

# Sand Hill Lakes Mitigation Bank Combined DEP/USACE Fifteenth Annual Report



**FDEP Permit # 0227351-001 Issued 9/6/2005, Washington County**

**Northwest Florida Water Management District**

**Submitted by David Clayton**

**In support of Specific Conditions 26 and 28**

## Executive Summary

The Sand Hill Lakes Mitigation Bank (SHLMB) consists of approximately 2,155 acres in southern Washington County in the Sand Hill Lakes region of the Florida Panhandle. It is located just west of the intersection of State Road (SR) 77 and SR 279 within Township 1 North, Range 14 & 15 West. The site contains 850 acres of wetlands, 155 acres of natural lakes and ponds, and 1,150 acres of upland communities. The Florida Department of Environmental Protection (FDEP) permit was issued September 5, 2005, and US Army Corps of Engineers (USACE) permits were approved on May 16, 2006. This is the fifteenth annual combined FDEP and USACE report for the SHLMB, and it is written in accordance with Specific Condition 26 and 28. All restoration activities described in the Mitigation Bank Permit have been implemented and restored habitats are improving. Interim success criteria have been met since June 2010.

Fire was reintroduced to the SHLMB in the fall of 2004, and warm season burns were implemented in 2007. Six burn cycles have been completed, although communities requiring more frequent fires have had eight burn cycles since the bank was established. Frequent fires have greatly improved the quality and diversity within the pyrogenic communities. The hydrologic restoration was completed by January 2008 and included the removal of two fill-roads, installation three railcar bridges, replacement of two culverts and dams, and the remediation of ten erosion sites. The hydrologic restoration continues to function as designed.

Hydric pine flatwoods restoration activities have been implemented on 163.88 acres. Shrub reduction was completed in August 2008. Herbicide treatments were conducted for three years and nuisance shrub cover been maintained at less than five percent cover. The hydric pine flatwoods were planted with 1.18 million wiregrass plants, 182,700 cut over muhly grass, 122,600 toothache grass and 72,600 mixed hydric pine flatwoods wildflowers. All plantings were conducted in accordance with Specific Condition 10 and Appendix D. The hydric pine flatwood community is burned on a two-year rotation. In 2020, a total of 105 species were observed within they hydric pine flatwoods restoration on the west side of Dry Pond during the annual monitoring. Quantitative transect data within the hydric pine flatwoods restoration had an average herbaceous vegetation cover of 84.4 percent. This is a significant increase from two herbaceous species and 98 percent shrub cover observed during the baseline documentation.

All upland restoration activities described in the permit have been completed since 2010 and include removal of pine plantations, eradication of shrub species, replanting with longleaf pine, wiregrass, and implementation of warm season burns on a two-year interval. A total of 646 acres of sandhill were enhanced by planting longleaf pine at a density of 436 trees per acre. Currently, average planted longleaf pine densities remain below 200 trees per acre. A total of 454.5 acres of sandhill understory was restored by planting wiregrass on three-foot centers. In 2017, 32,000 plants from 20 sandhill species grown from seed collected at the SHLMB were installed within 37 acres of sandhill restoration adjacent to the entrance. The restored sandhills continue to thrive and a total of 128 sandhill species were observed adjacent to Little Deep Edge Pond in 2020. An evaluation of wiregrass seedlings per meter square was conducted within former sand pine plantations planted with wiregrass. An average of four wiregrass seedlings per meter square were observed during the fall monitoring in 2020. This recruitment will help to increase the wiregrass coverage within the sandhill restoration. Surveys of nuisance species (flora and fauna) have been conducted throughout the past fourteen years.

Feral hog damage was limited in 2020. However, hog trapping resulted in the removal of 25 hogs. The dates of annual sampling for the 2020 annual report were September 21, 23, 24, October 21, 22, 24, and November 18, 19, and 24. Species diversity was excellent throughout the SHLMB and plants appeared healthy. The number of species observed continues to increase as habitats improve from implementation of restoration activities.

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## Introduction

The Sand Hill Lakes Mitigation Bank (SHLMB) consists of 2,155 acres in southern Washington County in the Sand Hill Lakes region of the Florida Panhandle (Figure 1, Figure 2). It is located just west of the intersection of SR77 and SR 279, and is within Township 1 North, Range 14 & 15 West. The property contains 850 acres of wetlands, including high quality cypress sloughs and strands, hydric pine flatwoods restoration, bayheads, seepage slopes, and approximately 155 acres of natural solution ponds and shallow, gently sloped lakes connected by streams and ditches. The uplands consist of 1,150 acres of hardwood oak communities and sandhill enhancement and restored sandhill communities (Figure 2).

The SHLMB occurs on the divide between the Choctawhatchee and St. Andrew Bay watersheds. The majority of the SHLMB occurs within the surface headwaters of Pine Log Creek, which flows westerly and southwesterly to Pine Log State Forest and ultimately to the Choctawhatchee River and Bay. However, due to the karst nature of the Sand Hill Lakes region, the SHLMB also occurs within a recharge area for Econfina Creek, which, via Deer Point Lake Reservoir, is the water supply for Panama City, ultimately discharging to St. Andrew Bay.

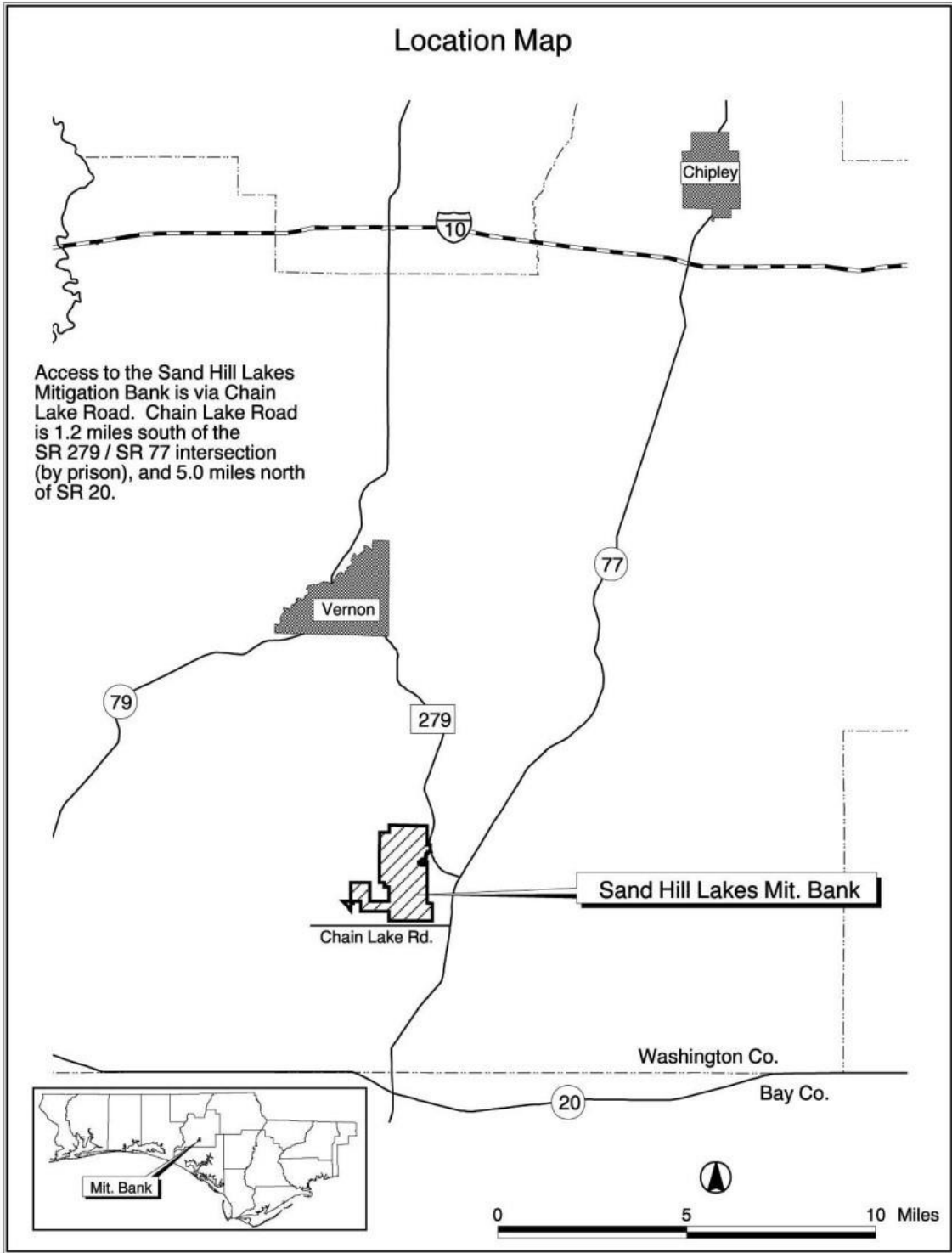


Figure 1. Location Map (2005 FDEP Permit)

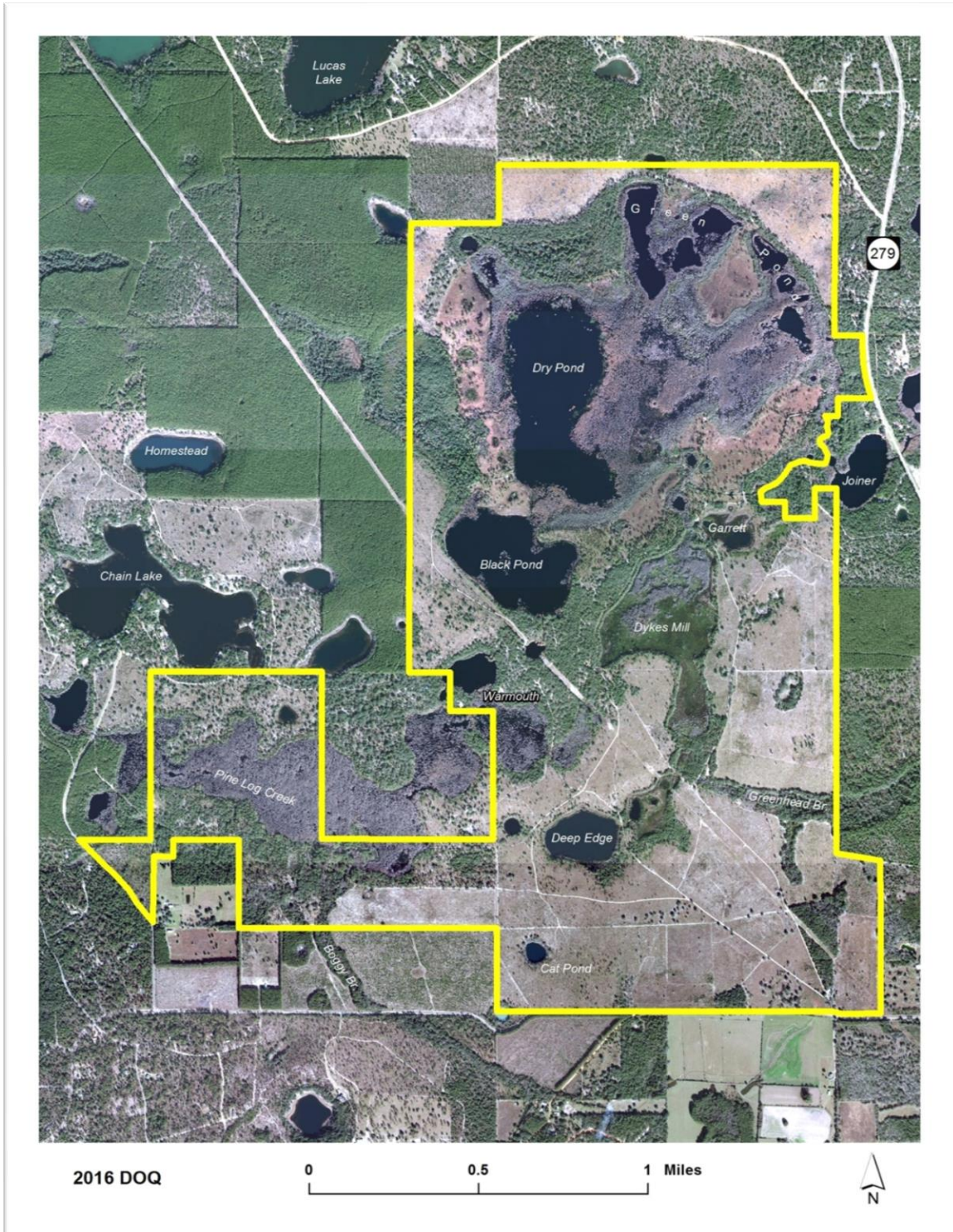


Figure 2. SHLMB Boundary Map

# Bank Establishment and Mitigation Work Schedule

Specific Conditions 1-5, 7, 8, and 14

The FDEP permit for the SHLMB was issued on September 5, 2005 and the USACE Mitigation Banking Instrument (MBI) was approved on May 16, 2006. This is the fifteenth annual combined FDEP and USACE report for the SHLMB. Construction activities were initiated in July 2006 and completed by January 2008. All restoration activities described in the Mitigation Bank permit have been completed and restored habitats are improving with regular burn intervals. Interim success criteria have been met since 2010. The mitigation work schedule is included below (Table 1).

