Vegetation Monitoring at Yellow River Ranch Northwest Florida Water Management District Mitigation Site

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Florida State University

Yellow River Ranch
Qualitative and Quantitative Monitoring
November 2023

INTRODUCTION

The Yellow River Ranch consists of 275 acres in Santa Rosa County managed by the Northwest Florida Water Management District (Figure 1). 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 2). Quantitative and qualitative monitoring was used to document the current plant species composition and vegetation structure of Hydric Pine Flatwoods, and belt transects were used to measure tree species composition and structure in restoration Bottomland Forest and Cypress areas with planted saplings. FNAI began annual monitoring in October 2018. Prior to 2018, the site vegetation was monitored by Ecological Resource Consultants, Inc. (ERC).

METHODS

The quantitative monitoring utilized 150-foot long permanent transect lines previously marked with metal posts in surveys conducted by Ecological Resource Consultants (ERC). Two transects were located in the Hydric Pine Flatwoods target community (Figure 2). 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 up to 2 m tall. Plant cover estimates were converted to mid-point values and averaged across each transect. Relative cover (in which all plant cover and bare ground is given as a proportion of 100 percent cover) was also calculated and is reported in separate pie charts.

To measure the success of tree plantings, two belt transects were established in Cypress and two in Bottomland Forest. Within each 20 by 150-foot transect, all tree species were tallied by height class. Total trees per acre were calculated by multiplying the tally by 14.28. Transect corners were previously marked with metal posts by ERC. Belt Transect #3 in Cypress was moved to a new location in 2018 on the recommendation of project manager David Clayton (NWFWMD).

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, Allie Heiker, and Ethan Hughes on November 27, 2023.

