

**Vegetation Monitoring at Dutex West
Northwest Florida Water Management District
Mitigation Site**

Fall 2023

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Dutex West Restoration Site

Qualitative and Quantitative Monitoring

November 2023

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. Only the western tract has been monitored by FNAI from 2018-2022. This tract is accessed by taking Saufley Pines Road west from North Blue Angel Parkway and then turning south onto Wyndotte Road.

The NFWFMD goal is to return the Dutex Restoration Site to pre-disturbance conditions. Target communities include Hydric Pine Flatwoods (HPF), Hydric Pine Savanna (HPS), Bay Swamp (BS), Mesic Flatwoods (MF), Freshwater Marsh (FM), and Salt Marsh. (Figure 2). Quantitative and qualitative monitoring was used to document the current plant species composition and vegetation structure of these targeted communities. FNAI began annual monitoring in October 2018. Prior to 2018, the site vegetation was monitored by Ecological Resource Consultants, Inc. (ERC).

METHODS

The quantitative monitoring utilized 300-foot long permanent transect lines previously marked in surveys conducted by ERC. Two transects were located in the Hydric Pine Flatwoods target community and two in Hydric Pine Savanna (Figure 2). 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.

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, Allie Heiker, and Ethan Hughes on November 28-29, 2023.

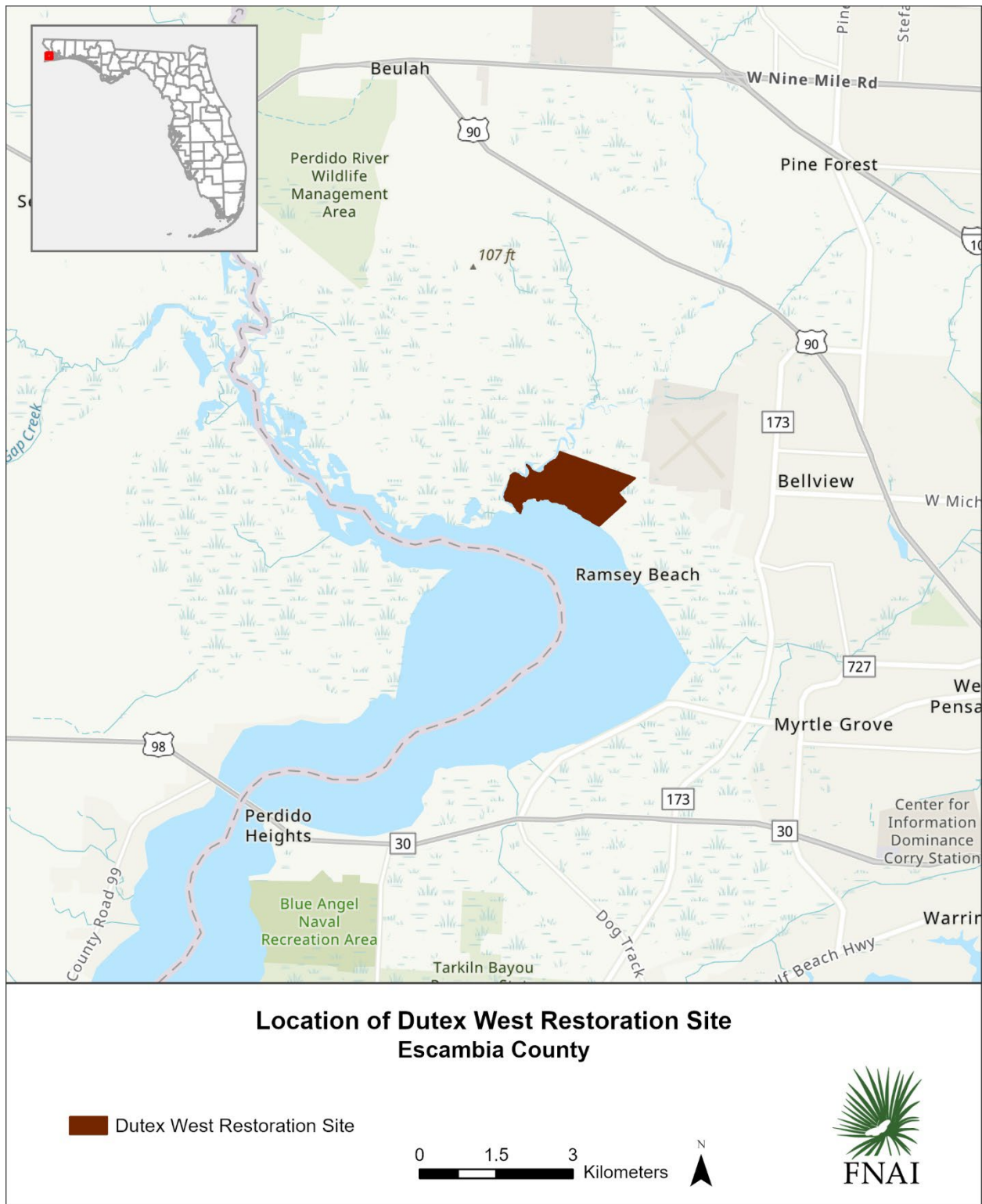


Figure 1. Location map of Dutex West Restoration Site.



Figure 2. 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 199 plant taxa were recorded during the 2023 monitoring period in the target communities at Dutex West (Table 1). Sixteen new species 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 (<http://florida.plantatlas.usf.edu/>), Institute for Systematic Botany, University of South Florida, Tampa.

Table 1. Plant species observed in the target communities at Dutex West Mitigation Site on November 29-30, 2022. (bold name = new species; bold X = new observation in community type; * = threatened or endangered; † = non-native invasive)