**Table 1. Restoration Work Schedule**

Restoration Work Activity	Estimated Completion Date
Conservation easement, QMS	Completed 3/2006
Fencing and signage	Completed 3/2005
Site security / law enforcement / internal gating / road closures	Ongoing
Stabilization of 10 erosion sites	Completed 3/2007
Hydrologic enhancements	
- Replacement of Black Pond dam	Initiated 10/2007 Completed 1/2008
- Removal of Dykes Mill Pond dam	Initiated 7/2006 Completed 8/2006
- Removal of road fill at (3) sites	Initiated 7/2006 Completed 3/2007
- Construction of 2 bridges and replacement of 3 culverts	Initiated 7/2006 Completed 3/2007
Removal of pine plantation and thinning of slash pine	Initiated 7/2007 Completed 10/2007  Additional thinning of Management Unit 3 to reduce pine densities to <200 ac (August 2012)  Sand pine seedlings were eradicated from 158 acres former sand pine plantation restored to sand hills in August 2012.
Removal of oak overgrowth and replanting with longleaf pine	Completed: Oak removed 2005/2006, additional oak removal (ULW, 6/2009) 150 acres oak and shrub reduction, 12/2010  Pine planted 2005 and 12/2007. Additional hardwood removal in 2009 and 2011.  Additional hardwood removal was conducted for 40 acres in the sand hill restoration in August 2012.
80 percent completion of initial growing season and fuel reduction fires in areas to be maintained as oak / pine community	Completed 12/2005
Initial thinning, roller chopping, and fuel reduction fires in hydric pine	Completed Initial burns 8/2005  Completed required shrub reduction (Gyro-Trac) 082008  Completed Pine thinning 10/2007 Fuel reduction burns following timbering harvesting and Gyro-Trac completed 12/2008

Restoration Work Activity	Estimated Completion Date
<p>Supplemental wiregrass seeding if necessitated by onsite conditions.</p> <p>To date within the 163.88 acres of hydric pine flatwoods restoration site, 1.18 million wiregrass plugs, 182,700 cut over muhly grass, 122,600 tooth ache grass and 72,600 mixed hydric pine flatwoods wildflowers have been established in the hydric pine flatwoods restoration area in accordance with Specific Condition 10.</p> <p>Road fill removal areas were planted with sapling cypress and black gum and shrub species in 2009 in accordance with Specific Condition 10.</p> <p>A total of 646 acres of sandhill and sandhill restoration were planted with longleaf pine at a rate of 436 trees per acre in accordance with Specific Condition 10.</p> <p>A total of 454.5 acres of sandhill understory was restored by planting wiregrass on 3' centers (2,199,780 plants).</p> <p>In 2017, 32,000 plants from 20 sandhill species grown from seed collected at the SHLMB were installed in sandhill restoration.</p>	<p>2008/2012 Planting</p> <p>*Supplemental planting maybe added if poor survival is observed in the future.</p>
Installation of water level gages	Completed 12/2005
Baseline assessments of vegetation, First Annual Report	Completed /2006
Fire Management / Monitoring Year 1 / 2 <sup>nd</sup> Annual Report	Completed 2007
Fire Management / Monitoring Year 2/ 3 <sup>rd</sup> Annual Report	Completed 2008
Fire Management / Monitoring Year 3 / 4 <sup>th</sup> Annual Report	Completed 2009
Fire Management / Monitoring Year 4 / 5th Annual Report	Completed 2010
Fire Management / Monitoring Year 5 / 6th Annual Report	Completed 2011
Fire Management / Monitoring Year 6 / 7th Annual Report	Completed 2012
Fire Management / Monitoring Year 7 / 8th Annual Report	Completed 2013
Fire Management / Monitoring Year 8 / 9th Annual Report	Completed 2014
Fire Management / Monitoring Year 9/ 10th Annual Report	Completed 2015
Fire Management / Monitoring Year 10 /11th Annual Report	Completed 2017
Fire Management / Monitoring Year 11 /12th Annual Report	Completed 2018
Fire Management / Monitoring Year 12 /13th Annual Report	Completed 2019
Fire Management / Monitoring Year 13 /14th Annual Report	Completed 2020
Fire Management / Monitoring Year 14 /15th Annual Report	Completed 2021
Perpetual Ecological Management	Year 21+

## Hydrologic Enhancements

### Specific Condition 12

Hydrologic enhancements included the removal of two fill-road crossings, installation of bridges at three crossings and two culverts and the removal or replacement of two failing water control structures, the remediation of ten erosion areas, and the stabilization of a boat launch (Figures 3 and 4). All water control structures, culverts and road removals and erosion stabilization areas continue to function as designed.



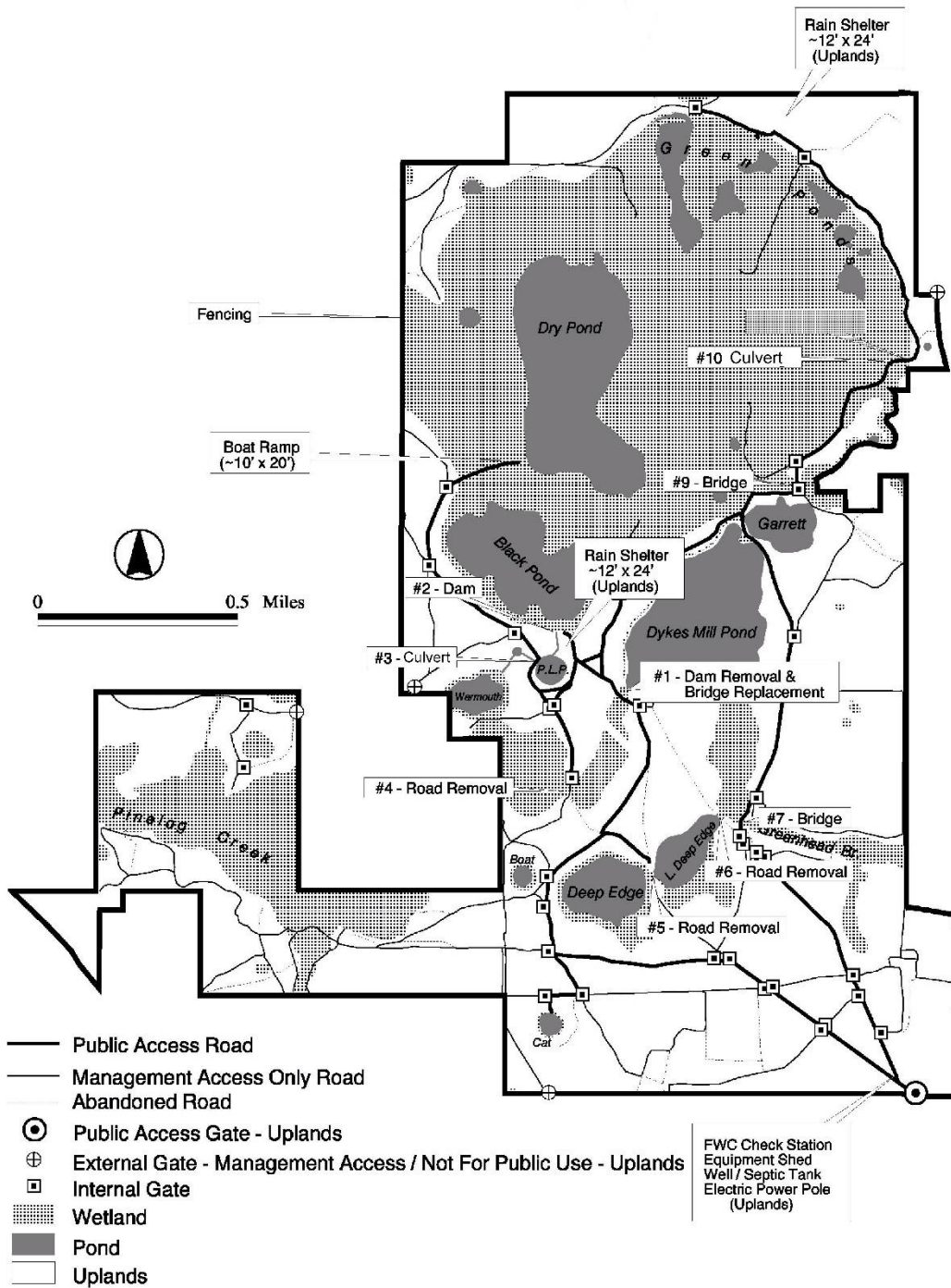


Figure 3. Structures Approved for Construction at the SHLMB (2005 FDEP Permit)

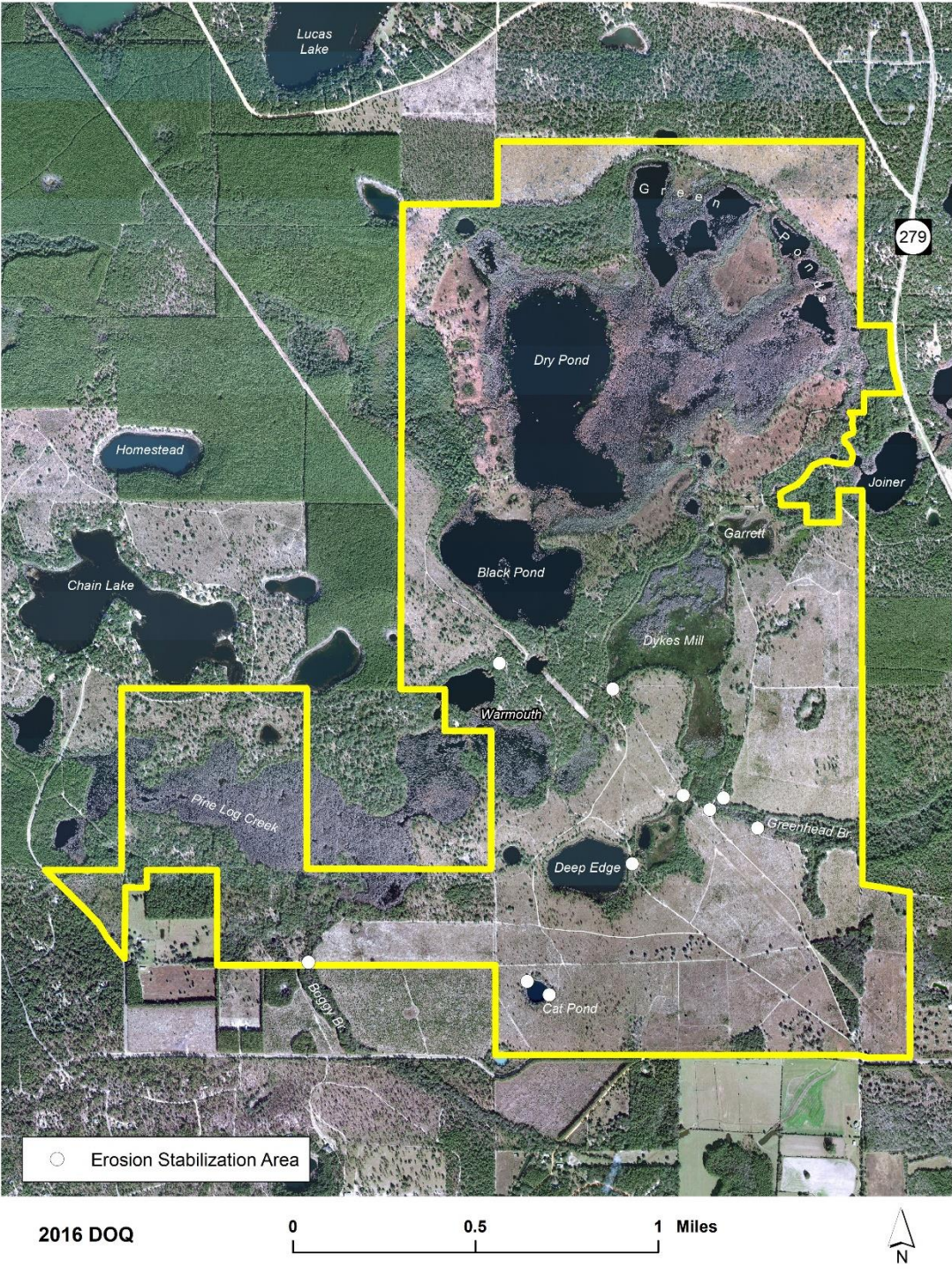


Figure 4. Erosion Stabilization Areas Restored at the SHLMB

## Fire Management

### Specific Condition 11: Prescribed fire

The bank is divided into 14 Management Units that range from 0.25 to 580 acres. Prescribed fire is an integral component of management, enhancement and restoration at the SHLMB. Fire was re-introduced to the SHLMB during the winter of 2004 and burns were completed by December of 2005. Anticipated burn cycles were developed for the SHLMB (Figure 5). A total of 787 acres were burned in 2020 at the SHLMB (Figure 6). It is anticipated that 500 acres will be burned in 2021.

Fire prescriptions have been written to comply with open burning laws (Florida Statutes, Chapter 590). Safety and protection of property will continue to be the priority concern of the Florida Certified Prescribed Burn Manager (FCMB).

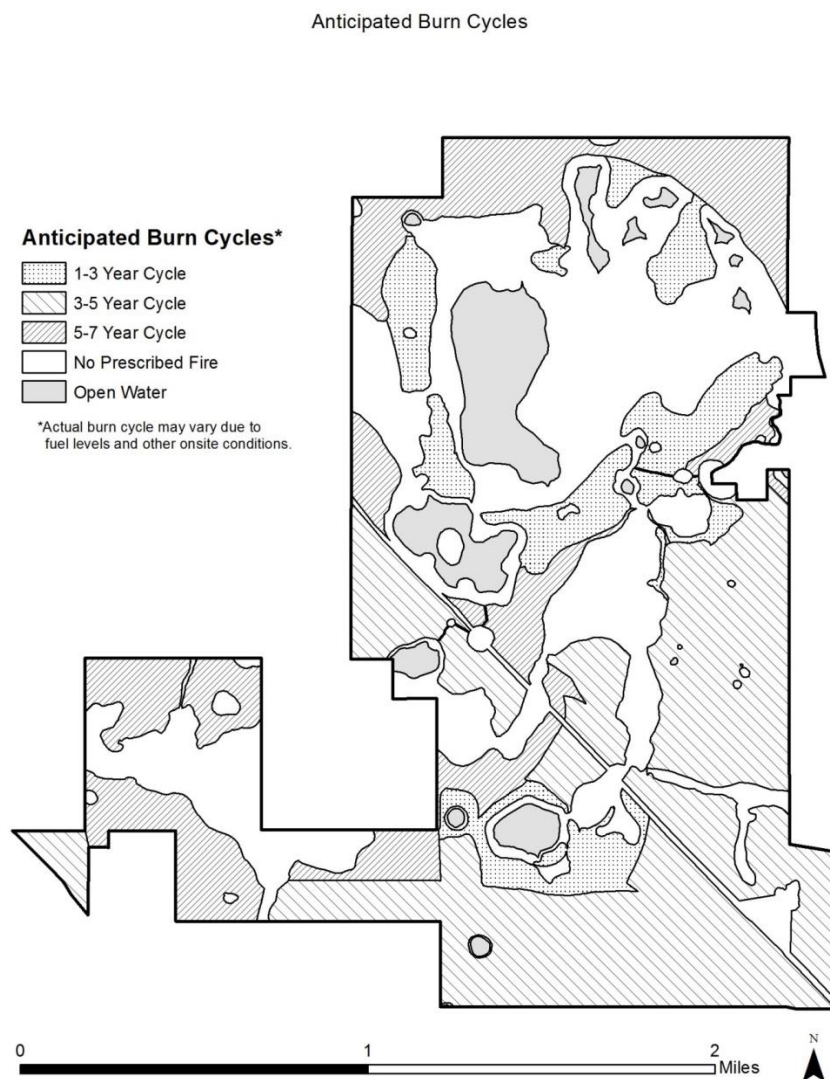
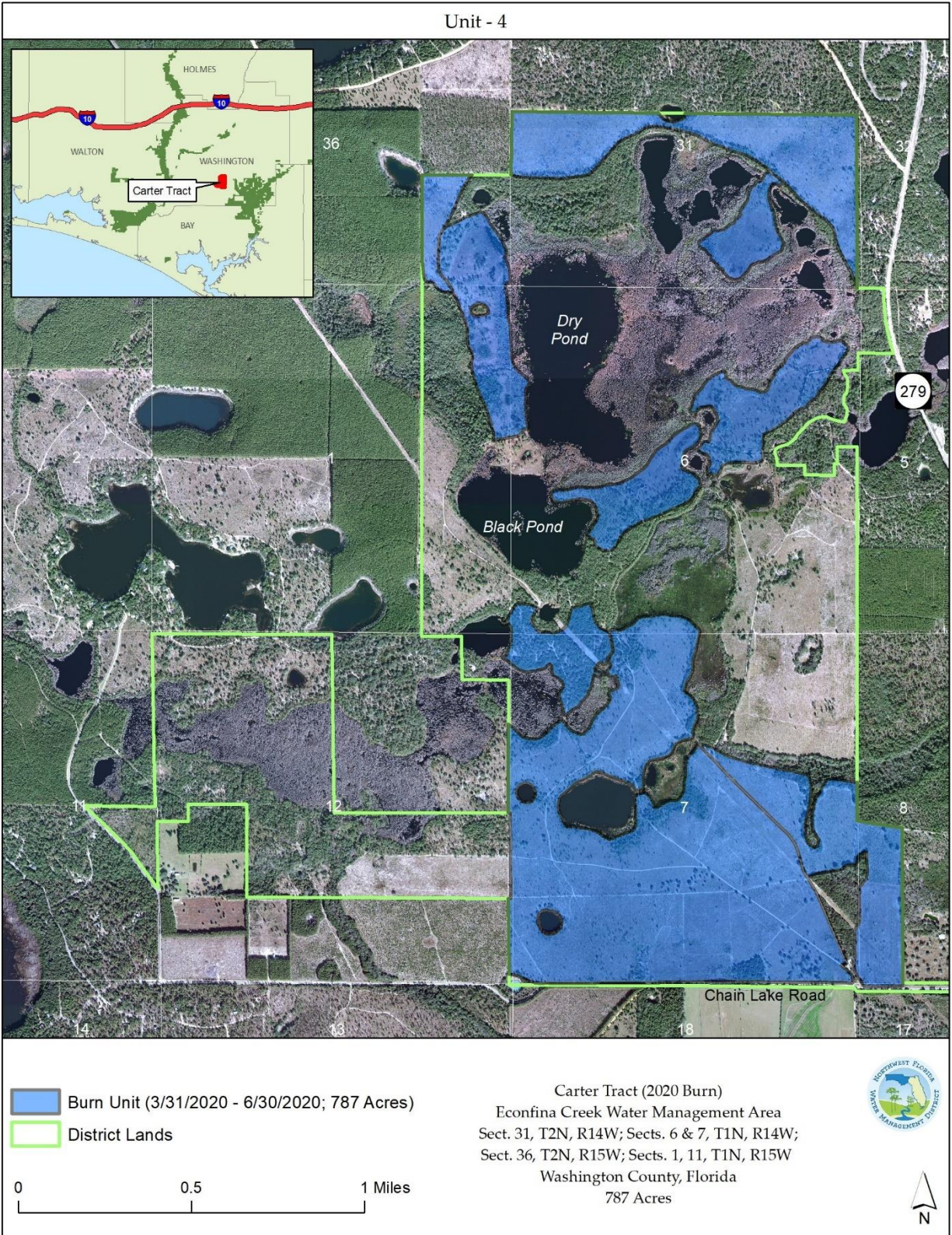


