Vegetation Monitoring at Dutex East
Northwest Florida Water Management District
Mitigation Site

Fall 2024

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Funding for this project was provided by the Northwest Florida Water Management District under the Purchase Order #00250061-000 with the Florida Natural Areas Inventory
Florida State University

Dutex East Restoration Site
Qualitative and Quantitative Monitoring
December 2024

INTRODUCTION

The Dutex Restoration Site consists of 820 acres in Escambia County managed by the Northwest Florida Water Management District (Figure 1). 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 and is split into two tracts. The eastern tract comprising 339 acres is accessed by taking Saufley Pines Road west from North Blue Angel Parkway approximately 2.7 miles and then turning southwest at the gated entrance.

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), Titi Swamp (TS), and Wetland Forested Mixed (WFM) (Figure 2). FNAI conducted quantitative and qualitative monitoring to document the current plant species composition and vegetation structure of these targeted communities. In December 2024, FNAI began annual monitoring on the eastern tract. Prior to 2016, vegetation was monitored by Ecological Resource Consultants, Inc. (ERC).

METHODS

We conducted quantitative monitoring utilizing 300-foot-long permanent transect lines that were established and marked by ERC. Two transects were located in the Hydric Pine Flatwoods target community and two in Hydric Pine Savanna (Figure 2). FNAI botanists did not find the posts for T3 and T4, so we established new posts at the approximate locations given in the 2016 report. We placed fifteen 1m x 1m quadrats spaced every 20 feet along the left side of each transect line, beginning at 0 and ending at 280 feet. In each quadrat, we visually estimated the 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. We estimated open ground in each quadrat as the percentage of ground not obscured by plant cover.

To conduct qualitative monitoring, we walked meandering transects established by ERC in 2016 and recorded the species and vegetation structure observed.. These transect lines were drawn in ArcGIS Pro and used on a Trimble TDC running ESRI Field Maps. FNAI botanists Kim Alexander, Amy Jenkins, Allie Heiker, and Ethan Hughes conducted field surveys on December 9-11, 2024.

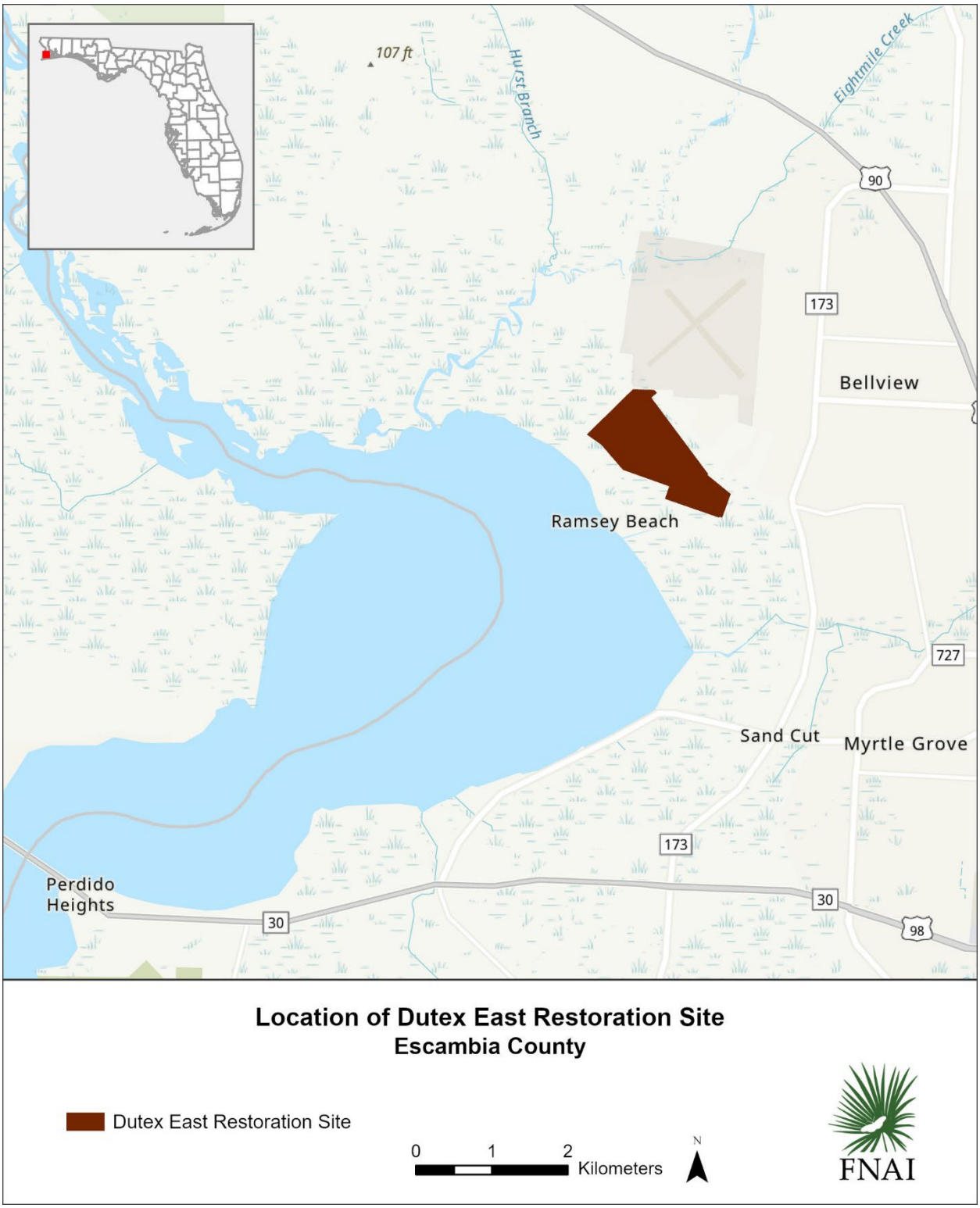

Figure 1. Location map of Dutex East Restoration Site.