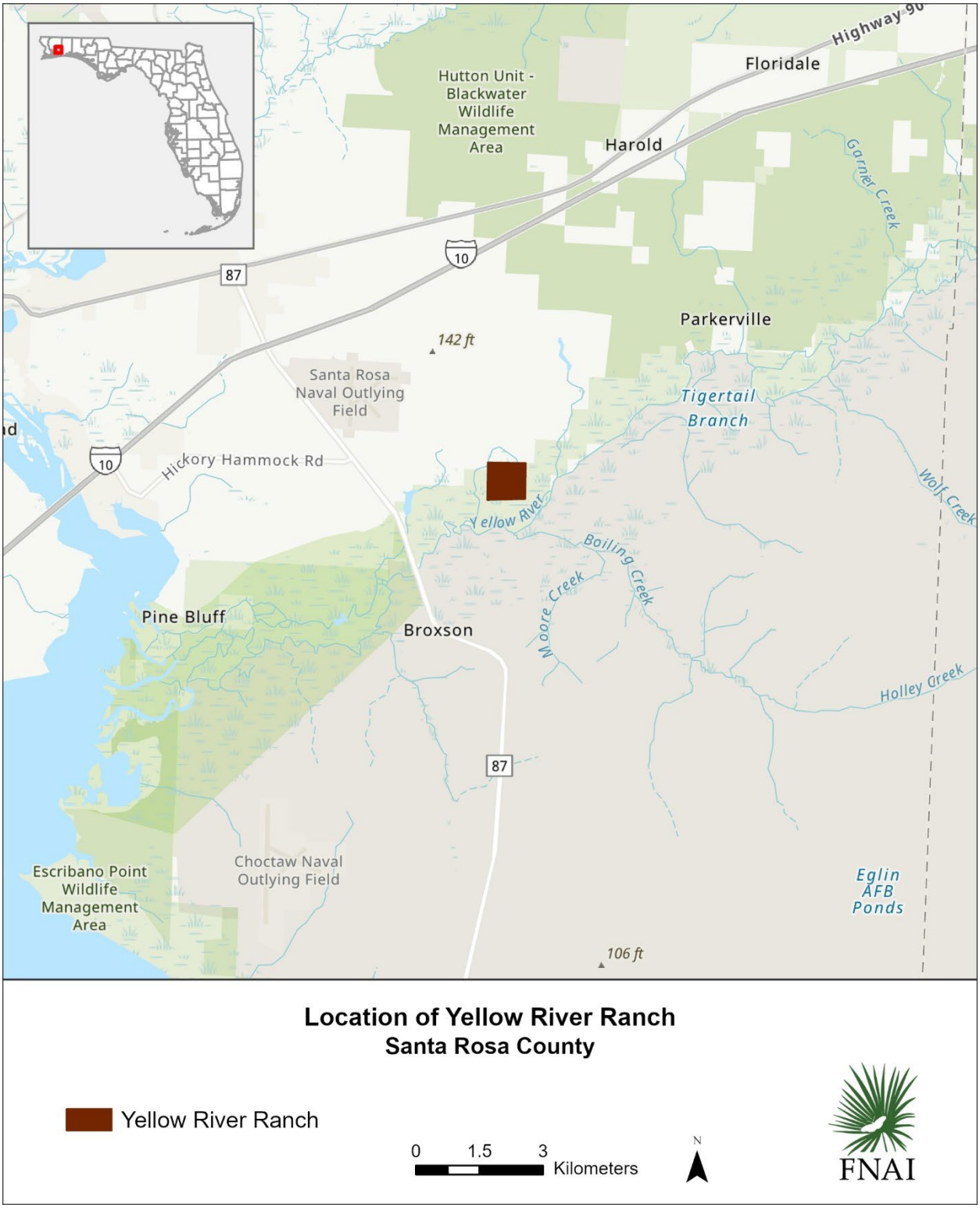

Figure 1. Location map of Yellow River Ranch mitigation site monitored by FNAI.