Figure 5. Proposed Burn Cycles



**Figure 6. 2019-2020 Prescribed Burns at the SHLMB**

## Exotic Fauna and Vegetation

Specific Condition 22, 25

Surveys of nuisance species are conducted throughout the year. No exotic vegetation was observed at the SHLMB in 2020.

The feral hog removal program at the SHLMB continued in 2020. Game cameras have been deployed across the site in key locations and are checked daily for the presence of feral hogs. Gaps in perimeter fencing have been fixed. Minimal feral hog damage was observed in 2020. The game cameras were useful in locating hogs and before damage could occur and a total of 25 hogs were trapped using the Jager Pro traps.

## Monthly Water Gage Readings

Specific Condition 12

Water level gauges were installed and surveyed to the same datum (NAVD 1988) in December 2005 at 10 locations throughout the bank. These locations include Black Pond, Power Line Pond, Pine Log Creek, Deep Edge Pond, Little Deep Edge Pond, Dykes Mill Pond ditch connecting to Pine Log Creek #7, a natural channel from Joiner Lake to the Green Pond, Green Ponds, and Dry Lake. The gauges are read monthly by the Florida Fish and Wildlife Conservation Commission staff, and the results are submitted to the NFWFMD (Table 2, Figure 7). The highest water levels for 2020 were reported in November and associated with rainfall from hurricane Sally (Table 2, Figure 7). Conversely, the lowest gage readings were recorded for June for most sampling stations.

Table 2. Water gauge data for the SHLMB

**Sand Hill Lakes Mitigation Bank Water Gauges Readings 2020**

<b>*Readings in Feet*</b>	<b>(1) Black Pond</b>	<b>(2) Power Line Pond</b>	<b>(3) Pine Log Creek</b>	<b>(4) Deep Edge Pond</b>	<b>(5) Little Deep Edge Pond</b>	<b>(6) Dykes Mill Pond</b>	<b>(7) Green Ponds Channel</b>	<b>(8) Joiner Lake Canal</b>	<b>(9) Green Ponds</b>	<b>(10) Dry Pond</b>
<b>Date</b>	1/2/2020	1/2/2020	1/2/2020	1/2/2020	1/2/2020	1/2/2020	1/2/2020	1/2/2020	1/2/2020	1/2/2020
<b>Reading</b>	5.7	4.52	2.66	3.38	3.40	4.52	3.46		5.52	6.02
<b>Date</b>	2/3/2020	2/3/2020	2/3/2020	2/3/2020	2/3/2020	2/3/2020	2/3/2020	2/3/2020	2/3/2020	2/3/2020
<b>Reading</b>	5.88	4.52	2.56	3.36	3.34	4.44	3.34		5.70	6.22
<b>Date</b>	3/2/2020	3/2/2020	3/2/2020	3/2/2020	3/2/2020	3/2/2020	3/2/2020	3/2/2020	3/2/2020	3/2/2020
<b>Reading</b>	6.02	4.74	2.82	3.46	3.36	4.74	3.44		5.82	6.34
<b>Date</b>	4/1/2020	4/1/2020	4/1/2020	4/1/2020	4/1/2020	4/1/2020	4/1/2020	4/1/2020	4/1/2020	4/1/2020
<b>Reading</b>	5.54	4.18	2.36	3.36	3.36	4.32	3.34		5.34	5.86
<b>Date</b>	5/4/2020	5/4/2020	5/4/2020	5/4/2020	5/4/2020	5/4/2020	5/4/2020	5/4/2020	5/4/2020	5/4/2020
<b>Reading</b>	5.06	3.76	2.12	3.36	3.30	4.18	3.36		4.88	5.38
<b>Date</b>	6/1/2020	6/1/2020	6/1/2020	6/1/2020	6/1/2020	6/1/2020	6/1/2020	6/1/2020	6/1/2020	6/1/2020
<b>Reading</b>	4.62	3.15	1.58	2.38	3.26	3.94	0.00		4.40	4.90
<b>Date</b>	7/1/2020	7/1/2020	7/1/2020	7/1/2020	7/1/2020	7/1/2020	7/1/2020	7/1/2020	7/1/2020	7/1/2020
<b>Reading</b>	5.12	3.86	2.10	2.64	3.38	4.18	2.86			6.44
<b>Date</b>	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020
<b>Reading</b>	5.16	3.92	2.10	2.50	3.36	4.12	2.64			5.50
<b>Date</b>	9/1/2020	9/1/2020	9/1/2020	9/1/2020	9/1/2020	9/1/2020	9/1/2020	9/1/2020	9/1/2020	9/1/2020
<b>Reading</b>	5.92	4.86	2.88	3.34	3.48	4.68	4.22			6.24
<b>Date</b>	10/12/2020	10/12/2020	10/12/2020	10/12/2020	10/12/2020	10/12/2020	10/12/2020	10/12/2020	10/12/2020	10/12/2020
<b>Reading</b>	under h2o	under h2o	4.70	3.54	3.60	4.40	5.14	under h2o	under h2o	under h2o
<b>Date</b>	11/6/2020	11/6/2020	11/6/2020	11/6/2020	11/6/2020	11/6/2020	11/6/2020	11/6/2020	11/6/2020	11/6/2020
<b>Reading</b>	under h2o	5.84	3.66	3.48	3.52	4.26	4.40	N/A	N/A	under h2o
<b>Date</b>	12/1/2020	12/1/2020	12/1/2020	12/1/2020	12/1/2020	12/1/2020	12/1/2020	12/1/2020	12/1/2020	12/1/2020
<b>Reading</b>	6.26	5.12	3.08	3.52	3.50	4.32	3.56	N/A	N/A	6.58

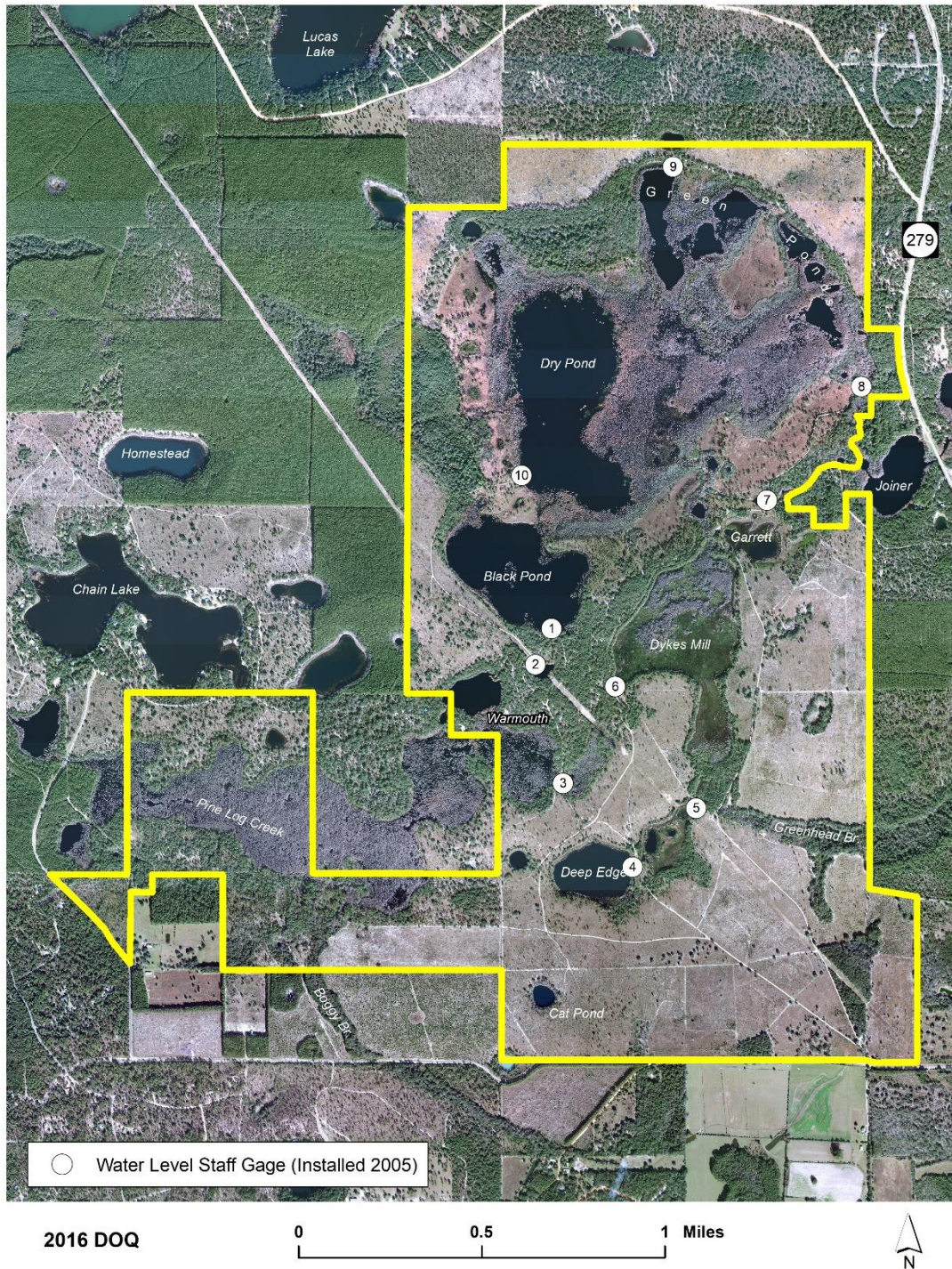


Figure 7. The Ten Staff Gage Locations at the SHLMB

## Sandhill Restoration

Specific Condition 10, Community restoration  
Oak eradication, Specific Condition 10b

Specific conditions and UMAM polygons can be found within the FDEP and ACOE Mitigation Bank permit and can be found at <https://www.nfwfwater.com/Water-Resources/Regional-Wetland-Mitigation-Program>. Oak eradication in UMAM polygon I was initiated in August of 2005. Five hundred fifty acres of sandhills have had the oaks thinned to less than 150 trees per acre in accordance with permit conditions. Hardwood eradication also occurred in UMAM Polygon III for a total of 355 acres. Target shrub species included sparkleberry, high bush blue berry, turkey oak, water oak and diamond oak. Sand pine seedlings were also eradicated in 2012 - 2013 for 258 acres of former sand pine plantation restored to sandhills (UMAM Polygon II).

Pine Plantation Harvest and Restoration Activities  
Specific Condition 10a

Restoration activities for the existing sand pine plantation (~383 acres) (UMAM polygon II) and slash pine plantations (UMAM polygon VII) were initiated in June 5, 2007. The sand pine and slash pine plantations harvest began on June 15 and completed in November 16, 2007.

Long Leaf Pine Planting  
Specific Condition 10c

A total of 646 acres of sandhill and sandhill restoration were planted with longleaf pine at a rate of 436 trees per acre in accordance with Specific Condition 10 (UMAM polygons I, II and III). Currently, average planted longleaf pine densities remain below 200 trees per acre.

Upland Wiregrass and Additional Planting  
Specific Condition 10c

In areas with less than 25 percent wiregrass cover, a supplemental wiregrass planting occurred. A total of 454.5 acres of sandhill understory was restored by planting wiregrass on 3' centers, (2,199,780 plants) (UMAM polygon II, III). Survival of the wiregrass in the uplands has averaged 80 percent. Seedling wiregrass has been commonly observed. In 2017, 32,000 plants from 20 sandhill species were installed within 37 acres of sandhill restoration adjacent to the entrance. An evaluation of wiregrass seedlings per meter square was conducted within former sand pine plantations planted with wiregrass. An average of four wiregrass seedlings per meter square were observed in 2020 sampling. This recruitment will help to increase the wiregrass coverage within the sandhill restoration.

