericum tetrapetalum	fourpetal St. John's wort	X			1
Ilex cassine var. myrtifolia	myrtle-leaved holly		X	X	2
Ilex coriacea	large gallberry	**X**		X	2
Ilex glabra	gallberry	X			1
Ilex opaca	American holly			X	1
Ilex vomitoria	yaupon	X		**X**	2
Itea virginica	Virginia willow		X	**X**	2
Jacquemontia tamnifolia	hairy clustervine	**X**			1
Juncus canadensis	Canadian rush		X		1
Juncus scirpoides	needlepod rush		**X**		1
Juniperus virginiana	red cedar	X			1
Kellochloa verrucosa	warty panicgrass	**X**	X		2
Lachnanthes caroliana	Carolina redroot		X		1
Lechea minor	thymeleaf pinweed	X			1
Lechea sessiliflora	pineland pinweed	X			1
Lespedeza hirta	hairy lespedeza	X			1
Liatris elegans	pinkscale gayfeather	X			1
Liatris gracilis	slender gayfeather	X			1
Liatris pauciflora var. secunda	Piedmont gayfeather	X			1
Liquidambar styraciflua	sweetgum	**X**	X		2
Ludwigia linearis	narrowleaf primrosewillow		X	**X**	2
Ludwigia pilosa	hairy primrosewillow		X	**X**	2
Ludwigia sphaerocarpa	globefruit primrosewillow		**X**		1
Ludwigia suffruticosa	shrubby primrosewillow		X		1
Lycopodiella alopecuroides	foxtail club-moss		X		1
Lycopodiella caroliniana	slender club-moss			**X**	1
Lycopus rubellus	taperleaf waterhorehound		X	X	2
Lygodium japonicum	Japanese climbing fern	**X**		**X**	2
Lyonia lucida	fetterbush			X	1
Magnolia virginiana	sweetbay		X	X	2
Mimosa quadrivalvis	sensitive briar	X			1
Morella cerifera	southern bayberry	**X**	X	X	3

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
Morella inodora	odorless bayberry			X	1
moss				X	1
Nymphaea odorata	white waterlily		X	**X**	2
Nyssa biflora	swamp tupelo		X	X	2
Oenothera filipes	slenderstalk beeblossom	**X**			1
Oenothera simulans	southern beeblossom	X			1
Osmunda regalis var. spectabilis	royal fern			**X**	1
Oxalis corniculata	common yellow woodsorrel	**X**			1
Panicum hemitomon	maidencane		X		1
Panicum virgatum	switchgrass	X			1
Paspalum setaceum	thin paspalum	X			1
Passiflora incarnata	purple passion-flower	X			1
Persea palustris	swamp bay			X	1
Phyllanthus urinaria	chamber bitter		**X**		1
Physalis walteri	WalterΓÇÖs groundcherry	X			1
Pieris phyllyreifolia	climbing fetterbush			X	1
Pinus elliottii	slash pine	X		X	2
Pinus palustris	longleaf pine	X			1
Pityopsis aspera	pineland silkgrass	X			1
Pityopsis graminifolia	narrowleaf silkgrass	X			1
Pluchea odorata	sweetscent		X		1
Polygala nana	candyroot	X			1
Polygonella gracilis	tall jointweed	X			1
Polypremum procumbens	rustweed	X			1
Prunus serotina	black cherry			**X**	1
Pseudognaphalium obtusifolium	sweet everlasting	X			1
Pteridium aquilinum	bracken fern	X			1
Quercus hemisphaerica	laurel oak	X			1
Quercus margarettae	sand post oak	X			1
Rhexia mariana	pale meadowbeauty	X	X	**X**	3
Rhexia virginica	handsome harry		X		1
Rhododendron canescens	mountain azalea			X	1
Rhododendron viscosum	swamp azalea		**X**		1
Rhus copallinum	winged sumac	X			1
Rhynchosia cytisoides	royal snoutbean	X			1
Rhynchosia reniformis	dollarleaf	X			1
Rhynchospora cephalantha	bunched beaksedge		X	X	2
Rhynchospora chalarocephala	loosehead beaksedge		X	X	2
Rhynchospora glomerata	clustered beaksedge			X	1
Rhynchospora inundata	narrowfruit horned beaksedge		**X**		1
Rhynchospora leptocarpa	brownish beaksedge			X	1

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
Rhynchospora scirpoides	longbeak beaksedge		X		1
Richardia sp.	Mexican clover	X			1
Rubus cuneifolius	sand blackberry	X	**X**		2
Rumex hastatulus	heartwing dock	**X**			1
Saccharum giganteum	sugarcane plumegrass		X	X	2
Schizachyrium stoloniferum	creeping little bluestem	X			1
Schizachyrium tenerum	slender bluestem	X			1
Scirpus cyperinus	woolgrass			**X**	1
Scleria ciliata	fringed nutrush	X			1
Scleria triglomerata	whip nutrush	X			1
Serenoa repens	saw palmetto	X			1
Sericocarpus tortifolius	whitetop aster	X			1
Smilax auriculata	earleaf greenbrier	X			1
Smilax bona-nox	saw greenbrier	X			1
Smilax glauca	cat greenbrier	X			1
Smilax laurifolia	laurel greenbrier	X		X	2
Smilax pumila	sarsaparilla vine	X			1
Smilax walteri	coral greenbrier		X		1
Solidago fistulosa	pinebarren goldenrod	X	X	X	3
Solidago odora	sweet goldenrod	X			1
Solidago petiolaris	downy ragged goldenrod	X			1
Solidago stricta	wand goldenrod	X			1
Sphagnum sp.	sphagnum moss			X	1
Stillingia sylvatica	queen's delight	X			1
Stylisma patens	coastalplain dawnflower	X			1
Symphyotrichum dumosum	rice button aster	X			1
Taxodium ascendens	pond cypress		X	**X**	2
Tephrosia spicata	spiked hoary-pea	X			1
Toxicodendron radicans	eastern poison ivy			X	1
Tragia smallii	Small's noseburn	X			1
Triadenum virginicum	Virginia marsh St. John's wort		X		1
Trichostema dichotomum	forked bluecurls	X			1
Utricularia sp.	bladderwort			**X**	1
Vaccinium arboreum	sparkleberry	X			1
Vaccinium corymbosum	highbush blueberry		X	X	2
Vaccinium elliottii	Elliott's blueberry	X		X	2
Vaccinium myrsinites	shiny blueberry	X			1
Vaccinium stamineum	deerberry	X			1
Vernonia angustifolia	tall ironweed	X			1
Viburnum nudum	possumhaw			X	1
Viola primulifolia	primroseleaf violet	X			1

Scientific Name	Common Name	Sandhill	Wetland Forest Mixed - restoration	Wetland Forest Mixed - preserved	Grand Total
Vitis rotundifolia	muscadine	X		X	2
Wahlenbergia marginata	southern rockbell	X			1
Woodwardia areolata	netted chain fern			X	1
Woodwardia virginica	Virginia chain fern			X	1
Xyris ambigua	coastalplain yellow-eyed grass		X	**X**	2
Xyris fimbriata	fringed yellow-eyed grass		X	X	2
Xyris flabelliformis	savannah yellow-eyed grass		X		1
Xyris platylepis	tall yellow-eyed grass		**X**		1
Yucca filamentosa	Adam's needle	X			1
Total number of taxa: 205		141	57	58	256

Sandhill

Qualitative sampling. The sandhill natural community has been degraded by past silviculture activities but retains many characteristic species. Young planted longleaf pines were widely spaced over the hillside. The diverse but somewhat sparse groundcover included Lynn Haven goldenaster, broomsedge bluestem, little bluestem, and needleleaf witchgrass. Wiregrass was very sparse and native weedy species constituted most of the herb layer. The occasional shrubs were mainly yaupon, turkey oak, sparkleberry, and sand blackberry. Earleaf greenbriar vines were common. Several gopher tortoise burrows were observed during sampling. A total of 141 plant species were identified in this community (Table PC-1).

Quantitative sampling. The northern Transect 1 (Table PC-2, Figure PC-2) was located midslope on an east-facing hill. It had a total of 60 species with 51% bare ground. The ground layer consisted of mainly herbaceous species with scattered shrubs. Broomsedge bluestem had the the highest percent cover by followed by yaupon, earleaf greenbrier, yankeeweed, and eggleaf witchgrass. Wiregrass was present at around 4% cover. Woody species made up around 11% 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 53 species with 29% bare ground. The vegetation was about 73% herbaceous cover, with the highest cover contributions from Lynn Haven goldenaster, bracken fern, and broomsedge bluestem. Saw palmetto, yellow jessamine, earleaf greenbrier, and sand blackberry formed most of the woody cover which made up around 27% average cover per quadrat. Although not recorded as cover, fruticose lichens were observed in several quadrats. There was an increase in total vegetation cover along the transect, probably reflecting time since fire.

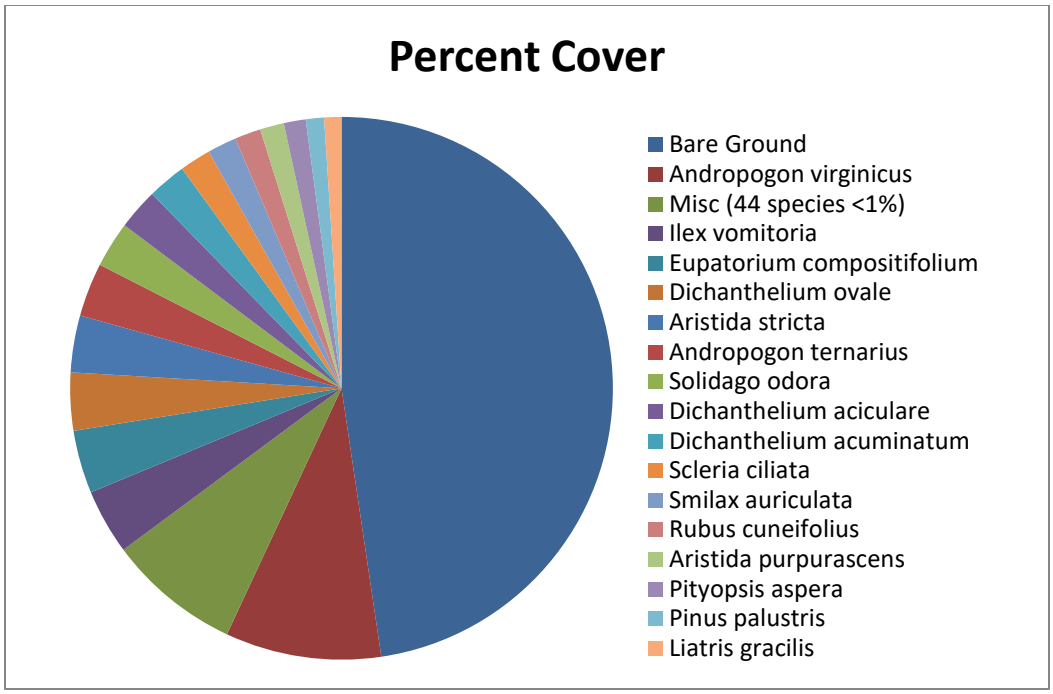


Figure PC-2. Percent cover of plant species in Sandhill Transect 1.

Table PC-2. Percent cover of plant species in Sandhill Transect 1 sampled on October 22, 2020.

Scientific name	Common name	Average percent cover per quadrat
Andropogon virginicus	broomsedge bluestem	9.97
Ilex vomitoria	yaupon	4.17
Eupatorium compositifolium	yankeeweed	4.03
Dichanthelium ovale	eggleaf witchgrass	3.70
Aristida stricta	wiregrass	3.63
Andropogon ternarius	splitbeard bluestem	3.43
Solidago odora	sweet goldenrod	2.93
Dichanthelium aciculare	needleleaf witchgrass	2.63
Dichanthelium acuminatum	tapered witchgrass	2.47
Scleria ciliata	fringed nutrush	2.00
Smilax auriculata	earleaf greenbrier	1.87
Rubus cuneifolius	sand blackberry	1.67
Aristida purpurascens	arrowfeather threeawn	1.53
Pityopsis aspera	pineland silkgrass	1.40
Pinus palustris	longleaf pine	1.17
Liatris gracilis	slender gayfeather	1.10
Paspalum setaceum	thin paspalum	0.93
Vaccinium stamineum	deerberry	0.63
Euthamia caroliniana	slender flattop goldenrod	0.50
Panicum virgatum	switchgrass	0.50
Vitis rotundifolia	muscadine	0.50
Oenothera filipes	slenderstalk beeblossom	0.47
Chrysopsis lanuginosa	Lynn Haven goldenaster	0.43

Scientific name	Common name	Average percent cover per quadrat
Smilax glauca	cat greenbrier	0.40
Galactia minor	leafy milkpea	0.37
Dichanthelium sphaerocarpon	roundseed witchgrass	0.33
Dalea pinnata	summer farewell	0.30
Bulbostylis ciliatifolia	capillary hairsedge	0.27
Dichanthelium ensifolium var. *unciphyllum*	cypress witchgrass	0.27
Elephantopus elatus	tall elephantsfoot	0.23
Schizachyrium stoloniferum	creeping little bluestem	0.23
Cnidoscolus stimulosus	tread softly	0.20
Gelsemium sempervirens	yellow jessamine	0.13
Lechea sessiliflora	pineland pinweed	0.13
Pteridium aquilinum	bracken fern	0.13
Wahlenbergia marginata	southern rockbell	0.13
Eupatorium album	white thoroughwort	0.10
Passiflora incarnata	purple passion-flower	0.10
Quercus margarettae	sand post oak	0.10
Rhynchosia reniformis	dollarleaf	0.10
Solidago petiolaris	downy ragged goldenrod	0.10
Symphyotrichum dumosum	rice button aster	0.10
Croton argyranthemus	silver croton	0.07
Eragrostis elliottii	Elliott's lovegrass	0.07
Euphorbia curtisii	Curtis' spurge	0.07
Galium hispidulum	coastal bedstraw	0.07
Hibiscus aculeatus	comfortroot	0.07
Hypericum hypericoides	St. Andrew's cross	0.07
Acalypha gracilens	slender threeseed mercury	0.03
Asimina spatulata	paw paw	0.03
Baptisia lanceolata	gopherweed	0.03
Berlandiera pumila	soft greeneyes	0.03
Crocanthemum carolinianum	Carolina frostweed	0.03
Polypremum procumbens	rustweed	0.03
Rhynchosia cytisoides	royal snoutbean	0.03
Sericocarpus tortifolius	whitetop aster	0.03
Solidago fistulosa	pinebarren goldenrod	0.03
Stylisma patens	coastalplain dawnflower	0.03
unknown		0.03
Vernonia angustifolia	tall ironweed	0.03
Bare Ground		51.17