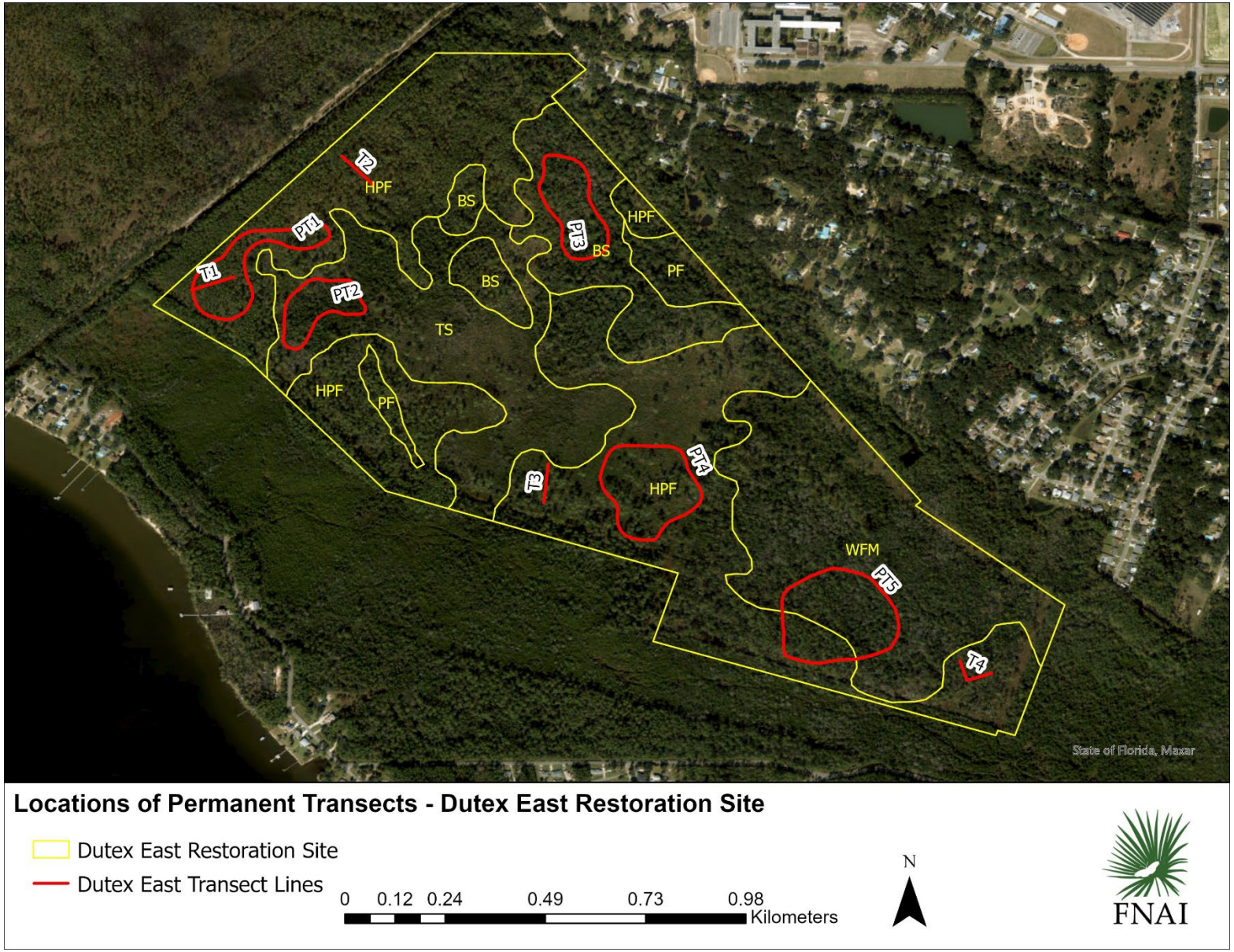

Figure 2. Permanent transects at Dutex Restoration Site – East Tract.

RESULTS AND DISCUSSION

Quantitative sampling

Hydric Pine Savanna – QT1, QT4

The western Transect 1 (Table 1, Figure 3) had a total of 41 species and 43% open ground. According to the 2016 monitoring report, this transect was dominated by black titi. In 2024 this species was still the most abundant by cover along the transect, with sweetbay and gallberry also common. Woody species made up about 41% average cover per quadrat. Tenangle pipewort contributed the most herbaceous cover.

The eastern Transect 4 (Table 2, Figure 4) had a total of 47 species and 39% open ground. Sawtooth blackberry, black titi, and large gallberry contributed the most cover. Woody species made up about 36% average cover per quadrat. Marsh fern contributed the most herbaceous cover, and the eastern end of the transect is markedly wetter and more swamp-like than the western end.

