

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

Fall 2023

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# Ward Creek West Mitigation Site Qualitative and Quantitative Monitoring November 2023

## 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 (Figure 1). 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 2). 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 2022.

## METHODS

The quantitative monitoring utilized 300-foot long permanent transect lines previously marked during the 2012 survey. In 2013, metal T-posts were placed at the ends of each transect to provide permanent reference points. Two transects were located in the Hydric Pine Flatwoods target community and two in Hydric Pine Savanna (Figure 2). 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 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.

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 Kim Alexander, Allie Heiker, Ethan Hughes, Kelly Anderson, and Jenna Annis on November 30, 2023.

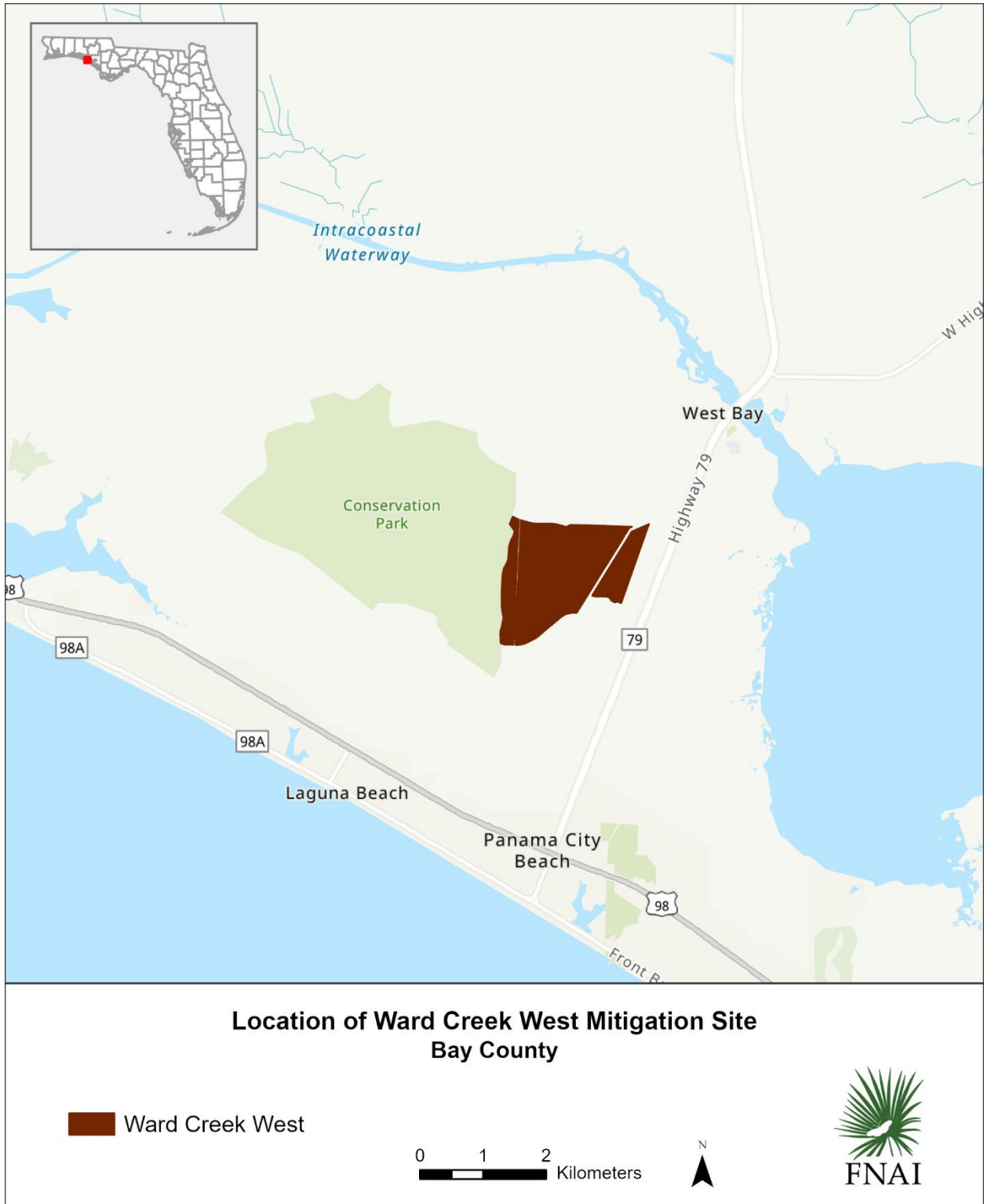


Figure 1. Location map of Ward Creek West Mitigation Site monitored by FNAI.