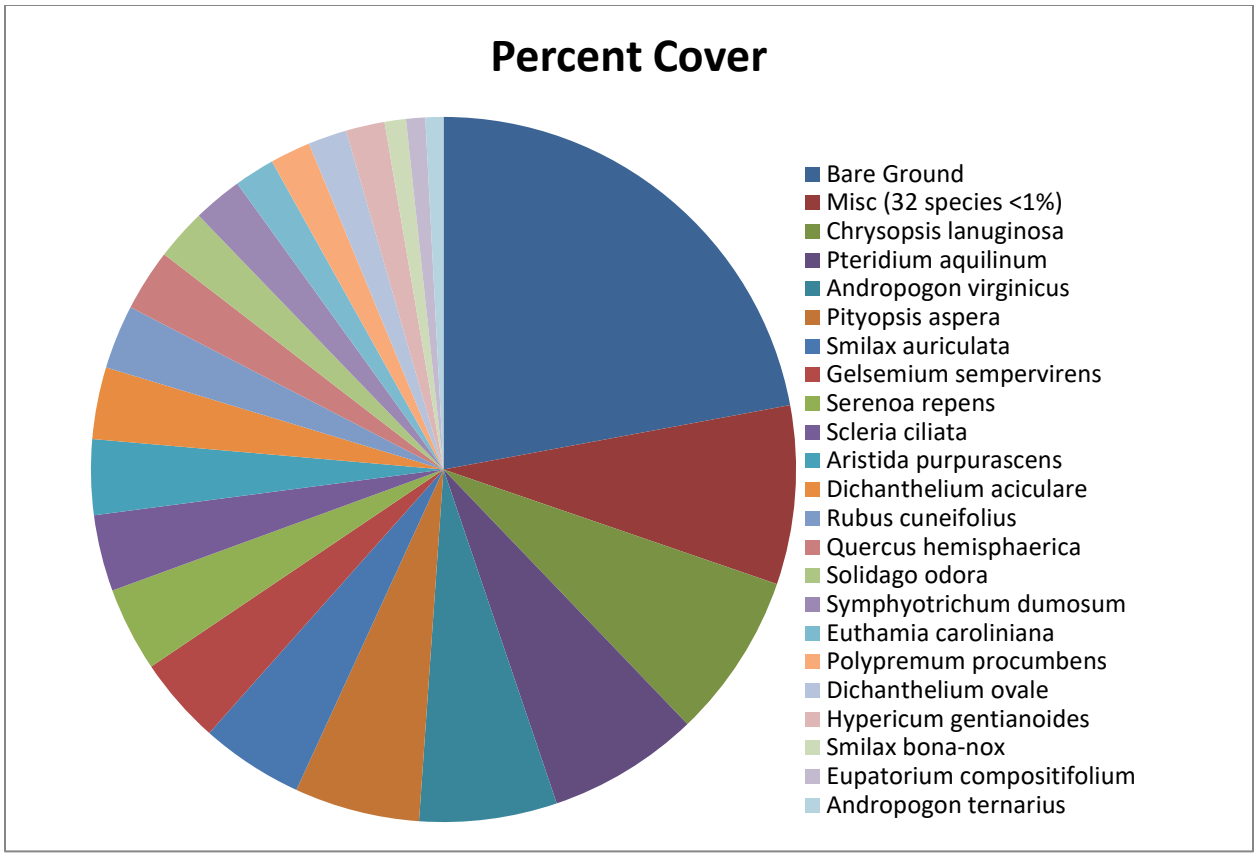


Figure PC-3. Percent species cover in Sandhill Transect 2.

Table PC-3. Percent cover of plant species in Sandhill Transect 2 sampled on October 23, 2020.

Scientific name	Common name	Average percent cover per quadrat
Chrysopsis lanuginosa	Lynn Haven goldenaster	9.80
Pteridium aquilinum	bracken fern	9.00
Andropogon virginicus	broomsedge bluestem	8.17
Pityopsis aspera	pineland silkgrass	7.43
Smilax auriculata	earleaf greenbrier	6.10
Gelsemium sempervirens	yellow jessamine	5.17
Serenoa repens	saw palmetto	5.00
Scleria ciliata	fringed nutrush	4.53
Aristida purpurascens	arrowfeather threeawn	4.47
Dichanthelium aciculare	needleleaf witchgrass	4.27
Rubus cuneifolius	sand blackberry	3.80
Quercus hemisphaerica	laurel oak	3.67
Solidago odora	sweet goldenrod	3.03
Symphyotrichum dumosum	rice button aster	2.93
Euthamia caroliniana	slender flattop goldenrod	2.40
Polypremum procumbens	rustweed	2.40
Dichanthelium ovale	eggleaf witchgrass	2.30
Hypericum gentianoides	orangegrass	2.30

Scientific name	Common name	Average percent cover per quadrat
Smilax bona-nox	saw greenbrier	1.27
Eupatorium compositifolium	yankeeweed	1.13
Andropogon ternarius	splitbeard bluestem	1.07
Aristida stricta	wiregrass	0.83
Dichanthelium sphaerocarpon	roundseed witchgrass	0.80
Cyperus ovatus	pinebarren flatsedge	0.70
Dichanthelium commutatum	variable witchgrass	0.70
Smilax glauca	cat greenbrier	0.70
Lechea sessiliflora	pineland pinweed	0.63
Hibiscus aculeatus	comfortroot	0.53
unknown		0.50
Croton glandulosus	vente conmigo	0.50
Digitaria filiformis var. *filiformis*	slender crabgrass	0.50
Sericocarpus tortifolius	whitetop aster	0.50
Diospyros virginiana	common persimmon	0.47
Liatris gracilis	slender gayfeather	0.47
Pinus elliottii	slash pine	0.47
Rumex hastatulus	heartwing dock	0.33
Dichanthelium strigosum	roughhair witchgrass	0.23
Houstonia procumbens	roundleaf bluet	0.23
Pseudognaphalium obtusifolium	sweet everlasting	0.23
Smilax pumila	sarsaparilla vine	0.23
Vaccinium arboreum	sparkleberry	0.23
Vernonia angustifolia	tall ironweed	0.23
Conyza canadensis	Canadian horseweed	0.10
Erigeron strigosus	prairie fleabane	0.10
Euphorbia floridana	greater Florida spurge	0.10
Asimina spatulata	paw paw	0.03
Crocanthemum carolinianum	Carolina frostweed	0.03
Dichondra carolinensis	Carolina ponysfoot	0.03
Galactia minor	leafy milkpea	0.03
Galium hispidulum	coastal bedstraw	0.03
Paspalum setaceum	thin paspalum	0.03
Tragia smallii	Small's noseburn	0.03
Trichostema dichotomum	forked bluecurls	0.03
Bare Ground		28.57

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 partially inundated at the time of the survey. The vegetative cover consisted primarily of willow herb, a low shrub with woody base and herbaceous stems that arch over to form a nearly impenetrable interlacing thicket. Interspersed with the willow herb were patches of young cypress with occasional swamp tupelo, sweetbay, and red maple. Shallower areas near the shore were lined

with a diverse set of wetland herbs, including taperleaf waterhorehound, loosehead beaksedge, and maidencane. Shrubs and small trees dominated the ecotone to the adjacent uplands. The total number of species observed in this community was 57 (Table PC-1).

Quantitative sampling. Transect 1 (Table PC-4, Figure PC-4) had a total of 20 species with 46% bare ground (including water). The transect was mostly flooded, with water levels up to around 12 inches. In general, the western end of the transect was shallower than the eastern end where hummocks were common. The highest percent cover was by willow herb followed by white waterlily, taperleaf waterhorehound, jointed spikerush, hairy primrosewillow, and coastalplain yelloweyed grass. While increased water levels this year seem to have led to an increase in white waterlily, humped bladderwort, a dominant species in 2018, was not detected at all along the transect. Woody species made around 21% average cover per quadrat, similar to last year.

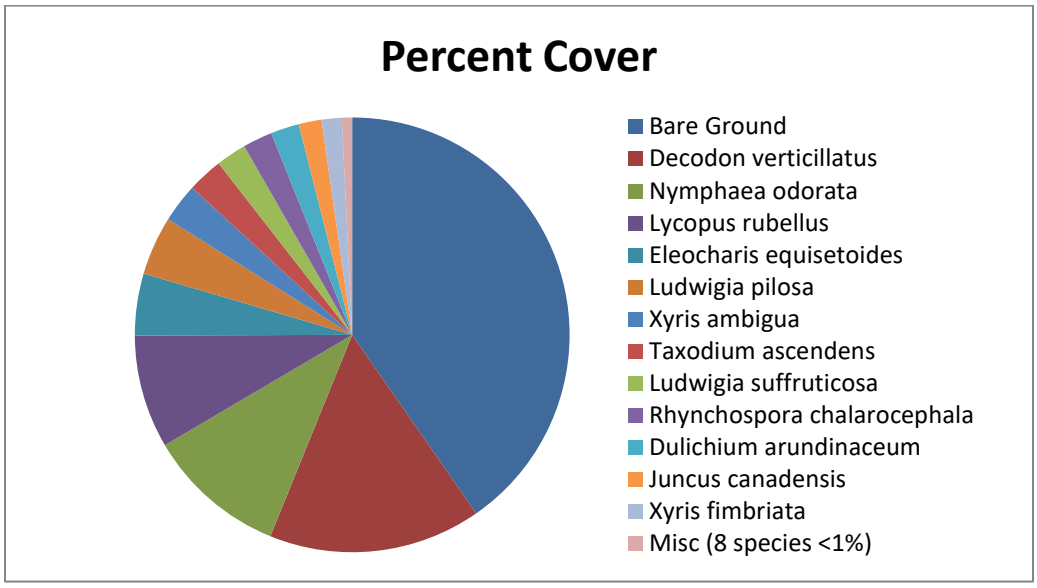


Figure PC-4. Percent cover of plant species in Mixed Forested Wetland (Restored) Transect 1.

Table PC-4. Percent cover of plant species in Mixed Forested Wetland (Restored) Transect 1 sampled on October 23, 2020.

Scientific name	Common name	Average percent cover per quadrat
Decodon verticillatus	willow herb	17.97
Nymphaea odorata	white waterlily	11.80
Lycopus rubellus	taperleaf waterhorehound	9.57
Eleocharis equisetoides	jointed spikerush	5.23
Ludwigia pilosa	hairy primrosewillow	4.97
Xyris ambigua	coastalplain yellow-eyed grass	3.30
Taxodium ascendens	pond cypress	3.00
Ludwigia suffruticosa	shrubby primrosewillow	2.57
Rhynchospora chalarocephala	loosehead beaksedge	2.50
Dulichium arundinaceum	threeway sedge	2.40

Juncus canadensis	Canadian rush	1.93
Xyris fimbriata	fringed yellow-eyed grass	1.70
Magnolia virginiana	sweetbay	0.23
Saccharum giganteum	sugarcane plumegrass	0.23
Nyssa biflora	swamp tupelo	0.10
Panicum hemitomon	maidencane	0.10
Lachnanthes caroliana	Carolina redroot	0.07
Triadenum virginicum	Virginia marsh St. John's wort	0.07
Rhynchospora scirpoides	longbeak beaksedge	0.03
Xyris flabelliformis	savannah yellow-eyed grass	0.03
Bare Ground		45.83

Wetland Forest Mixed (Preserved)

Qualitative sampling. The Preserved Wetland Forest Mixed (Figure PC-1) was a relatively undisturbed mature baygall forest. 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 58 (Table PC-1).

Quantitative sampling. Transect 2 (Table PC-5, Figure PC-5) had a total of 24 species with 66% bare ground. The dominant shrubs were fetterbush, large gallberry, and sweet pepperbush. Woody species made around 45% average cover per quadrat, accounting for around ¾ of the total cover observed. Sphagnum moss formed most of the sparse herbaceous cover.

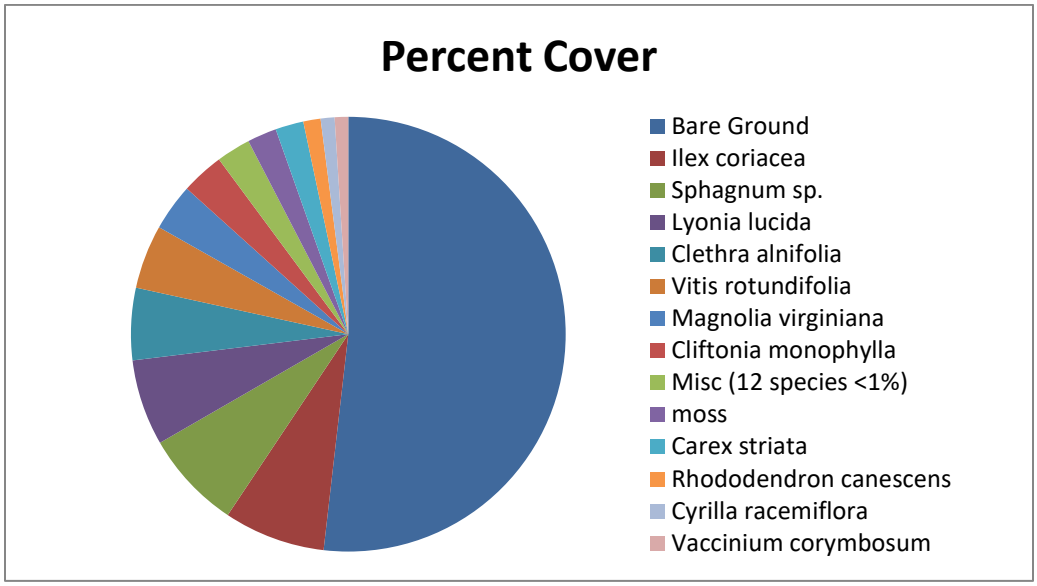


Figure PC-5. Percent cover of plant species in Mixed Forested Wetland (Preserved) Transect 2.

Table PC-5. Percent cover of plant species in Mixed Forested Wetland (Preserved) Transect 2 sampled on October 23, 2020.

Scientific name	Common name	Average percent cover per quadrat
Ilex coriacea	large gallberry	9.64
Sphagnum sp.	sphagnum moss	9.36
Lyonia lucida	fetterbush	8.18
Clethra alnifolia	sweet pepperbush	6.86
Vitis rotundifolia	muscadine	6.07
Magnolia virginiana	sweetbay	4.46
Cliftonia monophylla	black titi	4.07
moss		2.79
Carex striata	Walter's sedge	2.68
Rhododendron canescens	mountain azalea	1.64
Cyrilla racemiflora	titi	1.32
Vaccinium corymbosum	highbush blueberry	1.29
Smilax laurifolia	laurel greenbrier	0.89
Woodwardia virginica	Virginia chain fern	0.54
Rhynchospora leptocarpa	brownish beaksedge	0.46
Persea palustris	swamp bay	0.36
Woodwardia areolata	netted chain fern	0.36
Andropogon glomeratus var. *glaucopsis*	purple bluestem	0.18
Andropogon ternarius	splitbeard bluestem	0.11
Aronia arbutifolia	red chokeberry	0.11
Viburnum nudum	possumhaw	0.11
Vaccinium elliottii	Elliott's blueberry	0.07
Morella cerifera	southern bayberry	0.04
Morella inodora	odorless bayberry	0.04
Bare Ground		66.25

Ward Creek West Mitigation Site

Qualitative and Quantitative Monitoring

October 2020

Ward Creek West Mitigation Site
Qualitative and Quantitative Monitoring
October 2020

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 2019.

METHODS

The quantitative monitoring utilized 300-foot long permanent transect lines previously marked during the 2012 survey. In 2013, metal T-posts were placed at the ends of each transects to provide permanent reference points. Two transects were located in the Hydric Pine Flatwoods target community and two in Hydric Pine Savanna (Figure WC-1). 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 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 Amy Jenkins and Kim Alexander on October 6-7, 2020.