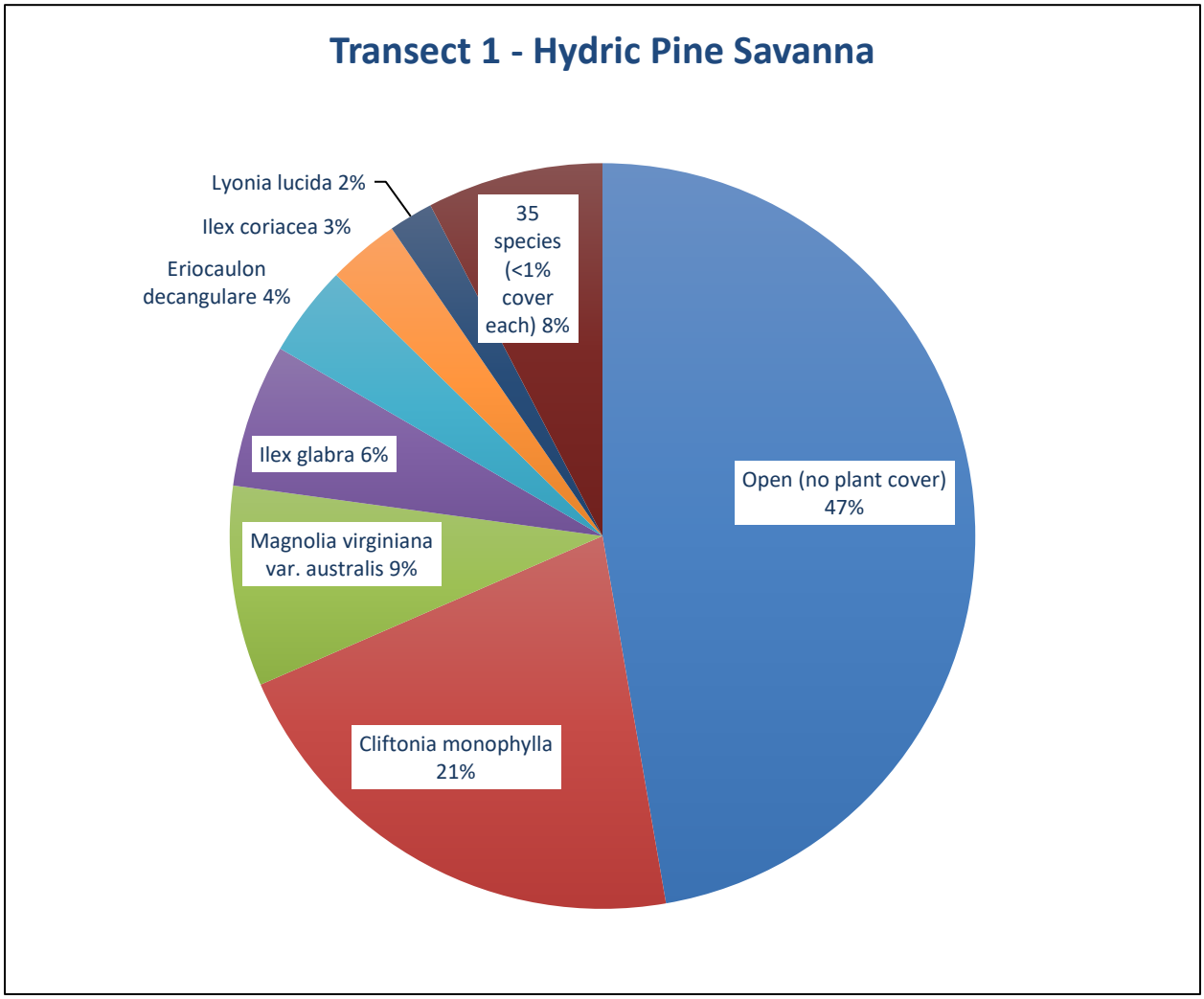

Figure 3. Percent cover of plant species in Hydric Pine Savanna Transect 1.

Table 1. Percent cover of species in Hydric Pine Savanna Transect 1 sampled on December 11, 2024.

Scientific name	Common name	Average percent cover per quadrat
Anchistea virginica	Virginia chain fern	0.13
Andropogon cretaceus	purple bluestem	0.03
Andropogon glomeratus	bushy bluestem	0.10
***Andropogon* sp.**	bluestem	0.63
Andropogon virginicus	broomsedge bluestem	0.17
Aronia arbutifolia	red chokeberry	0.03
Carex glaucescens	clustered sedge	0.67
Centella erecta	spadeleaf	0.03
Cliftonia monophylla	black titi	19.43
Dichanthelium leucothrix	rough witchgrass	0.33
***Dichanthelium* sp.**	witchgrass	0.10
Drosera capillaris	pink sundew	0.07
Edrastima uniflora	oldenlandia	0.10
Eriocaulon decangulare	tenangle pipewort	3.63
Euthamia caroliniana	slender flattop goldenrod	0.03
Gaylussacia mosieri	woolly huckleberry	0.10
Hypericum brachyphyllum	coastalplain St. John's wort	0.40
Hypericum cistifolium	roundpod St. John's wort	0.10
***Hypericum* sp.**	St. John's wort	0.03
Ilex coriacea	large gallberry	2.83
Ilex glabra	gallberry	5.70
Kellochloa verrucosa	warty panicgrass	0.50
Lachnanthes caroliniana	Carolina redroot	0.13
Lyonia lucida	fetterbush	1.77
Magnolia virginiana* var. *australis	sweetbay	7.97
Muscadinia rotundifolia	muscadine	0.07
Nyssa biflora	swamp tupelo	0.27
Pinus elliottii	slash pine	0.57
***Polygala* sp.**	milkwort	0.03
Rhexia petiolata	fringed meadowbeauty	0.03
Rhynchospora cephalantha* var. *cephalantha	bunched beaksedge	0.07
Rhynchospora gracilenta	slender beaksedge	0.53
Rubus pensilvanicus	sawtooth blackberry	0.17
Scleria ciliata	hairy nutrush	0.03
Smilax glauca	cat greenbrier	0.10
Smilax laurifolia	laurel greenbrier	0.87
***Sphagnum* sp.**	sphagnum moss	0.20
Tamala palustris	swamp bay	0.10
Viola primulifolia	primroseleaf violet	0.03
Xyris ambigua	coastalplain yellow-eyed grass	0.13
***Xyris* sp.**	yellow-eyed grass	0.10
Open (no plant cover)		43.33

