

Sand Hill Lakes Mitigation Bank Combined DEP/USACE Twelfth 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) instrument was approved on May 16, 2006. This is the twelfth 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. A total of three and a half burn cycles have been completed, although areas requiring more frequent fires have had five burns since the bank was established. Frequent fires have greatly improved the quality and diversity of the pyrogenic communities. However, in 2017, a state-wide burn ban prevented all burns from occurring at the SHLMB. Additional burns are scheduled for 2018. The hydrologic restoration was completed by January 2008 and included the removal of two fill-roads, installation of three railcar bridges, replacement of two culverts and dams, and 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. Gyro-Trac shrub reduction was completed in August 2008. Herbicide treatments were conducted for three years and nuisance shrub cover has been maintained at less than 2% 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 2017, a total of 100 species were observed within they hydric pine flatwoods restoration on the west side of Dry Pond during the annual monitoring. Quantitative transect data showed an average vegetation cover 86.8%. This is a significant increase from the two herbaceous species and 98% 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 were restored by planting wiregrass on three-foot centers. In 2017, the University of Florida installed 32,000 plants from 20 sandhill species grown from seed collected at the SHLMB. The plants were installed within 37 acres of sandhill restoration adjacent to the entrance. The restored sandhills continue to thrive, and a total of 119 sandhill species were observed adjacent to Little Deep Edge Pond in 2017. Surveys of nuisance species (flora and fauna) have been conducted throughout the past twelve years.

Minor feral hog damage was observed within the hydric pine flatwoods restoration in 2017. Two remotely deployed traps were utilized in hog control. In addition, game cameras were placed in key locations to track the hogs and the perimeter fencing was repaired to prevent access. Thirty-six feral

hogs were removed from the SHLMB in 2017. Thirty-three feral hogs were captured in corral traps and three were taken during the hunting season.

The annual monitoring for this report was conducted in 2017 on October 12, 16, 18, 23, 25, 26 and November 8, 9, 15, 16, 18, and 19. Species diversity was excellent throughout the SHLMB and plants were 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). 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 sandhill restoration (Figure 2).

The SHLMB occurs on the divide between the Choctawhatchee and St. Andrew Bay watersheds. The majority of the SHLMB is in 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 is also within a recharge area for Econfina Creek, which, via Deer Point Lake, is the water supply for Panama City, ultimately discharging to North Bay and St. Andrew Bay.