## Hydric Pine Flatwoods Restoration

Specific Condition 10c

According to the permit requirements, 147 acres of wet flatwood restoration was scheduled to occur at the SHLMB, UMAM Polygon V. However, District staff identified and additional 16.88 acres that were historic wet flatwoods and added this acreage to UMAM Polygon V for a total acreage of 163.88 acres of



wet flatwoods restoration (Figure 8). Standing biomass of shrubs (primarily titi, gallberry and fetterbush) was reduced to ground level with the use of a Gyro-Trac followed by winter burns. The Gyro-Track work was initiated on March 13, 2007 and was completed by August 20, 2008. The Gyro-Trac areas were burned following the shrub reduction. Annual herbicide treatments for three years reduced shrub cover to less than 5 percent. These areas have maintained at 5 percent or less shrub cover with the use warm season burns on a two-year interval. The hydric pine flatwoods were planted with 1.18 million wiregrass plants, 182,700 cut over muhly grass, 122,600 toothache grass and 72,600 mixed hydric pine flatwoods wildflowers. All plantings were conducted in accordance with Specific Condition 10 and Appendix D. The hydric pine flatwood community continues to develop and increase in cover and diversity. Annual burning of the hydric pine flatwoods restoration was initiated in 2018 within fifty acresto reduce cover of bushy bluestem (*Andropogon glomeratus*). After two years, the annual burns appear to be successful in reducing bushy bluestem cover. In 2021, annual burning will be implemented across the hydric pine flatwood acreage.

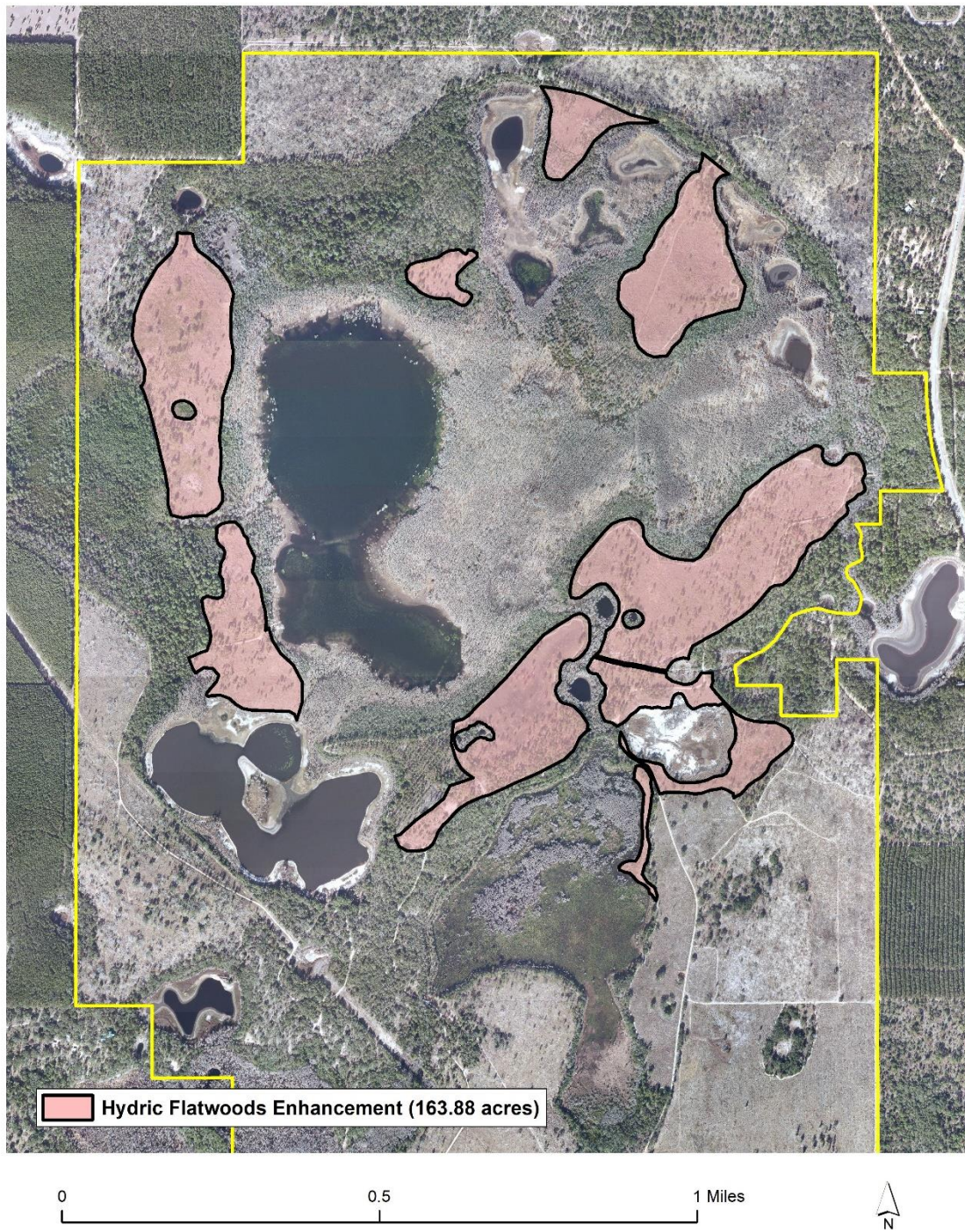


Figure 8. Hydric Pine Flatwoods Restoration Areas (163.88 Acres)

## Annual Monitoring

Specific Conditions 26 and 28

Sampling locations were located on a map and field verified (Figure 13). Fall monitoring methods and data analysis are described below. Pedestrian surveys and photographic documentation are located at: <https://www.nfwwater.com/Water-Resources/Regional-Wetland-Mitigation-Program>

The dates of annual sampling for the 2020 annual report were September 21, 23, 24, October 21, 22, 24, and November 18, 19, in accordance with Specific Condition 28. Pedestrian surveys were conducted for both wetland and uplands. The pedestrian surveys are particularly useful in providing detailed species lists and help in determining community diversity. Species diversity is good to excellent throughout the SHLMB and plants appeared vigorous and healthy. The number of species observed continues to increase within the restoration communities as habitats improve. The 2019-2020 Annual report by the Florida Fish and Conservation Commission can be found on the District website (see above) in accordance with Specific Condition 25f.

## Quantitative Monitoring

### Materials and Methods

Quantitative monitoring has been conducted in accordance with the methods described in Attachment H – Monitoring Plan. Quantitative vegetation monitoring occurred at the end of the growing season. This is the twelfth annual monitoring report for the SHLMB.

The percent vegetation cover was monitored at transect locations shown in Figure 11. One-meter square quadrats were established along 600-foot transects at 20-foot intervals. Vegetation species coverage statistics were recorded. The percent coverage for each species was generated by adding all quadrat observations together and dividing the total coverage by the cover of each species within each transect. This represents a modified Daubenmire cover scale where vegetation species statistics are used to determine the percent cover by species.

Tree density was monitored using the “line strip” (belt transect) technique. Transects were co-located with each vegetation transect. The belt transects will be 600± feet in length and 30± feet in width. Within each belt transect the height and condition of each planted tree was recorded.

### Photographic Stations

Panoramic photographs were taken from the permanently established stations at each transect and are found on the District website: <https://www.nfwwater.com/Water-Resources/Regional-Wetland-Mitigation-Program> (Figure 9).

### Wildlife Utilization

During the vegetation monitoring described above, wildlife observations are recorded in each community. These observations will consist of direct sightings, scat, tracks, or vocalizations.

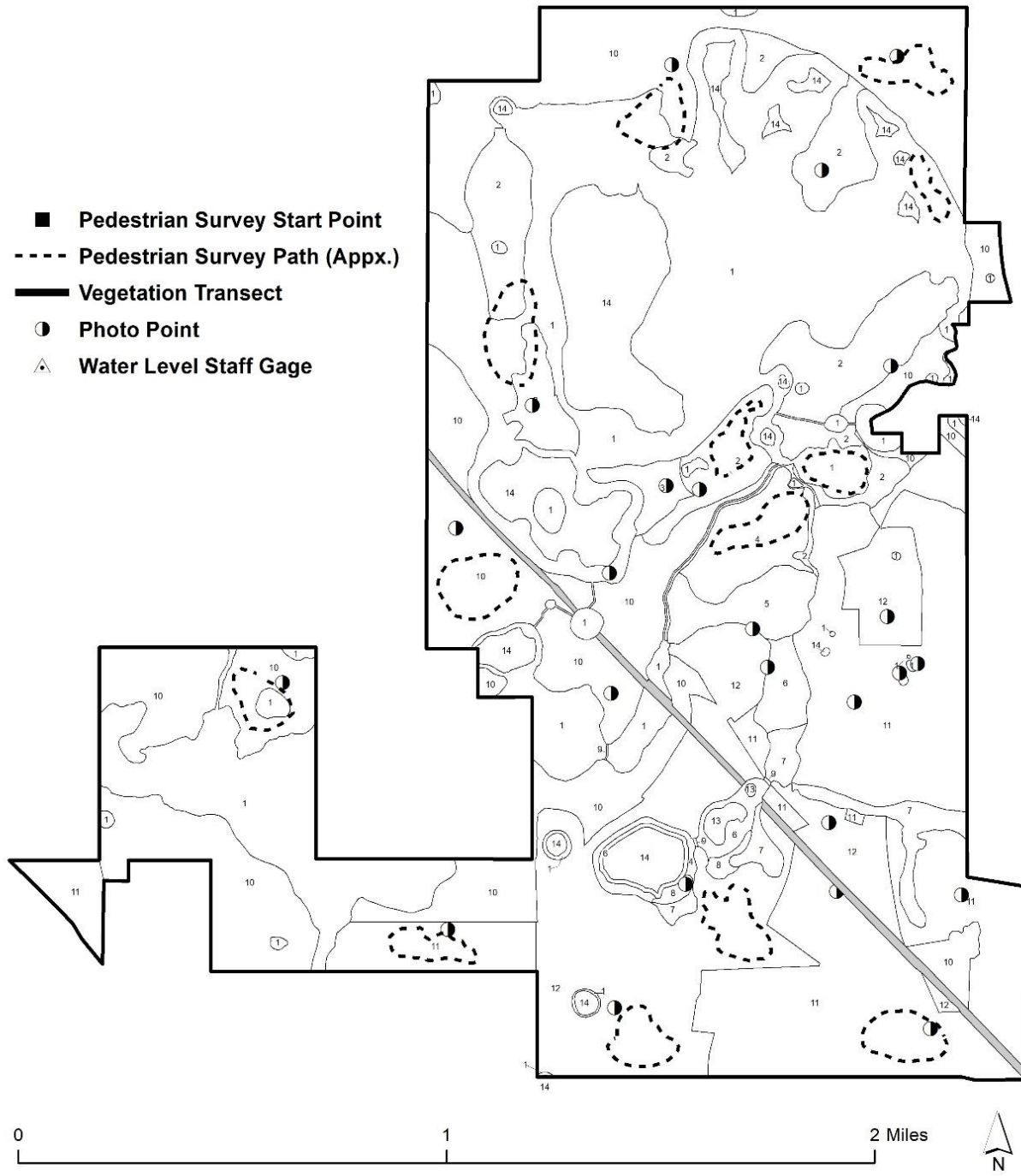


Figure 9. Monitoring Locations

## Results and Discussion

### UMAM Polygon II, Management Unit 11- Sand Pine Plantation (Transect #1, #2 and #4)

UMAM Polygon II, Management Unit 11, consists of 367 acres of planted sand pine plantation that have been restored to sandhills. Baseline conditions indicated a sand pine canopy with 100 percent canopy closure and an average of 880 sand pine trees per acre in the sand pine plantations. Removal of the sand pine was completed in November 2007 followed by planting of longleaf pine at 436 trees per acre. Baseline herbaceous monitoring identified 10 species within Transect 1, 16 in Transect 2, and 20 in Transect 4.

During the 2019 monitoring, 19 species were observed in Transect 1, 26 in Transect 2. Transect 4, was burned in early October and was not sampled. Wiregrass had the greatest vegetative cover for each transect ranging from 46.2 percent in transect 1 to percent 41.5 percent in Transect 2. Bare ground ranged from 21 percent in Transect 1 to 28.1 percent in Transect 2. Species diversity increased from the previous year. Wiregrass cover significantly increased for each site, while bare ground decreased from the previous year.

During the 2020 monitoring, 27 species were observed in Transect 1, 30 in Transect 2 and 30 within transect 4. (Tables 3-5; Figures 10-12). Wiregrass had the greatest vegetative cover for each transect ranging from 32 percent in transect 2 to percent 45.3 percent in Transect 4. Bare ground ranged from 19 percent in Transect 1 to 33 percent in Transect 2. The site continues to develop in species richness.