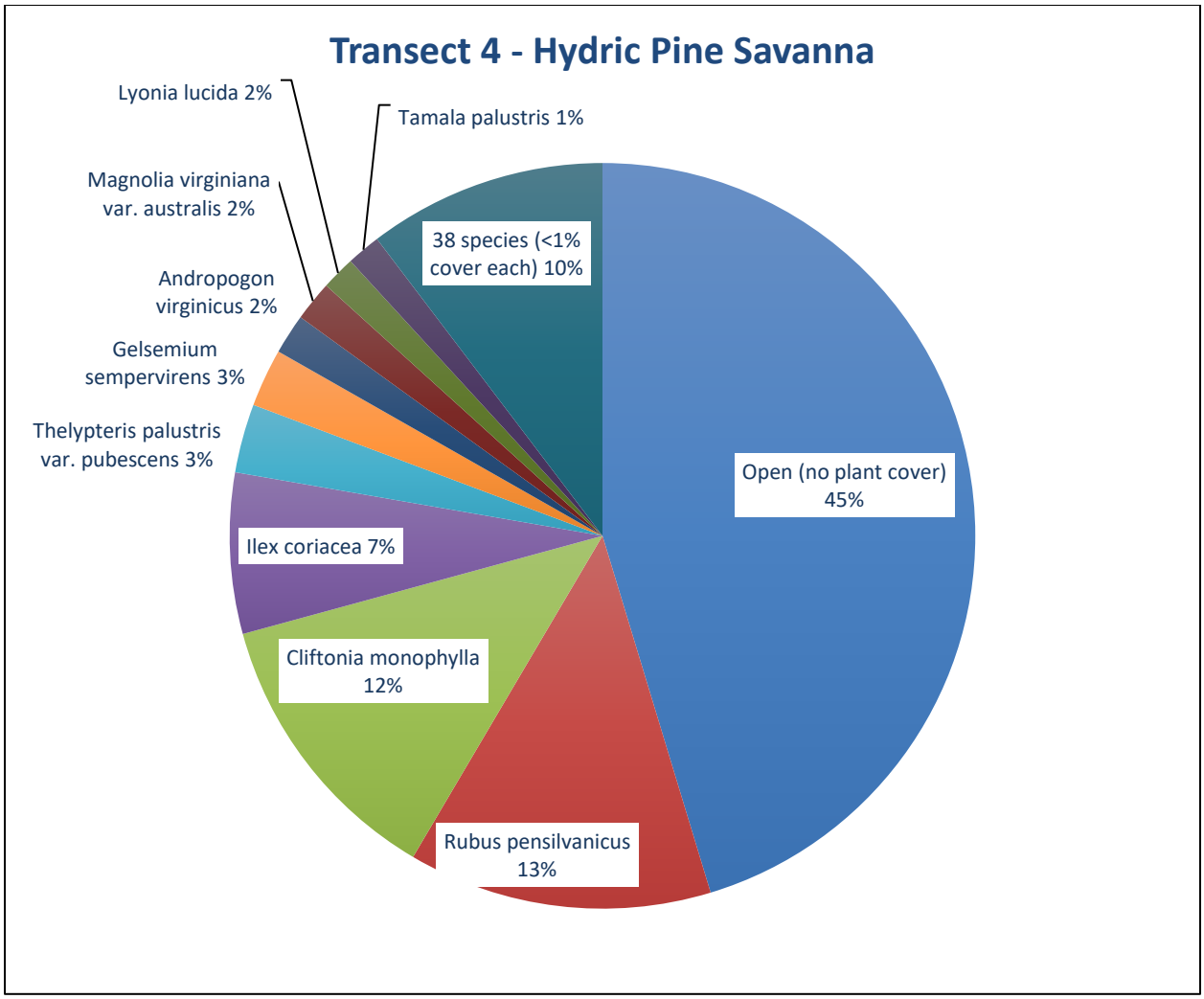

Figure 4. Percent cover of plant species in Hydric Pine Savanna Transect 4.

Table 2. Percent cover of plant species in Hydric Pine Savanna Transect 4 sampled on December 10, 2024.

Scientific name	Common name	Average percent cover per quadrat
Anchistea virginica	Virginia chain fern	0.17
Andropogon cretaceus	purple bluestem	0.23
***Andropogon* sp.**	bluestem	0.37
Andropogon virginicus	broomsedge bluestem	1.50
Bidens mitis	smallfruit beggarticks	0.10
Carex glaucescens	clustered sedge	0.13
***Carex* sp.**	sedge	0.30
Centella erecta	spadeleaf	0.10
Cliftonia monophylla	black titi	10.57
Cyperaceae	sedge family	0.23
***Dichanthelium* sp.**	witchgrass	0.40

Scientific name	Common name	Average percent cover per quadrat
Eriocaulon compressum	flattened pipewort	0.60
Eupatorium semiserratum	smallflower thoroughwort	0.53
***Eupatorium* sp.**	thoroughwort	0.10
Euthamia caroliniana	slender flattop goldenrod	0.27
Gelsemium sempervirens	yellow jessamine	2.17
Ilex coriacea	large gallberry	6.00
Ilex myrtifolia	myrtle-leaved holly	0.03
Lorinseria areolata	netted chain fern	0.50
Ludwigia pilosa	hairy primrosewillow	0.40
Lycopus rubellus	taperleaf waterhorehound	0.63
Lyonia lucida	fetterbush	1.27
Magnolia virginiana* var. *australis	sweetbay	1.50
Mikania scandens	climbing hempvine	0.27
Mitchella repens	partridgeberry	0.03
Morella cerifera	southern bayberry	0.10
Muscadinia rotundifolia	muscadine	0.37
Nyssa biflora	swamp tupelo	0.23
Pinus elliottii	slash pine	0.20
***Pluchea* sp.**	camphorweed	0.10
Poaceae	grass family	0.13
Rhexia alifanus	savannah meadowbeauty	0.10
Rhynchospora cephalantha* var. *cephalantha	bunched beaksedge	0.03
Rhynchospora chalarocephala	loosehead beaksedge	0.27
Rhynchospora gracilenta	slender beaksedge	0.17
Rubus pensilvanicus	sawtooth blackberry	11.33
Rubus trivialis	southern dewberry	0.10
Sacciolepis striata	American cupscale	0.03
Scleria ciliata	hairy nutrush	0.07
Smilax laurifolia	laurel greenbrier	0.90
***Solidago* sp.**	goldenrod	0.03
Tamala palustris	swamp bay	1.27
Thelypteris palustris* var. *pubescens	marsh fern	2.57
Triadica sebifera	Chinese tallow tree	0.27
Unknown herb		0.03
Viburnum nudum	possumhaw	0.03
Viola primulifolia	primroseleaf violet	0.33
Open (no plant cover)		39.00

Hydric Pine Flatwoods – QT2, QT3

The eastern Transect 2 (Table 3, Figure 5) had a total of 44 species with 15% open ground. This was the most herbaceous of the four quantitative transects sampled this year, despite having a fairly high woody cover. Tenangle pipewort contributed the most cover, with coastalplain St. John's wort and sweetbay also dominant. Woody species made up about 48% average cover per quadrat.