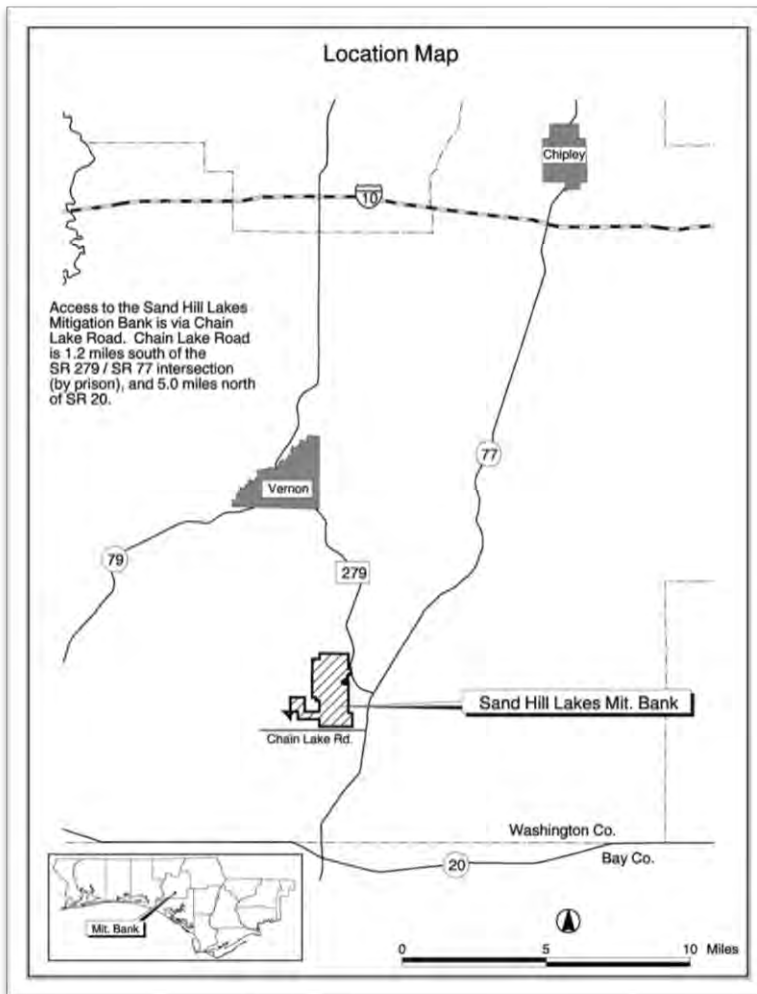


Figure 1. Location Map



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 twelfth 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, Qualified Mitigation Supervisor	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 three sites	Initiated 7/2006 Completed 3/2007
- Construction of two bridges and replacement of three 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% 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) 08/2008 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 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>From May to August 2017, University of Florida installed 32,000 plants from 20 sandhill species grown from seed collected at the SHLMB adjacent to the entrance.</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 nd Annual Report	Completed 2007
Fire Management / Monitoring Year 2 / 3 rd Annual Report	Completed 2008
Fire Management / Monitoring Year 3 / 4 th Annual Report	Completed 2009
Fire Management / Monitoring Year 4 / 5 th Annual Report	Completed 2010
Fire Management / Monitoring Year 5 / 6 th Annual Report	Completed 2011
Fire Management / Monitoring Year 6 / 7 th Annual Report	Completed 2012
Fire Management / Monitoring Year 7 / 8 th Annual Report	Completed 2013
Fire Management / Monitoring Year 8 / 9 th Annual Report	Completed 2014
Fire Management / Monitoring Year 9 / 10 th Annual Report	Completed 2015
Fire Management / Monitoring Year 10 / 11 th Annual Report	Completed 2017
Fire Management / Monitoring Year 11 / 12 th Annual Report	Completed 2018
Fire Management / Monitoring Year 12 / 13 th Annual Report	
Fire Management / Monitoring Year 13 / 14 th Annual Report	
Fire Management / Monitoring Year 14 / 15 th Annual Report	
Perpetual Ecological Management	