#### Interim Success Criteria:

The sand pine plantations were harvested in 2007. Site preparation burns were conducted during the winter of 2008 and planted with longleaf pine in the winter of 2008-2009. Wiregrass plugs were planted on 3-foot centers in the former sand pine plantations in 2008 and completed in 2010. The area is burned on a two-year rotation. Wiregrass cover continues to be the dominant species. Planted longleaf pine densities remain below 200 trees per acre. Trees are healthy and vigorous. Bahia and centipede grass cover continues to be monitored and treated as needed

**Table 3. Transect 1 Species cover and occurrence (Sandhill Restoration)**

Date 11/22/20 Collector: David Clayton Wildlife observed: None

Scientific Name	Common Name	Percent Cover
<i>Andropogon ternarius</i>	Splitbeard bluestem	3.2
<i>Andropogon virginicus</i>	Broomgrass	0.8
<i>Aristida stricta</i>	Wiregrass	45
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	0.2
<i>Crotalaria rotundifolia</i>	Rabbit bells	0.2
<i>Ctenium aromaticum</i>	Toothache grass	0.2
<i>Cuphea carthagenesis</i>	Waxweed	0.2
<i>Cyperus sp.</i>	Cyperus	1.8
<i>Diospyros virginiana</i>	Persimon	0.5

Scientific Name	Common Name	Percent Cover
<i>Eragagrostis elliottii</i>	Elliot's lovegrass	1.2
<i>Eremochloa ophiuroides</i>	Centipede grass	1.3
<i>Eupatorium capillifolium</i>	Dogfennel	0.3
<i>Eupatorium compositifolium</i>	Yankeeweed	1.2
<i>Hieracium megacephalon</i>	Hawkweed	0.2
<i>Ilex vomitoria</i>	Yaupon	0.5
<i>Opuntia mesacantha subsp. Lata</i>	Prickly pear	0.7
<i>Oxalis cuniculata</i>	Common wood sorrel	0.3
<i>Penstemon multiflorus</i>	Penstemon	0.2
<i>Pityopsis graminifolia</i>	Narrowleaf silkgrass	8.5
<i>Polyprenum procumbens</i>	Rustweed	0.2
<i>Quercus hemaespherica</i>	Diamond oak	0.2
<i>Rhexia mariana</i>	Pale meadow beauty	0.3
<i>Rubus cuneifolius</i>	Sand black berry	5
<i>Schizachyrium sp</i>	Little blue stem	3.2
<i>Solidago odora</i>	Pine barren goldenrod	0.8
<i>Yucca filimentosa</i>	Adam's needle	3
	<b>Bare ground</b>	<b>19</b>

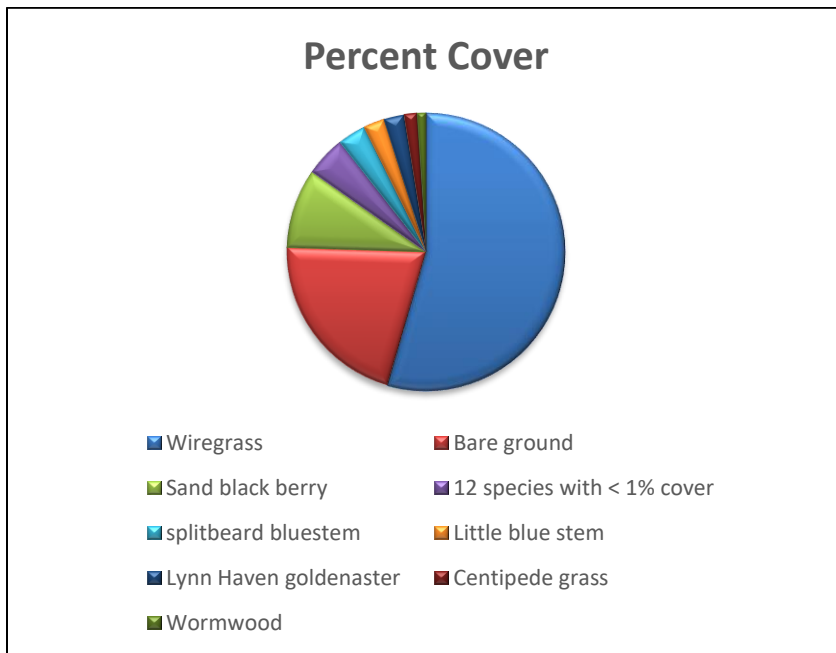


Figure 10. Transect 1: Sand pine plantation restored to sandhill

Table 4. Transect 2 Species cover and occurrence (Sandhill Restoration)

Date 10/21/20 Collector: David Clayton Wildlife observed: None

Scientific Name	Common Name	Percent Cover
<i>Agalinis fasciculata</i>	Beach false foxglove	0.5
<i>Andropogon ternarius</i>	Splitbeard bluestem	0.3
<i>Andropogon virginicus</i>	Broom grass	2.3
<i>Aristida stricta</i>	Wiregrass	32
<i>Baptisia lanceolata</i>	Gopher weed	1.8
<i>Bulbostylis ciliatifolia</i>	Capillary hairsedge	1.7
<i>Ceanothus microphyllus</i>	New Jersey Tea	1.8
<i>Chrysoma pauciflosculosa</i>	Woody goldenrod	3.5
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	1.2
<i>Cnidioscolus stimulosus</i>	Tread softey	0.7
<i>Croton argyranthemus</i>	Silver croton	0.3
<i>Cyperus sp.</i>	Cyperus	0.3
<i>Dalea pinnata</i>	Summer farewell	1
<i>Diospyros virginiana</i>	Persimon	0.3
<i>Eragrostis spectabilis</i>	Purple lovegrass	0.3
<i>Eriogonum tomentosum</i>	Wild buckwheat	1.7
<i>Eupatorium compositifolium</i>	Yankeeweed	0.3
<i>Geobalanus oblongifolius</i>	Gopher apple	1.8
<i>Opuntia humifusa</i>	Prickly pear	0.2
<i>Pityopsis graminifolia</i>	Narrowleaf silkgrass	0.3
<i>Pteridium aquilinum</i>	Brachen	0.8
<i>Rhynchosia cytisoides</i>	Royal snoutbean	0.33
<i>Serenoa repens</i>	Saw palmetto	0.3
<i>Smilax sp.</i>	Smilax	0.6
<i>Solidago fistulosa</i>	Goldenrod	5.8
<i>Tephrosia virginiana</i>	Goat's Rue	0.1
<i>Vaccinium darrowii</i>	Darrow's bleuberry	0.6
	Bare ground	33

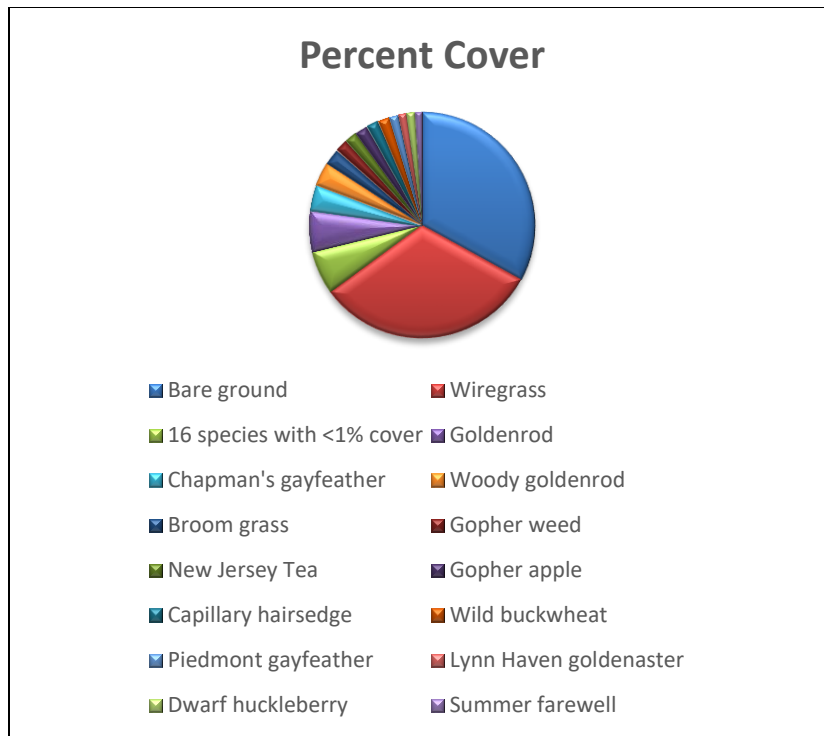


Figure 11. Transect 2: Sand pine plantation restored to sandhill

Table 5. Transect 4 Species cover and occurrence (Sandhill Restoration)

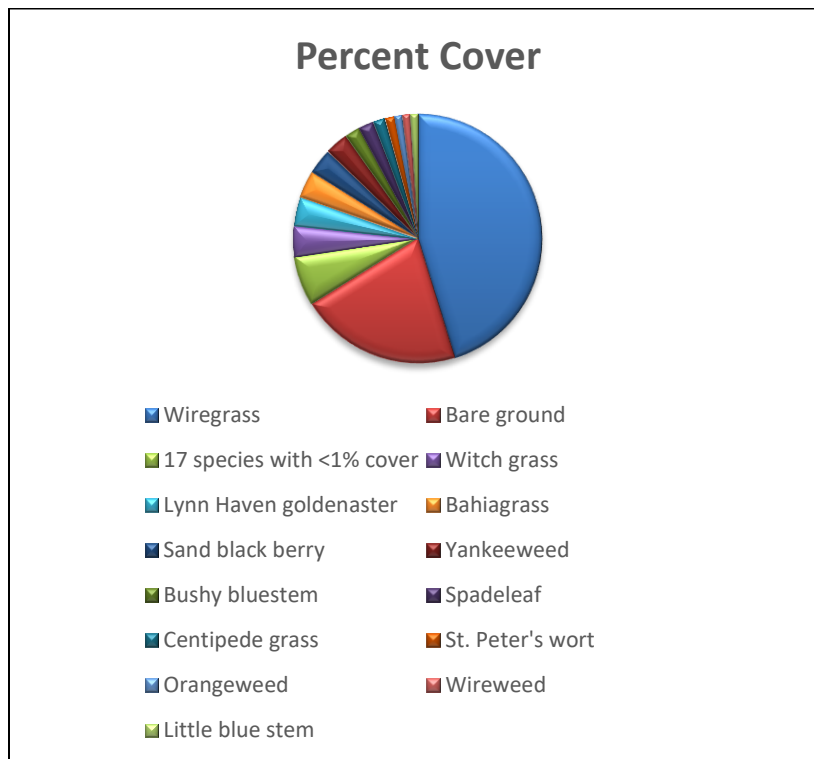
Date 11/19/20 Collector: David Clayton Wildlife observed: None

Scientific Name	Common Name	Percent Cover
<i>Andropogon glomeratus</i>	Bushy bluestem	2
<i>Andropogon ternarius</i>	Splitbeard bluestem	0.3
<i>Aristida stricta</i>	Wiregrass	45.3
<i>Centella asiatica</i>	Spadeleaf	2
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	3.7
<i>Conyza canadensis</i>	Canadian horseweed	0.5
<i>Cyperus sp.</i>	Cyperus	0.5
<i>Dichaanthelium sp.</i>	Witch grass	4
<i>Edrastima uniflora</i>	Clustered mille grains	0.2
<i>Eremochloa ophiuroides</i>	Centipede grass	1.5
<i>Eupatorium compositifolium</i>	Yankeeweed	3
<i>Hypericum crux-andreae</i>	St. Peter's wort	1.3
<i>Hypericum gentianoides</i>	Orangeweed	1
<i>lachnocaulon anceps</i>	bogbutton	0.2
<i>Liatris pauciflora</i>	Shooting star	0.5
<i>Mimosa quadrivalvis</i>	Powderpuff	0.2
<i>Paspalum notatum</i>	Bahiagrass	3.6



Scientific Name	Common Name	Percent Cover
<i>Pinus elliotii</i>	Slash pine	0.6
<i>Pityopsis graminifolia</i>	Silkgrass	0.2
<i>Polygonella gracilis</i>	Wireweed	1
<i>Polyprenum procumbens</i>	Rustweed	0.2
<i>Quecus laevis</i>	Turkey oak	0.5
<i>Rhexia mariana</i>	Pale meadow beauty	0.2
<i>Rhynchospora</i>	Rhynchospora	0.2
<i>Rubus cuneifolius</i>	Sand black berry	3.3
<i>Schizachyrium sp</i>	Little blue stem	1
<i>Solidago fistulosa</i>	Pine barren goldenrod	0.3
<i>Symphotrichum dumosum</i>	Rice button aster	0.8
<i>Vaccinium elliotii</i>	Sparkleberry	0.3
	Bare ground	21

Figure 12. Transect 4: Sand pine plantation restored to sandhill



### Planted Longleaf Pine Seedlings

Longleaf pine seedlings were planted in the sandhills at a rate of 436 trees per acre. Permit conditions require a maximum average of 200 longleaf pine trees per acre. Planted tree densities are determined by

counting all the seedlings in a 30' X 600' plot co-located with each transect and converting to trees per acre. All tree seedlings counted and measured by size class and notes on tree condition are included. The survival of longleaf pine seedlings along each transect was observed to be trees between 94 and 174 trees per acre. Overall health of the planted seedlings was excellent. Most trees were 20 -25 feet in height and the average diameter and breast height (DBH) is nine inches (Figures 13-15).

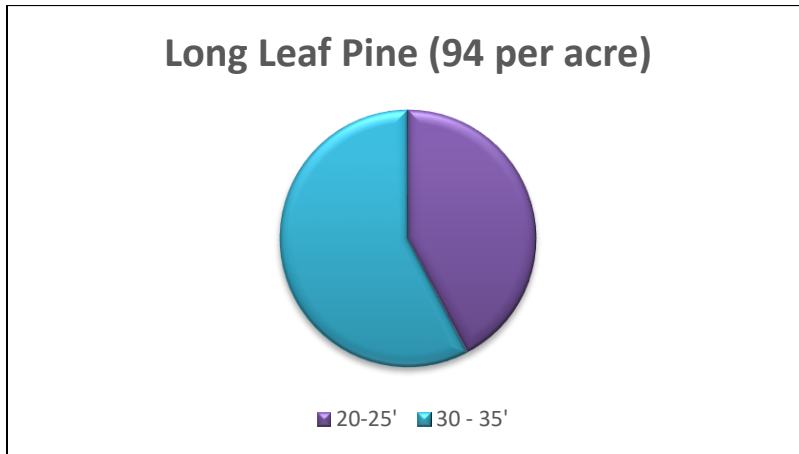


Figure 13. Planted longleaf pine seedlings (Transect 1)

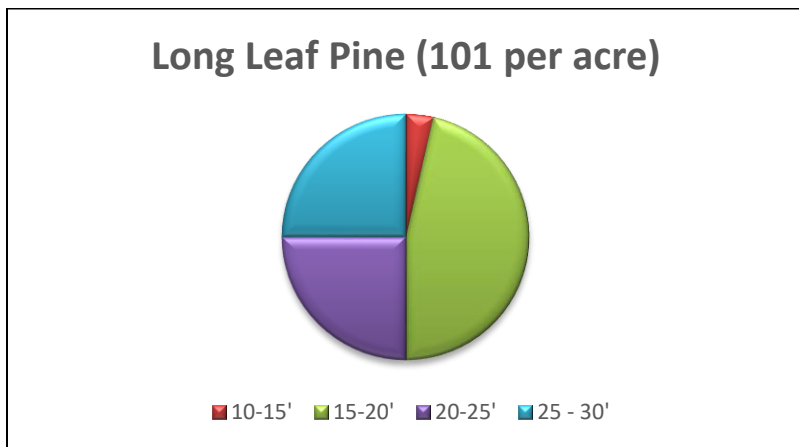


Figure 14. Planted longleaf pine seedlings (Transect 2)

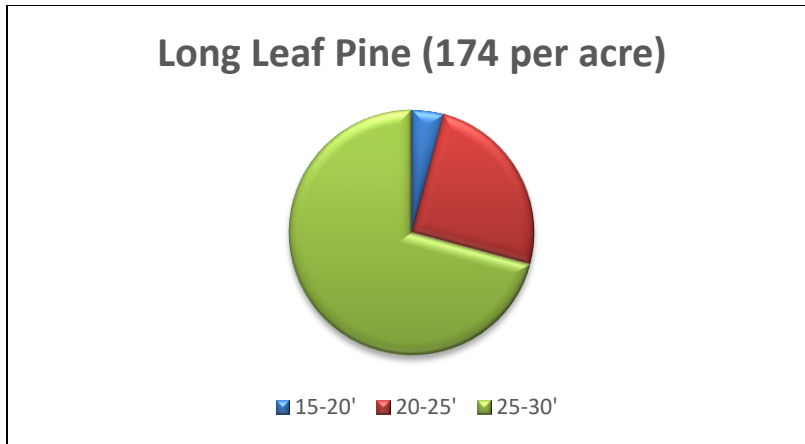


Figure 15. Planted longleaf pine seedlings (Transect 4)

### UMAM Polygon I, Management Unit 12- Sandhill Restoration

UMAM Polygon I, Management Unit 12, consists of 263.52 acres. At the time of purchase, the sandhill overstory was dominated by turkey and live oaks with scattered remnant longleaf pine and an understory dominated by hardwood shrubs, woody goldenrod, wiregrass, and a variety of herbaceous species. Reclamation activities included reintroduction of fire, thinning of oaks to less than 150 trees per acre, and reestablishment of longleaf pine. Fire was reintroduced during the winter of 2004. Currently, longleaf pines dominate the overstory with scattered turkey, live oak, and bluejack oak. The understory is dominated by wiregrass. Baseline sampling indicated 23 species within Transect 3 and 31 species in Transect 5.