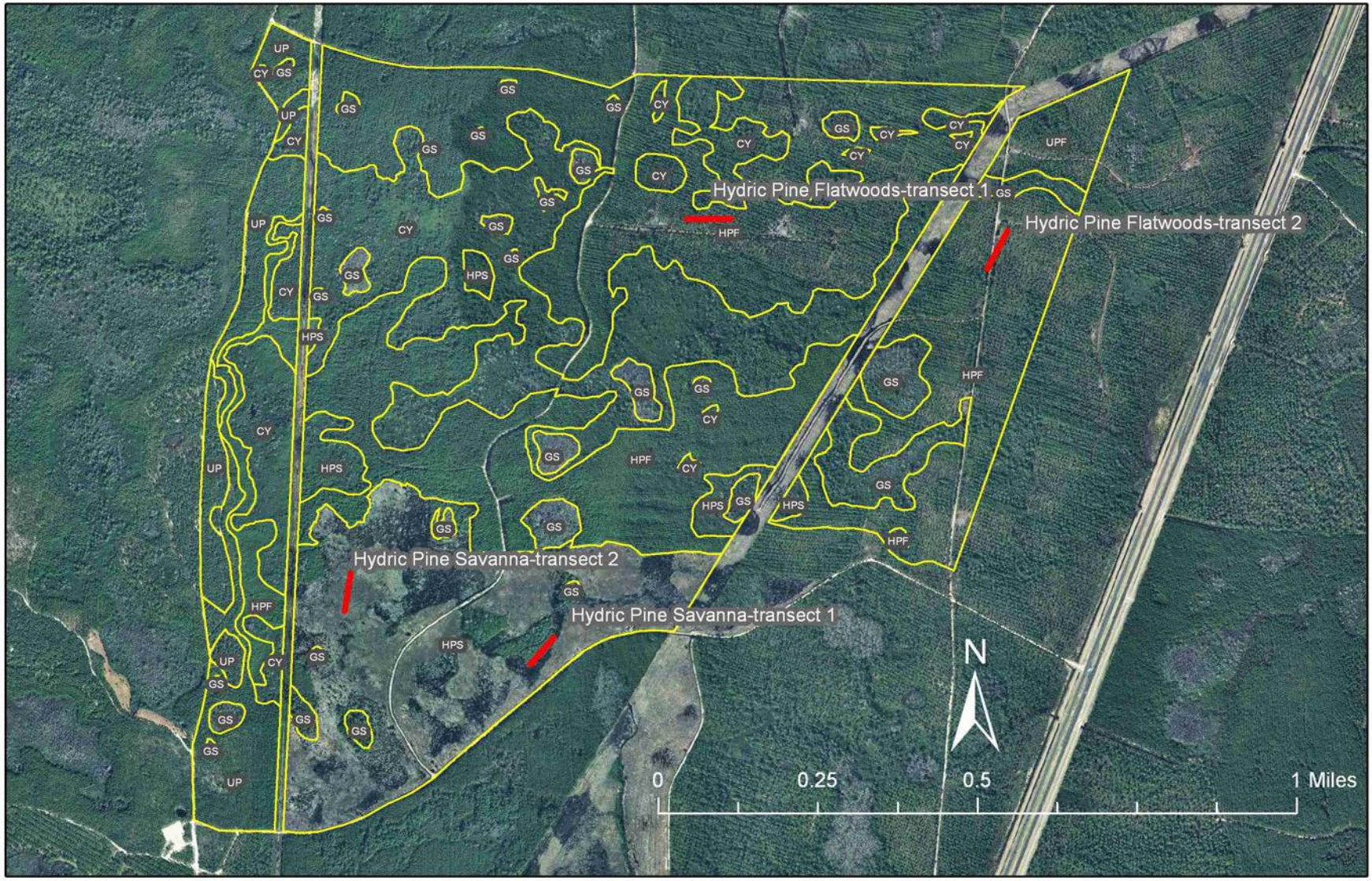


Figure WC-1. Location of permanent transects at Ward Creek West Mitigation Site. CY=Cypress, UP=Upland Pine, HPF=Hydric Pine Flatwoods, HPS=Hydric Pine Savanna, GS=Gum Swamp.

RESULTS AND DISCUSSION

A total of 145 plant taxa were recorded during the 2020 monitoring period in the target communities at Ward Creek West (Table WC-1). Nine new taxa were recorded during the 2020 monitoring.

Table WC-1. Plant species observed in the target communities at Ward Creek West Mitigation Site on October 6-7, 2020. (bold name = new species; bold X = new observation in community type)

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
Andropogon glomeratus	bushy bluestem			X	1
Andropogon glomeratus var. glaucopsis	purple bluestem		X	X	2
Andropogon virginicus	broomsedge bluestem		X	X	2
Andropogon virginicus var. glaucus	chalky bluestem	X	X	X	3
Anthaenantia rufa	purple silkyscale		X		1
Aristida spiciformis	bottlebrush threeawn		X	X	2
Aristida stricta	wiregrass		X	X	2
Aronia arbutifolia	red chokeberry		X	X	2
Baccharis halimifolia	groundsel tree		**X**		1
Balduina uniflora	oneflower honeycomb-head		**X**		1
Bidens mitis	smallfruit beggarticks		X		1
Bigelowia nudata	pineland rayless goldenrod		**X**		1
Carex striata	Walter's sedge	X			1
Carphephorus odoratissimus	vanillaleaf		X	X	2
Carphephorus pseudoliatris	bristleleaf chaffhead			**X**	1
Centella asiatica	spadeleaf		X	X	2
Chamaecrista fasciculata	partridge pea		X		1
Chrysopsis lanuginosa	Lynn Haven goldenaster		X	X	2
Chrysopsis mariana	Maryland goldenaster		X		1
Clethra alnifolia	sweet pepperbush	X	X		2
Cliftonia monophylla	black titi	X	X	X	3
Coleataenia anceps	beaked panicum		X	X	2
Ctenium aromaticum	toothache grass			X	1
Cyperus croceus	Baldwin's flatsedge		X		1
Cyperus ovatus	pinebarren flatsedge		X		1
Cyrilla racemiflora	titi	X	X	X	3
Dichanthelium ensifolium	cypress witchgrass		X	X	2
Dichanthelium ensifolium var. unciphyllum	cypress witchgrass			**X**	1
Dichanthelium oligosanthes	Heller's witchgrass		**X**		1
Dichanthelium scabriusculum	woolly witchgrass		X	X	2
Dichanthelium sphaerocarpon	roundseed witchgrass		X		1
Drosera capillaris	pink sundew	**X**		X	2
Erechtites hieraciifolius	fireweed		X		1

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
Eriocaulon decangulare	tenangle pipewort	X	X	X	3
Eupatorium capillifolium	dogfennel		X		1
Eupatorium compositifolium	yankeeweed		**X**		1
Eupatorium leucolepis	justiceweed			X	1
Eupatorium mohrii	Mohr's thoroughwort	**X**	X	X	3
Eupatorium pilosum	rough boneset			**X**	1
Euthamia caroliniana	slender flattop goldenrod		X	X	2
Fuirena breviseta	saltmarsh umbrellasedge		X	X	2
Gaylussacia dumosa	dwarf huckleberry			X	1
Gaylussacia frondosa var. tomentosa	blue huckleberry		X	**X**	2
Gaylussacia mosieri	woolly huckleberry		X	X	2
Helianthus angustifolius	narrowleaf sunflower			X	1
Helianthus heterophyllus	variableleaf sunflower		**X**		1
Hypericum brachyphyllum	coastalplain St. John's wort		X	X	2
Hypericum cistifolium	roundpod St. John's wort		X		1
Hypericum crux-andreae	St. Peter's wort		X		1
Hypericum fasciculatum	peelbark St. John's wort	X	X	X	3
Hypericum gentianoides	orangegrass		X		1
Hypericum microsepalum	flatwoods St. John's wort		X	X	2
Hypericum tetrapetalum	fourpetal St. John's wort		X		1
Ilex cassine var. myrtifolia	myrtle-leaved holly	X	X		2
Ilex coriacea	large gallberry	X	X	X	3
Ilex glabra	gallberry	X	X	X	3
Juncus marginatus	grassleaf rush		X		1
Juncus scirpoides	needlepod rush		X	X	2
Kalmia hirsuta	hairy wicky		X	X	2
Kellochloa verrucosa	warty panicgrass	**X**	X	X	3
Lachnanthes caroliana	Carolina redroot	**X**	X	X	3
Lachnocaulon anceps	whitehead bogbutton		X		1
Lechea pulchella var. ramosissima	Leggett's pinweed			X	1
Liatris spicata	dense gayfeather		X	X	2
Lobelia brevifolia	shortleaf lobelia			X	1
Lophiola aurea	golden crest	X			1
Ludwigia linifolia	southeastern primrosewillow			X	1
Ludwigia pilosa	hairy primrosewillow		X		1
Lycopodiella alopecuroides	foxtail club-moss		X	X	2
Lycopodiella appressa	southern club-moss		**X**		1
Lyonia ferruginea	rusty staggerbush		X	X	2
Lyonia fruticosa	coastalplain staggerbush			X	1
Lyonia lucida	fetterbush		X	X	2
Magnolia virginiana	sweetbay	X	X		2
Morella caroliniensis	evergreen bayberry	X	X		2
Morella inodora	odorless bayberry	**X**			1

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
moss			X		1
Nyssa ursina	bog tupelo		X		1
Oldenlandia uniflora	clustered mille graines		X	X	2
Osmunda cinnamomea	cinnamon fern		X		1
Panicum hemitomon	maidencane		**X**		1
Pieris phyllyreifolia	climbing fetterbush	X			1
Pinus elliottii	slash pine	X	X	X	3
Pinus sp.	pine		X		1
Pityopsis graminifolia	narrowleaf silkgrass		X		1
Pluchea baccharis	rosy camphorweed		**X**		1
Pluchea foetida	stinking camphorweed		X	X	2
Polygala cruciata	drumheads			X	1
Polygala cymosa	tall pinebarren milkwort			X	1
Polygala lutea	orange milkwort		X		1
Polygonella gracilis	tall jointweed		X		1
Pteridium aquilinum	bracken fern		X	X	2
Pterocaulon pycnostachyum	blackroot		X		1
Quercus geminata	sand live oak			**X**	1
Quercus minima	dwarf live oak		X		1
Rhexia alifanus	savannah meadowbeauty	**X**	X	X	3
Rhexia mariana	pale meadowbeauty	**X**	X	X	3
Rhexia nuttallii	Nuttall's meadowbeauty			X	1
Rhexia petiolata	fringed meadowbeauty		X	X	2
Rhexia virginica	handsome harry	**X**	X	X	3
Rhynchospora cephalantha	bunched beaksedge	X	X	X	3
Rhynchospora chapmanii	Chapman's beaksedge		X	X	2
Rhynchospora ciliaris	fringed beaksedge		X	X	2
Rhynchospora corniculata	shortbristle horned beaksedge			X	1
Rhynchospora fascicularis	fascicled beaksedge	X	X	X	3
Rhynchospora fernaldii	Fernald's beaksedge		X	X	2
Rhynchospora gracilenta	slender beaksedge	**X**	X	X	3
Rhynchospora inundata	narrowfruit horned beaksedge	**X**			1
Rhynchospora plumosa	plumed beaksedge		X	X	2
Rhynchospora sp.	beaksedge		X		1
Rubus pensilvanicus	sawtooth blackberry		X	X	2
Sabatia brevifolia	shortleaf rosegentian		X	X	2
Saccharum giganteum	sugarcane plumegrass			X	1
Sarracenia flava	yellow pitcherplant			X	1
Schizachyrium stoloniferum	creeping little bluestem		X		1
Scleria ciliata	fringed nutrush		X	X	2
Scleria reticularis	netted nutrush		X	X	2
Scleria triglomerata	whip nutrush		X		1
Serenoa repens	saw palmetto		X	X	2

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
Smilax auriculata	earleaf greenbrier		X		1
Smilax glauca	cat greenbrier		X		1
Smilax laurifolia	laurel greenbrier	X	X	X	3
Smilax pumila	sarsaparilla vine		X	X	2
Smilax walteri	coral greenbrier	X			1
Solidago fistulosa	pinebarren goldenrod		X	X	2
Solidago odora	sweet goldenrod			X	1
Sphagnum sp.	sphagnum moss	X	X	X	3
Syngonanthus flavidulus	yellow hatpins		X		1
Taxodium ascendens	pond cypress	X		X	2
Tiedemannia filiformis ssp. filiformis	water cowbane			X	1
Utricularia juncea	southern bladderwort			X	1
Utricularia purpurea	eastern purple bladderwort	**X**			1
Utricularia subulata	zigzag bladderwort			X	1
Vaccinium corymbosum	highbush blueberry		X		1
Vaccinium myrsinites	shiny blueberry		X		1
Vitis rotundifolia	muscadine	X	X	X	3
Woodwardia areolata	netted chain fern		**X**		1
Woodwardia virginica	Virginia chain fern		X		1
Xyris ambigua	coastalplain yellow-eyed grass	X	X	X	3
Xyris brevifolia	shortleaf yellow-eyed grass		X	X	2
Xyris caroliniana	Carolina yellow-eyed grass		X		1
Xyris elliottii	Elliott's yellow-eyed grass			X	1
Xyris fimbriata	fringed yellow-eyed grass	X		X	2
Xyris flabelliformis	savannah yellow-eyed grass		X	X	2
Xyris sp.	yellow-eyed grass	X			1
Total number of taxa: 145		36	110	88	234

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. There were numerous pine trees blown down by the Hurricane Michael in 2018, but these were mostly concentrated in the more densely planted stand immediately north of the large Hydric Pine Savanna. 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 total number of species observed in this community was 110 (Table WC-1).

Quantitative sampling. The western Transect 1 (Table WC-2, Figure WC-2) had a total of 31 species with 39% bare ground. Numerous slash pines had fallen in the area of the transect due to past storms. Purple bluestem contributed the most cover, followed by woody species (large gallberry, black titi, saw palmetto, and highbush blueberry). Woody species made up well over half of the total cover, around 37% average cover per quadrat. With the exception of a reduction in purple bluestem, this transect was largely unchanged from last year.

The eastern Transect 2 (Table WC-3, Figure WC-3) had a total of 43 species with 35% bare ground. Shrubby species, primarily saw palmetto and slash pine, contributed just over one quarter of the total cover. Woody species made around 15% average cover per quadrat. Purple bluestem, cypress witchgrass, plumed beaksedge, creeping little bluestem, beaked panicum, and bunched beaksedge made up most of the herbaceous cover. Total plant cover (55% average cover per quad) was similar to the 2018 sample, but the composition has changed markedly. Dwarf live oak and shortleaf yellow-eyed grass, once dominants, are now only trace components, while weedy purple bluestem is now the most abundant species.

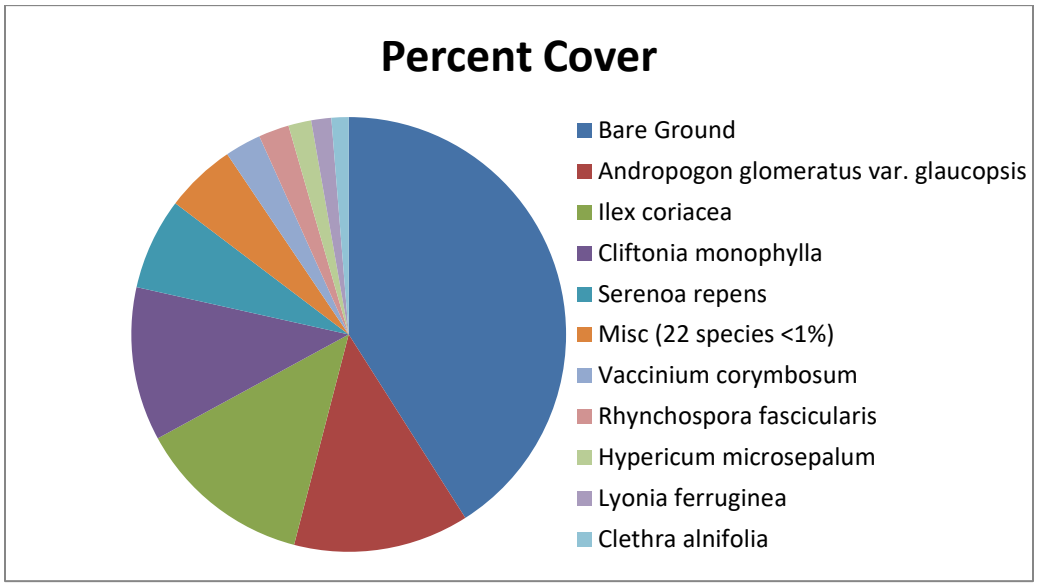


Figure WC-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

Table WC-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 sampled on October 7, 2020.