Hydrologic Enhancements

Specific Condition 12

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

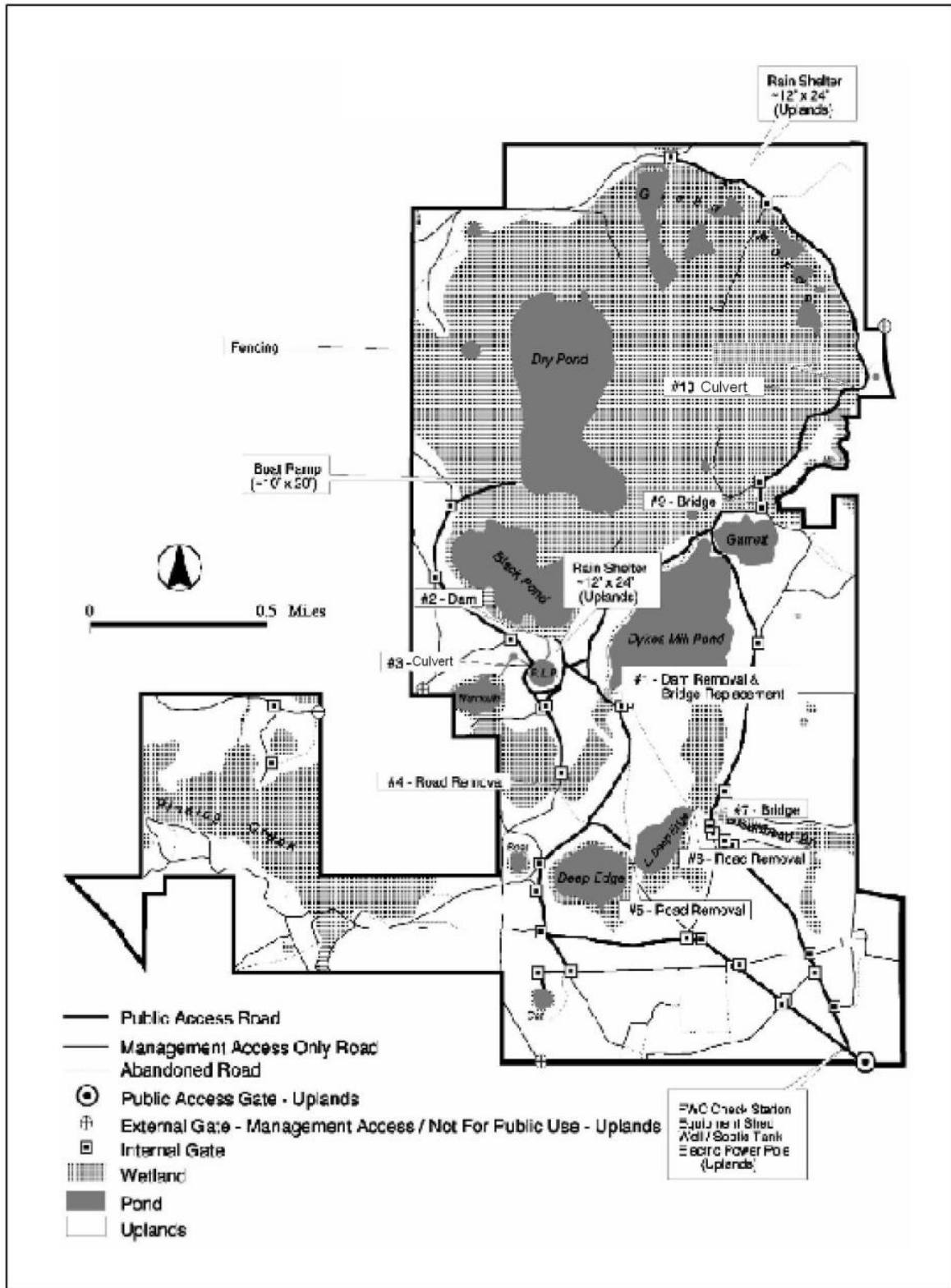


Figure 3. Approved structures

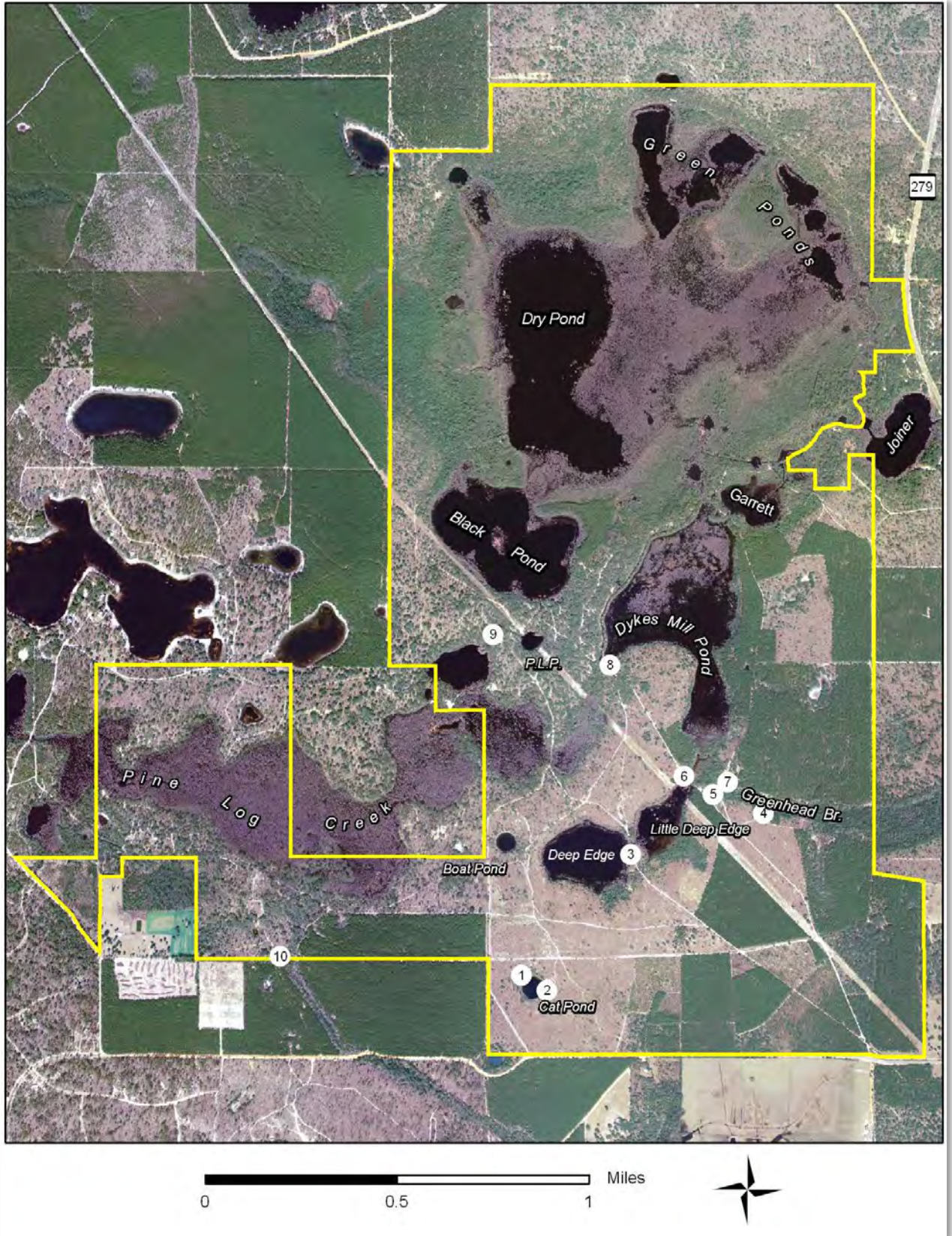


Figure 4. Erosion stabilization areas

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). No burns were conducted during 2017 due to a state-wide fire ban. It is anticipated that additional burns will be conducted in 2018.