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Acer rubrum</i>	red maple	X	X	X	X	X	X	6
<i>Amphicarpum muehlenbergianum</i>	blue maidencane	X	X					2
* <i>Andropogon arctatus</i>	pinewoods bluestem		X		X			2
<i>Andropogon glomeratus</i>	bushy bluestem		X			X		2
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	X	X		X			3
<i>Andropogon gyrans</i> var. <i>stenophyllus</i>	Elliott's bluestem		X					1
<i>Andropogon virginicus</i>	broomsedge bluestem	X	X		X			3
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	X						1
<i>Anthraenantia rufa</i>	purple silkyscale		X					1
<i>Aristida palustris</i>	longleaf threeawn		X					1
<i>Aristida purpurascens</i> var. <i>virgata</i>	arrowfeather threeawn	X						1
<i>Aristida stricta</i>	wiregrass	X	X		X			3
<i>Aronia arbutifolia</i>	red chokeberry		X					1
<i>Arundinaria gigantea</i>	switchcane		X	X				2
<i>Baccharis halimifolia</i>	groundsel tree	X	X	X		X		4
<i>Bacopa monnieri</i>	herb-of-grace					X		1
<i>Balduina uniflora</i>	oneflower honeycomb-head				X			1
<i>Bidens alba</i>	beggarticks					X		1
<i>Bidens mitis</i>	smallfruit beggarticks	X	X	X				3
<i>Bigelovia nudata</i>	pineland rayless goldenrod				X			1
<i>Brasenia schreberi</i>	watershield			X				1
<i>Callicarpa americana</i>	American beautyberry				X			1
<i>Carex glaucescens</i>	clustered sedge	X	X	X				3
<i>Carex longii</i>	Long's sedge		X					1
<i>Carphephorus odoratissimus</i>	vanillaleaf				X			1
<i>Centella asiatica</i>	spadeleaf	X	X					2
<i>Chamaecrista nictitans</i>	sensitive pea				X			1
<i>Chamaecyparis thuyoides</i>	Atlantic white cedar			X				1
† <i>Cinnamomum camphora</i>	camphor tree		X					1
<i>Cladium jamaicense</i>	sawgrass	X		X		X	X	4
<i>Cliftonia monophylla</i>	black titi	X	X	X	X			4

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Coelorachis tessellata</i>	lattice jointgrass		X					1
<i>Coleataenia longifolia</i>	ciliate redtop panicum	X	X	X				3
<i>Conoclinium coelestinum</i>	blue mistflower			X				1
<i>Conradina canescens</i>	false rosemary				X			1
<i>Conyza canadensis</i>	Canadian horseweed				X			1
<i>Crinum americanum</i>	string lily			X				1
<i>Ctenium aromaticum</i>	toothache grass		X		X			2
<i>Cyperus haspan</i>	haspan flatsedge		X					1
<i>Cyperus</i> sp.	flatsedge					X		1
<i>Cyrilla racemiflora</i>	titi		X	X				2
<i>Dichantheium acuminatum</i> var. <i>acuminatum</i>	tapered witchgrass			X				1
<i>Dichantheium ensifolium</i>	cypress witchgrass	X	X					2
<i>Dichantheium ensifolium</i> var. <i>unciphyllum</i>	cypress witchgrass				X			1
<i>Dichantheium leucothrix</i>	rough witchgrass	X	X					2
<i>Dichantheium portoricense</i>	hemlock witchgrass	X	X					2
<i>Dichantheium scabriusculum</i>	woolly witchgrass	X	X	X	X			4
<i>Dichantheium</i> sp.	witchgrass	X	X					2
<i>Dichantheium strigosum</i>	roughhair witchgrass				X			1
<i>Drosera capillaris</i>	pink sundew	X	X					2
<i>Dulichium arundinaceum</i>	threeway sedge			X				1
<i>Echinochloa walteri</i>	coast cockspur					X		1
<i>Echinodorus</i> sp.	burrhead			X				1
† <i>Eichhornia crassipes</i>	water hyacinth			X				1
<i>Eleocharis tuberculosa</i>	conecup spikerush	X	X					2
<i>Eragrostis</i> sp.	lovegrass				X			1
<i>Eriocaulon decangulare</i>	tenangle pipewort	X	X					2
<i>Eupatorium capillifolium</i>	dogfennel				X			1
<i>Eupatorium compositifolium</i>	yankeeweed				X			1
<i>Eupatorium pilosum</i>	rough boneset		X					1
<i>Eupatorium semiserratum</i>	smallflower thoroughwort		X	X	X			3
<i>Eupatorium serotinum</i>	lateflowering thoroughwort					X		1
<i>Eupatorium x anomalum</i>	Florida thoroughwort		X		X			2
<i>Eupatorium x pinnatifidum</i>	throughwort				X			1
<i>Euthamia caroliniana</i>	slender flattop goldenrod	X	X		X			3
<i>Euthamia graminifolia</i>	flattop goldenrod				X	X	X	3
<i>Fimbristylis spadicea</i>	marsh fimbry					X		1
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge	X	X					2
<i>Fuirena scirpoidea</i>	southern umbrellasedge		X					1
<i>Gaylussacia mosieri</i>	woolly huckleberry		X		X			2
<i>Helianthus angustifolius</i>	narrowleaf sunflower			X				1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	X	X		X			3