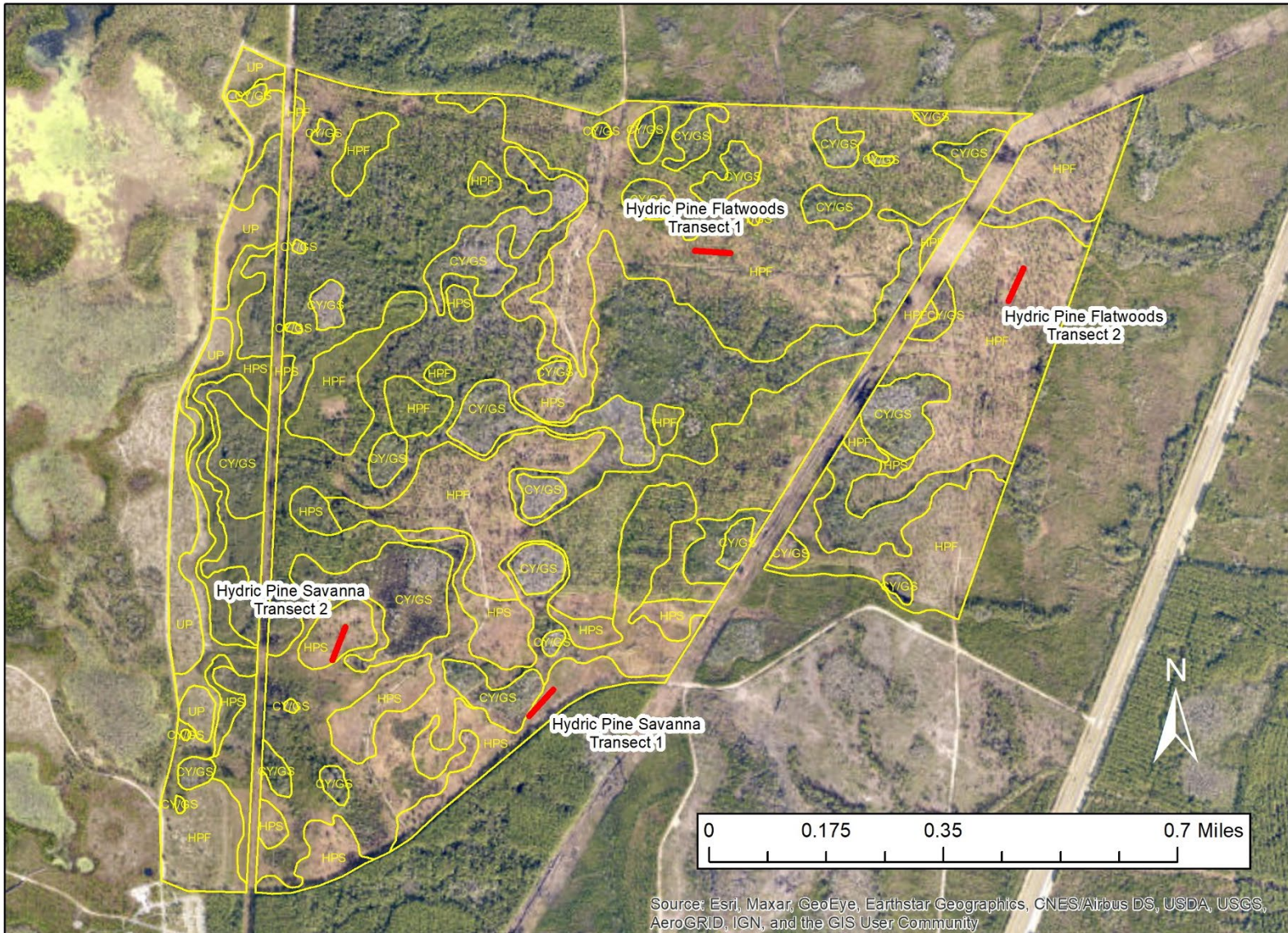


Figure 2. Location of permanent transects at Ward Creek West Mitigation Site. CY=Cypress, UP=Upland Pine, HPF=Hydrich Pine Flatwoods, HPS=Hydrich Pine Savanna, GS=Gum Swamp.



## RESULTS AND DISCUSSION

A total of 174 plant taxa were recorded during the 2023 monitoring period in the target communities at Ward Creek West (Table 1). Twenty-three 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 (<http://florida.plantatlas.usf.edu/>), Institute for Systematic Botany, University of South Florida, Tampa.

Table 1. Plant species observed in the target communities at Ward Creek West Mitigation Site on November 30, 2023. (bold name = new species; bold X = new observation in community type; \* = state-listed endangered or threatened; † = non-native invasive)

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
<i>Acer rubrum</i>	red maple	X			1
* <i>Andropogon arctatus</i>	pinewoods bluestem			<b>X</b>	1
<i>Andropogon glomeratus</i>	bushy bluestem			X	1
<i>Andropogon glomeratus</i> var. <i>glaucoptis</i>	purple bluestem	X	X	X	3
<b><i>Andropogon gyrans</i></b>	Elliott's bluestem		<b>X</b>		1
<i>Andropogon gyrans</i> var. <i>stenophyllus</i>	Elliott's bluestem			X	1
<i>Andropogon virginicus</i>	broomsedge bluestem		X	X	2
<b><i>Andropogon virginicus</i> var. <i>decipiens</i></b>	broomsedge bluestem		<b>X</b>		1
<i>Andropogon virginicus</i> var. <i>glauca</i>	chalky bluestem		X		1
<i>Anthraenantia rufa</i>	purple silkyscale		X		1
<b><i>Anthraenantia villosa</i></b>	green silkyscale		<b>X</b>		1
<i>Aristida palustris</i>	longleaf threeawn			X	1
<b><i>Aristida purpurascens</i></b>	arrowfeather threeawn		<b>X</b>		1
<i>Aristida spiciformis</i>	bottlebrush threeawn		X	X	2
<i>Aristida stricta</i>	wiregrass		X	X	2
<i>Aronia arbutifolia</i>	red chokeberry		X		1
<i>Asclepias</i> sp.	milkweed		X		1
<i>Balduina uniflora</i>	oneflower honeycomb-head		X		1
<b><i>Baptisia lanceolata</i></b>	gopherweed		<b>X</b>		1
<i>Bidens mitis</i>	smallfruit beggarticks		X		1
<b><i>Bulbostylis ciliatifolia</i></b>	capillary hairsedge		<b>X</b>		1
* <i>Calamovilfa curtissii</i>	Curtiss' sandgrass			X	1
<i>Carex glaucescens</i>	clustered sedge	X	<b>X</b>		2
<i>Carex striata</i>	Walter's sedge	X		X	2
<i>Carphephorus odoratissimus</i>	vanillaleaf		X	X	2
<i>Centella asiatica</i>	spadeleaf		X	X	2
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster		X	X	2
<i>Chrysopsis mariana</i>	Maryland goldenaster		X		1
<i>Clethra alnifolia</i>	sweet pepperbush	X	X		2
<i>Cliftonia monophylla</i>	black titi	X	X	X	3
<b><i>Coelorachis rugosa</i></b>	wrinkled jointgrass			<b>X</b>	1
<i>Coleataenia longifolia</i>	ciliate redtop panicum		X	<b>X</b>	2
<i>Conradina canescens</i>	false rosemary		X		1
<b><i>Crocanthemum corymbosum</i></b>	pinebarren frostweed		<b>X</b>		1