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).

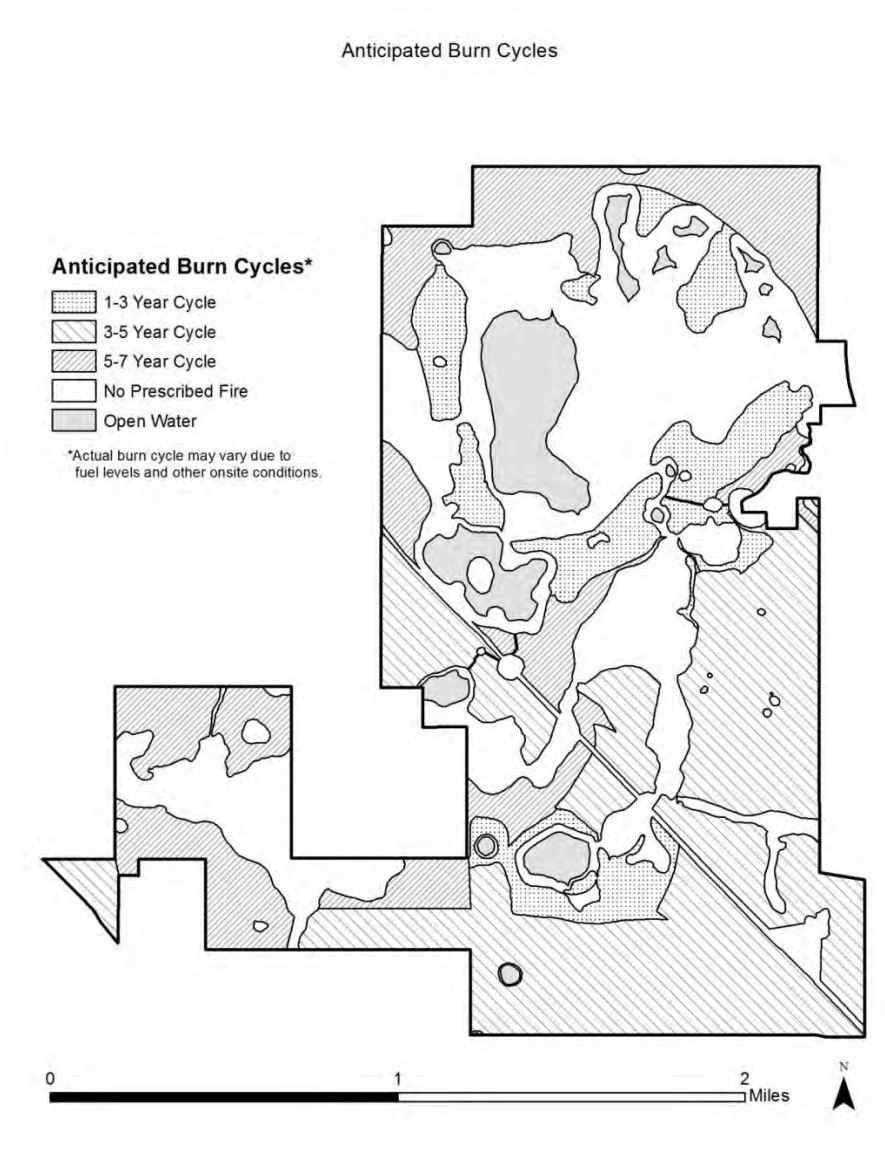


Figure 5. Anticipated burn cycles

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 2017.

The feral hog removal program at the SHLMB was very successful in 2017 with a total of 36 hogs removed, 33 from trapping program and 3 through hunting. Hog damage within the wetlands has been minimal and greatly reduced from previous years. 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 and the fence is patrolled weekly for damage (Table 2).