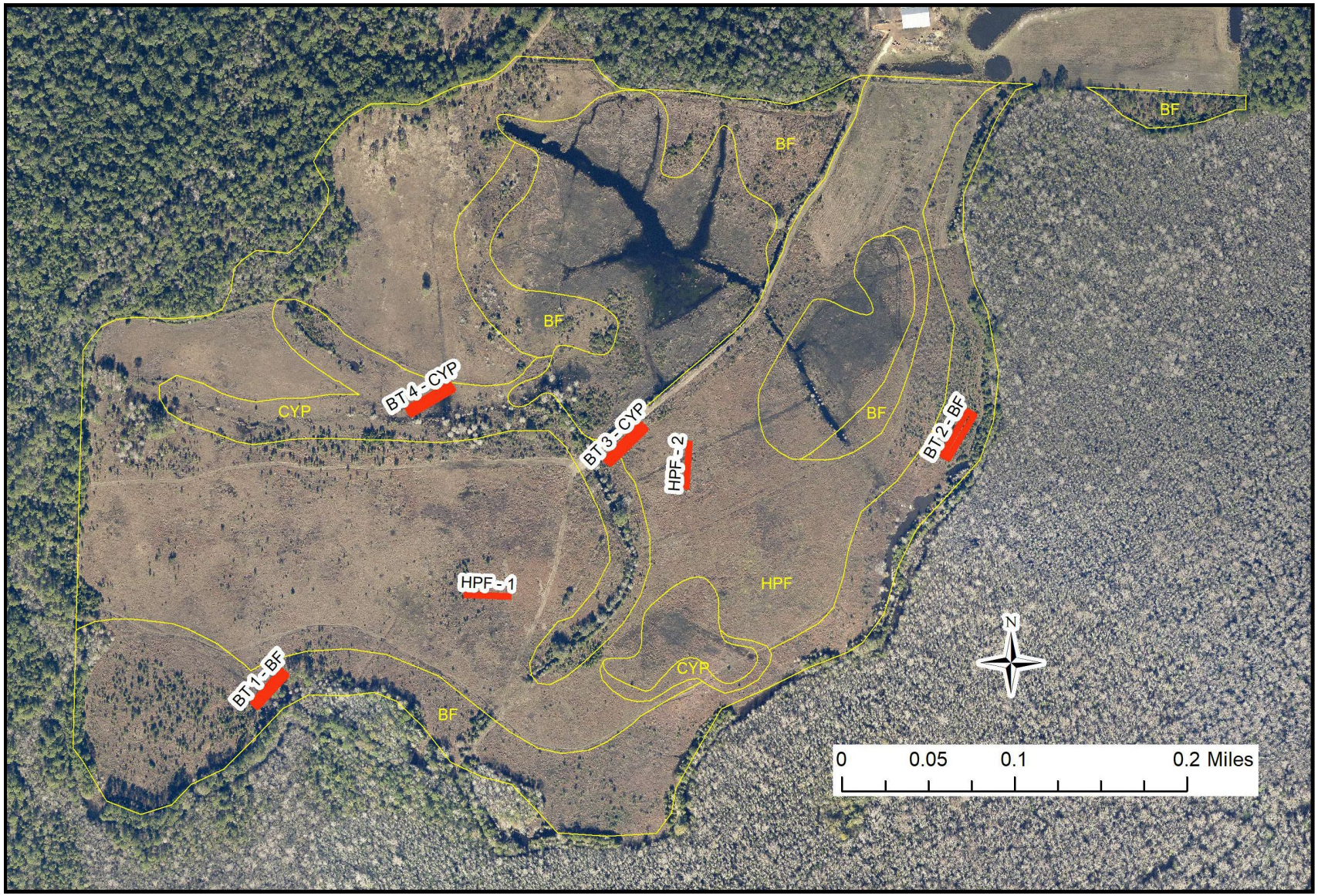

Figure 2. Location of permanent transects at Yellow River Ranch. HPF=Hydric Pine Flatwoods, CYP=Cypress, BF=Bottomland Forest, BT=Belt Transect.

RESULTS AND DISCUSSION

A total of 99 plant taxa were recorded during the Fall 2023 monitoring in Hydric Pine Flatwoods at Yellow River Ranch (Table 1). Thirteen new taxa were recorded during the 2023 monitoring. 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.

Table 1. Plant species observed in Hydric Pine Flatwoods at Yellow River Ranch Mitigation Site on November 27, 2023. (bold name = new species; * = state-listed endangered or threatened; † = non-native invasive)

Scientific Name	Common Name
Acer rubrum	red maple
Andropogon glomeratus	bushy bluestem
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
Centella asiatica	spadeleaf
Chamaecyparis thyoides	Atlantic white cedar
†***Cinnamomum camphora***	camphor tree
Coleataenia anceps	beaked panicum
Coleataenia longifolia	ciliate redtop panicum
Cornus foemina	swamp dogwood
Ctenium aromaticum	toothache grass
Cuphea carthagenensis	Colombian waxweed
Cyperus haspan	haspan flatsedge
Cyrilla racemiflora	titi
Dichanthelium leucothrix	rough witchgrass
Dichanthelium scabriusculum	woolly witchgrass
Dichanthelium sphaerocarpon	roundseed witchgrass
Dichanthelium strigosum	roughhair witchgrass
Dichondra carolinensis	Carolina ponysfoot
Eleocharis equisetoides	jointed spikerush
Eleocharis tuberculosa	conecup spikerush
Eragrostis elliottii	Elliott's lovegrass
Eriocaulon decangulare	tenangle pipewort
Eupatorium capillifolium	dogfennel
Eupatorium semiserratum	smallflower thoroughwort
Eupatorium serotinum	lateflowering thoroughwort
Euthamia caroliniana	slender flattop goldenrod
Euthamia graminifolia	flattop goldenrod
Fraxinus caroliniana	Carolina ash

Scientific Name	Common Name
Fuirena breviseta	saltmarsh umbrellasedge
Gelsemium sempervirens	yellow jessamine
Helianthus angustifolius	narrowleaf sunflower
Hypericum brachyphyllum	coastalplain 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 nitidum	Carolina St. John's wort
Hyptis alata	clustered bushmint
Ilex cassine var. *myrtifolia*	myrtle-leaved holly
Ilex glabra	gallberry
Ilex vomitoria	yaupon
Juncus dichotomus	forked rush
Juncus effusus ssp. *solutus*	soft rush
Juncus marginatus	grassleaf rush
Juncus scirpoides	needlepod rush
Lachnanthes caroliana	Carolina redroot
†*Ligustrum sinense*	Chinese privet
Ludwigia pilosa	hairy primrosewillow
Lycopodiella alopecuroides	foxtail club-moss
Lycopus rubellus	taperleaf waterhorehound
†***Lygodium japonicum***	Japanese climbing fern
Magnolia virginiana	sweetbay
Mikania scandens	climbing hempvine
Mitreola sessilifolia	swamp hornpod
Morella cerifera	southern bayberry
moss	
Muhlenbergia capillaris* var. *trichopodes	cutover muhly
Nyssa biflora	swamp tupelo
Oldenlandia uniflora	clustered mille graines
Osmunda regalis var. *spectabilis*	royal fern
Paspalum notatum	bahiagrass
Paspalum setaceum	thin paspalum
Persea palustris	swamp bay
Pinus elliottii	slash pine
Pinus palustris	longleaf pine
Pluchea baccharis	rosy camphorweed
Pluchea sp.	camphorweed
Pontederia cordata	pickerelweed
Proserpinaca pectinata	combleaf mermaidweed
Pseudognaphalium obtusifolium	sweet everlasting
Quercus laurifolia	swamp laurel oak
Rhexia virginica	handsome harry
Rhynchospora chalarocephala	loosehead beaksedge