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Hypericum cistifolium</i>	roundpod St. John's wort	X	X					2
<i>Hypericum crux-andreae</i>	St. Peter's wort		X		X			2
<i>Hypericum hypericoides</i>	St. Andrew's cross			X				1
<i>Hyptis alata</i>	clustered bushmint			X				1
<i>Ilex cassine</i>	dahoon		X					1
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	X	X	X			X	4
<i>Ilex coriacea</i>	large gallberry	X	X	X	X			4
<i>Ilex glabra</i>	gallberry		X		X			2
<i>Ilex vomitoria</i>	yaupon	X					X	2
† <i>Imperata cylindrica</i>	cogon grass				X			1
<i>Ipomoea sagittata</i>	saltmarsh morning glory	X				X	X	3
<i>Itea virginica</i>	Virginia willow			X				1
<i>Iva imbricata</i>	seacoast marshelder					X		1
<i>Juncus marginatus</i>	grassleaf rush		X					1
<i>Juncus pelocarpus</i>	annual rush			X				1
<i>Juncus roemerianus</i>	needle rush					X	X	2
<i>Juncus trigonocarpus</i>	redpod rush		X	X				2
<i>Kalmia hirsuta</i>	hairy wicky				X			1
<i>Kelochloa verrucosa</i>	warty panicgrass	X	X		X			3
<i>Kosteletzkya pentacarpos</i>	Virginia saltmarsh mallow						X	1
<i>Lachnanthes caroliniana</i>	Carolina redroot	X	X		X			3
<i>Lachnocaulon anceps</i>	whitehead bogbutton		X		X			2
<i>Lechea torreyi</i>	Piedmont pinweed				X			1
<i>Lespedeza capitata</i>	roundhead lespedeza				X			1
<i>Liatris spicata</i>	dense gayfeather		X					1
* <i>Lilium iridollae</i>	Panhandle lily			X				1
<i>Lobelia brevifolia</i>	shortleaf lobelia		X					1
<i>Lophiola aurea</i>	golden crest	X	X	X				3
<i>Ludwigia linifolia</i>	southeastern primrosewillow		X					1
<i>Ludwigia palustris</i>	marsh seedbox			X				1
<i>Ludwigia pilosa</i>	hairy primrosewillow		X					1
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	X	X					2
<i>Lycopodiella caroliniana</i>	slender club-moss		X					1
<i>Lycopus rubellus</i>	taperleaf waterhorehound		X					1
<i>Lyonia lucida</i>	fetterbush	X	X	X	X			4
<i>Lythrum lineare</i>	wand loosestrife					X		1
<i>Magnolia virginiana</i>	sweetbay	X	X	X	X			4
<i>Mikania scandens</i>	climbing hempvine		X			X		2
<i>Morella caroliniensis</i>	evergreen bayberry			X	X			2
<i>Morella cerifera</i>	southern bayberry	X	X	X	X		X	5
<i>Myriophyllum aquaticum</i>	parrot feather water milfoil			X				1
<i>Nymphaea odorata</i>	white waterlily			X				1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Nyssa biflora</i>	swamp tupelo	X	X	X				3
<i>Oldenlandia uniflora</i>	clustered mille grains	X	X					2
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	X		X			X	3
† <i>Panicum repens</i>	torpedo grass					X		1
<i>Panicum virgatum</i>	switchgrass	X	X	X		X	X	5
<i>Paspalum urvillei</i>	vaseygrass					X		1
<i>Paspalum vaginatum</i>	seashore paspalum					X		1
<i>Peltandra sagittifolia</i>	spoon-flower			X				1
<i>Persea palustris</i>	swamp bay	X	X	X		X	X	5
<i>Phragmites berlandieri</i>	common reed					X		1
<i>Pinus elliotii</i>	slash pine	X	X	X	X	X	X	6
<i>Pinus palustris</i>	longleaf pine				X			1
<i>Pluchea baccharis</i>	rosy camphorweed		X					1
<i>Pluchea foetida</i>	stinking camphorweed			X				1
<i>Polygala lutea</i>	orange milkwort		X					1
<i>Pontederia cordata</i>	pickerelweed			X				1
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting				X			1
<i>Pteridium aquilinum</i>	bracken fern				X	X		2
<i>Quercus hemisphaerica</i>	laurel oak				X			1
<i>Quercus virginiana</i>	live oak				X			1
<i>Rhexia alifanus</i>	savannah meadowbeauty				X			1
<i>Rhexia petiolata</i>	fringed meadowbeauty	X	X					2
<i>Rhexia</i> sp.	meadowbeauty		X					1
<i>Rhexia virginica</i>	handsome harry	X	X					2
<i>Rhus copallinum</i>	winged sumac				X			1
<i>Rhynchospora baldwinii</i>	Baldwin's beaksedge		X		X			2
<i>Rhynchospora cephalantha</i>	bunched beaksedge	X	X					2
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	X	X	X				3
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	X	X					2
<i>Rhynchospora ciliaris</i>	fringed beaksedge				X			1
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge			X				1
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	X	X					2
<i>Rhynchospora gracilentata</i>	slender beaksedge	X	X					2
<i>Rhynchospora rariflora</i>	fewflower beaksedge		X					1
<i>Rubus pensilvanicus</i>	sawtooth blackberry	X	X	X	X		X	5
<i>Rubus trivialis</i>	southern dewberry	X			X	X	X	4
<i>Rumex verticillatus</i>	swamp dock					X		1
<i>Sabal minor</i>	bluestem palmetto					X	X	2
<i>Saccharum giganteum</i>	sugarcane plumegrass		X					1
<i>Sagittaria lancifolia</i>	bulltongue arrowhead			X		X		2
<i>Sagittaria latifolia</i>	common arrowhead			X				1
* <i>Sarracenia leucophylla</i>	white-top pitcherplant		X					1

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>*Sarracenia rosea</i>	Gulf purple pitcherplant		X					1
<i>Sarracenia x mitchelliana</i>	pitcherplant		X					1
<i>Schizachyrium sanguineum</i>	crimson bluestem		X		X		X	3
<i>Schizachyrium stoloniferum</i>	creeping little bluestem				X			1
<i>Scleria ciliata</i>	fringed nutrush	X	X		X			3
<i>Serenoa repens</i>	saw palmetto		X		X			2
<i>*Sesbania punicea</i>	purple sesban					X	X	2
<i>Setaria</i> sp.	foxtail					X		1
<i>Smilax auriculata</i>	earleaf greenbrier				X			1
<i>Smilax bona-nox</i>	saw greenbrier				X	X		2
<i>Smilax glauca</i>	cat greenbrier	X	X		X			3
<i>Smilax laurifolia</i>	laurel greenbrier	X	X	X				3
<i>Smilax pumila</i>	sarsaparilla vine				X			1
<i>Smilax walteri</i>	coral greenbrier			X				1
<i>Solidago fistulosa</i>	pinebarren goldenrod		X					1
<i>Solidago sempervirens</i>	seaside goldenrod					X		1
<i>Solidago tortifolia</i>	twistedleaf goldenrod				X			1
<i>Spartina patens</i>	saltmeadow cordgrass	X				X	X	3
<i>Sphagnum</i> sp.	sphagnum moss	X	X					2
<i>Sporobolus junceus</i>	pineywoods dropseed				X			1
<i>Styrax americanus</i>	American snowbell		X					1
<i>Symphyotrichum dumosum</i>	rice button aster		X					1
<i>Symphyotrichum tenuifolium</i>	perennial saltmarsh aster					X		1
<i>Taxodium ascendens</i>	pond cypress	X	X	X			X	4
<i>Tiedemannia filiformis</i> ssp. <i>filiformis</i>	water cowbane		X	X				2
<i>Toxicodendron radicans</i>	eastern poison ivy	X						1
<i>Triadenum virginicum</i>	Virginia marsh St. John's wort			X				1
<i>*Triadica sebifera</i>	Chinese tallow tree		X		X			2
<i>Tripsacum dactyloides</i>	eastern gamagrass					X		1
<i>Vaccinium corymbosum</i>	highbush blueberry	X			X			2
<i>Vaccinium elliotii</i>	Elliott's blueberry		X					1
<i>Vaccinium myrsinites</i>	shiny blueberry				X			1
<i>Viburnum nudum</i>	possumhaw			X				1
<i>Viola primulifolia</i>	primroseleaf violet				X			1
<i>Viola</i> sp.	violet			X				1
<i>Vitis rotundifolia</i>	muscadine			X	X			2
<i>Woodwardia areolata</i>	netted chain fern	X	X	X				3
<i>Woodwardia virginica</i>	Virginia chain fern	X	X		X			3
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	X	X		X			3
<i>Xyris fimbriata</i>	fringed yellow-eyed grass		X					1
<i>Xyris floridana</i>	Florida yellow-eyed grass		X					1
<i>Xyris</i> sp.	yellow-eyed grass	X	X					2