Table 2. Hog eradication conducted at the SHLMB during 2017

Date	Hog(s)			36
	M	F	total	
1/24/2017		1		
1/24/2017		1		
1/24/2017		1		
4/13/17		1	1	
4/27/17	6	12	18	
5/2/17	4	1	5	
5/6/17	1		1	
5/12/17	1		1	
5/29/17	1		1	
6/20/17	1		1	
6/29/17		1	1	
8/30/17	4	0	4	

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 3, Figure 9). In 2017, the Florida Panhandle had average rainfall from January until March, then a moderate drought in April and May, and returning to average rainfall for the remainder of the year according to NOAA. The highest water levels were reported for June for most stations in 2017 (Table 3, Figure 9). Conversely, the lowest gage readings were recorded for December for most stations.

Table 3. Monthly water gage readings for 2017

SHLMB Water Gauges Readings 2017

Readings in Feet	(1) Black Pond	(2) Power Line Pond	(3) Pine Log Creek	(4) Deep Edge Pond	(5) Little Deep Edge Pond	(6) Dykes Mill Pond	(7) Green Ponds Channel	(8) Joiner Lake Canal	(9) Green Ponds	(10) Dry Pond
Date	1/11/2017	1/11/2017	1/11/2017	1/11/2017	1/11/2017	1/11/2017	1/11/2017	1/11/2017	1/11/2017	1/11/2017
Reading	5.76	4.72	2.81	2.44	3.38	4.22	3.81	4.86	5.54	6.08
Date	2/1/2017	2/1/2017	2/1/2017	2/1/2017	2/1/2017	2/1/2017	2/1/2017	2/1/2017	2/1/2017	2/1/2017
Reading	6.62	5.40	3.34	2.74	3.50	4.12	4.20	5.07	6.40	under water
Date	3/1/2017	3/1/2017	3/1/2017	3/1/2017	3/1/2017	3/1/2017	3/1/2017	3/1/2017	3/1/2017	3/1/2017
Reading	6.26	5.12	3.13	2.89	3.54	4.06	3.72	4.72	6.04	6.58
Date	3/30/2017	3/30/2017	3/30/2017	3/30/2017	3/30/2017	3/30/2017	3/30/2017	3/30/2017	3/30/2017	3/30/2017
Reading	5.54	4.37	2.50	2.54	3.48	3.88	3.21	3.90	5.30	5.84
Date	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017	5/1/2017
Reading	5.36	4.18	2.31	2.48	4.46	3.88	2.98	3.88	5.12	5.64
Date	6/2/2017	6/2/2017	6/2/2017	6/2/2017	6/2/2017	6/2/2017	6/2/2017	6/2/2017	6/2/2017	6/2/2017
Reading	4.88	3.62	1.81	2.1	3.5	2.78	1.9	3.4	4.62	5.14
Date	6/30/2017	6/30/2017	6/30/2017	6/30/2017	6/30/2017	6/30/2017	6/30/2017	6/30/2017	6/30/2017	6/30/2017
Reading	6.49	5.28	3.20	3.02	3.60	4.32	4.50	5.43	6.28	under water
Date	8/1/2017	8/1/2017	8/1/2017	8/1/2017	8/1/2017	8/1/2017	8/1/2017	8/1/2017	8/1/2017	8/1/2017
Reading	6.22	5.12	~3.00	3.16	3.50	4.24	3.84	4.94	6.00	6.52
Date	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/31/2017
Reading	5.66	4.58	~2.70	3.18	~3.70	4.38	3.52	4.38	5.46	5.98
Date	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017
Reading	5.18	4.08	~2.30	2.96	~3.50	4.13	2.78	3.98	4.96	5.46
Date	11/1/2017	11/1/2017	11/1/2017	11/1/2017	11/1/2017	11/1/2017	11/1/2017	11/1/2017	11/1/2017	11/1/2017
Reading	~4.70	~3.50	1.86	2.54	3.42	4.00	1.95	~3.40	~4.60	5.06
Date	12/5/2017	12/5/2017	12/1/2017	12/1/2017	12/5/2017	12/5/2017	12/1/2017	12/5/2017	12/5/2017	12/5/2017
Reading	4.42	~2.90	~1.58	3.00	3.25	3.72	Below gage	2.75	4.20	4.74