Scientific name	Common name	Average percent cover per quadrat
Andropogon glomeratus var. *glaucopsis*	purple bluestem	12.27
Ilex coriacea	large gallberry	12.23
Cliftonia monophylla	black titi	10.73
Serenoa repens	saw palmetto	6.40
Vaccinium corymbosum	highbush blueberry	2.53
Rhynchospora fascicularis	fascicled beaksedge	2.13
Hypericum microsepalum	flatwoods St. John's wort	1.60
Lyonia ferruginea	rusty staggerbush	1.40

Clethra alnifolia	sweet pepperbush	1.20
Lachnanthes caroliana	Carolina redroot	0.90
Smilax laurifolia	laurel greenbrier	0.73
Dichanthelium sphaerocarpon	roundseed witchgrass	0.67
Dichanthelium ensifolium	cypress witchgrass	0.37
Rhynchospora fernaldii	Fernald's beaksedge	0.27
Rhynchospora plumosa	plumed beaksedge	0.27
Rhynchospora ciliaris	fringed beaksedge	0.23
Rubus pensilvanicus	sawtooth blackberry	0.23
Xyris flabelliformis	savannah yellow-eyed grass	0.20
Rhexia petiolata	fringed meadowbeauty	0.17
Xyris brevifolia	shortleaf yellow-eyed grass	0.17
Vitis rotundifolia	muscadine	0.13
Eupatorium mohrii	Mohr's thoroughwort	0.10
Rhynchospora gracilenta	slender beaksedge	0.10
Scleria ciliata	fringed nutrush	0.10
Polygala lutea	orange milkwort	0.07
Xyris ambigua	coastalplain yellow-eyed grass	0.07
Ludwigia pilosa	hairy primrosewillow	0.03
Pinus elliottii	slash pine	0.03
Pinus sp.	pine	0.03
Rhynchospora sp.	beaksedge	0.03
Sphagnum sp.	sphagnum moss	0.03
Bare Ground		38.50

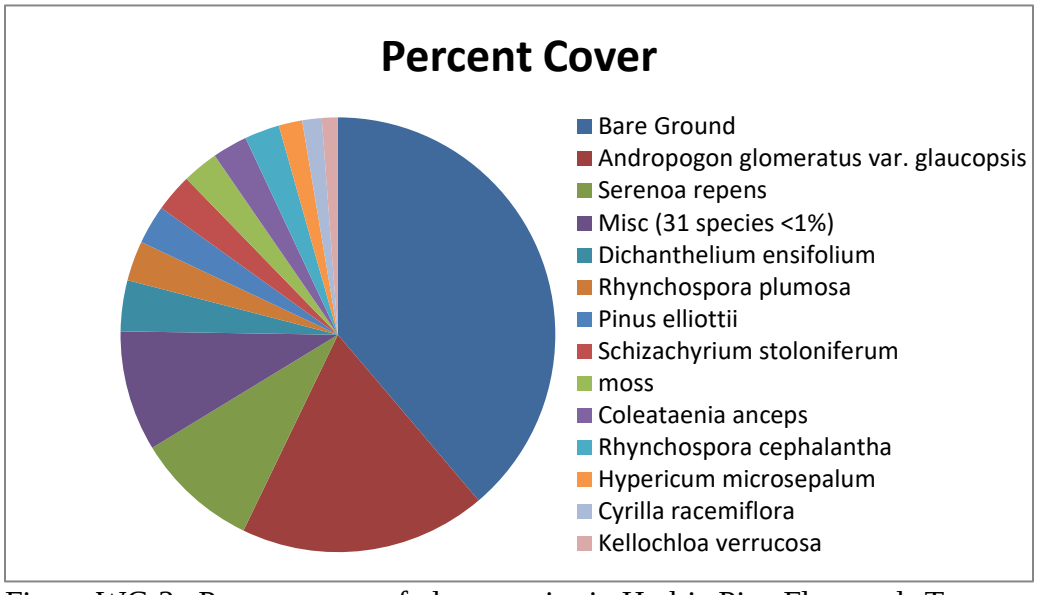


Figure WC-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2.

Table WC-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 sampled on October 7, 2020.

Scientific name	Common name	Average percent cover per quadrat
Andropogon glomeratus var. *glaucopsis*	purple bluestem	16.47
Serenoa repens	saw palmetto	8.20
Dichanthelium ensifolium	cypress witchgrass	3.40
Rhynchospora plumosa	plumed beaksedge	2.67
Pinus elliottii	slash pine	2.60
Schizachyrium stoloniferum	creeping little bluestem	2.53
moss		2.40
Coleataenia anceps	beaked panicum	2.33
Rhynchospora cephalantha	bunched beaksedge	2.33
Hypericum microsepalum	flatwoods St. John's wort	1.57
Cyrilla racemiflora	titi	1.30
Kellochloa verrucosa	warty panicgrass	1.07
Rhynchospora fascicularis	fascicled beaksedge	0.90
Andropogon virginicus	broomsedge bluestem	0.87
Lachnanthes caroliana	Carolina redroot	0.77
Xyris brevifolia	shortleaf yellow-eyed grass	0.77
Rhynchospora gracilenta	slender beaksedge	0.73
Euthamia caroliniana	slender flattop goldenrod	0.57
Sphagnum sp.	sphagnum moss	0.50
Dichanthelium oligosanthes	Heller's witchgrass	0.37
Dichanthelium sphaerocarpon	roundseed witchgrass	0.33
Cliftonia monophylla	black titi	0.30
Aristida spiciformis	bottlebrush threeawn	0.27
Ilex glabra	gallberry	0.23
Rubus pensilvanicus	sawtooth blackberry	0.23
Woodwardia virginica	Virginia chain fern	0.23
Lachnocaulon anceps	whitehead bogbutton	0.13
Hypericum fasciculatum	peelbark St. John's wort	0.10
Kalmia hirsuta	hairy wicky	0.10
Quercus minima	dwarf live oak	0.10
Cyperus ovatus	pinebarren flatsedge	0.07
Eupatorium mohrii	Mohr's thoroughwort	0.07
Oldenlandia uniflora	clustered mille graines	0.07
Carphephorus odoratissimus	vanillaleaf	0.03
Gaylussacia mosieri	woolly huckleberry	0.03
Lyonia lucida	fetterbush	0.03
Pluchea baccharis	rosy camphorweed	0.03
Rhexia petiolata	fringed meadowbeauty	0.03
Rhexia virginica	handsome harry	0.03
Scleria ciliata	fringed nutrush	0.03
Smilax auriculata	earleaf greenbrier	0.03
Xyris ambigua	coastalplain yellow-eyed grass	0.03
Xyris caroliniana	Carolina yellow-eyed grass	0.03
Bare Ground		34.80

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 (*Cleistes bifaria*). However, none of these were located during the 2020 survey. Hog digging was frequent in the areas visited. The total number of plant species observed in this community was 88 (Table WC-1).

Quantitative sampling. Transect 1 (Table WC-4, Figure WC-4) had a total of 37 species and 17% bare ground. Groundcover was heavily dominated by warty panicgrass and purple bluestem, followed by the shrubs fetterbush and black titi. Elliott's yellow-eyed grass, Carolina redroot, and large gallberry also contributed significant cover. Woody species made up about a third of the overall plant cover, around 21% average cover per quadrat. Vegetation along the transect was largely unchanged except for a marked increase in warty panicgrass, a species that can quickly increase and decrease in cover from year to year.

Transect 2 (Table WC-5, Figure WC-5) had a total of 36 species and 7% bare ground. The vegetation was dominated by purple bluestem followed by black titi shrubs. The next most abundant species were tenangle pipewort, titi, fetterbush, wiregrass, and plumed beaksedge. Woody species made up around one third of the overall plant cover, around 28% average cover per quadrat. Overall, the measured vegetation along this transect was similar to last year. Total cover, shrub cover, and wiregrass cover were all increasing.

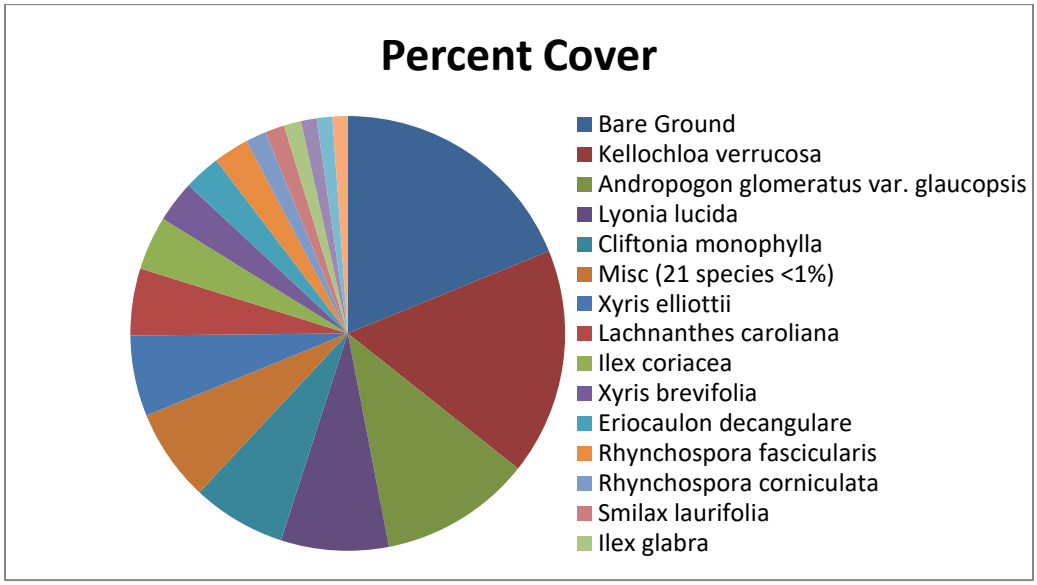


Figure WC-4. Percent cover of plant species in Hydric Pine Savanna Transect 1.

Table WC-4. Percent cover of species in Hydric Pine Savanna Transect 1 sampled on October 7, 2020.

Scientific name	Common name	Average percent cover per quadrat
Kellochloa verrucosa	warty panicgrass	15.43
Andropogon glomeratus var. *glaucopsis*	purple bluestem	10.33
Lyonia lucida	fetterbush	7.33
Cliftonia monophylla	black titi	6.40
Xyris elliottii	Elliott's yellow-eyed grass	5.50
Lachnanthes caroliana	Carolina redroot	4.57
Ilex coriacea	large gallberry	3.67
Xyris brevifolia	shortleaf yellow-eyed grass	2.83
Eriocaulon decangulare	tenangle pipewort	2.50
Rhynchospora fascicularis	fascicled beaksedge	2.40
Rhynchospora corniculata	shortbristle horned beaksedge	1.40
Smilax laurifolia	laurel greenbrier	1.33
Ilex glabra	gallberry	1.17
Euthamia caroliniana	slender flattop goldenrod	1.07
Rhynchospora gracilenta	slender beaksedge	1.07
Rhynchospora ciliaris	fringed beaksedge	1.03
Rhexia petiolata	fringed meadowbeauty	0.87
Cyrilla racemiflora	titi	0.80
Drosera capillaris	pink sundew	0.80
Eupatorium mohrii	Mohr's thoroughwort	0.73
Aristida stricta	wiregrass	0.60
Xyris flabelliformis	savannah yellow-eyed grass	0.53
Polygala cruciata	drumheads	0.37
Andropogon glomeratus	bushy bluestem	0.33
Xyris ambigua	coastalplain yellow-eyed grass	0.20
Rhexia nuttallii	Nuttall's meadowbeauty	0.17
Xyris fimbriata	fringed yellow-eyed grass	0.17
Dichanthelium ensifolium var. *unciphyllum*	cypress witchgrass	0.13
Andropogon virginicus	broomsedge bluestem	0.10
Rhynchospora fernaldii	Fernald's beaksedge	0.10
Sarracenia flava	yellow pitcherplant	0.10
Sphagnum sp.	sphagnum moss	0.10
Coleataenia anceps	beaked panicum	0.07
Eupatorium pilosum	rough boneset	0.03
Hypericum fasciculatum	peelbark St. John's wort	0.03
Rhexia alifanus	savannah meadowbeauty	0.03
Rhexia mariana	pale meadowbeauty	0.03
Bare Ground		17.23

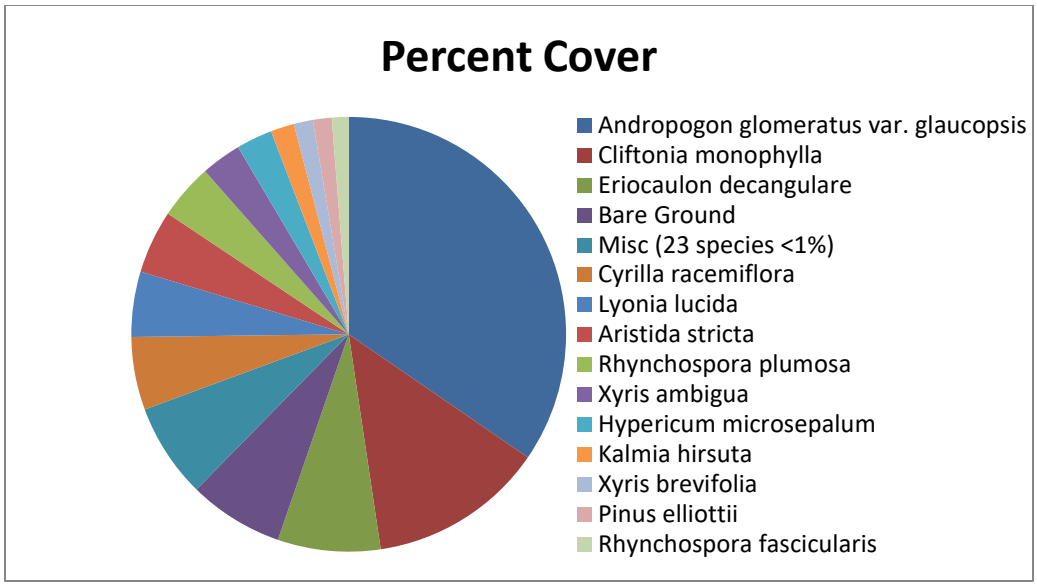


Figure WC-5. Percent cover of plant species in Hydric Pine Savanna Transect 2.

Table WC-5. Percent cover of plant species in Hydric Pine Savanna Transect 2 sampled on October 7, 2020.