Scientific Name	Common Name	Hydric Pine Flatwoods	Hydric Pine Savanna	Bay Swamp	Mesic Flatwoods	Freshwater Marsh	Salt Marsh	Grand Total
<i>Xyris stricta</i>	pineland yellow-eyed grass	X						1
Total number of taxa: 199		65	104	58	70	35	20	352

Hydric Pine Flatwoods

Qualitative sampling. Hydric Pine Flatwoods in the vicinities of Transect 1 (eastern) and 4 (western) were accessed to create a species list (Figure 2). The eastern area had an open canopy (26-35% cover) of mature slash pines. The ground layer was mainly herbaceous, although short shrubs and sprawling laurel greenbrier vines were dense in many areas. Purple bluestem and Carolina redroot were dominant along with a mix of other, mostly weedy species. Shrubs were mostly black titi, but also included large gallberry, coastalplain St. John’s wort, sweetbay, and highbush blueberry. The western flatwoods is only accessible by traversing a large bay swamp and is not currently actively managed. The canopy is denser and groundcover sparser than the eastern area. The total number of species observed in this community was 65 (Table 1).

Quantitative sampling. The eastern Transect 1 (Table 2, Figure 3) had a total of 32 species with 11% bare ground. Laurel greenbrier, purple bluestem, black titi, Carolina redroot, and bunched beaksedge contributed the most cover. Woody species made up about 45% average cover per quadrat, an increase from last year. Laurel greenbrier, purple bluestem, and black titi continues to increase along the transect compared to the last two years.

The western Transect 4 (Table 3, Figure 4) had a total of 28 species with 45% bare ground. Sawgrass, swamp bay, and yaupon contributed the most cover. Woody species made up about 20% average cover per quadrat, a slight increase from last year. Switchgrass and blue maidencane are somewhat reduced from last year. This transect has flooded over the past few years, but was dry during the 2023 site visit.

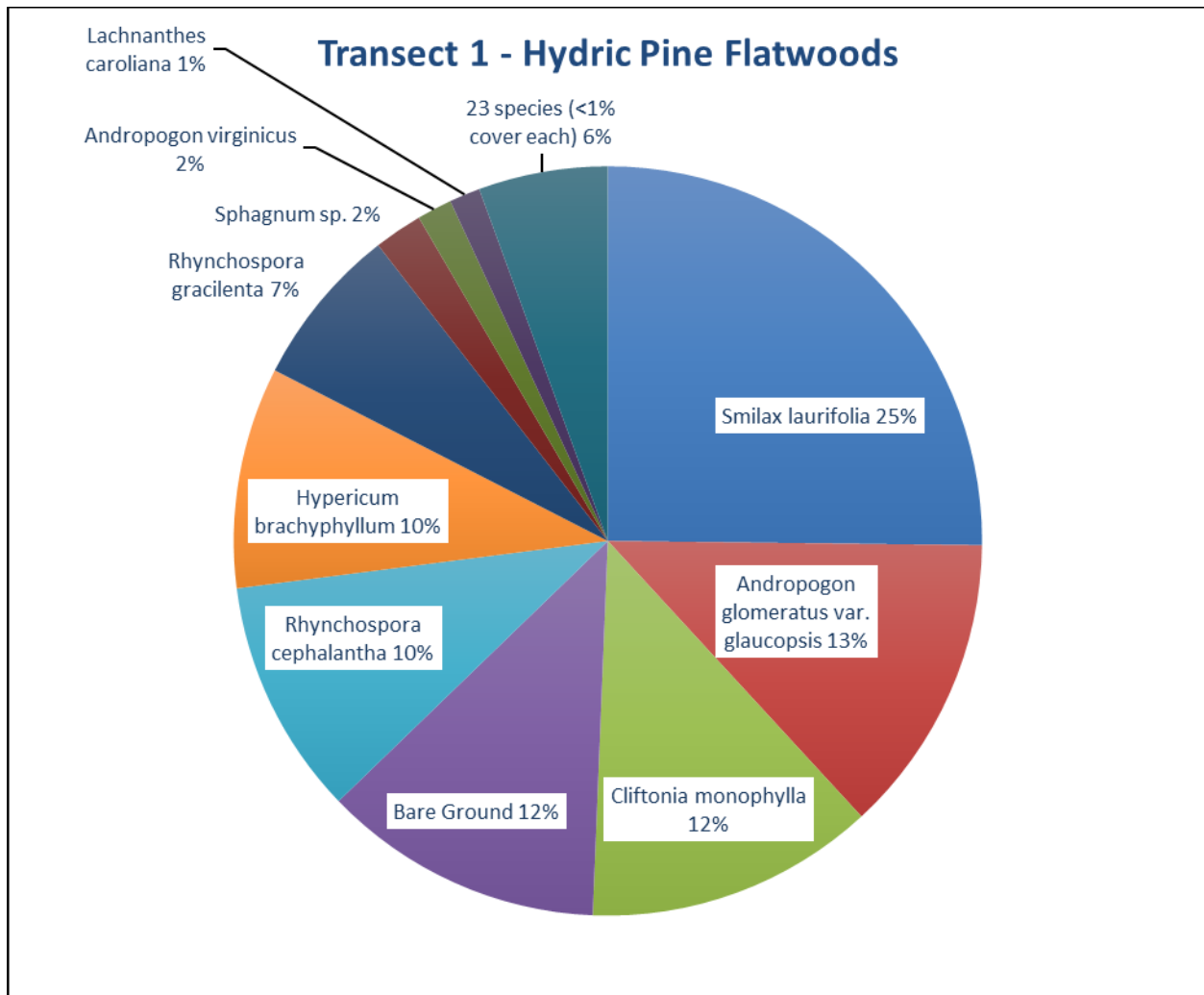


Figure 3. Percent cover of plant species in Hydric Pine Flatwoods Transect 1.