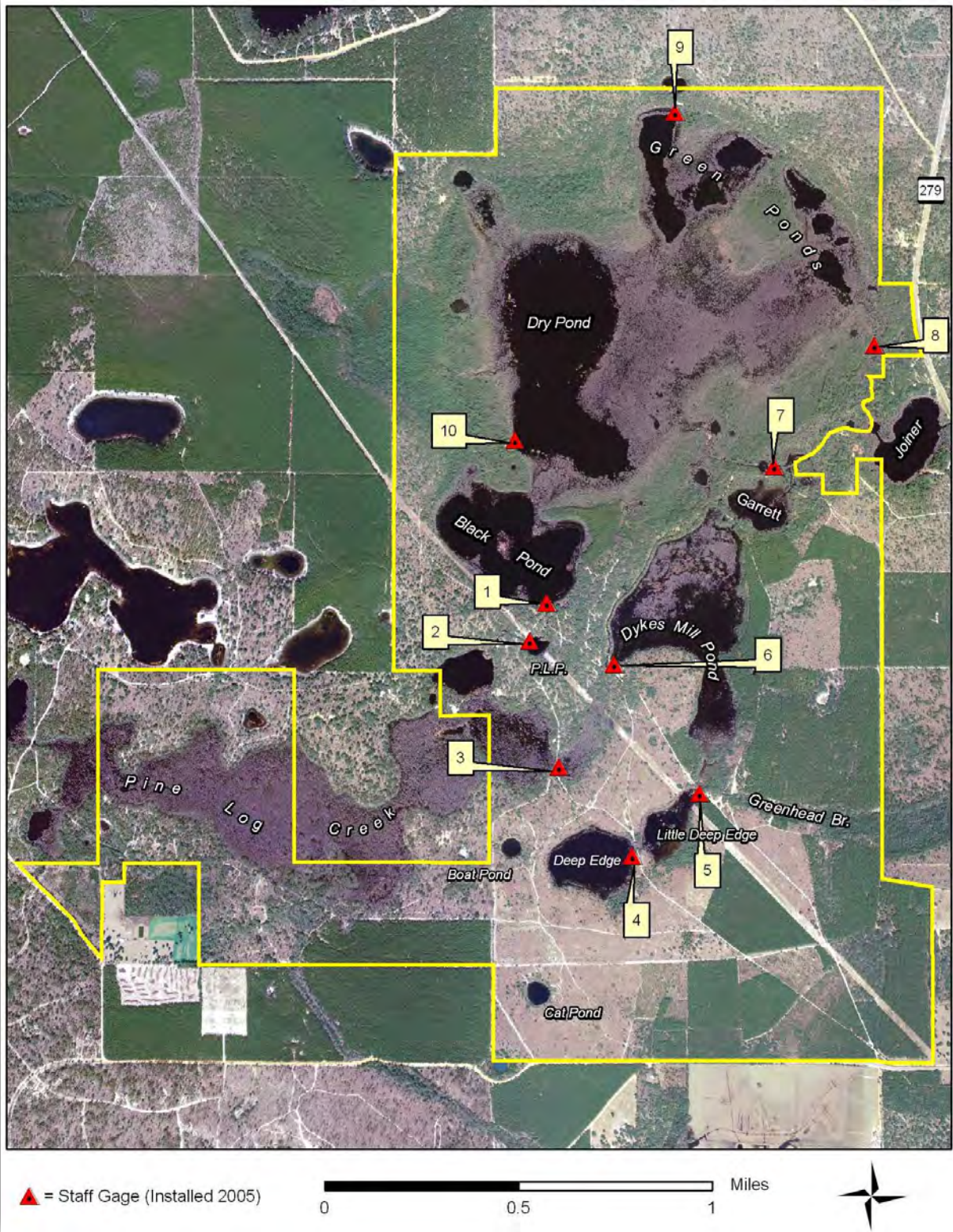


Figure 6. Staff gage locations

Sandhill Restoration

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

Oak eradication in UMAM polygon I was initiated in August 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 species have 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 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% wiregrass cover, a supplemental wiregrass planting was conducted. A total of 454.5 acres of sandhill understory was restored by planting wiregrass on three-foot centers, (2,199,780 plants) (UMAM polygon II, III). Survival of the wiregrass in the uplands has averaged 80%. Seedling wiregrass has been commonly observed. In 2017, the University of Florida installed 32,000 plants from 20 sandhill species grown from seed collected at the SHLMB. The plants were installed within 37 acres of sandhill restoration adjacent to the entrance.

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 an 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 10). 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-Trac 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 2%. These areas have maintained less than 2% cover of nuisance shrubs 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.