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
<i>Ctenium aromaticum</i>	toothache grass		X	X	2
<i>Cyrilla racemiflora</i>	titi		X	X	2
<i>Dichantheium aciculare</i>	needleleaf witchgrass		X		1
<i>Dichantheium ensifolium</i>	cypress witchgrass		X	X	2
<i>Dichantheium ensifolium</i> var. <i>unciphellum</i>	cypress witchgrass		X		1
<i>Dichantheium erectifolium</i>	erectleaf 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	2
<i>Dichantheium sphaerocarpon</i>	roundseed witchgrass		X		1
<i>Dichantheium strigosum</i>	roughhair witchgrass		X		1
<i>Drosera capillaris</i>	pink sundew	X		X	2
<b>Eragrostis sp.</b>	lovegrass		X		1
<b>Eriocaulon compressum</b>	flattened pipewort		X	X	2
<i>Eriocaulon decangulare</i>	tenangle pipewort		X	X	2
<b>Eryngium yuccifolium</b>	button rattlesnakemaster		X		1
<i>Eupatorium capillifolium</i>	dogfennel	X			1
<i>Eupatorium compositifolium</i>	yankeeweed		X		1
<i>Eupatorium mohrii</i>	Mohr's thoroughwort		X	X	2
<i>Eupatorium pilosum</i>	rough boneset			X	1
<i>Euthamia caroliniana</i>	slender flattop goldenrod		X	X	2
<i>Fuirena breviseta</i>	saltmarsh umbrellasedge			X	1
<i>Gaylussacia dumosa</i>	dwarf huckleberry		X	X	2
<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	blue huckleberry		X		1
<i>Gaylussacia mosieri</i>	woolly huckleberry		X	X	2
<i>Helianthus angustifolius</i>	narrowleaf sunflower			X	1
<i>Helianthus radula</i>	stiff sunflower			X	1
<i>Houstonia procumbens</i>	roundleaf bluet		X		1
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	X	X	X	3
<i>Hypericum chapmanii</i>	Chapman's St. John's wort	X			1
<i>Hypericum cistifolium</i>	roundpod St. John's wort	X		X	2
<i>Hypericum fasciculatum</i>	peelbark St. John's wort		X	X	2
<i>Hypericum microsepalum</i>	flatwoods St. John's wort		X	X	2
<i>Hypericum tetrapetalum</i>	fourpetal St. John's wort		X	X	2
<i>Ilex cassine</i> var. <i>myrtifolia</i>	myrtle-leaved holly	X			1
<i>Ilex coriacea</i>	large gallberry	X	X	X	3
<i>Ilex glabra</i>	gallberry		X	X	2
<i>Ilex vomitoria</i>	yaupon	X	X		2
<i>Juncus scirpoides</i>	needlepod rush		X	X	2
<i>Kalmia hirsuta</i>	hairy wicky		X	X	2
<i>Kelloggloa verrucosa</i>	warty panicgrass		X	X	2
<i>Lachnanthes caroliniana</i>	Carolina redroot		X	X	2
<i>Lachnocaulon anceps</i>	whitehead bogbutton		X		1
<b>Lechea torreyi</b>	Piedmont pinweed		X	X	2

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
<i>Liatris gracilis</i>	slender gayfeather		X		1
<i>Liatris spicata</i>	dense gayfeather		X	X	2
<i>Liatris tenuifolia</i> var. <i>quadriflora</i>	shortleaf gayfeather		X		1
<i>Lobelia glandulosa</i>	glade lobelia			X?	1
<i>Lophiola aurea</i>	golden crest	X	X	X	3
<i>Ludwigia linearis</i>	narrowleaf primrosewillow		X	X	2
<i>Ludwigia pilosa</i>	hairy primrosewillow	X		X	2
<i>Lycopodiella alopecuroides</i>	foxtail club-moss		X	X	2
<i>Lycopodiella caroliniana</i>	slender club-moss		X	X	2
<i>Lyonia ferruginea</i>	rusty staggerbush		X	X	2
<i>Lyonia fruticosa</i>	coastalplain staggerbush		X	X	2
<i>Lyonia lucida</i>	fetterbush	X	X	X	3
<i>Magnolia virginiana</i>	sweetbay	X	X	X	3
<i>Morella caroliniensis</i>	evergreen bayberry	X	X	X	3
<i>Morella cerifera</i>	southern bayberry	X	X		2
<i>Morella pumila</i>	dwarf bayberry		X		1
moss			X		1
<i>Muhlenbergia capillaris</i> var. <i>trichopodes</i>	cutover muhly			X	1
<i>Nyssa biflora</i>	swamp tupelo	X			1
<i>Nyssa ogeche</i>	ogeechee tupelo	X			1
<i>Nyssa ursina</i>	bog tupelo	X?			1
<i>Oldenlandia uniflora</i>	clustered mille grains		X	X	2
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	X			1
<i>Panicum hemitomom</i>	maidencane			X	1
† <i>Panicum repens</i>	torpedo grass		X		1
<i>Paspalum setaceum</i>	thin paspalum		X		1
<i>Pieris phyllireifolia</i>	climbing fetterbush	X		X	2
<i>Pinus elliotii</i>	slash pine	X	X	X	3
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass		X	X	2
<i>Pluchea baccharis</i>	rosy camphorweed		X		1
<i>Pluchea foetida</i>	stinking camphorweed	X			1
<i>Polygala lutea</i>	orange milkwort		X	X	2
<i>Polygonella gracilis</i>	tall jointweed		X		1
<i>Polygonella polygama</i>	october flower		X		1
<i>Proserpinaca pectinata</i>	combleaf mermaidweed			X	1
<i>Pteridium aquilinum</i>	bracken fern		X	X	2
<i>Quercus minima</i>	dwarf live oak		X	X	2
<i>Rhexia nuttallii</i>	Nuttall's meadowbeauty			X	1
<i>Rhexia petiolata</i>	fringed meadowbeauty		X	X	2
<i>Rhexia virginica</i>	handsome harry	X	X	X	3
<i>Rhynchospora baldwinii</i>	Baldwin's beaksedge			X	1
<i>Rhynchospora cephalantha</i>	bunched beaksedge	X	X	X	3
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge		X	X	2
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge			X	1

Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
<i>Rhynchospora ciliaris</i>	fringed beaksedge		X	X	2
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge	X		X	2
<i>Rhynchospora debilis</i>	savannah beaksedge		X		1
<i>Rhynchospora fascicularis</i>	fascicled beaksedge		X	X	2
<i>Rhynchospora fernaldii</i>	Fernald's beaksedge		X	X	2
<i>Rhynchospora gracilentata</i>	slender beaksedge	X	X	X	3
<i>Rhynchospora oligantha</i>	featherbristle beaksedge			X	1
<i>Rhynchospora plumosa</i>	plumed beaksedge	X	X	X	3
<i>Rubus pensilvanicus</i>	sawtooth blackberry	X	X		2
<i>Sabatia brevifolia</i>	shortleaf rosegentian		X		1
<i>Saccharum giganteum</i>	sugarcane plume grass			X	1
<i>Sarracenia flava</i>	yellow pitcherplant	X		X	2
<i>Schizachyrium stoloniferum</i>	creeping little bluestem		X		1
<i>Scleria baldwinii</i>	Baldwin's nutrush			X	1
<i>Scleria ciliata</i>	fringed nutrush		X	X	2
<i>Scleria triglomerata</i>	whip nutrush		X		1
<i>Serenoa repens</i>	saw palmetto		X		1
<i>Sericocarpus tortifolius</i>	whitetop aster		X		1
<b><i>Seymeria cassioides</i></b>	yaupon black senna		X		1
<i>Smilax auriculata</i>	earleaf greenbrier		X	X	2
<i>Smilax glauca</i>	cat greenbrier		X		1
<i>Smilax laurifolia</i>	laurel greenbrier	X	X	X	3
<i>Smilax pumila</i>	sarsaparilla vine		X	X	2
<i>Smilax walteri</i>	coral greenbrier			X	1
<i>Solidago fistulosa</i>	pinebarren goldenrod	X	X	X	3
<i>Solidago odora</i>	sweet goldenrod		X	X	2
<b><i>Solidago stricta</i></b>	wand goldenrod		X		1
<i>Sophranthe hispida</i>	rough hedgehyssop		X		1
<b><i>Sorghastrum nutans</i></b>	yellow indiagrass		X		1
<i>Sphagnum</i> sp.	sphagnum moss		X	X	2
<i>Symphyotrichum chapmanii</i>	savannah aster			X	1
<i>Syngonanthus flavidulus</i>	yellow hatpins			X	1
<i>Taxodium ascendens</i>	pond cypress	X		X	2
<i>Tiedemannia filiformis</i> ssp. <i>filiformis</i>	water cowbane			X	1
† <b><i>Triadica sebifera</i></b>	Chinese tallow tree	X			1
<i>Vaccinium corymbosum</i>	highbush blueberry		X		1
<i>Vaccinium darrowii</i>	Darrow's blueberry		X		1
<i>Vaccinium myrsinites</i>	shiny blueberry		X		1
<i>Vitis rotundifolia</i>	muscadine	X			1
<i>Woodwardia areolata</i>	netted chain fern	X			1
<i>Woodwardia virginica</i>	Virginia chain fern	X	X		2
<i>Xyris ambigua</i>	coastal plain yellow-eyed grass		X	X	2
<b><i>Xyris baldwiniana</i></b>	Baldwin's yellow-eyed grass			X	1
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass		X	X	2



Scientific Name	Common Name	Cypress	Hydric Pine Flatwoods	Hydric Pine Savanna	Grand Total
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass		X	X	2
<i>Xyris drummondii</i>	Drummond's yellow-eyed grass		X?		1
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass		X	X	2
<i>Xyris fimbriata</i>	fringed yellow-eyed grass	X		X	2
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass		X	X	2
<b><i>Xyris serotina</i></b>	acid swamp yellow-eyed grass	<b>X</b>	<b>X</b>	<b>X</b>	<b>3</b>
<i>Xyris stricta</i>	pineland yellow-eyed grass	<b>X</b>		X	2
<i>Yucca filamentosa</i>	Adam's needle		X		1
<b>Total number of taxa: 174</b>		44	126	106	276

## Hydric Pine Flatwoods

**Qualitative sampling.** The hydric pine flatwoods areas had been disturbed in the past few years by the thinning of mature planted slash pines. The open canopy of mature slash pines covered a variously dense shrub layer. The area near Transect 1 (western transect) had been bedded years ago when the pines were planted. This area had a moderately dense shrub stratum and an herbaceous layer composed primarily of purple bluestem. In the past, the eastern section near Transect 2 had more saw palmetto and gallberry and a diverse herbaceous cover with scattered patches of wiregrass and beaksedges. Recent shrub reduction efforts (chopping and chemical treatment) seem to have drastically altered this area, with less saw palmetto and runner oak, and an increase in weedy purple bluestem. The state-endangered Fernald's pogonia was detected in hydric pine flatwoods for the first time in 2021 but was not seen this year. The total number of species observed in this community was 126 (Table 1).

**Quantitative sampling.** The western Transect 1 (Figure 3, Table 2) had a total of 32 species with 21% bare ground. Numerous slash pines had fallen in the area of the transect due to past storms. Woody species (black titi, saw palmetto, and large gallberry) contributed the most cover, followed by purple bluestem. Woody species made around 61% average cover per quadrat. The transect was largely unchanged from last year, although there was a small increase in woody cover attributable to an increase in large gallberry and saw palmetto.

The eastern Transect 2 (Figure 4, Table 3) had a total of 45 species with 31% bare ground. Woody species, primarily saw palmetto and slash pine, contributed about one third of the total species cover (around 22% average cover per quadrat). Purple bluestem, creeping little bluestem, and broomsedge bluestem made up most of the herbaceous cover. Since 2018, dwarf live oak and shortleaf yellow-eyed grass, once dominants, are now only trace components, at most, while weedy purple bluestem is now the most abundant species.