Table 2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 sampled on November 29, 2023.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	12.00
<i>Andropogon virginicus</i>	broomsedge bluestem	1.40
<i>Bidens mitis</i>	smallfruit beggarticks	0.03
<i>Carex glaucescens</i>	clustered sedge	0.70
<i>Cliftonia monophylla</i>	black titi	11.57
<i>Coleataenia longifolia</i>	ciliate redtop panicum	0.03
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.40
<i>Dichantherium leucothrix</i>	rough witchgrass	0.13
<i>Dichantherium scabriusculum</i>	woolly witchgrass	0.23
<i>Drosera capillaris</i>	pink sundew	0.03
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.10
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	8.83

Scientific name	Common name	Average percent cover per quadrat
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.93
<i>Ilex coriacea</i>	large gallberry	0.23
<i>Kelochloa verrucosa</i>	warty panicgrass	0.40
<i>Lachnanthes caroliana</i>	Carolina redroot	1.23
<i>Lyonia lucida</i>	fetterbush	0.23
<i>Oldenlandia uniflora</i>	clustered mille grains	0.07
<i>Pinus elliotii</i>	slash pine	0.10
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.17
<i>Rhexia virginica</i>	handsome harry	0.17
<i>Rhynchospora cephalantha</i>	bunched beaksedge	9.43
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.23
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.37
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.03
<i>Rhynchospora gracilentata</i>	slender beaksedge	6.43
<i>Scleria ciliata</i>	fringed nutrush	0.03
<i>Smilax laurifolia</i>	laurel greenbrier	23.30
<i>Sphagnum</i> sp.	sphagnum moss	1.93
<i>Woodwardia virginica</i>	Virginia chain fern	0.30
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.03
<i>Xyris</i> sp.	yellow-eyed grass	0.20
Bare Ground		11.23

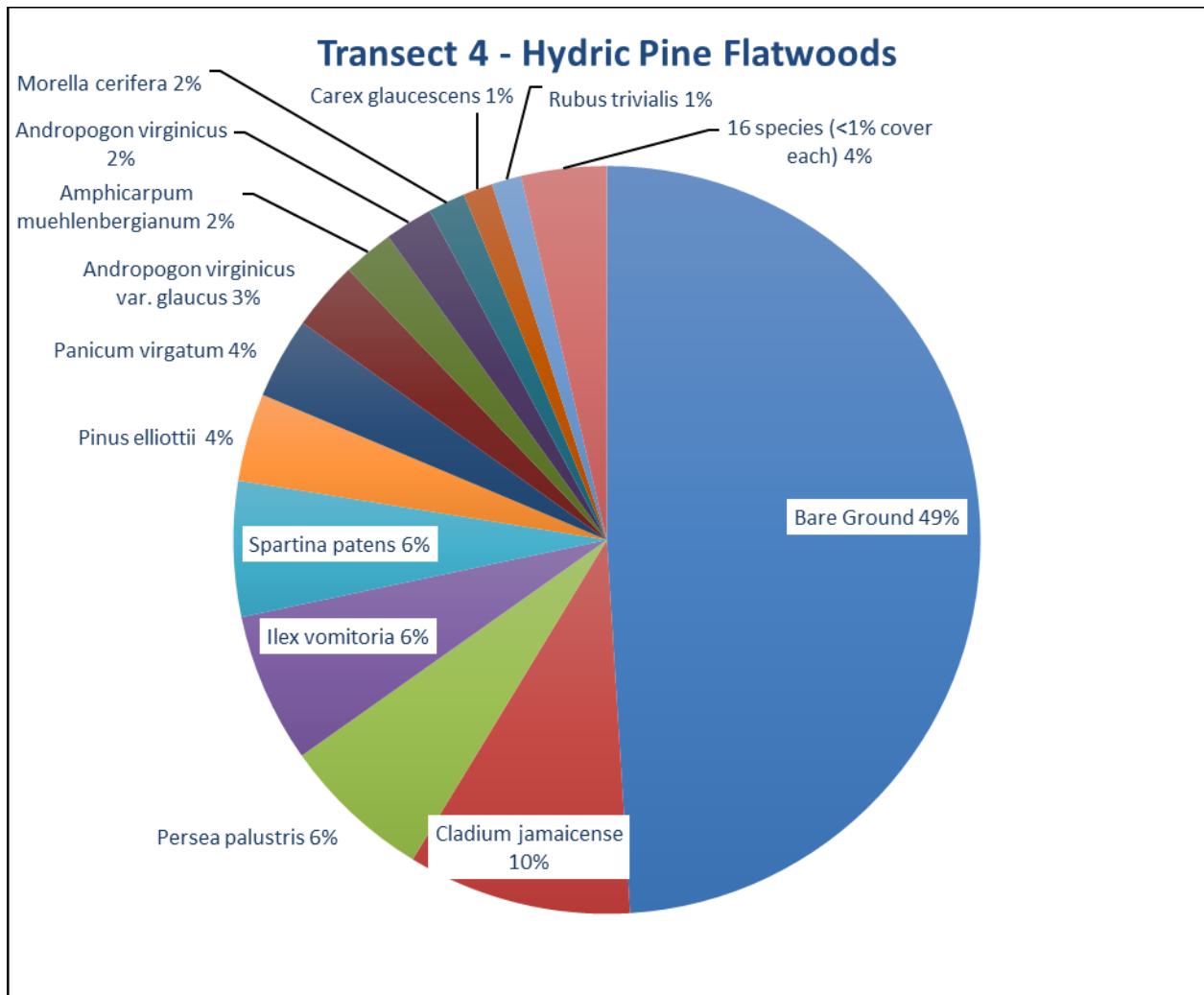


Figure 4. Percent cover of plant species in Hydric Pine Flatwoods Transect 4.

Table 3. Percent cover of plant species in Hydric Pine Flatwoods Transect 4 sampled on November 29, 2023.

Scientific name	Common name	Average percent cover per quadrat
<i>Acer rubrum</i>	red maple	0.20
<i>Amphicarpum muehlenbergianum</i>	blue maidencane	2.00
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	0.50
<i>Andropogon virginicus</i>	broomsedge bluestem	1.90
<i>Andropogon virginicus</i> var. <i>glaucus</i>	chalky bluestem	2.73
<i>Baccharis halimifolia</i>	groundsel tree	0.10
<i>Carex glaucescens</i>	clustered sedge	1.17
<i>Centella asiatica</i>	spadeleaf	0.43
<i>Cladium jamaicense</i>	sawgrass	8.83
<i>Dichantherium leucothrix</i>	rough witchgrass	0.10
<i>Dichantherium</i> sp.	witchgrass	0.27

<i>Eleocharis tuberculosa</i>	conecup spikerush	0.23
<i>Ilex vomitoria</i>	yaupon	5.90
<i>Ipomoea sagittata</i>	saltmarsh morning glory	0.03
<i>Magnolia virginiana</i>	sweetbay	0.03
<i>Morella cerifera</i>	southern bayberry	1.47
<i>Nyssa biflora</i>	swamp tupelo	0.23
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	0.07
<i>Panicum virgatum</i>	switchgrass	3.20
<i>Persea palustris</i>	swamp bay	5.93
<i>Pinus elliotii</i>	slash pine	3.47
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.10
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.20
<i>Rubus trivialis</i>	southern dewberry	1.17
<i>Smilax glauca</i>	cat greenbrier	0.10
<i>Spartina patens</i>	saltmeadow cordgrass	5.33
<i>Taxodium ascendens</i>	pond cypress	0.57
<i>Toxicodendron radicans</i>	eastern poison ivy	0.20
Bare Ground		44.67