Scientific Name	Common Name
Rhynchospora fascicularis	fascicled beaksedge
Rhynchospora inundata	narrowfruit horned beaksedge
Rhynchospora microcarpa	southern beaksedge
Rhynchospora rariflora	fewflower beaksedge
Rubus pensilvanicus	sawtooth blackberry
Sabal palmetto	cabbage palm
Saccharum giganteum	sugarcane plumegrass
Scirpus cyperinus	woolgrass
Scleria ciliata	fringed nutrush
Scoparia dulcis	licoriceweed
Solidago canadensis var. *scabra*	Canada goldenrod
Solidago fistulosa	pinebarren goldenrod
Symphyotrichum dumosum	rice button aster
Taxodium ascendens	pond cypress
Taxodium distichum	bald cypress
Toxicodendron radicans	eastern poison ivy
†*Triadica sebifera*	Chinese tallow tree
Vaccinium elliottii	Elliott's blueberry
Viola lanceolata	bog white violet
Woodwardia areolata	netted chain fern
Xyris fimbriata	fringed yellow-eyed grass
Xyris stricta	pineland yellow-eyed grass
Total number of taxa: 99	

Hydric Pine Flatwoods

Qualitative sampling. The Hydric Pine Flatwoods in the vicinity of Transect 2 and near Belt Transect 2 was accessed to create a species list (Figure 2). This area had a very sparse canopy of young slash pines around 30 feet high. Shrubs have been growing quickly since the last fire. Common species included sawtooth blackberry, groundsel tree, southern bayberry, myrtle holly, gallberry, young slash pine, Atlantic white cedar, and swamp tupelo. The ground layer was mostly herbaceous and weedy with rice button aster, woolly witchgrass, Carolina redroot, beaksedges, and broomsedge bluestem. Wiregrass was present, but very sparse and concentrated in the western area. The non-native invasive Chinese tallow tree and Chinese privet have been observed in prior site visits and are still present. Two additional invasive species, Japanese climbing fern and camphor tree, were seen for the first time in 2023. The total number of species observed in this community was 99 (Table 1).

Quantitative sampling. The western Transect 1 (Figure 3, Table 2) had a total of 36 species with 42% bare ground. Atlantic white cedar, southern bayberry, slash pine, and sawtooth blackberry contributed the most cover. Woody species made up about 37% average cover per quadrat, similar to last year. Dead canes of blackberry are still common along the transect but were not counted as cover. Broomsedge bluestem, a dominant in 2022, was somewhat decreased this year. Otherwise, vegetation along the the transect was similar to last year.

The eastern Transect 2 (Figure 4, Table 3) had a total of 41 species with 19% bare ground. Woolly witchgrass, southern bayberry, myrtle-leaved holly, and rice button aster contributed the most cover. Woody species made up about 23% average cover per quadrat, a small increase compared to last year. Woolly witchgrass which had been decreasing in cover in 2020 and 2021, increased from 3% (in 2021) to 14% (in 2022) to 33% this year.