The western Transect 3 (Table 4, Figure 6) had a total of 14 species with 25% open ground. This was a tall, dense, almost impenetrable shrub thicket of mostly large gallberry intertwined with laurel greenbrier. A wide edge had been recently mowed along the boundary trail. Woody species made up about 66% average cover per quadrat.

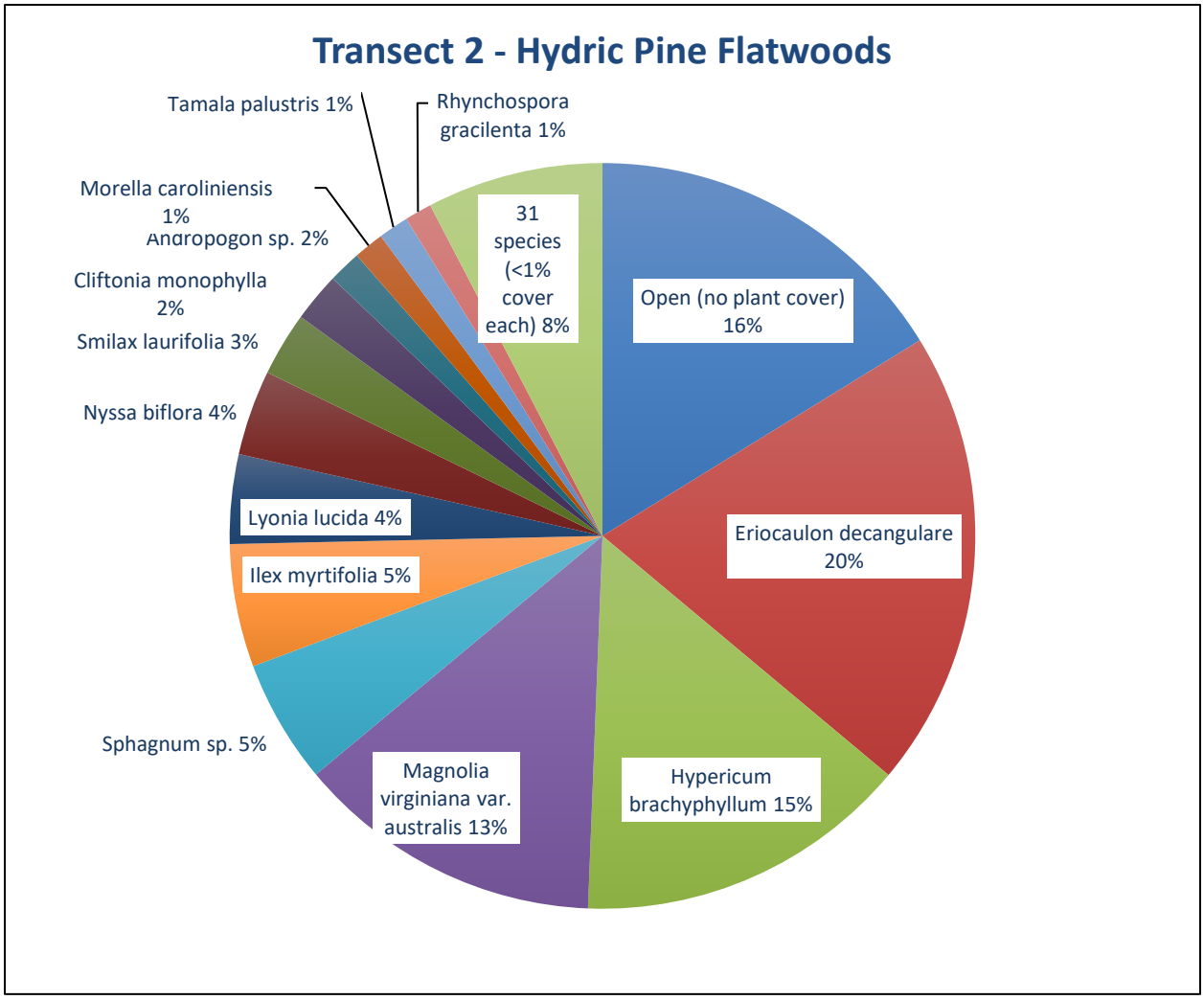

Figure 5. Percent cover of plant species in Hydric Pine Flatwoods Transect 2.

Table 3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 sampled on December 11, 2024.

Scientific name	Common name	Average percent cover per quadrat
Acer rubrum	red maple	0.03
Anchistea virginica	Virginia chain fern	0.13
***Andropogon* sp.**	bluestem	1.33
Andropogon virginicus	broomsedge bluestem	0.30
Aristida palustris	longleaf threeawn	0.23
Balduina uniflora	oneflower honeycomb-head	0.03