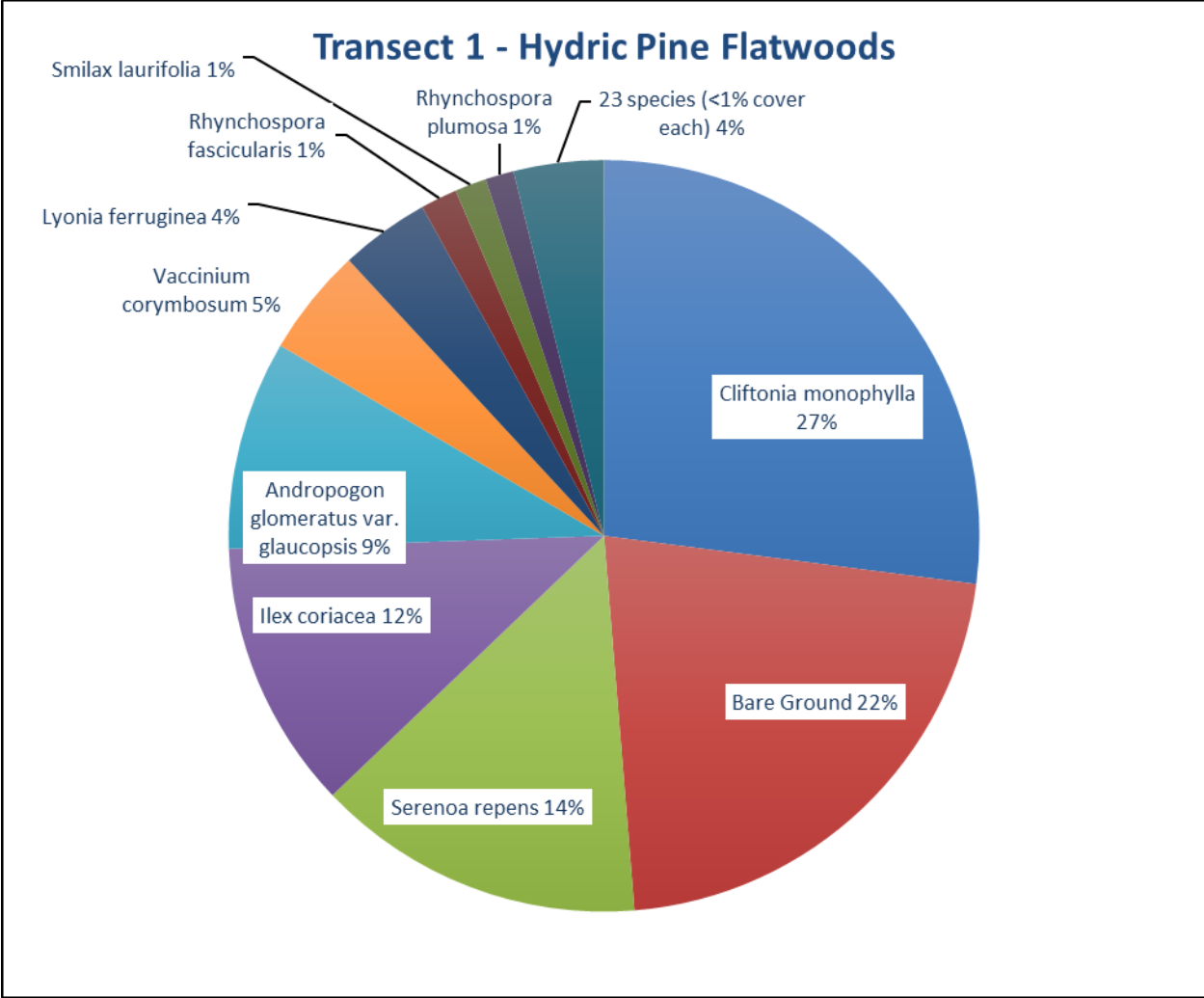


Figure 3. Percent relative cover of plant species in Hydric Pine Flatwoods Transect 1.

Table 2. Percent cover of plant species in Hydric Pine Flatwoods Transect 1 sampled on November 30, 2023.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	8.57
<i>Andropogon virginicus</i>	broomsedge bluestem	0.03
<i>Aronia arbutifolia</i>	red chokeberry	0.03
<i>Clethra alnifolia</i>	sweet pepperbush	0.03
<i>Cliftonia monophylla</i>	black titi	25.77
<i>Coleataenia longifolia</i>	ciliate redtop panicum	0.03
<i>Cyrilla racemiflora</i>	titi	0.27
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.37
<i>Dichantherium sphaerocarpon</i>	roundseed witchgrass	0.23
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.07
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	0.20

Scientific name	Common name	Average percent cover per quadrat
<i>Ilex coriacea</i>	large gallberry	11.03
<i>Kalmia hirsuta</i>	hairy wicky	0.23
<i>Lyonia ferruginea</i>	rusty staggerbush	3.67
<i>Magnolia virginiana</i>	sweetbay	0.03
<i>Pinus elliotii</i>	slash pine	0.63
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.27
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	1.50
<i>Rhynchospora fernaldii</i>	Fernald's beaksedge	0.03
<i>Rhynchospora gracilentata</i>	slender beaksedge	0.17
<i>Rhynchospora plumosa</i>	plumed beaksedge	1.17
<i>Rhynchospora sp.</i>	beaksedge	0.03
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.03
<i>Scleria ciliata</i>	fringed nutrush	0.03
<i>Serenoa repens</i>	saw palmetto	13.50
<i>Smilax laurifolia</i>	laurel greenbrier	1.30
<i>Sphagnum sp.</i>	sphagnum moss	0.53
<i>Vaccinium corymbosum</i>	highbush blueberry	4.43
<i>Vaccinium myrsinites</i>	shiny blueberry	0.03
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.07
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.10
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass	0.23
Bare Ground		20.63