Scientific name	Common name	Average percent cover per quadrat
Andropogon glomeratus var. *glaucopsis*	purple bluestem	32.30
Cliftonia monophylla	black titi	12.20
Eriocaulon decangulare	tenangle pipewort	7.13
Cyrilla racemiflora	titi	5.07
Lyonia lucida	fetterbush	4.53
Aristida stricta	wiregrass	4.40
Rhynchospora plumosa	plumed beaksedge	3.87
Xyris ambigua	coastalplain yellow-eyed grass	2.80
Hypericum microsepalum	flatwoods St. John's wort	2.50
Kalmia hirsuta	hairy wicky	1.63
Xyris brevifolia	shortleaf yellow-eyed grass	1.33
Pinus elliottii	slash pine	1.30
Rhynchospora fascicularis	fascicled beaksedge	1.17
Andropogon virginicus	broomsedge bluestem	0.97
Hypericum brachyphyllum	coastalplain St. John's wort	0.73
Lycopodiella alopecuroides	foxtail club-moss	0.73
Dichanthelium ensifolium	cypress witchgrass	0.60
Juncus scirpoides	needlepod rush	0.50
Rhexia petiolata	fringed meadowbeauty	0.40
Xyris flabelliformis	savannah yellow-eyed grass	0.40
Pteridium aquilinum	bracken fern	0.33
Euthamia caroliniana	slender flattop goldenrod	0.27
Lachnanthes caroliana	Carolina redroot	0.27
Ilex glabra	gallberry	0.23
Rhynchospora cephalantha	bunched beaksedge	0.23

Scientific name	Common name	Average percent cover per quadrat
Sphagnum sp.	sphagnum moss	0.23
Ctenium aromaticum	toothache grass	0.10
Eupatorium mohrii	Mohr's thoroughwort	0.10
Rhynchospora chapmanii	Chapman's beaksedge	0.10
Smilax laurifolia	laurel greenbrier	0.10
Drosera capillaris	pink sundew	0.07
Polygala cruciata	drumheads	0.07
Hypericum fasciculatum	peelbark St. John's wort	0.03
Pluchea foetida	stinking camphorweed	0.03
Polygala cymosa	tall pinebarren milkwort	0.03
Rhexia virginica	handsome harry	0.03
Bare Ground		6.60

Cypress

Qualitative sampling. The cypress target community was visited at two sites, one just west of and one just east of the main north/south road through the center of the property (Figure WC-1). The cypress area visited on the west side of the main road is currently mapped as hydric pine savanna, but a revised map of historic natural communities on Ward Creek West is being submitted with this report. 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. Areas of hog digging were common. The total number of species observed in this community was 36 (Table WC-1).

Dutex West Restoration Site

Qualitative and Quantitative Monitoring

October 2020

Dutex West Restoration Site
Qualitative and Quantitative Monitoring
October 2020

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 from 2018-2020. This tract is accessed by taking Saufley Pines Road west from North Blue Angel Parkway and then turning south onto Wyndotte Road. The NWFWMD 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 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 Camille Eckel on October 20-21, 2020.

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 213 plant taxa were recorded during the 2020 monitoring period in the target communities at Dutex West (Table DW-1). Fifty-two new species were recorded during the 2020 monitoring.

Table DW-1. Plant species observed in the target communities at Dutex West Mitigation Site on October 20-21, 2020. (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
Acalypha gracilens	slender threeseed mercury				**X**			1
Acer rubrum	red maple	X	X	X	X	X		5
Amphicarpum muehlenbergianum	blue maidencane	X	**X**					2
Andropogon arctatus	pinewoods bluestem		X		**X**			2
Andropogon glomeratus	bushy bluestem	X		X	X			3
Andropogon glomeratus var. glaucopsis	purple bluestem	X	X		X		**X**	4
Andropogon glomeratus var. hirsutior	bushy bluestem						**X**	1
Andropogon gyrans	Elliott's bluestem			**X**				1
Andropogon virginicus	broomsedge bluestem	X	X		X			3
Anthaenantia rufa	purple silkyscale		X			**X**		2
Aristida palustris	longleaf threeawn		X					1
Aristida spiciformis	bottlebrush threeawn				X			1
Aristida stricta	wiregrass		X		X			2
Aronia arbutifolia	red chokeberry		X		**X**			2
Asclepias lanceolata	fewflower milkweed						**X**	1
Baccharis halimifolia	groundsel tree					X		1
Bidens alba	beggarticks				**X**			1
Bidens mitis	smallfruit beggarticks	X	X	X	**X**	X		5
Carex glaucescens	clustered sedge	X	X	X	**X**			4
Carex verrucosa	warty sedge	X	**X**					2
Carphephorus odoratissimus	vanillaleaf				X			1
Carphephorus pseudoliatris	bristleleaf chaffhead		**X**					1
Centella asiatica	spadeleaf	X	X	X	**X**	**X**		5
Chamaecrista sp.	sensitive pea				X			1
Chamaecyparis thyoides	Atlantic white cedar		**X**	**X**				2
Chasmanthium laxum var. sessiliflorum	longleaf woodoats				**X**			1
Cladium jamaicense	sawgrass	X		X		X	X	4
Clethra alnifolia	sweet pepperbush		X	X	X			3
Cliftonia monophylla	black titi	X	X	X	X		X	5
Coelorachis rugosa	wrinkled jointgrass				**X**			1
Coleataenia anceps	beaked panicum	X	X					2
Coleataenia longifolia	ciliate redtop panicum		**X**					1
Conoclinium coelestinum	blue mistflower			**X**				1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
Coreopsis linifolia	Texas tickseed		X					1
Crinum americanum	string lily			**X**				1
Ctenium aromaticum	toothache grass		X		**X**			2
Cuscuta obtusiflora var. glandulosa	Peruvian dodder			**X**				1
Cyperus haspan	haspan flatsedge			**X**				1
Cyrilla racemiflora	titi	X	X	X				3
Dichanthelium acuminatum var. acuminatum	tapered witchgrass				**X**			1
Dichanthelium dichotomum	cypress witchgrass						**X**	1
Dichanthelium ensifolium	cypress witchgrass		X	X	**X**			3
Dichanthelium ensifolium var. unciphyllum	cypress witchgrass				**X**			1
Dichanthelium leucothrix	rough witchgrass	**X**	**X**		**X**			3
Dichanthelium ovale	eggleaf witchgrass				**X**			1
Dichanthelium portoricense	hemlock witchgrass				X			1
Dichanthelium scabriusculum	woolly witchgrass	X	X	X		**X**		4
Dichanthelium sp.	witchgrass	X						1
Dichanthelium sphaerocarpon	roundseed witchgrass				**X**			1
Diospyros virginiana	common persimmon			**X**				1
Drosera capillaris	pink sundew		X					1
Echinodorus sp.	burrhead			**X**				1
Eleocharis flavescens	yellow spikerush			**X**				1
Eleocharis sp.	spikerush		X					1
Eleocharis tuberculosa	conecup spikerush		X					1
Elephantopus elatus	tall elephantsfoot		**X**		**X**			2
Eragrostis virginica	coastal lovegrass				**X**			1
Erechtites hieraciifolius	fireweed				X			1
Erigeron vernus	early whitetop fleabane		**X**					1
Eriocaulon compressum	flattened pipewort		X	X				2
Eriocaulon decangulare	tenangle pipewort		X	X				2
Eupatorium capillifolium	dogfennel		X		X			2
Eupatorium mohrii	Mohr's thoroughwort		X					1
Eupatorium pilosum	rough boneset		**X**					1
Eupatorium rotundifolium	roundleaf thoroughwort		**X**					1
Eupatorium x anomalum	Florida thoroughwort	**X**			**X**			2
Eupatorium x pinnatifidum	throughwort		**X**		**X**			2
Euthamia caroliniana	slender flattop goldenrod	X	X	**X**	X			4
Euthamia graminifolia	flattop goldenrod			**X**	**X**	X	X	4
Fuirena breviseta	saltmarsh umbrellasedge		X	X				2
Fuirena scirpoidea	southern umbrellasedge		X					1
Fuirena sp.	umbrellasedge				**X**			1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
Gaylussacia dumosa	dwarf huckleberry				X			1
Gaylussacia frondosa var. tomentosa	blue huckleberry				**X**			1
Gaylussacia mosieri	woolly huckleberry		X		X			2
Gelsemium sempervirens	yellow jessamine			X	**X**			2
Habenaria repens	waterspider false rein orchid			**X**				1
Hydrocotyle umbellata	manyflower marshpennywort			**X**				1
Hydrocotyle verticillata	whorled marshpennywort		**X**					1
Hypericum brachyphyllum	coastalplain St. John's wort	X	X	X				3
Hypericum cistifolium	roundpod St. John's wort	X	X	**X**	**X**			4
Hypericum crux-andreae	St. Peter's wort	X	X		**X**			3
Hypericum hypericoides	St. Andrew's cross	X	**X**	**X**				3
Hyptis alata	clustered bushmint		**X**	**X**				2
Ilex cassine	dahoon	X	X	X		X		4
Ilex cassine var. myrtifolia	myrtle-leaved holly	X				X	X	3
Ilex coriacea	large gallberry	X	X	X	X	X	**X**	6
Ilex glabra	gallberry	X	X	X	X	X		5
Ilex vomitoria	yaupon	X		**X**	X	X	X	5
Ipomoea sagittata	saltmarsh morning glory					X	X	2
Ipomoea sp.	morning glory				**X**			1
Iris sp.	iris			**X**				1
Itea virginica	Virginia willow			**X**				1
Juncus pelocarpus	annual rush			**X**				1
Juncus roemerianus	needle rush						X	1
Juncus trigonocarpus	redpod rush		X					1
Kalmia hirsuta	hairy wicky				X			1
Kellochloa verrucosa	warty panicgrass	X	X	X	**X**		X	5
Lachnanthes caroliana	Carolina redroot	X	X	X	**X**	**X**		5
Lachnocaulon anceps	whitehead bogbutton		X		**X**			2
Lechea pulchella var. ramosissima	Leggett's pinweed				**X**			1
Liatris spicata	dense gayfeather		X					1
Lilium catesbaei	pine lily	**X**						1
Lilium iridollae	Panhandle lily			X				1
Lobelia brevifolia	shortleaf lobelia		X		**X**			2
Lophiola aurea	golden crest		**X**					1
Ludwigia linifolia	southeastern primrosewillow		X					1
Ludwigia maritima	seaside primrosewillow				**X**			1
Ludwigia palustris	marsh seedbox			**X**				1
Ludwigia pilosa	hairy primrosewillow		X	**X**				2
Lycopodiella alopecuroides	foxtail club-moss		X		**X**			2
Lycopodiella caroliniana	slender club-moss		**X**		**X**			2
Lycopus rubellus	taperleaf waterhorehound		X					1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
Lyonia lucida	fetterbush	X	X	X	X			4
Magnolia virginiana	sweetbay		X	X	X		X	4
Mikania scandens	climbing hempvine		X		**X**			2
Mitchella repens	partridgeberry	**X**						1
Morella caroliniensis	evergreen bayberry						X	1
Morella cerifera	southern bayberry	X	X	X	**X**	X	X	6
Morella inodora	odorless bayberry			**X**				1
Nymphaea odorata	white waterlily			X				1
Nyssa biflora	swamp tupelo	X	X	X				3
Oldenlandia uniflora	clustered mille graines	X	X		X			3
Osmunda cinnamomea	cinnamon fern	X		X	X	X		4
Osmunda regalis var. spectabilis	royal fern	X	X	X	**X**	X	X	6
Oxalis sp.	woodsorrel				**X**			1
Panicum repens	torpedo grass				**X**			1
Panicum virgatum	switchgrass	X		X	X	X	X	5
Paspalum floridanum	Florida paspalum	X						1
Paspalum praecox	early paspalum				**X**	**X**		2
Peltandra sagittifolia	spoon-flower			**X**				1
Persea palustris	swamp bay	X	X	X	X	X	X	6
Persicaria hydropiperoides	mild waterpepper			**X**				1
Phragmites berlandieri	common reed					X		1
Pinus elliottii	slash pine	X	X	X	X	X	X	6
Pinus palustris	longleaf pine				**X**			1
Pityopsis graminifolia	narrowleaf silkgrass				**X**			1
Pluchea foetida	stinking camphorweed		X	**X**				2
Pluchea sp.	camphorweed						**X**	1
Polygala cruciata	drumheads		X					1
Polygala lutea	orange milkwort		X		**X**			2
Polypremum procumbens	rustweed				**X**			1
Proserpinaca pectinata	combleaf mermaidweed		X					1
Pteridium aquilinum	bracken fern		X		X			2
Quercus geminata	sand live oak				X			1
Quercus nigra	water oak	**X**	**X**		**X**			3
Quercus virginiana	live oak				X			1
Rhexia alifanus	savannah meadowbeauty		X		**X**			2
Rhexia lutea	yellow meadowbeauty		**X**					1
Rhexia petiolata	fringed meadowbeauty	X	X		**X**			3
Rhexia virginica	handsome harry	X	X		X			3
Rhododendron canescens	mountain azalea				X			1
Rhus copallinum	winged sumac	X	X		X			3
Rhynchospora baldwinii	Baldwin's beaksedge		X		**X**			2

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
Rhynchospora cephalantha	bunched beaksedge	X	X					2
Rhynchospora chapmanii	Chapman's beaksedge		X		**X**			2
Rhynchospora ciliaris	fringed beaksedge		**X**		**X**			2
Rhynchospora corniculata	shortbristle horned beaksedge			X				1
Rhynchospora fascicularis	fascicled beaksedge	X	X		**X**			3
Rhynchospora galeana	shortbristle beaksedge				**X**			1
Rhynchospora glomerata	clustered beaksedge		X					1
Rhynchospora gracilenta	slender beaksedge	X	X		**X**			3
Rhynchospora plumosa	plumed beaksedge				**X**			1
Rhynchospora rariflora	fewflower beaksedge		X					1
Rhynchospora sp.	beaksedge		X					1
Rubus cuneifolius	sand blackberry				**X**			1
Rubus pensilvanicus	sawtooth blackberry	X	X	X	X	X	X	6
Rubus trivialis	southern dewberry			**X**	X		**X**	3
Sabal minor	bluestem palmetto						X	1
Sacciolepis striata	American cupscale						**X**	1
Sagittaria lancifolia	bulltongue arrowhead			**X**		**X**	**X**	3
Sarracenia leucophylla	white-top pitcherplant		X					1
Schizachyrium sanguineum	crimson bluestem				**X**	**X**	**X**	3
Schizachyrium scoparium var. scoparium	little bluestem				**X**			1
Schizachyrium stoloniferum	creeping little bluestem				**X**			1
Scleria ciliata	fringed nutrush		**X**		**X**			2
Scleria sp.	nutrush		X					1
Scleria triglomerata	whip nutrush				**X**			1
Serenoa repens	saw palmetto		X		X			2
Sesbania punicea	purple sesban						**X**	1
Smilax auriculata	earleaf greenbrier		**X**		X			2
Smilax bona-nox	saw greenbrier				**X**			1
Smilax glauca	cat greenbrier	X	**X**	**X**	X			4
Smilax laurifolia	laurel greenbrier	X	X	X				3
Smilax pumila	sarsaparilla vine				**X**			1
Smilax walteri	coral greenbrier		X	X				2
Solidago fistulosa	pinebarren goldenrod	X	X	**X**	X			4
Solidago sempervirens	seaside goldenrod					X	**X**	2
Sophronanthe pilosa	shaggy hedgehyssop		**X**	**X**				2
Spartina patens	saltmeadow cordgrass	X					X	2
Sphagnum sp.	sphagnum moss	X	X	X				3
Symphyotrichum dumosum	rice button aster					**X**		1
Taxodium ascendens	pond cypress	X	X	X		X	X	5
Tiedemannia filiformis ssp. filiformis	water cowbane		**X**	**X**				2
Tillandsia usneoides	Spanish moss			**X**				1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
Toxicodendron radicans	eastern poison ivy	X	X	X	**X**	X	X	6
Triadenum virginicum	Virginia marsh St. John's wort			**X**				1
Triadica sebifera	Chinese tallow tree			**X**	X			2
Vaccinium arboreum	sparkleberry				X			1
Vaccinium corymbosum	highbush blueberry		X	X	X			3
Vaccinium darrowii	Darrow's blueberry		**X**		X			2
Vaccinium elliottii	Elliott's blueberry				**X**			1
Vaccinium myrsinites	shiny blueberry		**X**		X			2
Viola lanceolata	bog white violet		**X**					1
Viola primulifolia	primroseleaf violet		**X**	**X**	**X**			3
Vitis rotundifolia	muscadine	X	X	X	X		X	5
Woodwardia areolata	netted chain fern	X	X	X	**X**	**X**		5
Woodwardia virginica	Virginia chain fern	X	X	X	**X**	**X**	**X**	6
Xyris ambigua	coastalplain yellow-eyed grass	**X**	**X**	**X**				3
Xyris baldwiniana	Baldwin's yellow-eyed grass		**X**					1
Xyris caroliniana	Carolina yellow-eyed grass				X			1
Xyris fimbriata	fringed yellow-eyed grass		X	**X**				2
Xyris smalliana	Small's yellow-eyed grass	**X**						1
Total number of taxa: 213		61	117	81	114	32	34	439

Hydric Pine Flatwoods

Qualitative sampling. The eastern area of Hydric Pine Flatwoods in the vicinity of Transect 1 was accessed to create a species list (Figure DW-1). This 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 and made estimating herb/shrub covers difficult. 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 total number of species observed in this community was 61 (Table DW-1).