Scientific name	Common name	Average percent cover per quadrat
Bidens mitis	smallfruit beggarticks	0.27
Bigelowia nudata	pineland rayless goldenrod	0.23
Carex glaucescens	clustered sedge	0.13
Cliftonia monophylla	black titi	2.00
Dichanthelium leucothrix	rough witchgrass	0.67
Dichanthelium scabriusculum	woolly witchgrass	0.23
***Dichanthelium* sp.**	witchgrass	0.13
Eriocaulon decangulare	tenangle pipewort	18.63
Eupatorium semiserratum	smallflower thoroughwort	0.07
Euthamia caroliniana	slender flattop goldenrod	0.03
Gaylussacia mosieri	woolly huckleberry	0.97
Gelsemium sempervirens	yellow jessamine	0.23
Hypericum brachyphyllum	coastalplain St. John's wort	13.63
Ilex coriacea	large gallberry	0.53
Ilex glabra	gallberry	0.23
Ilex myrtifolia	myrtle-leaved holly	5.00
Ludwigia pilosa	hairy primrosewillow	0.40
Lyonia lucida	fetterbush	3.63
Magnolia virginiana* var. *australis	sweetbay	12.50
Morella caroliniensis	evergreen bayberry	1.23
Nyssa biflora	swamp tupelo	3.47
Pinus elliottii	slash pine	0.10
Proserpinaca pectinata	combleaf mermaidweed	0.27
Rhexia alifanus	savannah meadowbeauty	0.10
Rhexia petiolata	fringed meadowbeauty	0.03
Rhynchospora cephalantha* var. *cephalantha	bunched beaksedge	0.40
Rhynchospora gracilenta	slender beaksedge	1.10
***Rhynchospora* sp.**	beaksedge	0.07
Rubus pensilvanicus	sawtooth blackberry	0.03
Smilax auriculata	earleaf greenbrier	0.10
Smilax glauca	cat greenbrier	0.03
Smilax laurifolia	laurel greenbrier	2.60
***Sphagnum* sp.**	sphagnum moss	5.03
Tamala palustris	swamp bay	1.23
Vaccinium elliottii	Elliott's blueberry	0.10
Viola primulifolia	primroseleaf violet	0.03
Xyris ambigua	coastalplain yellow-eyed grass	0.90
***Xyris* sp.**	yellow-eyed grass	0.13
Open (no plant cover)		15.20

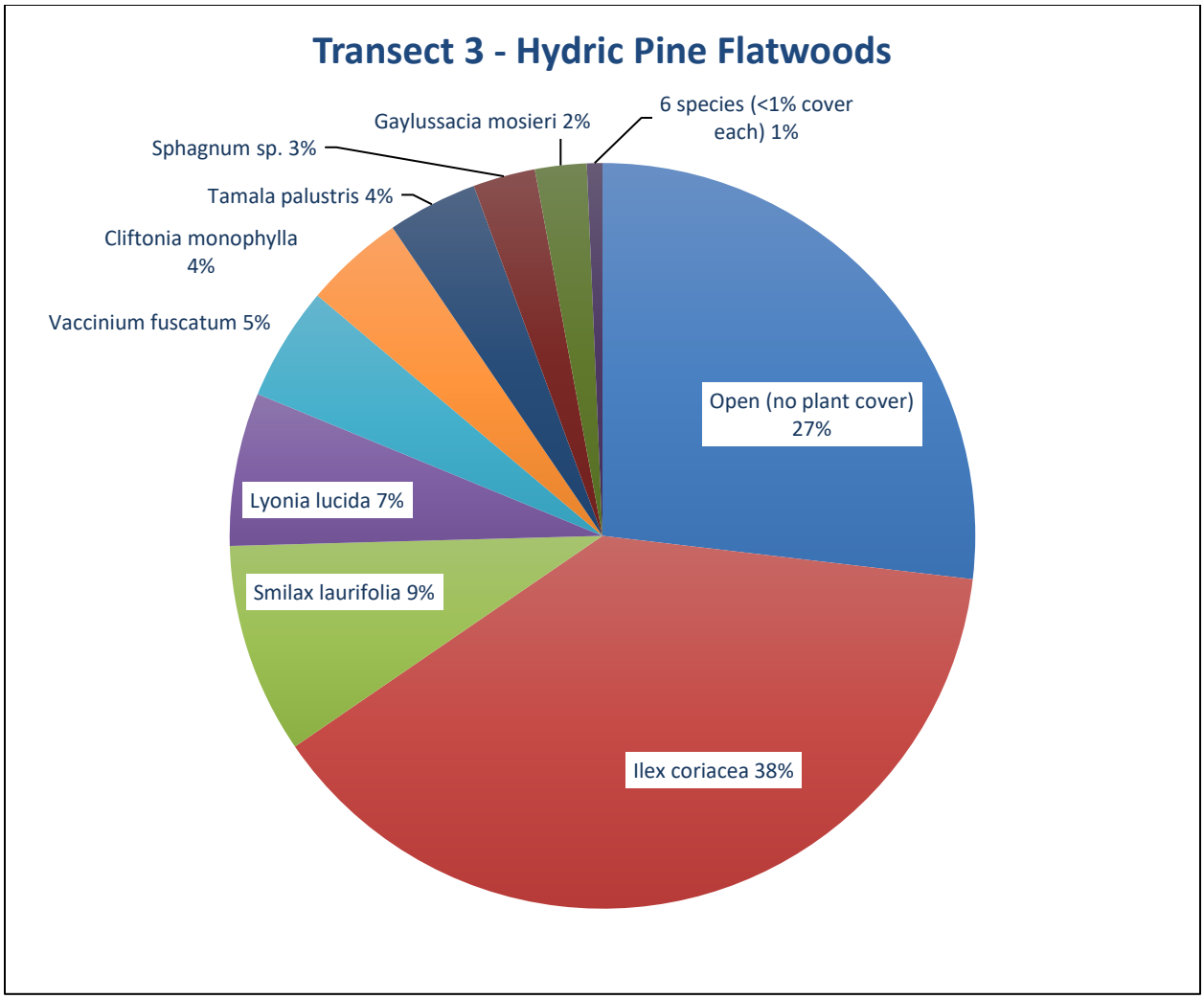

Figure 6. Percent cover of plant species in Hydric Pine Flatwoods Transect 3.

Table 4. Percent cover of plant species in Hydric Pine Flatwoods Transect 3 sampled on December 10, 2024.