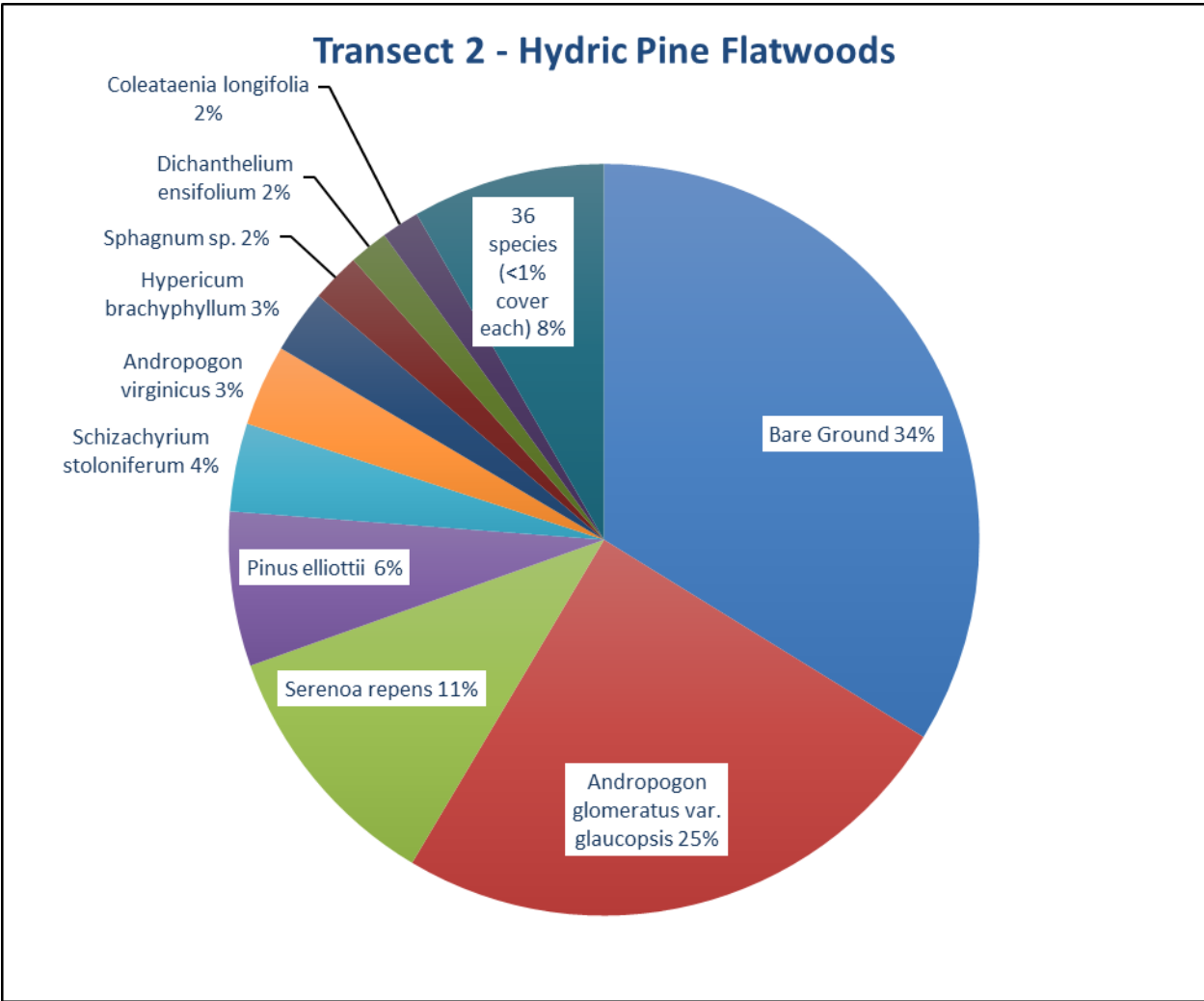


Figure 4. Percent relative cover of plant species in Hydric Pine Flatwoods Transect 2.

Table 3. Percent cover of plant species in Hydric Pine Flatwoods Transect 2 sampled on November 30, 2023.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	22.60
<i>Andropogon virginicus</i>	broomsedge bluestem	3.20
<i>Aristida spiciformis</i>	bottlebrush threeawn	0.07
<i>Carphephorus odoratissimus</i>	vanillaleaf	0.10
<i>Cliftonia monophylla</i>	black titi	0.03
<i>Coleataenia longifolia</i>	ciliate redtop panicum	1.50
<i>Cyperaceae</i>		0.10
<i>Cyrilla racemiflora</i>	titi	0.50
<i>Dichanthelium ensifolium</i>	cypress witchgrass	1.53
<i>Dichanthelium sp.</i>	witchgrass	0.03

Scientific name	Common name	Average percent cover per quadrat
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.03
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.57
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	2.50
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	0.63
<i>Ilex glabra</i>	gallberry	0.70
<i>Juncus scirpoides</i>	needlepod rush	0.07
<i>Kalmia hirsuta</i>	hairy wicky	0.03
<i>Kelochloa verrucosa</i>	warty panicgrass	0.07
<i>Lachnocaulon anceps</i>	whitehead bogbutton	0.13
<i>Lyonia lucida</i>	fetterbush	0.03
<i>Magnolia virginiana</i>	sweetbay	0.03
<i>Morella cerifera</i>	southern bayberry	0.03
moss	unknown moss	0.83
<i>Oldenlandia uniflora</i>	clustered mille grains	0.13
<i>Pinus elliottii</i>	slash pine	6.07
<i>Polygala lutea</i>	orange milkwort	0.07
<i>Quercus minima</i>	dwarf live oak	0.03
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.03
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.60
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.10
<i>Rhynchospora debilis</i>	savannah beaksedge	0.13
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.17
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.27
<i>Rhynchospora plumosa</i>	plumed beaksedge	0.37
<i>Rhynchospora sp.</i>	beaksedge	0.03
<i>Rubus pensilvanicus</i>	sawtooth blackberry	0.73
<i>Schizachyrium stoloniferum</i>	creeping little bluestem	3.47
<i>Serenoa repens</i>	saw palmetto	10.07
<i>Smilax auriculata</i>	earleaf greenbrier	0.23
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.33
<i>Sphagnum sp.</i>	sphagnum moss	1.93
<i>Woodwardia virginica</i>	Virginia chain fern	0.20
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.10
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass	0.03
<i>Xyris sp.</i>	yellow-eyed grass	0.03
<b>Bare Ground</b>		<b>30.87</b>

## 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, black titi, and laurel greenbrier occur throughout. In prior years, three state-listed species have been found in this community, the threatened Curtiss' sandgrass (*Calamovilfa curtissii*) and red-flowered pitcher plant (*Sarracenia rubra*), plus the endangered upland spreading pogonia (*Cleistes bifaria*). In 2023, Curtiss' sandgrass was observed, as

well as a new observation of the threatened pinewoods bluestem (*Andropogon arctatus*). The total number of plant species observed in this community was 106 (Table 1).

**Quantitative sampling.** Transect 1 (Figure 5, Table 4) had a total of 34 species and 18% bare ground. Groundcover was heavily dominated by purple bluestem, followed by black titi and fetterbush. Slender beaksedge and broomsedge bluestem also contributed significant cover. Woody species made up over a third of the overall plant cover, around 32% average cover per quadrat, a small increase from last year. Otherwise, vegetation along the transect was largely unchanged from last year.

Transect 2 (Figure 6, Table 5) had a total of 37 species and 9% bare ground. The vegetation was dominated by black titi shrubs, followed by purple bluestem. The next most abundant species were fetterbush, tenangle pipewort, titi, and wiregrass. Woody species made up over half of the overall plant cover, around 49% average cover per quadrat. Overall, the measured vegetation along this transect was similar to last year. Shrub cover increased slightly, while wiregrass cover remained the same.