Quantitative sampling. The eastern Transect 1 (Table DW-2, Figure DW-2) had a total of 26 species with 31% bare ground. Purple bluestem, laurel greenbrier, Carolina redroot, black titi, and warty panicgrass contributed the most cover. Woody species made up about 20% average cover per quadrat. There was a notable decline in black titi cover, possibly due to shrub management efforts. However, sedge cover was also reduced, averaging just 1% per quad (down from 7% last year).

The western Transect 4 (Table DW-3, Figure DW-3) had a total of 21 species with 76% bare ground. Switchgrass, swamp bay, slash pine and yaupon contributed the most cover. Woody

species made up about 14% average cover per quadrat, a decline from last year. This transect was in an area that experienced significant storm surge in September. The marker post for the beginning of the transect had been washed away, and many shrubs were impacted from the flooding and physical disturbance.

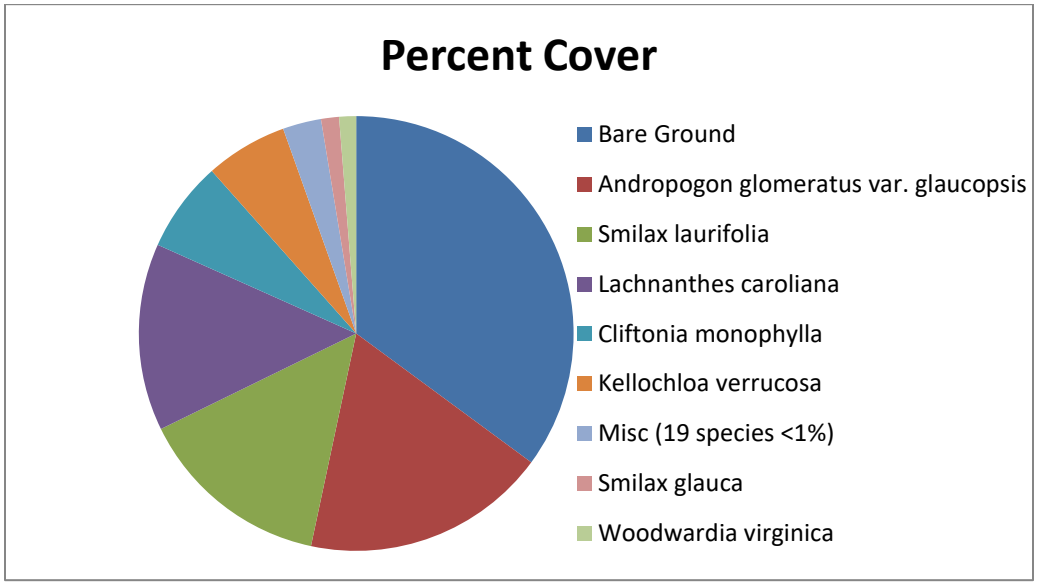


Figure DW-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

Table DW-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 sampled on October 21, 2020.

Scientific name	Common name	Average percent cover per quadrat
Andropogon glomeratus var. *glaucopsis*	purple bluestem	15.93
Smilax laurifolia	laurel greenbrier	12.60
Lachnanthes caroliana	Carolina redroot	12.17
Cliftonia monophylla	black titi	5.90
Kellochloa verrucosa	warty panicgrass	5.33
Smilax glauca	cat greenbrier	1.17
Woodwardia virginica	Virginia chain fern	1.10
Rhynchospora gracilenta	slender beaksedge	0.33
Carex verrucosa	warty sedge	0.30
Rhexia petiolata	fringed meadowbeauty	0.30
Carex glaucescens	clustered sedge	0.23
Dichanthelium leucothrix	rough witchgrass	0.23
Rhynchospora fascicularis	fascicled beaksedge	0.20
Sphagnum sp.	sphagnum moss	0.17
Andropogon glomeratus	bushy bluestem	0.10
Lyonia lucida	fetterbush	0.10
Pinus elliottii	slash pine	0.10
Rhynchospora cephalantha	bunched beaksedge	0.10
Xyris ambigua	coastalplain yellow-eyed grass	0.10
Euthamia caroliniana	slender flattop goldenrod	0.03

Hypericum cistifolium	roundpod St. John's wort	0.03
Hypericum hypericoides	St. Andrew's cross	0.03
Oldenlandia uniflora	clustered mille graines	0.03
Rhexia virginica	handsome harry	0.03
Rubus pensilvanicus	sawtooth blackberry	0.03
Coleataenia anceps	beaked panicum	0.03
Bare Ground		30.67

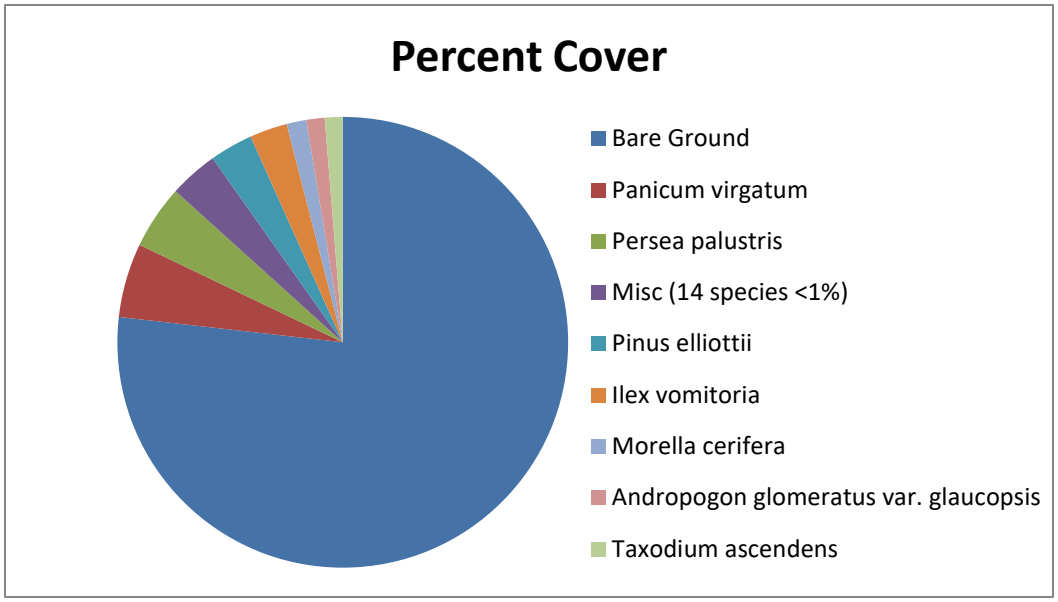


Figure DW-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 4.

Table DW-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 4 sampled on October 21, 2020.

Scientific name	Common name	Average percent cover per quadrat
Panicum virgatum	switchgrass	5.27
Persea palustris	swamp bay	4.53
Pinus elliottii	slash pine	3.07
Ilex vomitoria	yaupon	2.67
Morella cerifera	southern bayberry	1.40
Andropogon glomeratus var. *glaucopsis*	purple bluestem	1.30
Taxodium ascendens	pond cypress	1.27
Nyssa biflora	swamp tupelo	0.73
Andropogon virginicus	broomsedge bluestem	0.60
Osmunda cinnamomea	cinnamon fern	0.50
Amphicarpum muehlenbergianum	blue maidencane	0.30
Paspalum floridanum	Florida paspalum	0.30
Toxicodendron radicans	eastern poison ivy	0.27
Cladium jamaicense	sawgrass	0.17
Spartina patens	saltmeadow cordgrass	0.17

Scientific name	Common name	Average percent cover per quadrat
Osmunda regalis var. *spectabilis*	royal fern	0.13
Centella asiatica	spadeleaf	0.10
Woodwardia virginica	Virginia chain fern	0.10
Acer rubrum	red maple	0.03
Carex glaucescens	clustered sedge	0.03
Ilex glabra	gallberry	0.03
Bare Ground		76.00

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 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 state-listed endangered whitetop pitcherplant has been seen in prior years and was also observed during this survey. The total number of plant species observed in this community was 117 (Table DW-1).

Quantitative sampling. The southern Transect 2 (Table DW-4, Figure DW-4) had a total of 30 species and 79% 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. Herbs had not had time to recover and formed only a miniscule cover. Woody species made up about 2% average cover per quadrat. In 2020, the habitat is still very open, but shrub and herb cover is increasing, now at 16% and 5%, respectively. And overall diversity is much higher, from 13 species last year to 30 this year.

The northern Transect 3 (Table DW-5, Figure DW-5) had a total of 56 species and 26% bare ground. Laurel greenbrier, woolly witchgrass, tenangle pipewort, and sweetbay contributed the most cover. Woody species made up about 29% average cover per quadrat. Other than a decrease in woolly witchgrass cover, vegetation along the transect is very similar to last year. The state listed endangered whitetop pitcher plant was seen again this year along this transect.

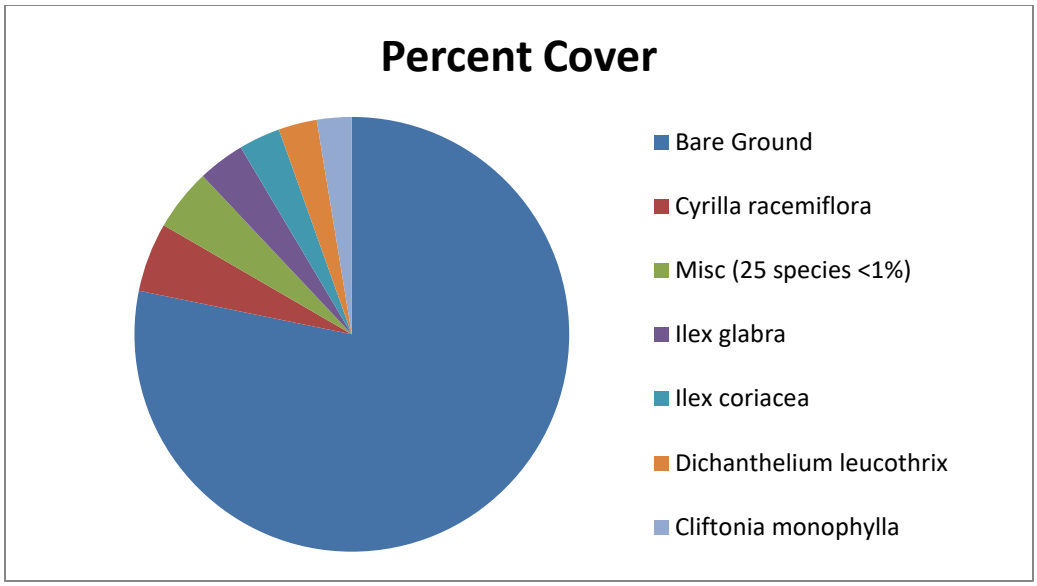


Figure DW-4. Percent cover of plant species in Hydric Pine Savanna Transect 2.

Table DW-4. Percent cover of species in Hydric Pine Savanna Transect 2 sampled on October 21, 2020.

Scientific name	Common name	Average percent cover per quadrat
Cyrilla racemiflora	titi	5.17
Ilex glabra	gallberry	3.50
Ilex coriacea	large gallberry	3.10
Dichanthelium leucothrix	rough witchgrass	2.87
Cliftonia monophylla	black titi	2.60
Coleataenia anceps	beaked panicum	0.53
Andropogon glomeratus var. *glaucopsis*	purple bluestem	0.50
Nyssa biflora	swamp tupelo	0.50
Vaccinium corymbosum	highbush blueberry	0.50
Aristida stricta	wiregrass	0.23
Eriocaulon decangulare	tenangle pipewort	0.23
Kellochloa verrucosa	warty panicgrass	0.23
Persea palustris	swamp bay	0.23
Vitis rotundifolia	muscadine	0.23
Gaylussacia mosieri	woolly huckleberry	0.20
Lachnanthes caroliana	Carolina redroot	0.17
Rhynchospora chapmanii	Chapman's beaksedge	0.17
Lyonia lucida	fetterbush	0.13
Smilax laurifolia	laurel greenbrier	0.13
Lachnocaulon anceps	whitehead bogbutton	0.10
Smilax glauca	cat greenbrier	0.10
Woodwardia virginica	Virginia chain fern	0.10
Andropogon virginicus	broomsedge bluestem	0.07
Aronia arbutifolia	red chokeberry	0.07
Ilex cassine	dahoon	0.03

Scientific name	Common name	Average percent cover per quadrat
Oldenlandia uniflora	clustered mille graines	0.03
Pteridium aquilinum	bracken fern	0.03
Rhexia petiolata	fringed meadowbeauty	0.03
Rhynchospora cephalantha	bunched beaksedge	0.03
Rhynchospora gracilenta	slender beaksedge	0.03
Bare Ground		78.50

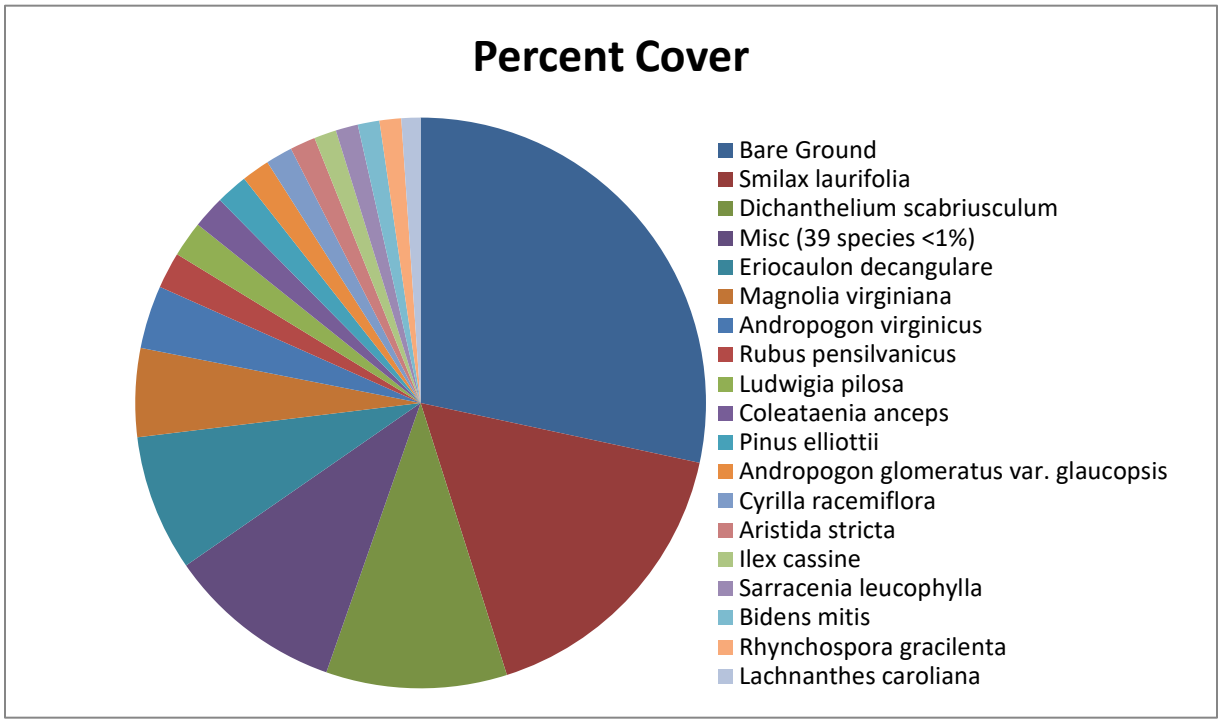


Figure DW-5. Percent cover of plant species in Hydric Pine Savanna Transect 3.