During the 2019 monitoring, 26 species were observed within Transect 3 an increase of three species. Transect 5 was not sampled due to a burn in early October. Wiregrass cover was the greatest cover class observed with 31 percent cover. Bare ground cover was 29 percent. Species observed, wiregrass cover increased over the last year while bare ground decreased significantly.

During the 2020 monitoring, 33 species were observed within Transect 3 an increase of five species. A total of 33 species were also observed within transect 5 (Table 6, 7, Figures 16 and 17). Wiregrass cover was the greatest cover class observed with 27.5 percent cover in Transect 3 and 32 percent within Transect 5. Bare ground cover was 34.3 percent within Transect 3 and 25 percent within Transect 5.

#### Interim Success Criteria:

The interim success criteria have been met for UMAM I polygon I. Fire was re-introduced to the site, turkey and live oaks were thinned to less than 150 trees per acre and longleaf pine have been planted. No nuisance or exotic species were observed, fire adapted species dominate the vegetative cover.

**Table 6. Transect 3: Species Cover and Occurrence (Sandhill Enhancement)**  
 10/21/20, Data Collector: David Clayton, Wildlife observed: None

<b>Scientific Name</b>	<b>Common Name</b>	<b>Percent Cover</b>
<i>Andropogon ternarius</i>	Splitbeard bluestem	1.2
<i>Andropogon virginicu</i>	Broom sedge	2.7
<i>Aristida stricta</i>	Wiregrass	27.5
<i>Bulbostylis ciliatifolia</i>	Capillary hairsedge	0.83
<i>Carphephorus odoratissimus</i>	Vanilla leaf	0.2
<i>Ceanothus microphyllus</i>	New Jersey Tea	1.1
<i>Chrysoma pauciflosculosa</i>	Woody goldenrod	5
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	0.33
<i>Cyperus sp.</i>	Cyperus	0.2
<i>Dichantherium aciculare</i>	Needleleaf witchgrass	10.3
<i>Diospyros virginiana</i>	Persimon	1
<i>Eragrostis sp.</i>	Lovegrass	0.7
<i>Eupatorium compositifolium</i>	Yankeeweed	0.5
<i>Croton argyranthemus</i>	Silver croton	0.2
<i>Galactia floridana</i>	Florida milkpea	2
<i>Liatris chapmanii</i>	Chapman's gayfeather	0.2
<i>Liatris pauciflora</i>	Piedmont gayfeather	0.2
<i>Mimosa quadrivalvis</i>	Powder puff	0.16
<i>Panicum virgatum</i>	Switch grass	1.2
<i>Pieris phyllyreifolia</i>	Pieris	0.2
<i>Pennstemon multiflorus</i>	Penstemon	0.33
<i>Pityopsis graminifolia</i>	Narrowleaf silkgrass	0.33
<i>Polygonella gracilis</i>	Wire weed	0.16
<i>Opuntia humifusa</i>	Prickly pear cactus	0.66
<i>Quercus incana</i>	Bluejack oak	0.8
<i>Quercus laevis</i>	Turkey oak	0.5
<i>Rhus copallinum</i>	Sumac	0.33
<i>Rhynchosia cytisoides</i>	Royal snoutbean	0.2
<i>Rubus cunefolius</i>	Blackberry	0.5
<i>Schizachyrium sp</i>	Little blue stem	0.83
<i>Smilax sp</i>	Greenbrier	0.2
<i>Solidago fistulosa</i>	Pinebarn goldenrod	0.66
<i>Vaccinium darrowii</i>	Darrow's blueberry	4.5
	Bare ground	34.3

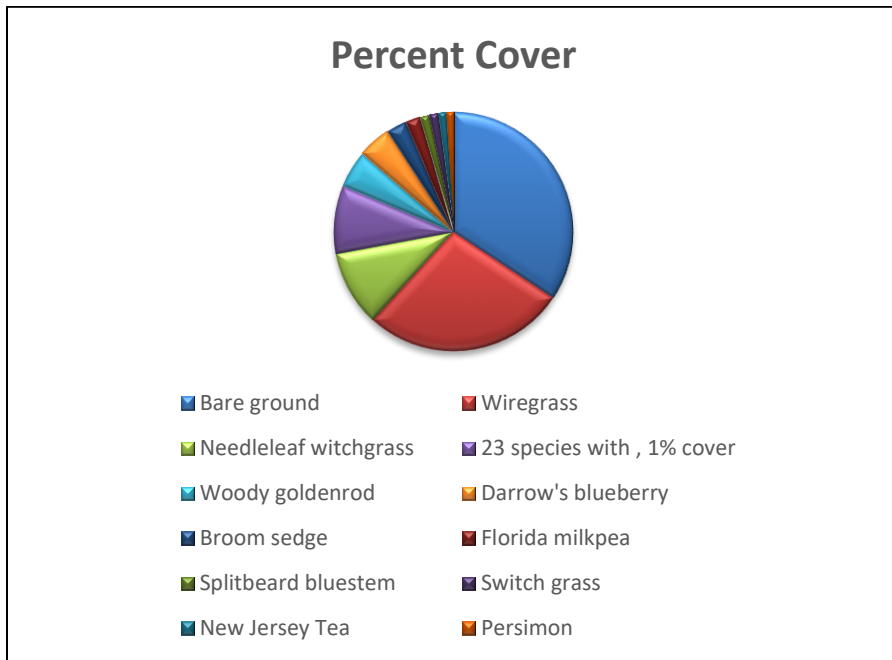


Figure 16. Transect 3: Species cover and occurrence (Sandhill Enhancement)

Table 7. Transect 5: Species Cover and Occurrence (Sandhill Enhancement)  
11/19/20, Data Collector: David Clayton, Wildlife observed: Two bald eagles

Scientific Name	Common Name	Percent Cover
<i>Andropogon ternarius</i>	Splitbeard bluestem	4
<i>Andropogon virginicus</i>	Broomgrass	0.3
<i>Aristida stricta</i>	Wiregrass	32
<i>Balduina angustifolia</i>	Coastalplain honeycomb head	4.2
<i>Bulbostylis capillaris</i>	Hairsedge	0.5
<i>Chrysoma pauciflosculosa</i>	Woody goldenrod	0.3
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	0.3
<i>Crataegus michauxii</i>	Michaux's Hawthorn	1
<i>Cyperus sp.</i>	Sedge	0.3
<i>Dichaanthelium sp.</i>	Witch grass	0.5
<i>Eriogonum tomentosum</i>	Dogtongue wild buckwheat	0.3
<i>Eupatorium compositifolium</i>	Yankeeweed	0.2
<i>Euphorbia discoidalis</i>	Summer spurge	0.3
<i>Froelichia floridana</i>	Cottonweed	0.2
<i>Geobalanus oblongifolius</i>	Gopher apple	6.3
<i>Hypericum gentinianoides</i>	Orangeweed	3.2
<i>Liatris chapmanii</i>	Chapman's gayfeather	7.2
<i>Liatris pauciflora</i>	Gayfeather	1.7
<i>Mimosa quadrivalvis</i>	Powder puff	0.7

Scientific Name	Common Name	Percent Cover
<i>Paronychia patula</i>	Sand squares	1.3
<i>Pityopsis graminifolia</i>	Narrowleaf silkgrass	3.2
<i>Polygonella gracilis</i>	Wire weed	0.3
<i>Pteridium aquilinum</i>	Brachen	1.1
<i>Quercus incana</i>	Bluejack oak	1.3
<i>Quercus laevis</i>	Turkey oak	0.8
<i>Smilax sp.</i>	Smilax	0.6
<i>Solidago fistulosa</i>	Pine barren goldenrod	0.6
<i>Symphotrichum dumosum</i>	Rice button aster	0.2
<i>Tephrosia virginiana</i>	Goat rue	0.2
<i>Trichostema setaceum</i>	blue curls	0.2
<i>Vaccinium darrowii</i>	Darrow's blueberry	0.2
<i>Warea sessilifolia</i>	Pineland cress	1
<i>Yucca filamentosa</i>	Adam's needle	0.5
	Bare ground	25

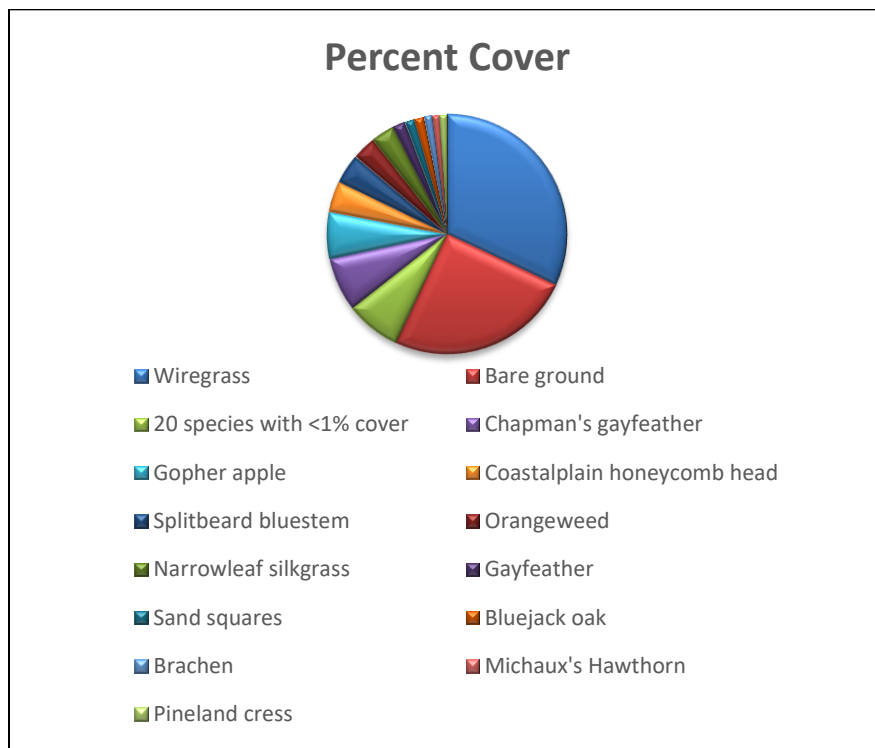


Figure 17. Transect 5: Species cover and occurrence (Sandhill Enhancement)

### Planted Longleaf Pine Seedlings

Longleaf pine seedlings were planted in the sandhills at a rate of 436 trees per acre.

In 2020, the survival of longleaf pine seedlings was 116 per acre in Transect 3 and 120 per acre in Transect 5. Tree height was variable but with the most trees in the 18-21' and the 21-24' class. Trees appear healthy and vigorous (Figures 18 and 19).

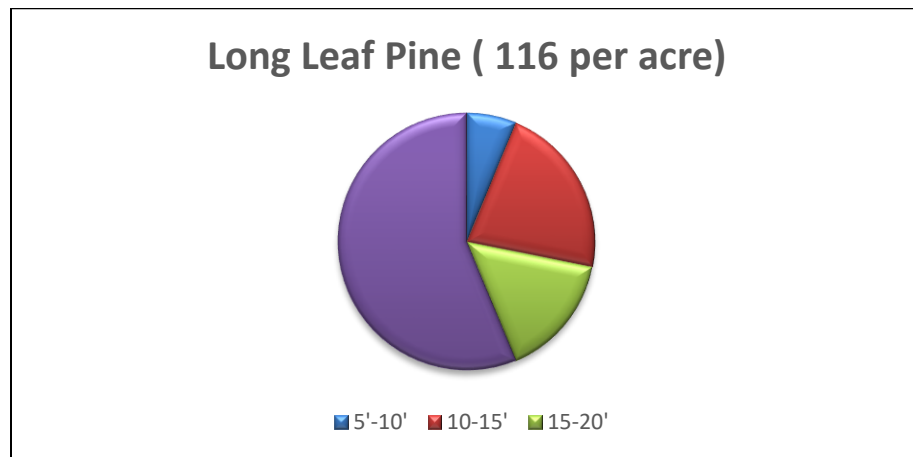


Figure 18. Planted longleaf pine seedlings (Transect 3)

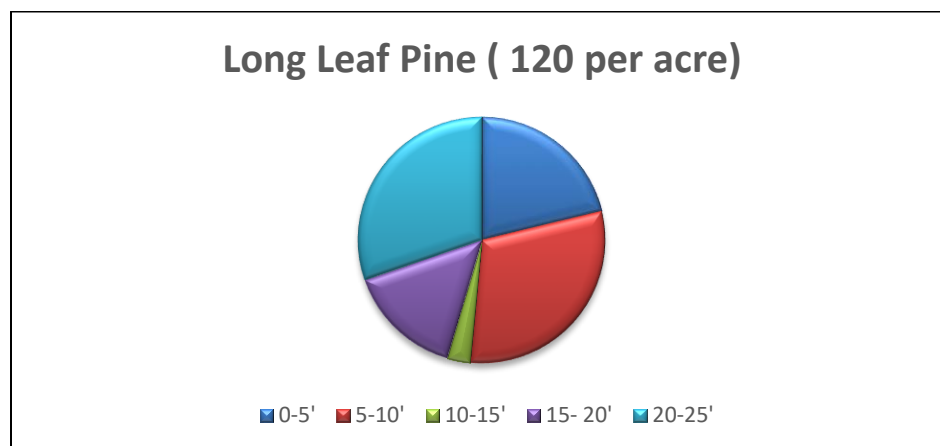


Figure 19. Planted longleaf pine seedlings (Transect 5)

### UMAM Polygon(s): VII, Management Unit 3- Planted Slash Pine Plantation

UMAM Polygon VII, Management Unit 3, consists of 11.5 acres of bedded planted slash pine restored to a hydric pine flatwood. The overstory was dominated by planted slash pine at 880 trees per acre. The shrub layer was well developed and the understory largely absent due to the coverage of the trees and shrubs. Pines were thinned to 400 trees per acre in 2007. Trees were harvested again in 2012 to 200 trees per acre. In winter 2012, wiregrass and toothache grass plugs were planted on three-foot centers.