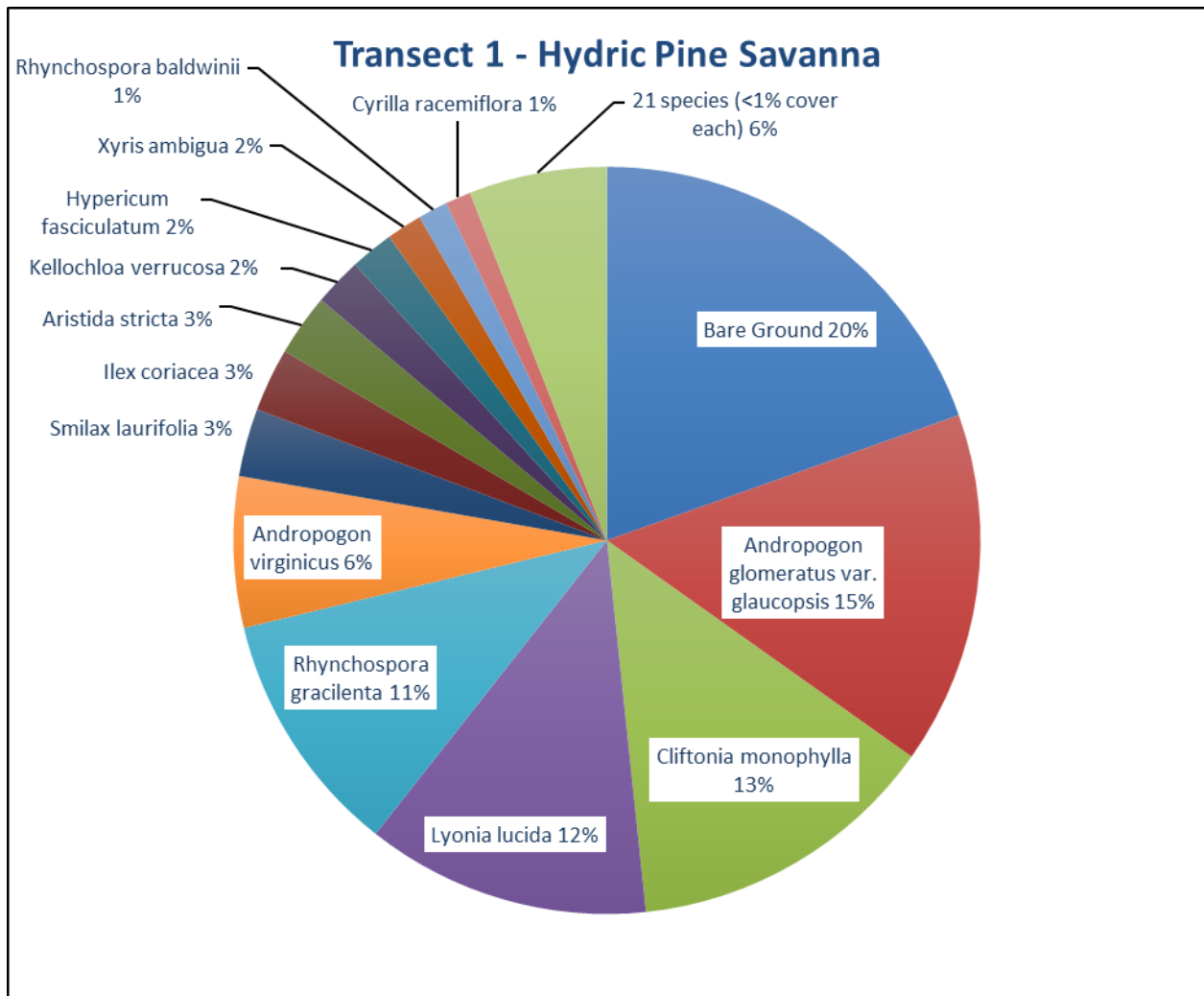


Figure 5. Percent relative cover of plant species in Hydric Pine Savanna Transect 1.



Table 4. Percent cover of plant species in Hydric Pine Savanna Transect 1 sampled on November 30, 2023.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	purple bluestem	13.87
<i>Andropogon virginicus</i>	broomsedge bluestem	5.93
<i>Aristida stricta</i>	wiregrass	2.43
<i>Cliftonia monophylla</i>	black titi	12.27
<i>Coleataenia longifolia</i>	ciliate redtop panicum	0.03
<i>Cyrilla racemiflora</i>	titi	1.00
<i>Dichantherium ensifolium</i>	cypress witchgrass	0.60
<i>Drosera capillaris</i>	pink sundew	0.27
<i>Eriocaulon compressum</i>	flattened pipewort	0.23
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.03
<i>Eupatorium pilosum</i>	rough boneset	0.13
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.27
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.10
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.03
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	1.70
<i>Ilex coriacea</i>	large gallberry	2.50
<i>Kelochloa verrucosa</i>	warty panicgrass	1.90
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.03
<i>Lyonia lucida</i>	fetterbush	11.17
<i>Pinus elliotii</i>	slash pine	0.10
<i>Rhexia nuttallii</i>	Nuttall's meadowbeauty	0.03
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.37
<i>Rhynchospora baldwinii</i>	Baldwin's beaksedge	1.17
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.73
<i>Rhynchospora ciliaris</i>	fringed beaksedge	0.27
<i>Rhynchospora corniculata</i>	shortbristle horned beaksedge	0.50
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	0.50
<i>Rhynchospora gracilentata</i>	slender beaksedge	9.63
<i>Smilax laurifolia</i>	laurel greenbrier	2.67
<i>Sphagnum</i> sp.	sphagnum moss	0.10
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	1.40
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.83
<i>Xyris elliotii</i>	Elliott's yellow-eyed grass	0.17
<i>Xyris stricta</i>	pineland yellow-eyed grass	0.10
Bare Ground		17.77