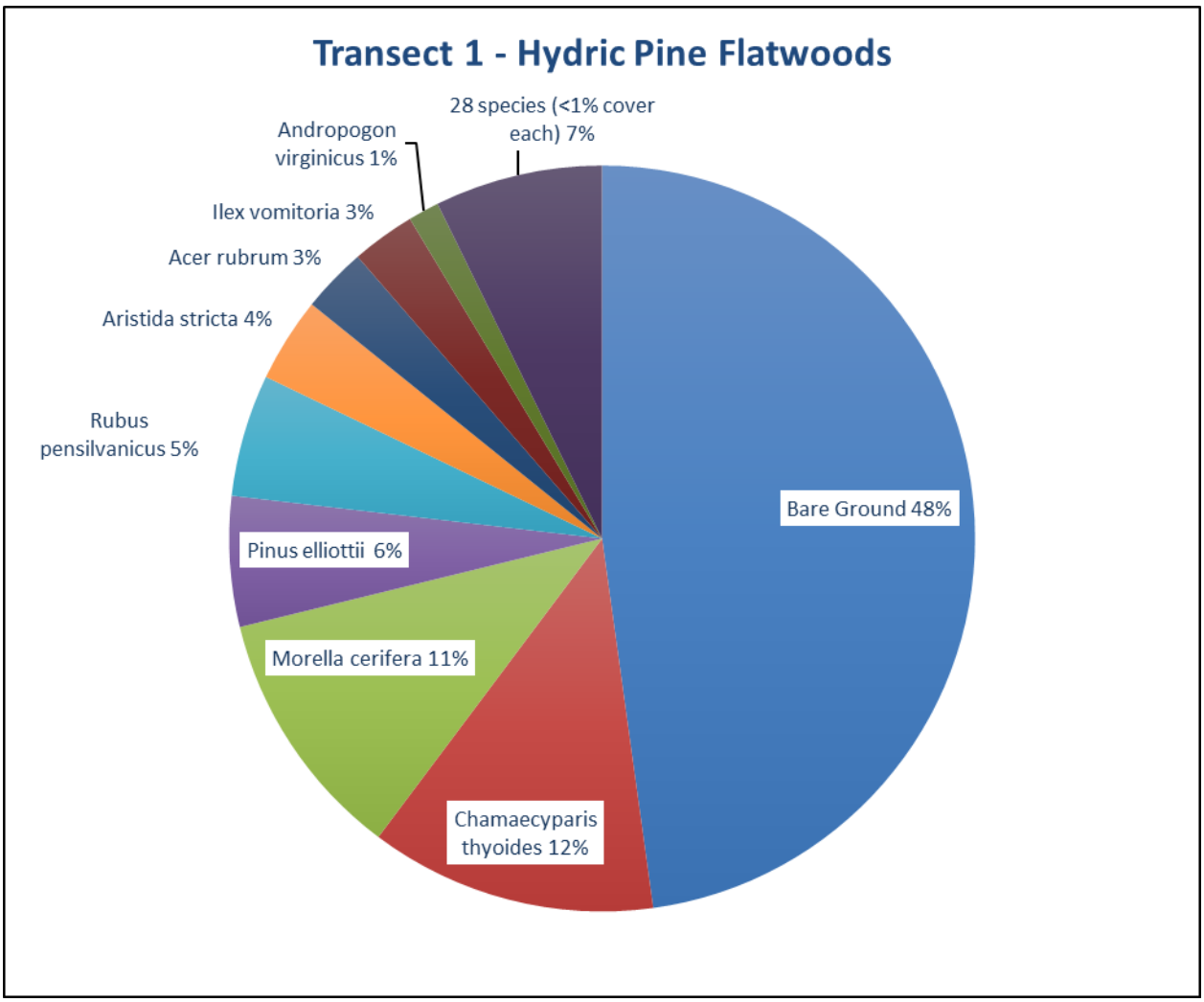

Figure 3. Percent relative cover of plant species in Hydric Pine Flatwoods Transect 1.

Table 2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 sampled on November 27, 2023.

Scientific name	Common name	Average percent cover per quadrat
Acer rubrum	red maple	2.50
Andropogon virginicus	broomsedge bluestem	1.19
Aristida stricta	wiregrass	3.25
Centella asiatica	spadeleaf	0.13
Chamaecyparis thyoides	Atlantic white cedar	11.00