Hydric Pine Savanna

Qualitative sampling. Hydric Pine Savanna was accessed in an area between Transects 2 and 3 to create a species list (Figure 2). This area had an open canopy of mature slash pines. The ground layer was mostly herbaceous with hairy primrosewillow and woolly witchgrass dominant along with a mix of other species including various beaksedges, tenangle pipewort, yellow-eyed grass, slender flattop goldenrod, and wiregrass. Shrubs included coastalplain St. John’s wort, titi, gallberry, sweet pepperbush, and southern bayberry. The savanna in the vicinity of Transect 2 has been mechanically and chemically treated to produce dramatic shrub reduction since 2017. This area is much more heavily dominated by weedy purple bluestem. The state-listed endangered whitetop pitcherplant is known from Transect 3 and was observed this year. The state-listed Gulf purple pitcherplant and pinewoods bluestem were also observed during qualitative sampling. For the first time since FNAI began monitoring this site, the non-native invasive camphor tree was seen in hydric pine savanna. The non-native invasive Chinese tallow tree was also observed again in Fall 2023. The total number of plant species observed in this community was 104 (Table 1).

Quantitative sampling. The southern Transect 2 (Table 4, Figure 5) had a total of 44 species and 39% bare ground. Until 2019, Transect 2 was dominated by a thicket of tall, woody species. The area was mechanically treated to reduce shrubs, and the 2019 monitoring transect recorded the very open habitat that resulted from this treatment. All shrubs had been mowed to the ground which was covered in the resulting mulch. Herb cover has been increasing since that treatment, and woody cover was likewise increasing. In 2021, woody species were further treated, resulting in reductions in titi, black titi, and gallberry cover in Fall 2022. Woody species made up about 15% average cover per quadrat in Fall 2023, and overall plant cover increased. Both purple bluestem and black titi cover increased compared to last year’s sample.

The northern Transect 3 (Table 5, Figure 6) had a total of 60 species and 12% bare ground. Laurel greenbrier, coastalplain St. John’s wort, woolly witchgrass, and hairy primrosewillow contributed the most cover. Woody species made up about 51% average cover per quadrat, an increase from last year (27%) that appears mostly attributable to a marked increased in laurel greenbrier. Otherwise, vegetation along the transect is very similar to 2022. The state listed endangered whitetop pitcherplant was seen again this year along Transect 3.

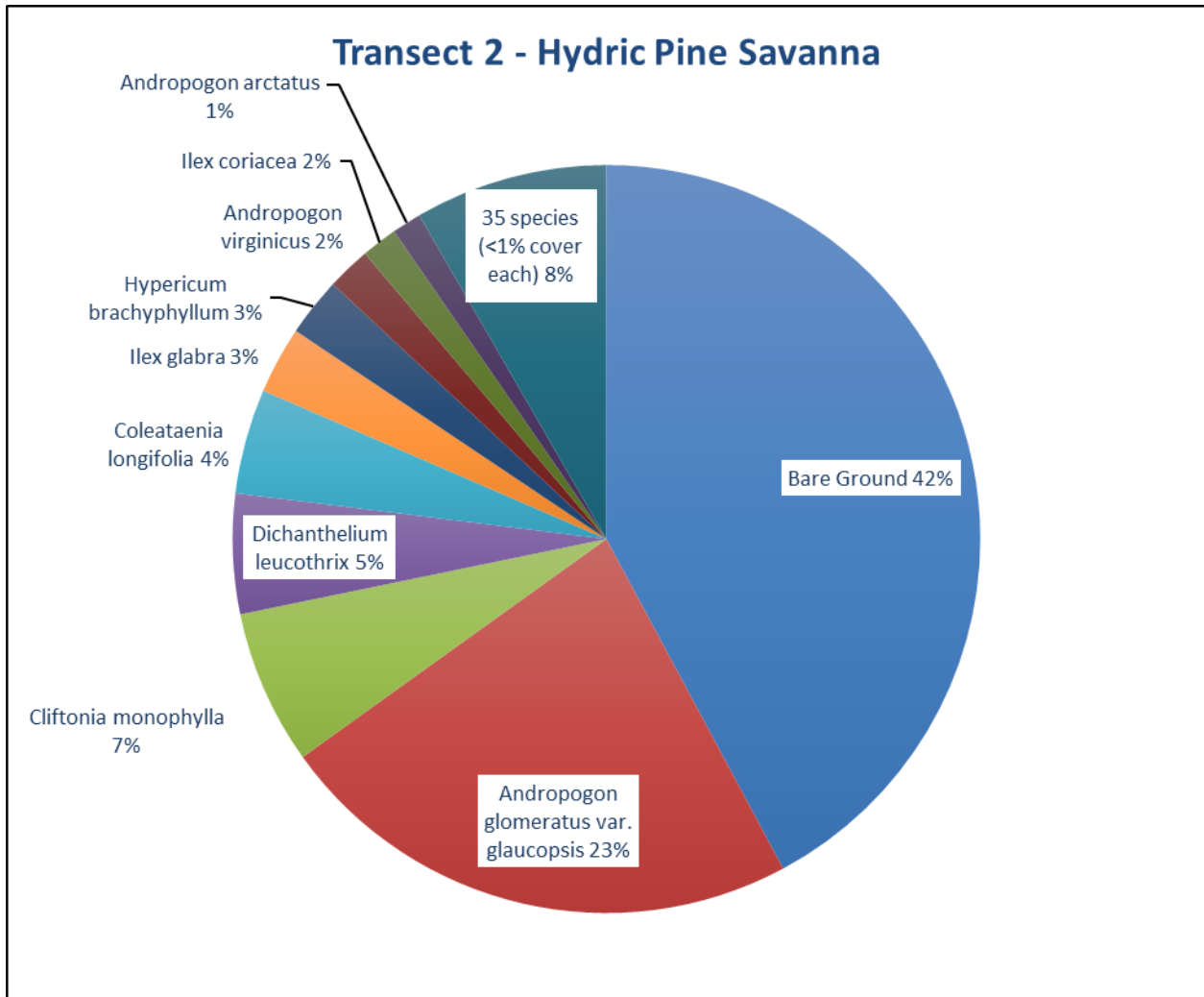


Figure 5. Percent cover of plant species in Hydric Pine Savanna Transect 2.