The restored slash pine plantation is burned on a two-year rotation. Baseline monitoring indicated a total of 17 species. Nine of the observed species were shrubs.

During the 2019 monitoring 32 species were observed a slight increase from the previous year. The site diversity continues to improve as the site develops. Bare ground was very low at 1.07 percent. Grasses and sedge cover was 39.5% cover.

During the 2020 monitoring 37 species were observed an increase of five species from the previous year. The site diversity continues to improve as the site develops. Bare ground was low at 5 percent. Nuisance shrub species cover was 0.7 percent and herbaceous species cover was 94.3 percent cover (Table 8, Figure 20).

**Interim Success Criteria:**

The management activities used to restore UMAM VII, Management Unit 3 have been completed. A diverse wet flatwoods understory continues to develop.

**Table 8. Transect 8. Species Cover and Occurrence (Hydric Pine Restoration)**

Date 11/24/20 Collector: David Clayton Wildlife observed: none

<i>Scientific Name</i>	<b>Common Name</b>	<b>Percent Cover</b>
<i>Andropogon glomeratus</i>	Bushy bluestem	3.8
<i>Andropogon ternarius</i>	Splitbeard bluestem	0.2
<i>Aristida stricta</i>	Wiregrass	4.8
<i>Axonopus furcatus</i>	Big carpet grass	0.2
<i>Carex glaucescens</i>	Clustered sedge	3.7
<i>Centella asiatica</i>	Centella	6.4
<i>Cladium jamaicense</i>	Sawgrass	0.2
<i>Cliftonia monophylla</i>	Black titi	0.2
<i>Ctenium aromaticum</i>	Toothache grass	0.9
<i>Cyperus sp.</i>	Cyperus	1.2
<i>Dichantherium sp.</i>	Witch grass	6.4
<i>Drosera capillaris</i>	Sundew	0.5
<i>Edrastima uniflora</i>	Clustered mille grains	0.5
<i>Eubotrys racemosa</i>	Swamp dog hobble	0.5
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	3.7
<i>Hypericum cisitifolium</i>	Round pod St. John's wort	0.2
<i>Hypericum punctatum</i>	Spotted St. John's wort	8.8
<i>Hypericum fasciculatum</i>	St. John's wort	0.7
<i>Juncus megacephalus</i>	Large-headed rush	2.7
<i>Kellochloa verrucosum</i>	Warty panic grass	5.9
<i>Lachnanthes caroliana</i>	Red root	1.5
<i>Ludwigia punctatum</i>	Punctate primrose willow	0.7



Scientific Name	Common Name	Percent Cover
<i>Lycopodiella appressa</i>	Southern club moss	0.5
<i>Muhlenbergia expansa</i>	Cutover muhlygrass	1.1
<i>Paspalum laeve</i>	Field paspalum	0.5
<i>Persea borbonia</i>	Red bay	2.2
<i>Pluchea longifolia</i>	Longleaf camphorweed	5
<i>Rhexia mariana</i>	Pale meadow beauty	0.5
<i>Rhexia virginica</i>	Handsome Harry	0.5
<i>Rhynchospora plumosa</i>	Plumed beaksedge	0.2
<i>Rhynchospora sp.</i>	Bunched beaksedge	5.7
<i>Scleria sp.</i>	Scleria	0.2
<i>Solidago stricta</i>	Pine barren goldenrod	1.3
<i>Sphagnum sp.</i>	Sphagnum	14.6
<i>Xyris caroliniana</i>	Carolina yellow-eyed grass	3.7
<i>Xyris jupicai</i>	Richard's yellow-eyed grass	1.1
<i>Xyris sp.</i>	Yellow-eyed grass	4.2
	Bareground	5

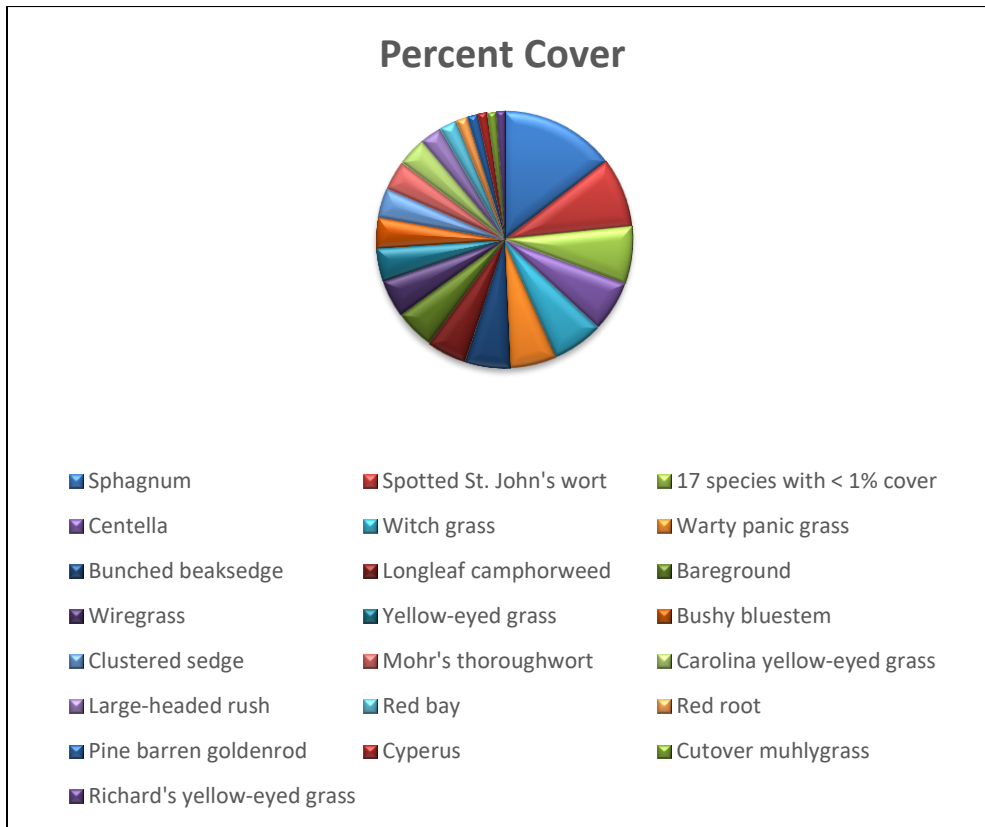


Figure 20. Transect 8: Species cover and occurrence

## UMAM Polygon V, Management Unit 2, Hydric Pine Flatwoods

UMAM Polygon V, Management Unit 2 consists of 163.88 acres of fire suppressed shrub dominated hydric pine flatwoods that have been restored to a hydric pine flatwood. The overstory was dominated by a near impenetrable shrub layer and absent herbaceous layer. Reclamation activities within this polygon included removal of shrub overstory utilizing a Gyro-Trac followed treatment with selective herbicides, re-introduction of fire, and planting wiregrass plugs on 3' centers. Two transects, 6 and 7 were established within the hydric pine flatwoods restoration. Baseline monitoring in 2006 indicated 14 species in Transect 6 and 16 species in Transect 7. Seven of the species identified were shrubs.

During the 2019 monitoring, 22 and 18 species were observed within Transect 6 and 7, respectively, slightly lower for Transect 6 and an increase of one species for Transect 7. Hydric pine flatwood species dominated both transects. Shrub cover was 3.4 percent for Transect 6 and 8.9 percent for Transect 7. Transect 7 shrubs will be treated in 2020 to reduce cover. Vegetative cover exceeds 90 percent for each transect.

During the 2020 monitoring, 18 and 16 species were observed within Transect 6 and 7, respectively, lower for Transect 6 and Transect 7. Hydric pine flatwood species dominated both transects. Shrub cover was 1.0 percent for Transect 6 and 4.3 percent for Transect 7, a reduction from the previous year. Vegetative cover was 75 percent for transect 6 and 89.5 for Transect 7 (Table 9, 10, Figure 21 and 22).

### Interim Success Criteria:

The restoration activities for UMAM V, Management Unit 2 were completed by 2007. Fire was introduced in 2005. A Gyro-Trac shrub reduction was initiated in April 2007 and completed in August 2008. Baseline data from the 2006 monitoring event showed 100 percent cover of shrubs for both sites. Herbicide treatments conducted for three years along with burns every two years have successfully reduced the shrub cover to less than 2 percent. Despite extensive wiregrass planting, cover remains low and survival has been significantly reduced by prolonged flooding. A total of 105 species were observed within the hydric pine flatwood adjacent to Dry Pond from pedestrian transects, a significant increase from the two-herbaceous species recorded during the baseline documentation.

**Table 9. Transect 6. Species Cover and Occurrence (Hydric Pine Flatwoods)**

Date 11/18/20 Collector: David Clayton Wildlife observed: none

Scientific Name	Common Name	Percent Cover
<i>Andropogon glomeratus</i>	Bushy bluestem	18.8
<i>Aristida stricta</i>	Wiregrass	5
<i>Centella asiatica</i>	Spade leaf	6.5
<i>Eubotrys racemosus</i>	Swamp dog hobble	0.2
<i>Eupatorium morhii</i>	Mohr's thorough wort	1.5
<i>Euthamia caroliniana</i>	Slender flattop goldenrod	2
<i>Hypericum microsepalum</i>	Flatwoods St. Johns-wort	8.5
<i>Ilex myrtifolia</i>	Myrtle-leaved holly	0.2
<i>Kelochloa verrucosa</i>	Warty panic grass	4.5

Scientific Name	Common Name	Percent Cover
<i>Lachnanthes caroliniana</i>	Carolina redroot	13.7
<i>Lyonia lucida</i>	Fetterbush	0.8
<i>Rhexia virginica</i>	Handsome harry	1.8
<i>Rhynchospora plumosa</i>	Plumed beaksedge	2.3
<i>Rubus pensilvanicus</i>	Sawtooth blackberry	0.5
<i>Solidago fistulosa</i>	Pine barren goldenrod	1
<i>Sphagnum sp.</i>	Sphagnum moss	1.3
<i>Woodwardia virginica</i>	Virginia chain fern	5.7
<i>Xyris sp.</i>	Yellow-eyed grass	0.7
	Bare ground	25

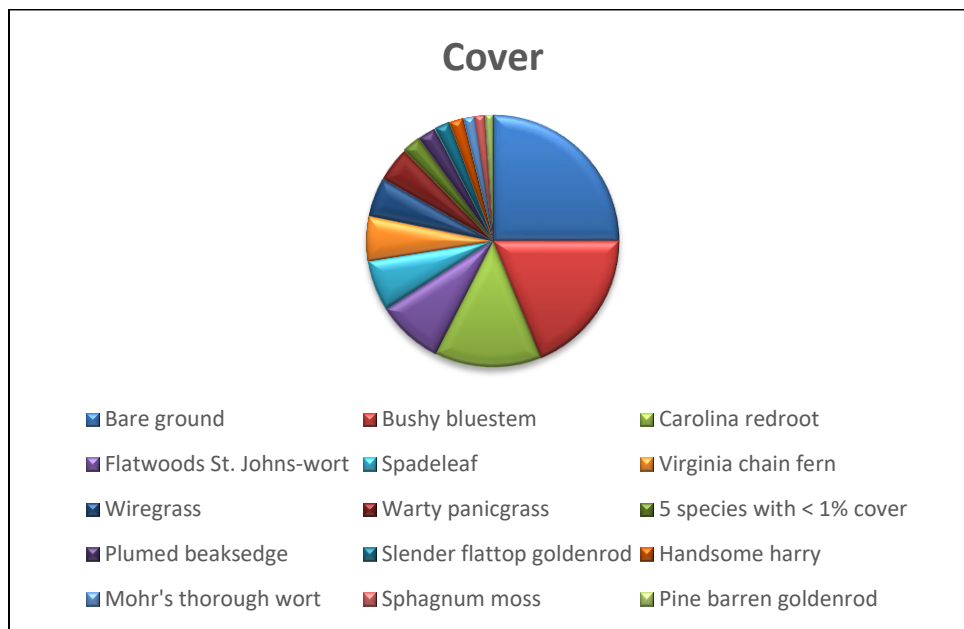


Figure 21. Transect 6. Species cover and occurrence (Hydric Pine Flatwoods Restoration)

Table 10. Transect 7. Species and Occurrence (Hydric Pine Flatwoods Restoration)

Date 11/18/20 Collector: David Clayton Wildlife observed: None

Scientific Name	Common Name	Percent Cover
<i>Andropogon glomeratus</i>	Bushy bluestem	8
<i>Aristida stricta</i>	Wiregrass	0.5
<i>Cliftonia monophylla</i>	Black titi	3.3
<i>Ctenium aromaticum</i>	Toothache grass	0.2
<i>Dichaenanthelium sp.</i>	Witch grass	0.7

Scientific Name	Common Name	Percent Cover
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	1
<i>Ilex myrtifolia</i>	Myrtle leaved holly	1.3
<i>Lachnanthes caroliniana</i>	Carolina redroot	51.8
<i>Lyonia lucida</i>	Fetterbush	1
<i>Rhexia virginica</i>	Handsome Harry	0.3
<i>Rhynchospora sp.</i>	Rhynchospora Sawtooth	4.3
<i>Rubus pensilvanicus</i>	blackberry	0.3
<i>Smilax laurifolia</i>	Greenbriar	0.3
<i>Sphagnum sp.</i>	Sphagnum Virginia chain fern	1.7
<i>Woodwardia virginica</i>	fern	18.5
<i>Xyris sp.</i>	Yellow eyed-grass	0.6
	Bare ground	6.2

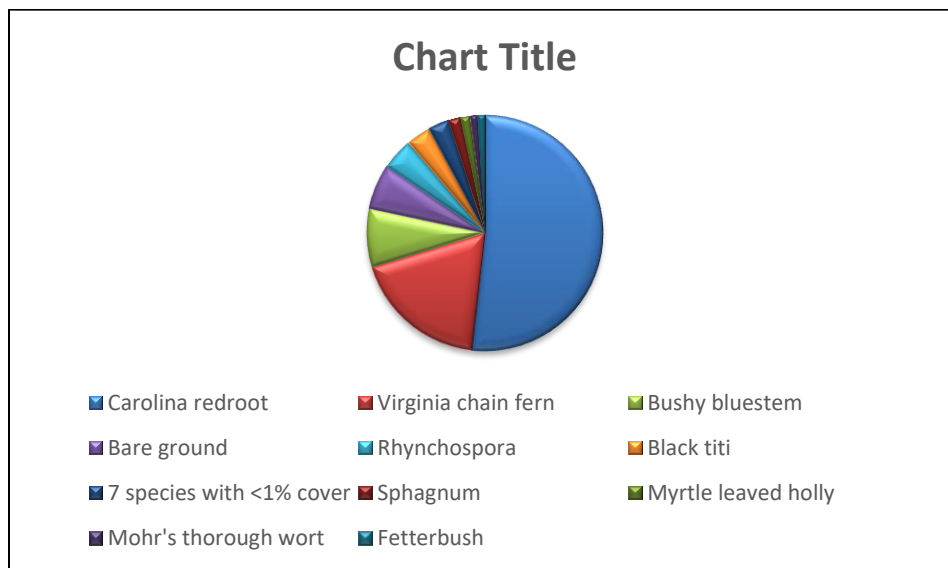


Figure 22. Transect 7. Species cover and occurrence (Hydric Pine Flatwoods)

### UMAM Polygon V1, Management Unit 5, Inland Ponds and Sloughs

UMAM Polygon V1, Management Unit 5 consists of 24.880 acres of a dammed slough (Dykes Mill Pond) restored to slough/marsh. Reclamation activities within this polygon include the removal of Dykes Mill Pond dam, spanning the gap with a railcar bridge, and planting of cypress and black gum saplings. Dykes Mill Pond was removed in August of 2006 and bridge construction completed in April 2007. Planting of cypress and black gum trees occurred in fall of 2007. Since the removal of the dam, water levels have been reduced by two feet in depth (Figure 23). Most of Dykes Mill Pond is dominated by water lilies and other aquatic submerged vegetation.