Table DW-5. Percent cover of plant species in Hydric Pine Savanna Transect 3 sampled on October 21, 2020.

Scientific name	Common name	Average percent cover per quadrat
Smilax laurifolia	laurel greenbrier	15.47
Dichanthelium scabriusculum	woolly witchgrass	9.47
Eriocaulon decangulare	tenangle pipewort	7.13
Magnolia virginiana	sweetbay	4.63
Andropogon virginicus	broomsedge bluestem	3.30
Rubus pensilvanicus	sawtooth blackberry	1.90
Ludwigia pilosa	hairy primrosewillow	1.87
Coleataenia anceps	beaked panicum	1.70
Pinus elliottii	slash pine	1.67
Andropogon glomeratus var. *glaucopsis*	purple bluestem	1.47
Cyrilla racemiflora	titi	1.40

Scientific name	Common name	Average percent cover per quadrat
Aristida stricta	wiregrass	1.33
Ilex cassine	dahoon	1.17
Sarracenia leucophylla	white-top pitcherplant	1.17
Bidens mitis	smallfruit beggarticks	1.13
Rhynchospora gracilenta	slender beaksedge	1.13
Lachnanthes caroliana	Carolina redroot	1.00
Euthamia caroliniana	slender flattop goldenrod	0.90
Ilex coriacea	large gallberry	0.73
Cliftonia monophylla	black titi	0.60
Rhynchospora rariflora	fewflower beaksedge	0.60
Lycopus rubellus	taperleaf waterhorehound	0.57
Taxodium ascendens	pond cypress	0.53
Anthaenantia rufa	purple silkyscale	0.50
Pluchea foetida	stinking camphorweed	0.50
Sphagnum sp.	sphagnum moss	0.50
Hypericum brachyphyllum	coastalplain St. John's wort	0.37
Dichanthelium ensifolium	cypress witchgrass	0.33
Rhynchospora fascicularis	fascicled beaksedge	0.33
Aristida palustris	longleaf threeawn	0.23
Eupatorium pilosum	rough boneset	0.23
Morella cerifera	southern bayberry	0.23
Osmunda regalis var. *spectabilis*	royal fern	0.23
Ilex glabra	gallberry	0.20
Ludwigia linifolia	southeastern primrosewillow	0.20
Rhynchospora sp.	beaksedge	0.20
Mikania scandens	climbing hempvine	0.17
Woodwardia areolata	netted chain fern	0.17
Carex verrucosa	warty sedge	0.10
Eleocharis tuberculosa	conecup spikerush	0.10
Fuirena breviseta	saltmarsh umbrellasedge	0.10
Aronia arbutifolia	red chokeberry	0.07
Eleocharis sp.	spikerush	0.07
Oldenlandia uniflora	clustered mille graines	0.07
Drosera capillaris	pink sundew	0.03
Erigeron vernus	early whitetop fleabane	0.03
Eupatorium mohrii	Mohr's thoroughwort	0.03
Hyptis alata	clustered bushmint	0.03
Kellochloa verrucosa	warty panicgrass	0.03
Nyssa biflora	swamp tupelo	0.03
Proserpinaca pectinata	combleaf mermaidweed	0.03
Rhynchospora glomerata	clustered beaksedge	0.03
Scleria sp.	nutrush	0.03
Smilax walteri	coral greenbrier	0.03
Vaccinium corymbosum	highbush blueberry	0.03
Xyris fimbriata	fringed yellow-eyed grass	0.03
Bare Ground		26.20

Bay Swamp

Qualitative sampling. An area of Bay Swamp south of the Hydric Pine Savanna Transect 2 was sampled in fall 2020. 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, the Perdido River can now be seen through the open canopy. There is a seepy ecotone from the Hydric Pine Savanna to the swamp that was more herbaceous with wiregrass. However, the majority of the community was more of 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. The stunted canopy was around 25% cover and composed of slash pine, pond cypress, and swamp tupelo to about 45 feet tall. A subcanopy and tall shrub layer mostly around 15 feet tall made up about 45% cover and was composed of canopy species plus red maple, sweetbay, southern bayberry, and swamp bay. The short shrub (under 6 feet tall) layer made up around 25% cover and was composed of black titi, southern bayberry, and swamp bay. The patchy herbaceous layer was around 50% cover and consisted mostly of sawgrass, cinnamon fern, and clustered sedge. While walking across the area of bay swamp where an old road was removed for hydrology restoration, a few stems of the state-listed endangered Panhandle lily were seen in fruit. This is the same clump that was observed in 2019. The total number of species observed in this community was 81 (Table DW-1).

Mesic Flatwoods

Qualitative sampling. Several areas of Mesic Flatwoods were sampled on the eastern side of the property along the main road through the Dutex West property (Figure DW-1). These areas had 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. In the flatwoods located southwest of the Hydric Pine Flatwoods Transect 1, wiregrass was common, along with weedy species, such as purple bluestem, and typical flatwoods species. Flatwoods on the southwest side of the road had recently been chopped, and thus had less herbaceous cover. The total number of species observed in this community was 114 (Table DW-1).

Freshwater Marsh

Qualitative sampling. The Freshwater Marsh target community was accessed east of the Hydric Pine Flatwoods 4 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 32 (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 or saltmarsh cordgrass with patches of needle rush. Small patches of shrubs throughout formed about 10% cover with most shrubs up to around 9 feet tall. These consisted of southern bayberry and swamp bay. The invasive exotic species Japanese climbing fern (*Lygodium japonicum*) and Chinese tallow tree have been observed in prior years invading in the ecotone between the hydric pine flatwoods and the salt marsh, but were not seen this year. However, a small individual of the invasive purple sesban, known from freshwater marsh on the site, was documented in the salt marsh ecotone this year. The total number of species observed in this community was 34 (Table DW-1).

Yellow River Ranch

Qualitative and Quantitative Monitoring

October 2020

Yellow River Ranch
Qualitative and Quantitative Monitoring
October 2020

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 NWFWMD 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 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. For the Hydric Pine Flatwoods Transect 2, we were unable to find the start post, so we re-established the beginning point of the transect. The end post and last years flagging were found.

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 Camille Eckel on October 22, 2020.

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 (NWFWMD). 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.

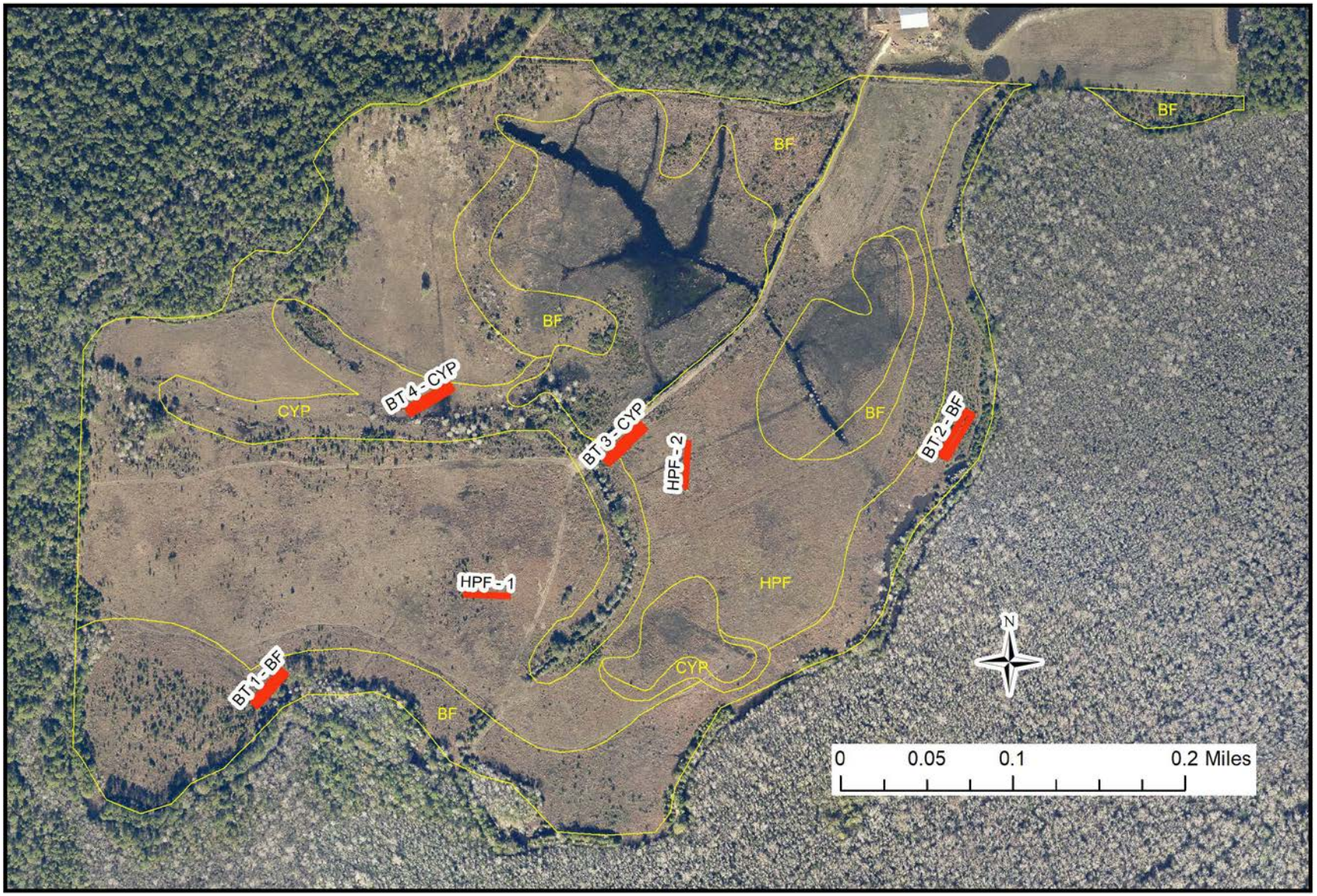


Figure YRR-1. Location of permanent transects at Yellow River Ranch. HPF=Hydric Pine Flatwoods, CYP=Cypress, BF=Bottomland Forest, BT=Belt Transect.

RESULTS AND DISCUSSION

A total of 91 plant taxa were recorded during the Fall 2020 monitoring in Hydric Pine Flatwoods at Yellow River Ranch (Table YRR-1). Eleven new taxa were recorded during the 2020 monitoring.

Table YRR-1. Plant species observed in Hydric Pine Flatwoods at Yellow River Ranch Mitigation Site on October 22, 2020. (bold name = new species)

Scientific Name	Common Name
Acer rubrum	red maple
Andropogon glomeratus var. glaucopsis	purple bluestem
Andropogon virginicus	broomsedge bluestem
Aristida stricta	wiregrass
Baccharis halimifolia	groundsel tree
Bidens mitis	smallfruit beggarticks
Carex glaucescens	clustered sedge
Carex verrucosa	warty sedge
Centella asiatica	spadeleaf
Cephalanthus occidentalis	common buttonbush
Chamaecrista fasciculata	partridge pea
Chamaecyparis thyoides	Atlantic white cedar
Coleataenia anceps	beaked panicum
Coleataenia longifolia	ciliate redtop panicum
Ctenium aromaticum	toothache grass
Cuphea carthagenensis	Colombian waxweed
Cyrilla racemiflora	titi
Dichanthelium scabriusculum	woolly witchgrass
Dichanthelium sp.	witchgrass
Diodia virginiana	Virginia buttonweed
Diospyros virginiana	common persimmon
Eleocharis baldwinii	Baldwin's spikerush
Eleocharis tuberculosa	conecup spikerush
Eragrostis elliottii	Elliott's lovegrass
Eriocaulon decangulare	tenangle pipewort
Eupatorium capillifolium	dogfennel
Eupatorium mohrii	Mohr's thoroughwort
Eupatorium pilosum	rough boneset
Eupatorium semiserratum	smallflower thoroughwort
Euthamia caroliniana	slender flattop goldenrod
Euthamia graminifolia	flattop goldenrod
Fraxinus caroliniana	Carolina ash
Helianthus angustifolius	narrowleaf sunflower
Houstonia procumbens	roundleaf bluet
Hydrocotyle umbellata	manyflower marshpennywort

Scientific Name	Common Name
Hypericum brachyphyllum	coastalplain St. John's wort
Hypericum cistifolium	roundpod St. John's wort
Hypericum crux-andreae	St. Peter's wort
Hypericum fasciculatum	peelbark St. John's wort
Hypericum hypericoides	St. Andrew's cross
Hypericum mutilum	dwarf St. John's wort
Hypoxis juncea	fringed yellow stargrass
Hyptis alata	clustered bushmint
Ilex cassine var. myrtifolia	myrtle-leaved holly
Ilex coriacea	large gallberry
Ilex glabra	gallberry
Ilex opaca	American holly
Ilex verticillata	common winterberry
Ilex vomitoria	yaupon
Juncus effusus ssp. solutus	soft rush
Juncus marginatus	grassleaf rush
Kellochloa verrucosa	warty panicgrass
Lachnanthes caroliana	Carolina redroot
Lobelia brevifolia	shortleaf lobelia
Ludwigia pilosa	hairy primrosewillow
Lycopus rubellus	taperleaf waterhorehound
Magnolia virginiana	sweetbay
Morella cerifera	southern bayberry
Nyssa biflora	swamp tupelo
Oldenlandia uniflora	clustered mille graines
Paspalum setaceum	thin paspalum
Persea palustris	swamp bay
Persicaria punctata	dotted smartweed
Phyla nodiflora	turkey tangle fogfruit
Pinus elliottii	slash pine
Pluchea baccharis	rosy camphorweed
Polypremum procumbens	rustweed
Proserpinaca pectinata	combleaf mermaidweed
Rhexia mariana	pale meadowbeauty
Rhexia nuttallii	Nuttall's meadowbeauty
Rhexia virginica	handsome harry
Rhynchospora cephalantha	bunched beaksedge
Rhynchospora elliottii	Elliott's beaksedge
Rhynchospora plumosa	plumed beaksedge
Rhynchospora rariflora	fewflower beaksedge
Rhynchospora sp.	beaksedge
Rubus cuneifolius	sand blackberry
Rubus pensilvanicus	sawtooth blackberry

Scientific Name	Common Name
Saccharum giganteum	sugarcane plumegrass
Scirpus cyperinus	woolgrass
Scleria ciliata	fringed nutrush
Smilax laurifolia	laurel greenbrier
Solidago fistulosa	pinebarren goldenrod
Sphagnum sp.	sphagnum moss
Symphyotrichum dumosum	rice button aster
Taxodium ascendens	pond cypress
Triadica sebifera	Chinese tallow tree
Viola lanceolata	bog white violet
Xyris ambigua	coastalplain yellow-eyed grass
Xyris brevifolia	shortleaf yellow-eyed grass
Xyris sp.	yellow-eyed grass
Total number of taxa: 91	

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, and swamp tupelo. The ground layer was mostly herbaceous and weedy with rice button aster, woolly witchgrass, slender flattop goldenrod, Carolina redroot, pinebarren goldenrod, and broomsedge bluestem. Wiregrass was present, but very sparse. The total number of species observed in this community was 91 (Table YRR-1).