Table 4. Percent cover of species in Hydric Pine Savanna Transect 2 sampled on November 29, 2023.

Scientific name	Common name	Average percent cover per quadrat
<i>Acer rubrum</i>	red maple	0.10
<i>Andropogon arctatus</i>	pinewoods bluestem	1.17
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	21.07

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon virginicus</i>	broomsedge bluestem	1.73
<i>Aristida stricta</i>	wiregrass	0.57
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Carex longii</i>	Long's sedge	0.23
<i>Cliftonia monophylla</i>	black titi	6.13
<i>Coleataenia longifolia</i>	ciliate redtop panicum	4.17
<i>Cyrilla racemiflora</i>	titi	0.63
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.57
<i>Dichantherium leucothrix</i>	rough witchgrass	4.77
<i>Dichantherium portoricense</i>	hemlock witchgrass	0.23
<i>Dichantherium</i> sp.	witchgrass	0.03
<i>Drosera capillaris</i>	pink sundew	0.07
<i>Eriocaulon decangulare</i>	tenangle pipewort	0.53
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.33
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge	0.03
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.10
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	2.33
<i>Hypericum cistifolium</i>	roundpod St. John's wort	0.03
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.07
<i>Ilex coriacea</i>	large gallberry	1.43
<i>Ilex glabra</i>	gallberry	2.67
<i>Kelochloa verrucosa</i>	warty panicgrass	0.13
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.10
<i>Magnolia virginiana</i>	sweetbay	0.07
<i>Odenlandia uniflora</i>	clustered mille grains	0.13
<i>Persea palustris</i>	swamp bay	0.27
<i>Pinus elliotii</i>	slash pine	0.30
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.07
<i>Rhexia</i> sp.	meadowbeauty	0.13
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.37
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.13
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.03
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.77
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.27
<i>Scleria ciliata</i>	fringed nutrush	0.30
<i>Serenoa repens</i>	saw palmetto	0.03
<i>Smilax glauca</i>	cat greenbrier	0.03
<i>Smilax laurifolia</i>	laurel greenbrier	0.40
<i>Woodwardia virginica</i>	Virginia chain fern	0.50
<i>Xyris floridana</i>	Florida yellow-eyed grass	0.03
<i>Xyris</i> sp.	yellow-eyed grass	0.03
Bare Ground		38.73

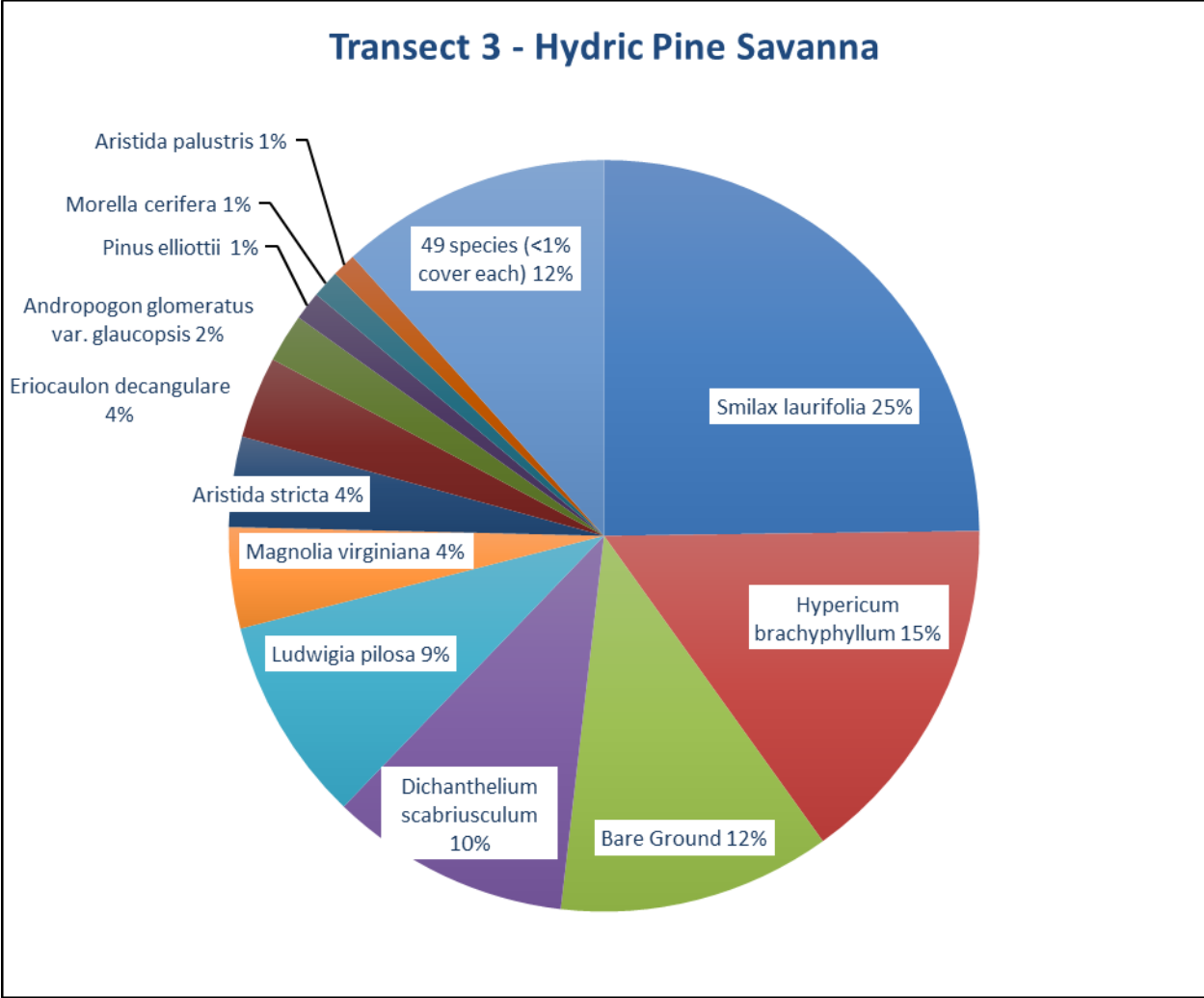


Figure 6. Percent cover of plant species in Hydric Pine Savanna Transect 3.