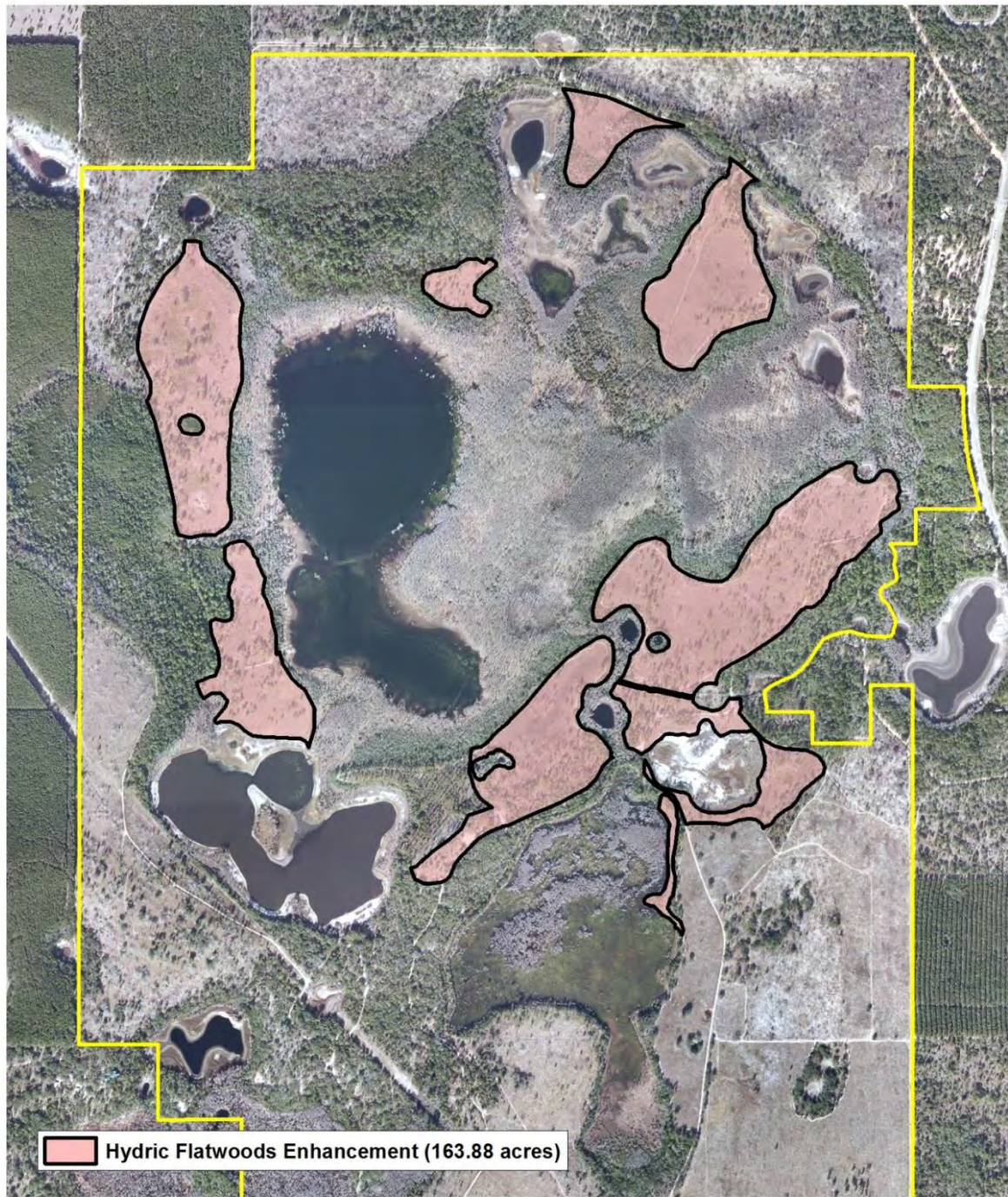


Figure 7. Hydric pine flatwoods restoration areas

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: <http://www.nfwmdwetlands.com/index.php>.

The annual monitoring for this report was conducted in 2017 on October 12, 16, 18, 23, 25, 26 and November 8, 9, 15, 16, 18, and 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 2016-2017 Annual report by the Florida Fish and Wildlife Conservation Commission was completed in December and 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: <http://www.nfwmdwetlands.com/index.php> (Figure 11).

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.