Scientific name	Common name	Average percent cover per quadrat
Coleataenia anceps	beaked panicum	0.06
Cuphea carthagenensis	Colombian waxweed	0.19
Cyrilla racemiflora	titi	0.06
***Dichanthelium* sp.**	witchgrass	0.38
Dichondra carolinensis	Carolina ponysfoot	0.19
Eriocaulon decangulare	tenangle pipewort	0.06
Eupatorium capillifolium	dogfennel	0.63
Euthamia caroliniana	slender flattop goldenrod	0.19
Euthamia graminifolia	flattop goldenrod	0.44
***Hypericum* sp.**	St. John's wort	0.13
Ilex glabra	gallberry	0.38
Ilex vomitoria	yaupon	2.44
Juncus marginatus	grassleaf rush	0.06
Lachnanthes caroliana	Carolina redroot	0.88
Lycopus rubellus	taperleaf waterhorehound	0.06
Lygodium japonicum	Japanese climbing fern	0.06
Morella cerifera	southern bayberry	9.69
moss	unknown moss	0.06
Nyssa biflora	swamp tupelo	0.25
Oldenlandia uniflora	clustered mille graines	0.19
Osmunda regalis* var. *spectabilis	royal fern	0.06
Persea palustris	swamp bay	0.44
Pinus elliottii	slash pine	5.00
Rhexia virginica	handsome harry	0.19
Rhynchospora rariflora	fewflower beaksedge	0.19
Rubus pensilvanicus	sawtooth blackberry	4.69
Solidago fistulosa	pinebarren goldenrod	0.75
Symphyotrichum dumosum	rice button aster	0.25
Toxicodendron radicans	eastern poison ivy	0.06
Viola lanceolata	bog white violet	0.06
***Xyris* sp.**	yellow-eyed grass	0.06
Bare Ground		42.31