Quantitative sampling. The western Transect 1 (Table YRR-2, Figure YRR-2) had a total of 46 species with 36% bare ground. Southern bayberry, sawtooth blackberry, Atlantic white cedar, rice button aster, Chinese tallow tree, and broomsedge bluestem contributed the most cover. Woody species made up about 49% average cover per quadrat. The invasive exotic Chinese tallow tree that was recorded last year in the quadrats at 100 and 140 feet was not found in the transect this year. Otherwise, vegetation along the the transect was fairly similar. Living blackberry was much reduced, but dead blackberry stems are still abundant.

The eastern Transect 2 (Table YRR-3, Figure YRR-3) had a total of 31 species with 25% bare ground. Woolly witchgrass, hairy primrosewillow, swamp tupelo, rice button aster, southern bayberry, and sugarcane plumegrass contributed the most cover. Woody species made up about 17% average cover per quadrat. Other than a reduction in woolly witchgrass cover, the vegetation was similar to last year.

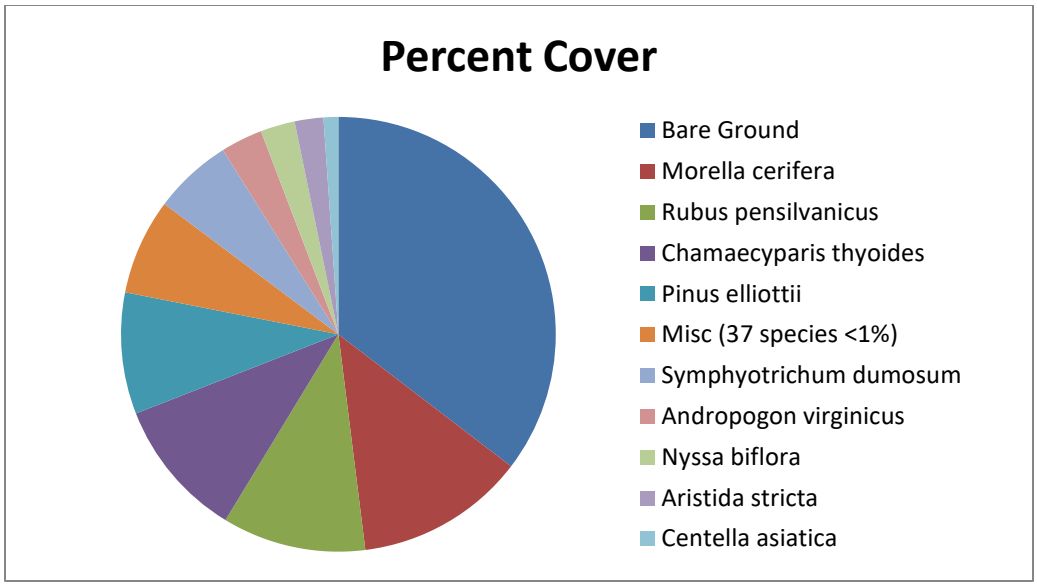


Figure YRR-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

Table YRR-2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 sampled on October 22, 2020.

Scientific name	Common name	Average percent cover per quadrat
Morella cerifera	southern bayberry	12.94
Rubus pensilvanicus	sawtooth blackberry	10.94
Chamaecyparis thyoides	Atlantic white cedar	10.63
Pinus elliottii	slash pine	9.25
Symphyotrichum dumosum	rice button aster	6.00
Andropogon virginicus	broomsedge bluestem	3.19
Nyssa biflora	swamp tupelo	2.63
Aristida stricta	wiregrass	2.19
Centella asiatica	spadeleaf	1.13
Acer rubrum	red maple	0.81
Dichanthelium scabriusculum	woolly witchgrass	0.63
Solidago fistulosa	pinebarren goldenrod	0.50
Ilex glabra	gallberry	0.44
Persea palustris	swamp bay	0.44
Rhexia virginica	handsome harry	0.44
Rhynchospora rariflora	fewflower beaksedge	0.44
Cuphea carthagenensis	Colombian waxweed	0.25
Hypericum crux-andreae	St. Peter's wort	0.25
Lachnanthes caroliana	Carolina redroot	0.25
Carex verrucosa	warty sedge	0.19
Coleataenia anceps	beaked panicum	0.19
Eragrostis elliottii	Elliott's lovegrass	0.19
Euthamia graminifolia	flattop goldenrod	0.19
Ilex vomitoria	yaupon	0.19
Lycopus rubellus	taperleaf waterhorehound	0.19

Paspalum setaceum	thin paspalum	0.19
Viola lanceolata	bog white violet	0.19
Euthamia caroliniana	slender flattop goldenrod	0.13
Hypericum cistifolium	roundpod St. John's wort	0.13
Lobelia brevifolia	shortleaf lobelia	0.13
Baccharis halimifolia	groundsel tree	0.06
Bidens mitis	smallfruit beggarticks	0.06
Diodia virginiana	Virginia buttonweed	0.06
Hydrocotyle umbellata	manyflower marshpennywort	0.06
Hypericum mutilum	dwarf St. John's wort	0.06
Hypoxis juncea	fringed yellow stargrass	0.06
Hypericum brachyphyllum	coastalplain St. John's wort	0.06
Juncus marginatus	grassleaf rush	0.06
Kellochloa verrucosa	warty panicgrass	0.06
Oldenlandia uniflora	clustered mille graines	0.06
Phyla nodiflora	turkey tangle fogfruit	0.06
Polypremum procumbens	rustweed	0.06
Scleria ciliata	fringed nutrush	0.06
Xyris ambigua	coastalplain yellow-eyed grass	0.06
Xyris brevifolia	shortleaf yellow-eyed grass	0.06
Xyris sp.	yellow-eyed grass	0.06
Bare Ground		36.25

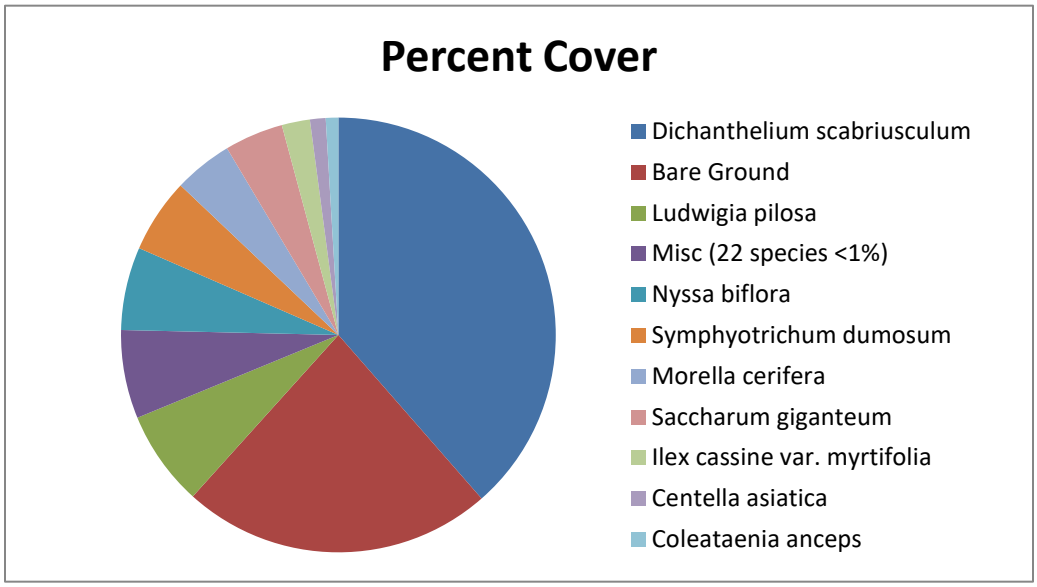


Figure YRR-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2.

Table YRR-3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 sampled on October 22, 2020.

Scientific name	Common name	Average percent cover per quadrat
Dichanthelium scabriusculum	woolly witchgrass	41.38
Ludwigia pilosa	hairy primrosewillow	7.63

Scientific name	Common name	Average percent cover per quadrat
Nyssa biflora	swamp tupelo	6.63
Symphyotrichum dumosum	rice button aster	5.94
Morella cerifera	southern bayberry	4.69
Saccharum giganteum	sugarcane plumegrass	4.69
Ilex cassine var. *myrtifolia*	myrtle-leaved holly	2.25
Centella asiatica	spadeleaf	1.25
Coleataenia anceps	beaked panicum	1.00
Ilex glabra	gallberry	0.94
Pinus elliottii	slash pine	0.94
Triadica sebifera	Chinese tallow tree	0.94
Rubus pensilvanicus	sawtooth blackberry	0.63
Euthamia caroliniana	slender flattop goldenrod	0.56
Lachnanthes caroliana	Carolina redroot	0.56
Acer rubrum	red maple	0.44
Rhynchospora plumosa	plumed beaksedge	0.25
Rhynchospora sp.	beaksedge	0.25
Andropogon glomeratus var. *glaucopsis*	purple bluestem	0.19
Bidens mitis	smallfruit beggarticks	0.19
Persicaria punctata	dotted smartweed	0.19
Rhexia virginica	handsome harry	0.19
Rhynchospora rariflora	fewflower beaksedge	0.19
Eragrostis elliottii	Elliott's lovegrass	0.13
Viola lanceolata	bog white violet	0.13
Andropogon virginicus	broomsedge bluestem	0.06
Dichanthelium sp.	witchgrass	0.06
Eupatorium capillifolium	dogfennel	0.06
Eupatorium pilosum	rough boneset	0.06
Hydrocotyle umbellata	manyflower marshpennywort	0.06
Xyris brevifolia	shortleaf yellow-eyed grass	0.06
Bare Ground		24.81

Bottomland Forest

Quantitative sampling. Belt transect 1 contained a mix of mostly red maple, slash pine, and pond cypress, with a few additional species occurring only occasionally (Table YRR-4). While slash pines and pond cypress were mostly taller, red maples in the transect were mostly small, regenerating saplings. Both bald cypress and pond cypress stems were recorded this year, in contrast to prior years where all cypress stems were considered to be pond cypress. Also, two stems of the invasive exotic Chinese tallow tree were recorded along the transect for the first time. There was a small increase in the number of stems.

Belt Transect 2 consisted of a mix of larger Atlantic white cedars with many small, regenerating red maples (Table YRR-5). This transect has a dense thicket of sawtooth blackberry, and was difficult to traverse and spot saplings. At the southeast corner of the transect, several mature trees had been mechanically pushed down, so the number of large Atlantic white cedars was reduced from last year.

Cypress

Quantitative sampling. Belt transect 3 was moved to a new location based on information provided by project manager David Clayton (NWFWMD). This transect is now 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 increased this year. Most of this increase is probably attributable to better detection as well as an increase in young red maples.

Belt Transect 4 was quite open and contained almost exclusively young pond cypress with only two other stems taller than 6 feet, one swamp tupelo and one slash pine (Table YRR-7). Cypress on the transect appear to be maturing well, with an increase in larger stems compared to last year. Several red maples and a single swamp bay were seen for the first time along this transect this year.

Table YRR-4. Belt Transect Summary for Bottomland Forest Transect 1 sampled on October 22, 2020.

Belt Transect Summary for Bottomland Forest Transect 1 (YYR-BT1-630)									
		Height Scale (feet)							
Species	**Total Number**	**0-1'**	**>1'-2'**	**>2'-3'**	**>3'-4'**	**>4'-5'**	**>5'-6'**	**>6'**	**Condition**
Acer rubrum	260	21	28	64	74	25	14	34	
Cephalanthus occidentalis	13				2			11	
Chamaecyparis thyoides	2				1		1		
Ilex myrtifolia	0								
Nyssa biflora	17			1		5	6	5	
Pinus elliottii	73							73	
Styrax americana	52	51						1	
Taxodium ascendens	11							11	
Taxodium distichum	27		2	1	6	1	1	16	
Triadica sebifera	2		1			1			new in plot
Ilex verticillata	0								
Total Number All Species	457								
Number of Stems/Acre	6526								

Table YRR-5. Belt Transect Summary for Bottomland Forest Transect 2 sampled on October 22, 2020.

Belt Transect Summary for Bottomland Forest Transect 2 (YYR-BT2-630)									
		Height Scale (feet)							
Species	**Total Number**	**0-1'**	**>1'-2'**	**>2'-3'**	**>3'-4'**	**>4'-5'**	**>5'-6'**	**>6'**	**Condition**
Acer rubrum	51	18	8	4	8	4	1	8	
Chamaecyparis thyoides	27		1					26	Several trees pushed down on SE edge of plot
Diospyros virginiana	1	1							
Ilex opaca	2							2	
Juniperus virginiana	1							1	
Magnolia virginiana	2							2	
Nyssa biflora	0								
Pinus palustris	1							1	
Pinus elliottii	1							1	
Quercus laurifolia	4							4	
Sapium sebiferum	3			1		1		1	
Taxodium ascendens	3				3				
Persea palustris	0								
Fraxinus caroliniana	1					1			
Total Number All Species	97								
Number of Stems/Acre	1385								

Table YRR-6. Belt Transect Summary for Cypress Transect 3 sampled on October 22, 2020.

Belt Transect Summary for Cypress Transect 3 (YYR-BT3-621)									
		Height Scale (feet)							
Species	**Total Number**	**0-1'**	**>1'-2'**	**>2'-3'**	**>3'-4'**	**>4'-5'**	**>5'-6'**	**>6'**	**Condition**
Acer rubrum	60	8	3	14	15	7	4	9	
Chamaecyparis thyoides	35				4	2	4	25	
Ilex myrtifolifa	12						2	10	
Ilex verticillata	2				5		1		
Magnolia virginiana	13				2	1		10	
Nyssa biflora	303				6	7	11	279	
Pinus elliottii	16			1			1	14	
Taxodium ascendens	71				1	1	3	66	
Triadica sebifera	1							1	
Total Number All Species	513								
Number of Stems/Acre	7326								

Table YRR-7. Belt Transect Summary for Cypress Transect 4 sampled October 22, 2020.

Belt Transect Summary for Cypress Transect 4 (YYR-BT4-621)									
		Height Scale (feet)							
Species	**Total Number**	**0-1'**	**>1'-2'**	**>2'-3'**	**>3'-4'**	**>4'-5'**	**>5'-6'**	**>6'**	**Condition**
Magnolia virginiana	1				1				
Nyssa biflora	36	2	3	11	15	2	2	1	
Pinus elliottii	2	1						1	
Taxodium ascendens	149	1		7	19	7	22	93	
Acer rubrum	13	2			10	1			
Persea palustris	1				1				
Chamaecyparis thyoides	2				2				
Total Number All Species	204								
Number of Stems/Acre	2913								