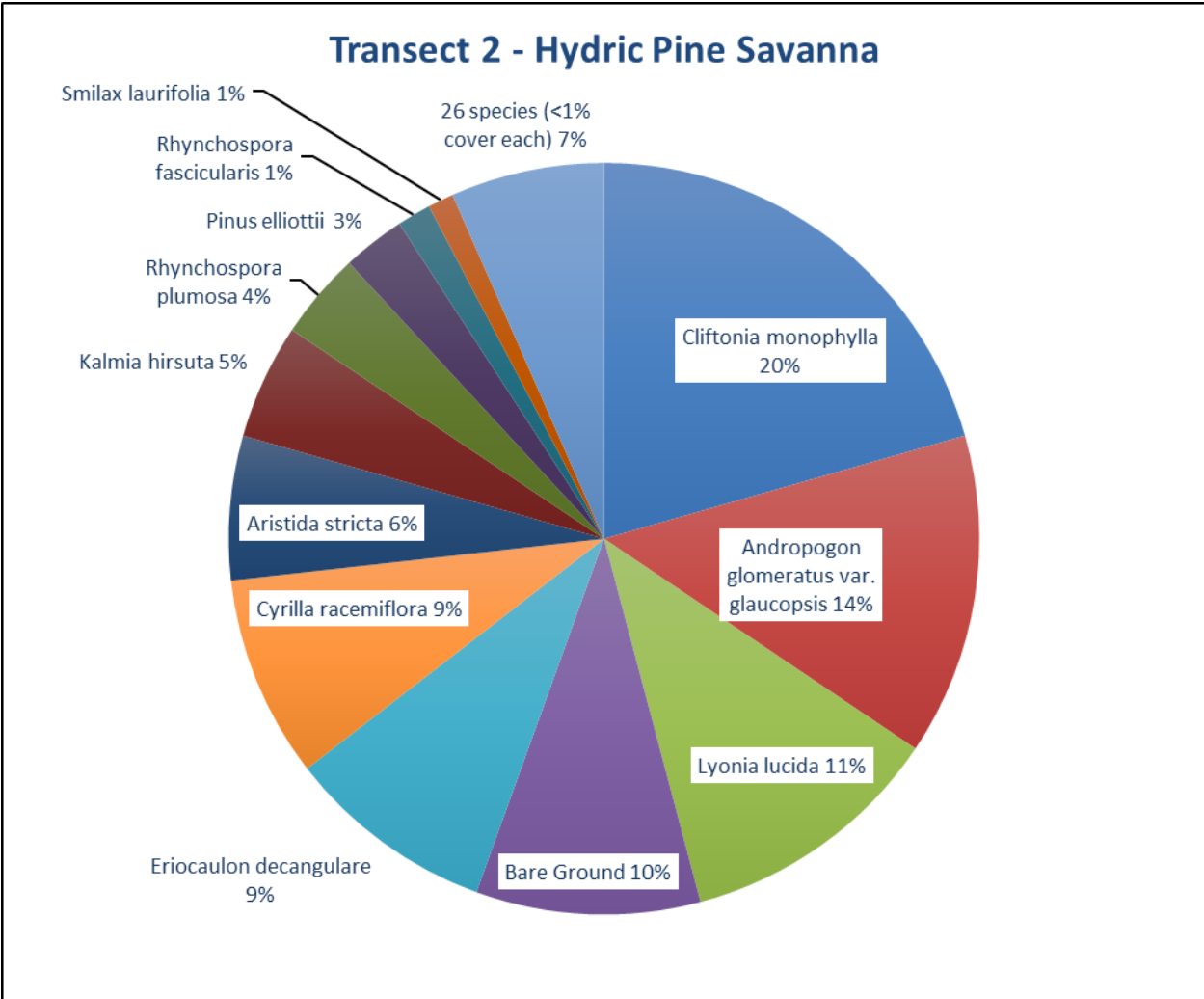


Figure 6. Percent relative cover of plant species in Hydric Pine Savanna Transect 2.

Table 5. Percent cover of plant species in Hydric Pine Savanna Transect 2 sampled on November 30, 2023.

Scientific name	Common name	Average percent cover per quadrat
<i>Andropogon glomeratus var. glaucopsis</i>	purple bluestem	13.33
<i>Andropogon sp.</i>	bluestem	0.03
<i>Aristida spiciformis</i>	bottlebrush threeawn	0.10
<i>Aristida stricta</i>	wiregrass	5.97
<i>Cliftonia monophylla</i>	black titi	19.80
<i>Ctenium aromaticum</i>	toothache grass	0.03
<i>Cyrilla racemiflora</i>	titi	8.37
<i>Dichanthelium ensifolium</i>	cypress witchgrass	0.10
<i>Drosera capillaris</i>	pink sundew	0.03
<i>Eriocaulon decangulare</i>	tenangle pipewort	8.67

Scientific name	Common name	Average percent cover per quadrat
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.17
<i>Euthamia caroliniana</i>	slender flattop goldenrod	0.07
<i>Gaylussacia mosieri</i>	woolly huckleberry	0.03
<i>Hypericum brachyphyllum</i>	coastalplain St. John's wort	0.03
<i>Hypericum fasciculatum</i>	peelbark St. John's wort	0.03
<i>Hypericum microsepalum</i>	flatwoods St. John's wort	0.47
<i>Ilex glabra</i>	gallberry	0.73
<i>Kalmia hirsuta</i>	hairy wicky	4.77
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.43
<i>Lyonia ferruginea</i>	rusty staggerbush	0.10
<i>Lyonia lucida</i>	fetterbush	11.00
<i>Pinus elliotii</i>	slash pine	2.60
<i>Polygala lutea</i>	orange milkwort	0.03
<i>Pteridium aquilinum</i>	bracken	0.73
<i>Rhexia petiolata</i>	fringed meadowbeauty	0.10
<i>Rhynchospora cephalantha</i>	bunched beaksedge	0.33
<i>Rhynchospora chalarocephala</i>	loosehead beaksedge	0.03
<i>Rhynchospora chapmanii</i>	Chapman's beaksedge	0.23
<i>Rhynchospora fascicularis</i>	fascicled beaksedge	1.40
<i>Rhynchospora gracilentia</i>	slender beaksedge	0.53
<i>Rhynchospora plumosa</i>	plumed beaksedge	3.60
<i>Smilax laurifolia</i>	laurel greenbrier	1.07
<i>Sphagnum</i> sp.	sphagnum moss	0.40
<i>Xyris ambigua</i>	coastalplain yellow-eyed grass	0.77
<i>Xyris baldwiniana</i>	Baldwin's yellow-eyed grass	0.10
<i>Xyris brevifolia</i>	shortleaf yellow-eyed grass	0.63
<i>Xyris flabelliformis</i>	savannah yellow-eyed grass	0.10
Bare Ground		9.30

## Cypress

**Qualitative sampling.** The cypress target community was visited at several sites (Figure 1). The canopy was around 45–60 feet tall and dominated by pond cypress and sweetbay, with smaller sweetbay, titi, and swamp bay in the subcanopy and tall shrub layers. Shorter shrubs included sweet pepperbush, swamp bay, sweetbay, and climbing fetterbush. A dense perimeter of shrubs and vines often limits access to swamps. Areas of hog digging were common. The non-native invasive Chinese tallow tree was observed in this community for the first time in 2023. The total number of species observed in this community was 44 (Table 1).