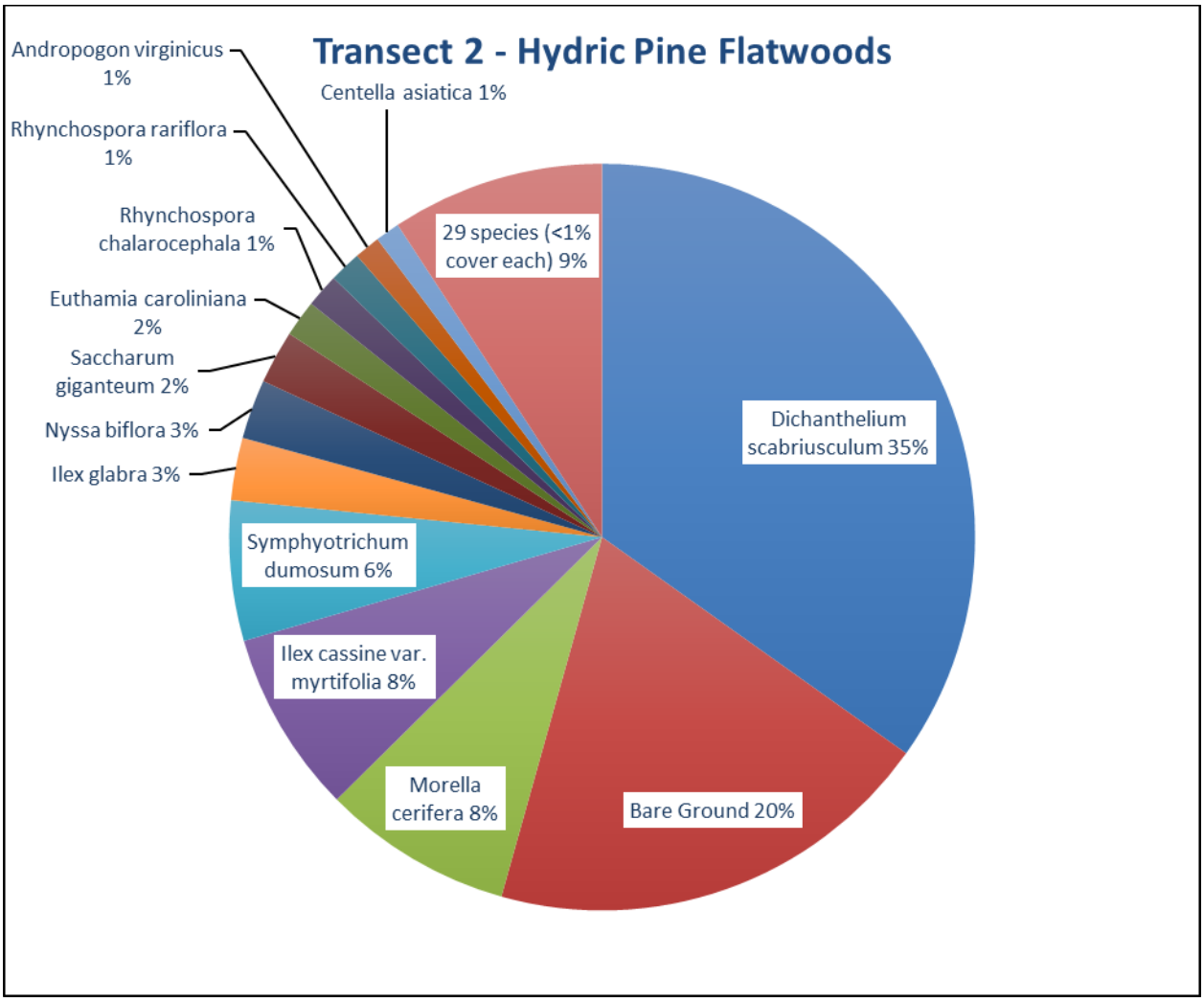

Figure 4. Percent relative cover of plant species in Hydric Pine Flatwoods Transect 2.

Table 3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 sampled on November 27, 2023.

Scientific name	Common name	Average percent cover per quadrat
Acer rubrum	red maple	0.88
***Andropogon* sp.**	bluestem	0.06
Andropogon virginicus	broomsedge bluestem	1.06
Bidens mitis	smallfruit beggarticks	0.19
Carex glaucescens	clustered sedge	0.06
Centella asiatica	spadeleaf	1.00
Coleataenia anceps	beaked panicum	0.56
Cyperus haspan	haspan flatsedge	0.44
Dichanthelium leucothrix	rough witchgrass	0.06
Dichanthelium scabriusculum	woolly witchgrass	33.00
Eragrostis elliottii	Elliott's lovegrass	0.19
Eupatorium semiserratum	smallflower thoroughwort	0.44

Scientific name	Common name	Average percent cover per quadrat
Eupatorium serotinum	lateflowering thoroughwort	0.19
***Eupatorium* sp.**	thoroughwort	0.25
Euthamia caroliniana	slender flattop goldenrod	1.50
Fuirena breviseta	saltmarsh umbrellasedge	0.19
Hypericum hypericoides	St. Andrew's cross	0.19
Ilex cassine* var. *myrtifolia	myrtle-leaved holly	7.50
Ilex glabra	gallberry	2.56
Juncus marginatus	grassleaf rush	0.06
Juncus scirpoides	needlepod rush	0.06
Lachnanthes caroliana	Carolina redroot	0.38
Ludwigia pilosa	hairy primrosewillow	0.69
Lycopus rubellus	taperleaf waterhorehound	0.50
Morella cerifera	southern bayberry	7.81
Nyssa biflora	swamp tupelo	2.44
Oldenlandia uniflora	clustered mille graines	0.06
Pinus elliottii	slash pine	0.44
***Pluchea* sp.**	camphorweed	0.19
Rhynchospora chalarocephala	loosehead beaksedge	1.38
Rhynchospora fascicularis	fascicled beaksedge	0.19
Rhynchospora microcarpa	southern beaksedge	0.38
Rhynchospora rariflora	fewflower beaksedge	1.31
***Rhynchospora* sp.**	beaksedge	0.13
Rubus pensilvanicus	sawtooth blackberry	0.69
Saccharum giganteum	sugarcane plumegrass	2.19
Scleria ciliata	fringed nutrush	0.19
Solidago fistulosa	pinebarren goldenrod	0.13
Symphyotrichum dumosum	rice button aster	5.75
Triadica sebifera	Chinese tallow tree	0.94
Viola lanceolata	bog white violet	0.06
Bare Ground		18.50

Bottomland Forest

Quantitative sampling. Belt transect 1 contained a mix of mostly red maple, slash pine, and cypress, with a few additional species occurring only occasionally (Table 4). Slash pines and red maples were mostly taller. Both bald cypress and pond cypress stems were recorded in, but juvenile similarities between these two types make them difficult to distinguish when young, and many taxonomists consider them to be a single species. The invasive non-native Chinese tallow tree was recorded along the transect for the first time in 2020 and was again found this year. There was a decrease in the number of stems found, but this is mainly attributable to a decrease in observed seedlings. Stems over 4 feet tall increased.