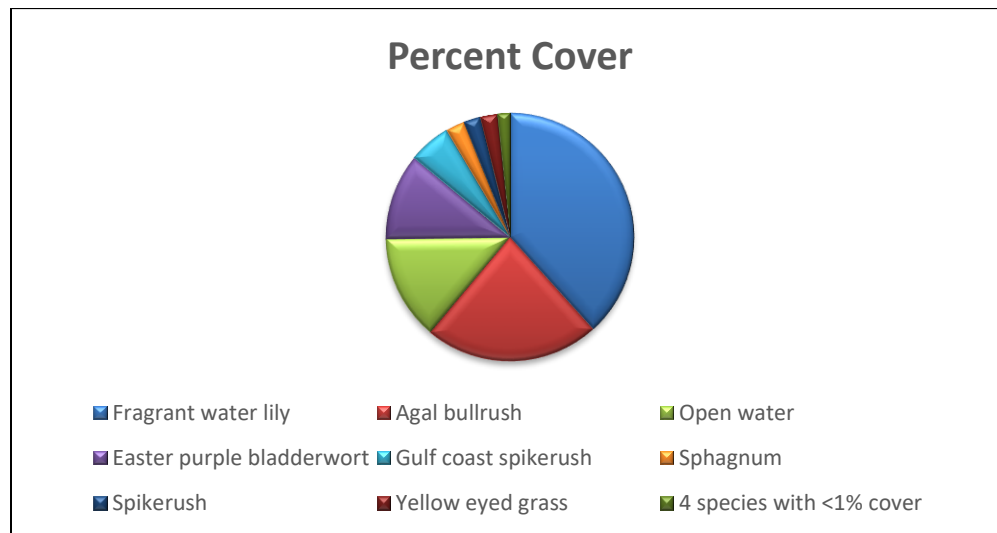
In 2019, a total of 12 species were observed along Transect 9. The aquatic vegetation is thriving providing important habitat for wildlife. Fragrant water lily represented the dominant cover class with 46 percent cover followed by algal bull rush with 17 percent cover. Open water has steadily decreased from 38 percent from baseline sampling to 15.2 percent in 2020. Water depth averaged 1.2 meters.

In 2020, a total of 11 species were observed along Transect 9 (Table 11, Figure 23). The aquatic vegetation is thriving providing important habitat for wildlife. Fragrant water lily represented the dominant cover class with 38.3 percent cover followed by algal bull rush with 22.8 percent cover. Open water has steadily decreased from 38 percent from baseline sampling to 13.7 percent in 2020. Water depth averaged 1.2 meters.

**Table 11. Transect 9. Species and Occurrence (Hydric Pine Flatwoods Restoration)**

Date 11/24/20 Collector: David Clayton Wildlife observed: Green wing teal

Scientific Name	Common Name	Percent Cover
<i>Centella asiatica</i>	Spadeleaf	0.3
<i>Eleocharis cellulosa</i>	Gulf coast spikerush	5.5
<i>Eleocharis sp.</i>	Spikerush	2.2
<i>Lachnocaulon anceps</i>	Whitehead bogbutton	0.2
<i>Lycopodiella alopecuroides</i>	Foxtail club-moss	0.3
<i>Nymphaea odorata</i>	Fragrant water lily	38.3
<i>Rhynchospora microcephala</i>	Bunched beaksedge	0.8
<i>Sphagnum</i>	Sphagnum	2.5
<i>Utricularia purpurea</i>	Easter purple bladderwort	11.2
<i>Websteria confervoides</i>	Agal bullrush	22.8
<i>Xyris sp.</i>	Yellow eyed grass	2.2
	Open water	13.7



**Figure 23. Transect 9. Species cover and occurrence (Dykes Mill Pond)**

## Qualitative Monitoring

### Materials and Methods

Qualitative vegetation monitoring includes an assessment of the vegetation, both ground cover and planted trees, wildlife use observations, and general habitat health. Pedestrian surveys increase site coverage and include a 30+ minute meandering walk-path. The pedestrian walk-path continued if species were being added; however, once additional species were not recorded for 3 minutes the survey was complete. Representative photos and a community description were provided for each walk-path. Plants were listed in the data sheet in the following categories (tree, shrub, vine or herbaceous) to give a better understanding of community composition. Wildlife observations were recorded for each walk-path. Figure 9 provides the location and coverage of transects and site photos can be found on the NFWMD website at <https://www.nfwwater.com/Water-Resources/Regional-Wetland-Mitigation-Program>

### Results and Discussion

A total of 13 pedestrian transects were located at the SHLMB (Figure 9). Three pedestrian surveys are in Management Unit 1, portions of UMAM Polygon IV, one in Management Unit 2, UMAM Polygon V, one in Management Unit 4, portions of UMAM Polygon IV, four in Management Unit 10, Polygon III, three in Management Unit 12, UMAM Polygon I, and one in Management Unit 14, portions of UMAM Polygon IV.

### Management Unit 1, UMAM Polygon IV, Preserved High Quality Forested and Herbaceous Wetlands (M8 and M9)

Management Unit 1, UMAM Polygon IV consists of 574.839 acres of a wide variety of preserved wetland habitats including FLUCCS: 621 – Cypress, 617 – Mixed Wetland Hardwoods, 644 – Emergent Aquatic Wetlands, 611 – Bay Swamps, 641 – Freshwater Marshes, 616 – Inland Ponds and Sloughs, 640 – and Vegetated Non-Forested Wetlands. The management goal for this polygon is preservation of the existing high-quality wetlands. Two of the pedestrian survey paths (M8 and M9) in Management Unit I, UMAM Polygon IV, were in cypress dominated wetlands. During the baseline monitoring, 38 species were observed in M8, while 32 species were observed in M9. Wildlife was abundant.

In 2019, a total of 55 species were observed along M8, and 50 species along M9. There was a slight increase in species observed in 2019 compared to 2018. Plants appear vigorous and thriving with good diversity. No nuisance or exotic species were observed.

In 2020, a total of 55 species were observed along M8, and 53 species along M9. Plants appear vigorous and thriving with good diversity. No nuisance or exotic species were observed.

#### Interim Success Criteria:

Interim success criteria have been met for this area. These include exotic vegetation cover < 1 percent per acre, nuisance vegetation cover < 5 percent per acre, and maintaining or improving in ecological function. Water levels were at or above normal pool through December of 2020.

### Management Unit 2, UMAM Polygon V, Hydric Pine Flatwoods

Management Unit 2, UMAM Polygon V consists of 146.678 acres of FLUCCS 635 hydric pine flatwoods. The management goal for this polygon includes the enhancement and restoration of the degraded hydric pine flatwoods. Two pedestrian transects (M10 and M11) located in Management Unit 2, UMAM Polygon

V. Each of these degraded hydric pine flatwoods were dominated by dense shrub cover and species during baseline monitoring.

In 2019, a total of 99 species were observed along the meandering transect of M10, a slight increase in species observed from the previous year. This area continues to develop and has good diversity. A total of 51 species were observed along M11. These sites continue to develop and diversity increase. No hog damage was observed within the restoration area in 2019.

In 2020, a total of 105 species were observed along the meandering transect of M10, an increase of five species observed from the previous year. This area continues to develop and has good diversity. A total of 54 species were observed along M11, a slight increase from the previous year. These sites continue to develop and diversity increase. No hog damage was observed within the restoration area in 2019.

Interim Success Criteria:

Interim success criteria have been met for this area. No exotic species were observed, and shrub cover has been maintained at or lower than 6 percent. Herbaceous groundcover and diversity continue to increase. Prescribed burns have been conducted in accordance with fire management plan on a one year rotation.

#### **Management Unit 10, UMAM Polygon III, Xeric and Live Oak**

Management Unit 10, UMAM Polygon III consists of 493.852 acres of FLUCCS 421 – Xeric Oak and 427 – Live Oak. Management goals include preservation, reintroduction of fire, removal of oaks and hardwoods, planting of longleaf pine, and exotic species control. Four transects were located within Polygon 10, M1, M2, M12 and M13). During baseline monitoring, 44 species were observed along M1, as were 29 species within M2, 26 species within M12, and 54 species within M13. In Transect M1, Florida threatened species, Gulf coast lupine (*Lupinus westianus*), and Gopher tortoise burrows have been observed scattered throughout the xeric communities.

In 2019, 95 species were found along Transect M1, an increase of three species. This area is a combination of several habitats as it grades towards the pond. A total of 84 species were observed within M2 and increase of seven species. A total of 68 species were observed within M12. Transect M13 had 81 species, an increase of four species. These sites were burned in 2018.

In 2020, 98 species were found along Transect M1, an increase of three species. This area is a combination of several habitats as it grades towards the pond. A total of 83 species were observed within M2. Seventy seven species were observed within M12 an increase of nine species. Transect M13 had 85 species, an increase of four species.

Interim Success Criteria:

Interim success criteria have been met for this area. No nuisance native or exotic vegetation have been observed, except for a small patch of Bahia grass at M1's entrance. Diversity is good and continued burns within these areas will maintain a healthy sandhill community. Wiregrass cover is excellent and oaks and other hardwood cover have been reduced to appropriate levels.

### **Management Unit 11, UMAM Polygon II, Upland Sand Pine or Slash Pine Plantations**

Management Unit 11, UMAM Polygon II consists of 383.484 acres of FLUCCS 411, Longleaf Pine/Wiregrass restored from slash or sand pine plantations.

The restoration goal for this area is to restore the sites to a sandhill community from a slash pine plantation. Management activities included the removal of planted sand pines, reintroduction of burns, re-planting with longleaf pine, and the addition of wiregrass as needed. Slash and sand pine trees were harvested from April to November 2007 followed by winter burns. Transect M5 is located within Management Unit 11, UMAM Polygon II. Observations from the baseline monitoring in 2006, indicated six trees, seven shrubs, two vines, and 35 herbaceous species.

In 2019, a total of 79 species were observed along M5. Species diversity and wiregrass cover is similar to sandhills within the region. The community continues to develop.

In 2020, a total of 91 species were observed along M5 an increase of 12 species. Species diversity and wiregrass cover is similar to sandhills within the region. The community continues to develop.

#### **Interim Success Criteria:**

The interim success criteria have been met for this area. No nuisance or exotic species were observed. Wiregrass is the dominant species. The ground cover is diverse and typical of a sandhill and the planted longleaf pines are 20 to 24' tall.

### **Management Unit 12, UMAM Polygon 1, Sandhill**

Management Unit 12, UMAM Polygon 1 consists of 263.52 acres of FLUCCS: 411 – Longleaf Pine / Wiregrass (Mesic Pine Flatwoods) restored from 421 – Xeric Oak habitat.

The goal for this polygon was to restore a diverse sandhill. Fire was reintroduced in 2004 and the once dominant woody goldenrod and oak cover has been replaced by wiregrass and diverse sandhill species. Removal of oaks  $\leq$  12 inches DBH occurred in the summer of 2005 and the area was replanted with longleaf pine. The sandhill is diverse and high quality with an excellent herbaceous species composition. Two transects (M3 and M4) were located within this polygon. Baseline documentation in 2006 observed a total of 35 species (seven trees, two shrubs, two vines, and 24 herbs) within pedestrian Transect M3, while 68 species (eight trees, nine shrubs, two vines and 49 herbs) were observed within M4. These two areas are the two most diverse upland areas of the bank and often have over 90 species observed. Floristically, they are typical of high quality sandhills within the region.

In 2019, a total of 83 species were observed along M3, seven less than the previous year. A total of 134 species were observed along M4, an increase of 15 species and the result of a recovery of a late season burn in 2018. These two areas are the two most diverse upland areas of the bank and often have over 90 species observed. Floristically, they are typical of high quality sandhills within the region.

In 2020, a total of 92 species were observed along M3, nine greater than the previous year. A total of 128 species were observed along M4, six less than the previous year. These two areas are the two most diverse upland areas of the bank and often have greater than 90 species observed. Floristically, they are typical of high quality sandhills within the region.



**Interim Success Criteria:**

This polygon has met the restoration goals set forth in the interim success criteria. Controlled burns within this polygon have greatly reduced the cover of woody goldenrod and oaks. Successive burns have increased diversity and wiregrass cover. Oaks have been reduced to less than 150 trees per acre and the herbaceous vegetation is dominated by wiregrass.

**Management Unit 14, portions of UMAM Polygon IV, Lakes**

Management Unit 14, portions of UMAM Polygon IV consists of 164.958 acres of FLUCCS 520, lakes. The goal for this polygon is the preservation of the lake and aquatic habitat. One pedestrian transect (M6) was placed within the polygon around Garret Pond and another M7 at Dykes Mill Pond. A zone of Smooth barked St. John’s wort and seedlings was observed just above normal pool adjacent to Garret Pond.

In 2019, water levels were above normal pool for most of the year. A total of 78 species were observed along M6, an increase of eight species while 38 species were observed along M7 and decrease of three species. Vegetation appears healthy and vigorous.

In 2020, water levels were again above normal pool for most of the year. A total of 86 species were observed along M6, an increase of eight species while 45 species were observed along M7 and increase of five species. Vegetation appears healthy and vigorous.

**Interim Success Criteria:**

Wetland vegetation is the dominant within both sites. Species appear healthy, diverse and vigorous. Success criteria for this area have been met.

**Certification**

**I certify that this report represents true accurate and representative description of the activities and site conditions at the time of this report.**

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**David C. Clayton**  
**Qualified Mitigation Specialist**  
**Senior Environmental Scientist**