Scientific name	Common name	Average percent cover per quadrat
Anchistea virginica	Virginia chain fern	0.10
Cliftonia monophylla	black titi	4.07
Gaylussacia mosieri	woolly huckleberry	2.10
Ilex coriacea	large gallberry	36.20
Lyonia lucida	fetterbush	6.23
Magnolia virginiana* var. *australis	sweetbay	0.33
Muscadinia rotundifolia	muscadine	0.10
Pinus elliottii	slash pine	0.03
Rhynchospora gracilenta	slender beaksedge	0.03
Smilax laurifolia	laurel greenbrier	8.57
***Sphagnum* sp.**	sphagnum moss	2.53

Tamala palustris	swamp bay	3.67
Toxicodendron radicans* var. *radicans	eastern poison ivy	0.03
Vaccinium fuscatum	hairy highbush blueberry	4.63
Open (no plant cover)		25.20

Qualitative Sampling

FNAI recorded a total of 114 plant taxa along qualitative pedestrian transects sampled in 2024 in the target communities at Dutex East (Table 5). Taxonomy follows Weakley, A.S., and Southeastern Flora Team. 2023. Flora of the southeastern United States: Florida. University of North Carolina Herbarium, North Carolina Botanical Garden, Chapel Hill, U.S.A.

Table 5. Plant species observed in the target communities at Dutex East Mitigation Site on December 9-11, 2024. (* = threatened or endangered; † = non-native invasive)

Scientific Name	Common Name	Hydric Pine Savanna T1	Titi Swamp T2	Bay Swamp T3	Hydric Pine Flatwoods T4	Wetland Forested Mixed T5	Grand Total
Acer rubrum var. *trilobum*	Carolina red maple	X		X		X	3
Anchistea virginica	Virginia chain fern	X	X	X	X	X	5
Andropogon cretaceus	purple bluestem	X			X	X	3
Andropogon glomeratus	bushy bluestem	X					1
Andropogon tenuispatheus	maritime bushy bluestem			X			1
Andropogon virginicus	broomsedge bluestem			X			1
Andropogon virginicus var. *1*	smooth bluestem	X					1
Andropogon virginicus var. *virginicus*	broomsedge bluestem	X				X	2
Aronia arbutifolia	red chokeberry					X	1
Baccharis halimifolia	groundsel tree			X			1
Balduina uniflora	oneflower honeycomb-head	X					1
Bartonia paniculata ssp. *paniculata*	twining screwstem					X	1
Bidens alba var. *radiata*	beggarticks			X			1
Bidens mitis	smallfruit beggarticks			X			1
Callicarpa americana	American beautyberry	X		X		X	3
Carex glaucescens	clustered sedge	X				X	2
Carex sp.	sedge	X	X	X		X	4
Cartrema americanum	wild olive			X		X	2
Centella erecta	spadeleaf			X			1
Chasmanthium laxum	slender woodoats			X			1
Cliftonia monophylla	black titi	X	X	X	X	X	5
Cuscuta sp.	dodder				X		1
Cyrilla racemiflora	titi	X		X			2
Dichanthelium ensifolium	small-leaved witchgrass	X				X	2
Dichanthelium longiligulatum	long-ligule witchgrass	X					1
Dichanthelium scabriusculum	woolly witchgrass	X					1

Scientific Name	Common Name	Hydric Pine Savanna T1	Titi Swamp T2	Bay Swamp T3	Hydric Pine Flatwoods T4	Wetland Forested Mixed T5	Grand Total
Dichanthelium sphagnicola	peaty witchgrass			X		X	2
Diospyros virginiana	common persimmon	X					1
Drosera capillaris	pink sundew	X					1
Edrastima uniflora	oldenlandia	X					1
Eriocaulon decangulare var. *decangulare*	common ten-angled pipewort	X				X	2
Eupatorium anomalum	anomalous thoroughwort	X					1
Eupatorium capillifolium	dogfennel			X			1
Eupatorium mohrii	Mohr's thoroughwort	X					1
Eupatorium semiserratum	smallflower thoroughwort			X			1
Euthamia caroliniana	slender flattop goldenrod	X					1
Fuirena breviseta	saltmarsh umbrellasedge	X					1
Gaylussacia mosieri	woolly huckleberry	X	X	X	X	X	5
Gelsemium rankinii	swamp jessamine	X		X			2
Gelsemium sempervirens	yellow jessamine					X	1
Gordonia lasianthus	loblolly bay				X		1
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					1
Ilex cassine	dahoon	X			X	X	3
Ilex coriacea	large gallberry	X	X	X	X	X	5
Ilex glabra	gallberry	X					1
Ilex myrtifolia	myrtle-leaved holly	X					1
Ilex vomitoria	yaupon			X			1
†*Imperata cylindrica*	cogon grass			X			1
Juncus effusus ssp. *solutus*	soft rush			X			1
Kellochloa verrucosa	warty panicgrass	X					1
Lachnanthes caroliniana	Carolina redroot	X			X	X	3
Lachnocaulon anceps	whitehead bogbutton	X					1
Ligustrum japonicum	Japanese privet			X			1
†*Ligustrum sinense*	Chinese privet			X			1
Liriodendron tulipifera var. *tulipifera*	tuliptree			X			1
†*Lonicera japonica*	Japanese honeysuckle			X			1
Lorinseria areolata	netted chain fern			X			1
Ludwigia pilosa	hairy primrosewillow	X		X		X	3
Lycopodiella alopecuroides	foxtail club-moss	X					1
Lycopus rubellus	taperleaf waterhorehound			X			1
†*Lygodium japonicum*	Japanese climbing fern			X			1
Lyonia lucida	fetterbush	X	X	X	X	X	5
Macrothelypteris torresiana	Mariana maiden fern			X			1
Magnolia virginiana var. *australis*	sweetbay	X	X	X	X	X	5
Mikania scandens	climbing hempvine			X			1