Belt Transect 2 consisted of a mix of larger Atlantic white cedars with many small, regenerating cedars and red maples (Table 5). This transect had a dense thicket of sawtooth blackberry in 2018 that has been slowly opening up over the last several years. Three stems, mostly young, of the invasive non-native Chinese tallow tree were spotted along the transect. A few species known from prior years were not

found, but this may have been attributable to the late sampling date. Overall, stems increased, mainly driven by abundant Atlantic white cedar seedlings.

Cypress

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

Belt Transect 4 was quite open and contained mostly young pond cypress. Swamp tupelos are continuing to grow vigorously, and three other species have stems over 6' tall (Table 7). Cypress on the transect appear to be maturing well. The overall number of stems along the transect is similar to last year.

Table 4. Belt Transect Summary for Bottomland Forest Transect 1 (YYR-BT1-630) sampled on November 27, 2023.

Species	**Total Number of Stems**	**0-1’**	**>1'-2'**	**>2'-3'**	**>3'-4'**	**>4'-5'**	**>5'-6'**	**>6'**	**Condition**
Acer rubrum	211	15	16	18	36	22	32	72	
Cephalanthus occidentalis	9							9	
Chamaecyparis thyoides	11		2	2		2	3	2	
Fraxinus caroliniana	1				1				New in plot in Fall 2023
Ilex myrtifolia	3		1		1		1		
Nyssa biflora	23		1		1	1	2	18	
Pinus elliottii	52							52	
Styrax americana	39	18	21						
Taxodium ascendens	18							18	
Taxodium distichum	13				2	1	1	9	
Triadica sebifera	1						1		New in plot in Fall 2020
Ilex verticillata	0								
Total Number All Species	381								
Number of Saplings/Acre	5441								

Table 5. Belt Transect Summary for Bottomland Forest Transect 2 (YYR-BT2-630) sampled on November 27, 2023.

Species	**Total Number**	**0-1'**	**>1'-2'**	**>2'-3'**	**>3'-4'**	**>4'-5'**	**>5'-6'**	**>6'**	**Condition**
Acer rubrum	60	26	13	5	3	1	4	8	
Chamaecyparis thyoides	190	131	20	5	2	1		31	At least one dead tree seen
Cornus foemina	3	2					1		
Diospyros virginiana	0								
Ilex opaca	3				1			2	
Juniperus virginiana	1							1	Two stems from the same base
Magnolia virginiana	2	1						1	
Nyssa biflora	0								
Pinus palustris	1							1	
Pinus elliottii	2						1	1	
Quercus laurifolia	4	2						2	
Triadica sebifera	3				1		1	1	
Taxodium ascendens	0								
Persea palustris	0								
Fraxinus caroliniana	0								
Total Number All Species	269								
Number of Saplings/Acre	3841								

* Some Lygodium japonicum on line

Table 6. Belt Transect Summary for Cypress Transect 3 (YYR-BT3-621) sampled on November 27, 2023.

Species	Total Number	0-1'	>1'-2'	>2'-3'	>3'-4'	>4'-5'	>5'-6'	>6'	Condition
Acer rubrum	114	6	14	12	19	13	18	32	
Chamaecyparis thyoides	77	2	2	1	1	4	6	61	
Cyrilla racemiflora	0								
Ilex myrtifolifa	18				4	2		12	
Ilex verticillata	2					1		1	
Magnolia virginiana	12							12	
Nyssa biflora	273							273	
Pinus elliottii	38						1	37	
Taxodium ascendens	85							85	
Total Number All Species	619								
Number of Saplings/Acre	8839								

Table 7. Belt Transect Summary for Cypress Transect 4 (YYR-BT4-621) sampled November 27, 2023.

Species	Total Number	0-1'	>1'-2'	>2'-3'	>3'-4'	>4'-5'	>5'-6'	>6'	Condition
Chamaecyparis thyoides	11			6	1	1	1	2	
Cyrilla racemiflora	17				3	12	2		
Magnolia virginiana	7					1	3	3	
Nyssa biflora	46				2	9	12	23	
Pinus elliottii	1						1		
Taxodium ascendens	122		1		2	2	7	110	
Acer rubrum	25	5	7	2	8		2	1	
Persea palustris	0								
Ilex myrtifolia	0								
Total Number All Species	229								
Number of Saplings/Acre	3270								