Table 5. Percent cover of plant species in Hydric Pine Savanna Transect 3 sampled on November 28, 2023.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i>	bushy bluestem	0.47
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	2.10
<i>Andropogon virginicus</i>	broomsedge bluestem	0.47
<i>Anthaenantia rufa</i>	purple silkyscale	0.03
<i>Aristida palustris</i>	longleaf threeawn	1.03
<i>Aristida stricta</i>	wiregrass	3.90
<i>Aronia arbutifolia</i>	red chokeberry	0.13
<i>Bidens mitis</i>	smallfruit beggarticks	0.13
<i>Carex glaucescens</i>	clustered sedge	0.77
<i>Centella asiatica</i>	spadeleaf	0.03
<i>Cliftonia monophylla</i>	black titi	0.87

Scientific name	Common name	Average percent cover per quadrat
<i>Coleataenia longifolia</i>	ciliate redtop panicum	0.07
<i>Ctenium aromaticum</i>	toothache grass	0.03
<i>Cyperus haspan</i>	haspan flatsedge	0.03
<i>Cyrilla racemiflora</i>	titi	0.60
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.20
<i>Dichantherium leucothrix</i>	rough witchgrass	0.37
<i>Dichantherium scabriusculum</i>	woolly witchgrass	10.40
<i>Eleocharis tuberculosa</i>	conecup spikerush	0.10
<i>Eriocaulon decangulare</i>	tenangle pipewort	3.53
<i>Eupatorium pilosum</i>	rough boneset	0.10
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.53
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge	0.03
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.03
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	15.37
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.03
<i>Ilex cassine</i>	dahoon	0.03
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	0.10
<i>Ilex coriacea</i>	large gallberry	0.73
<i>Ilex glabra</i>	gallberry	0.87
<i>Juncus trigonocarpus</i>	redpod rush	0.10
<i>Kelochloa verrucosa</i>	warty panicgrass	0.07
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.10
<i>Ludwigia linifolia</i>	southeastern primrosewillow	0.10
<i>Ludwigia pilosa</i>	hairy primrosewillow	8.87
<i>Lycopus rubellus</i>	taperleaf waterhorehound	0.50
<i>Magnolia virginiana</i>	sweetbay	4.37
<i>Mikania scandens</i>	climbing hempvine	0.47
<i>Morella cerifera</i>	southern bayberry	1.20
<i>Nyssa biflora</i>	swamp tupelo	0.03
<i>Paspalum</i> sp.	paspalum	0.03
<i>Persea palustris</i>	swamp bay	0.23
<i>Pinus elliotii</i>	slash pine	1.23
<i>Rhexia</i> sp.	meadowbeauty	0.03
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.03
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.07
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.23
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.30
<i>Rhynchospora rariflora</i>	fewflower beaksedge	0.50
<i>Rhynchospora</i> sp.	beaksedge	0.23
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.47
<i>Saccharum</i> sp.	plumegrass	0.10
<i>Sarracenia leucophylla</i>	white-top pitcherplant	0.50
<i>Smilax laurifolia</i>	laurel greenbrier	24.90
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.20
<i>Sphagnum</i> sp.	sphagnum moss	0.23
<i>Taxodium ascendens</i>	pond cypress	0.10
<i>Vaccinium elliotii</i>	Elliott's blueberry	0.03
<i>Woodwardia areolata</i>	netted chain fern	0.10

Scientific name	Common name	Average percent cover per quadrat
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	0.20
Bare Ground		11.80

Bay Swamp

Qualitative sampling. An area of Bay Swamp south of the Hydric Pine Savanna Transect 2 was sampled in Fall 2023. Species were also noted while walking across the restored bay swamp that separates the two main areas of pine flatwoods (Figure 2). This community is more similar to a freshwater tidal swamp or basin marsh than a typical bay swamp. Following large scale titi reductions in the savannas and flatwoods adjacent to the bay swamp in the vicinity of Hydric Pine Savanna Transect 2, the Perdido River can now be seen through the open canopy. There is a seepy ecotone from the Hydric Pine Savanna to the swamp. The majority of the community was a mix of trees and shrubs with patches of herbs typical of marshes. The ground was mucky with pools of ankle deep water, large patches of sphagnum moss, and numerous hummocks. In the southern bay swamp, the canopy is more stunted and composed of slash pine, pond cypress, and swamp tupelo to about 45 feet tall. A subcanopy and tall shrub layer was composed of canopy species plus red maple, sweetbay, southern bayberry, and swamp bay. The short shrub (under 6 feet tall) was composed of black titi, southern bayberry, and swamp bay. The patchy herbaceous layer consisted mostly of sawgrass, cinnamon fern, and clustered sedge. The state-listed endangered Panhandle lily is known from the western bay swamp along the former road that was removed for hydrology restoration. A clump has been observed from 2019-2021, and in Fall 2023, we observed a previously undocumented plant. The non-native invasive water hyacinth is known from this community at Dutex West. The total number of species observed in this community was 58 (Table 1).

Mesic Flatwoods

Qualitative sampling. Two areas of Mesic Flatwoods were sampled, one on the eastern side of the property between Hydric Pine Flatwoods Transect 1 and the main road through the Dutex West property, and the other southwest of Hydric Pine Savanna Transect 3 (Figure 2). The eastern area has a canopy of mature slash pine and an open layer of shrubs intermixed with patches of herbaceous species and open ground. Shrubs were mainly saw palmetto, shiny blueberry, and dwarf huckleberry with a diversity of other species present. Wiregrass was common, along with weedy species, such as purple bluestem, and typical flatwoods species. The state-listed threatened pinewoods bluestem was also observed in this community. The non-native invasive Chinese tallow tree was seen again in Fall 2023, and a clump of cogon grass was observed for the first time in mesic flatwoods. The total number of species observed in this community was 70 (Table 1).

Freshwater Marsh

Qualitative sampling. The Freshwater Marsh target community was accessed along the Perdido River southwest of the Hydric Pine Flatwoods 1 Transect (Figure 2). 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 non-native invasive species torpedo grass and

purple sesban were seen again in Fall 2023. The total number of species observed in this community was 35 (Table 1).

Salt Marsh

Qualitative sampling. The Salt Marsh target community was accessed by walking south from the Hydric Pine Flatwoods Transect 4 (Figure 2). The community was largely herbaceous, dominated by sawgrass with patches of needle rush. Small patches of shrubs consisted of dahoon and swamp bay. The invasive non-native Japanese climbing fern (*Lygodium japonicum*), Chinese tallow tree, and purple sesban have been observed in prior years invading in the ecotone between the hydric pine flatwoods and the salt marsh, but only purple sesban was found in 2023. The total number of species observed in this community was 20 (Table 1).