Scientific Name	Common Name	Hydric Pine Savanna T1	Titi Swamp T2	Bay Swamp T3	Hydric Pine Flatwoods T4	Wetland Forested Mixed T5	Grand Total
Mitchella repens	partridgeberry			X		X	2
Morella caroliniensis	evergreen bayberry	X	X			X	3
Morella cerifera	Southern bayberry	X		X	X	X	4
Morella inodora	odorless bayberry	X	X	X	X	X	5
Muscadinia rotundifolia	muscadine	X	X	X	X	X	5
Nyssa biflora	swamp tupelo	X	X	X		X	4
Osmundastrum cinnamomeum	cinnamon fern					X	1
Oxalis sp.	woodsorrel			X			1
Pinus elliottii	slash pine	X	X	X	X	X	5
Pluchea foetida	stinking camphorweed	X					1
Proserpinaca pectinata	combleaf mermaidweed	X					1
Pteridium pseudocaudatum	tailed bracken			X			1
Quercus laurifolia	swamp laurel oak			X			1
Quercus virginiana	live oak			X			1
Rhexia petiolata	fringed meadowbeauty	X					1
Rhexia virginica	handsome harry	X					1
Rhus copallinum var. *copallinum*	winged sumac	X					1
Rhynchospora careyana	Cary's horned beaksedge	X					1
Rhynchospora cephalantha var. *cephalantha*	bunched beaksedge	X	X			X	3
Rhynchospora chapmanii	Chapman's beaksedge	X					1
Rhynchospora compressa	flatfruit beaksedge	X					1
Rhynchospora corniculata	shortbristle horned beaksedge	X					1
Rhynchospora fascicularis	fascicled beaksedge				X		1
Rhynchospora gracilenta	slender beaksedge	X				X	2
Rubus argutus	sawtooth blackberry				X	X	2
Rubus pensilvanicus	sawtooth blackberry	X	X	X			3
Rubus trivialis	Southern dewberry			X			1
Smilax laurifolia	laurel greenbriar	X	X	X	X	X	5
Solidago fistulosa	pinebarren goldenrod			X			1
Sphagnum sp.	sphagnum moss	X	X	X	X	X	5
Styrax americanus	American snowbell	X					1
Tamala palustris	swamp bay	X	X	X	X		4
Thelypteris palustris var. *pubescens*	marsh fern			X			1
Toxicodendron radicans var. *radicans*	Eastern poison ivy			X	X	X	3
Toxicodendron vernix	poison sumac			X			1
†*Triadica sebifera*	Chinese tallow tree	X		X		X	3
Vaccinium elliottii	Elliott's blueberry	X					1
Vaccinium formosum	Southern highbush blueberry					X	1
Vaccinium fuscatum	hairy highbush blueberry	X	X	X	X	X	5
Viburnum nudum	possumhaw			X		X	2
Viola primulifolia	primroseleaf violet			X			1
Xyris ambigua	coastalplain yellow-eyed grass	X				X	2

Scientific Name	Common Name	Hydric Pine Savanna T1	Titi Swamp T2	Bay Swamp T3	Hydric Pine Flatwoods T4	Wetland Forested Mixed T5	Grand Total
Xyris fimbriata	fringed yellow-eyed grass	X		X	X	X	4
Xyris iridifolia	irisleaf yellow-eyed grass			X			1
Xyris serotina	acid swamp yellow-eyed grass	X				X	2
Xyris stricta	pineland yellow-eyed grass	X				X	2
Xyris sp.	yellow-eyed grass					X	1
Total taxa = 114		68	20	60	23	47	

Hydric Pine Savanna – PT1

Although QT1, QT4, and PT1 are identified in the ERC 2016 monitoring report as Hydric Pine Savanna, the target map given in that report indicates Hydric Pine Flatwoods. This discrepancy will be investigated before next year's sampling effort. The Hydric Pine Savanna target community along PT1 had an open canopy of mature slash pines, with interspersed younger slash pines. The understory was mainly tall gallberry, sweetbay, and black titi. Herbs were sparse and mostly limited to canopy openings. We noted the non-native invasive Chinese tallow tree along this transect. We observed 68 plant taxa along the Hydric Pine Savanna pedestrian transect PT1 (Table 5).

Titi Swamp – PT2

The Titi Swamp target community along PT2 was similar to a baygall containing canopied areas with sweetbay, swamp tupelo, and slash pine. The understory was dense and shrubby with tall black titi and large gallberry. We found no rare or non-native invasive plants. We observed 20 plant taxa along the Titi Swamp pedestrian transect PT2 (Table 5).

Bay Swamp – PT3

The Bay Swamp target community along PT3 had a mostly mature, mixed canopy of sweetbay, tuliptree, and swamp laurel oak with enormous slash pines intermixed. Tall shrubs and younger canopy species dominated the understory with large gallberry and sweetbay common. Herbs were sparse and generally limited to canopy openings or slight hummocks. The ground was covered by a thick layer of duff. We found several non-native invasive species while walking the transect – cogon grass, Chinese privet, Japanese honeysuckle, Japanese climbing fern, and Chinese tallow – which occurred along a disturbed trail that runs near the north boundary. We observed 60 plant taxa along the Bay Swamp pedestrian transect PT3 (Table 5).

Hydric Pine Flatwoods – PT4

The Hydric Pine Flatwoods target community along PT4 was a dense thicket of shrubs and vines, and we were only able to access a small portion of the transect. Tall black titi and large gallberry were dominant, with abundant laurel greenbrier laced through the shrubs. Pines were widely spaced. We found no rare

or non-native invasive plants. We observed 23 plant taxa along the Hydric Pine Flatwoods pedestrian transect PT4 (Table 5).

Wetland Forested Mixed – PT5

The Wetland Forested Mixed target community along PT5 had a mature canopy of slash pine, swamp tupelo, and sweetbay. The understory was mostly open with a mix of wetland shubs consisting of large gallberry, black titi, dahoon, bayberries, blueberries, and woolly huckleberry. Herbs were fairly diverse with several species of yellow-eyed grasses, beaksedges, and witchgrasses. We found the non-native invasive Chinese tallow tree along this transect. We observed 47 plant taxa along the Wetland Forested Mixed pedestrian transect PT5 (Table 5).