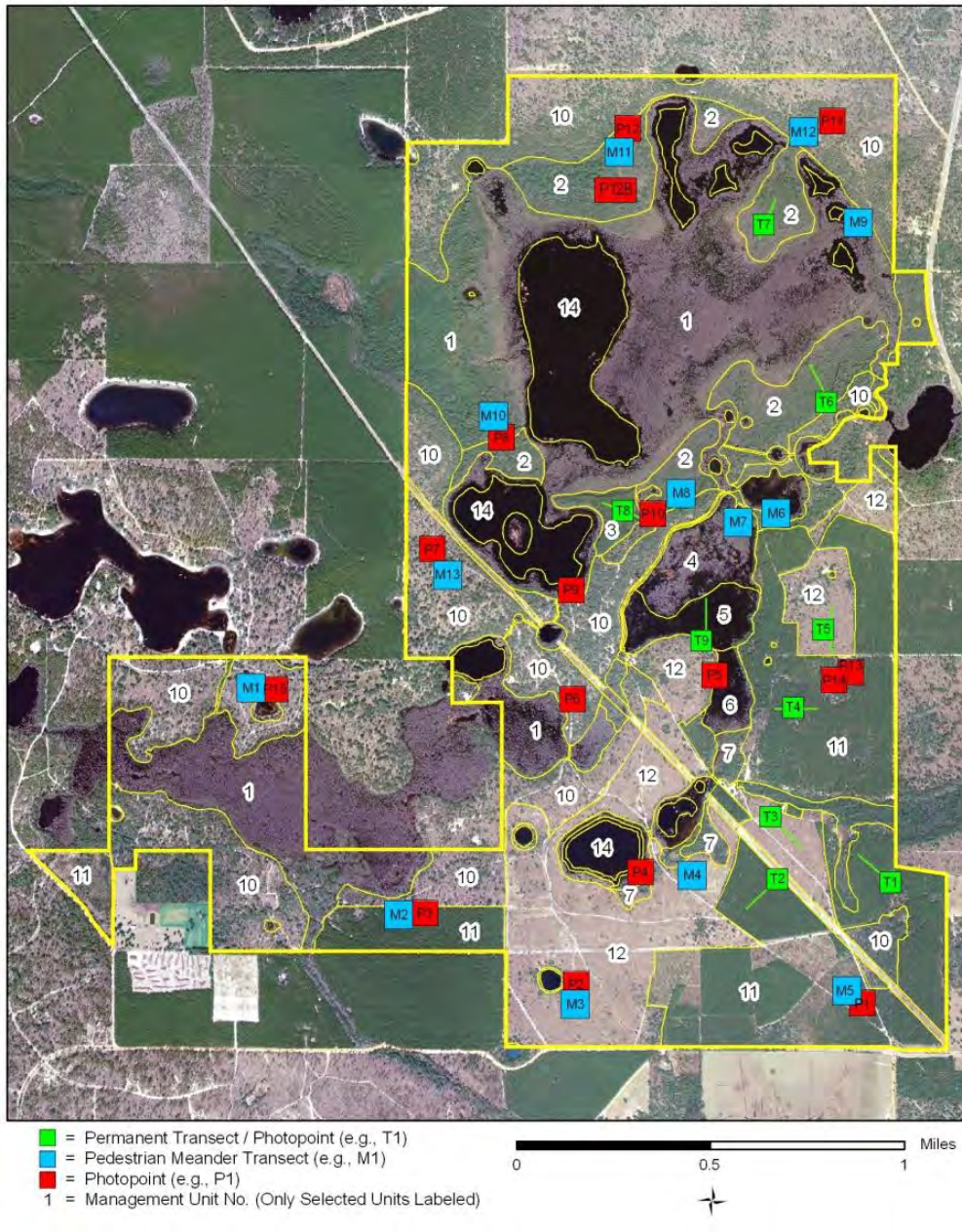


Figure 8. Monitoring locations

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% 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 2016 monitoring, 14 species were observed in Transect 1, 20 in Transect 2, and 18 in Transect 4. Wiregrass had the greatest vegetative cover for each transect ranging from 31% in transect 1 to 17% in Transect 2 and 25.6% in Transect 4. Bare ground ranged from 46% in Transect 1 to 57% in Transect 2. The areas that contained the sandhill restoration transects were burned in late July. Warm season burns tend to remove annual species. The reduced species cover and occurrence may be due to the mid-summer burns. In addition, the area surrounding transect 1 had been treated over the summer with herbicide to reduce centipede grass cover. The increase in bare ground is attributed at least in part to the herbicide treatment.

During the 2017 monitoring, 22 species were observed in Transect 1, 27 in Transect 2, and 26 in Transect 4 (Tables 4-6; Figures 12-14). Wiregrass had the greatest vegetative cover for each transect ranging from 46.2% in transect 1 to 20% in Transect 2 and 26% in Transect 4. Bare ground ranged from 17% in Transect 1 to 36% in Transect 2. Species diversity greatly increased from the previous year probably due to a recovery from the late season fire. Wiregrass cover also increased for each site as well as a reduction in bare ground.

Interim Success Criteria:

The sand pine plantations were harvested in 2007. Site preparation burns were conducted during the winter of 2008, and longleaf pine was planted in the winter of 2008-2009. Wiregrass plugs were planted on three-foot centers in the former sand pine plantations in 2008 and completed in 2009. The area is burned on a three-year rotation. Wiregrass cover continues to increase and is 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 4. Transect 1 Species cover and occurrence (Sandhill Restoration)

Date 10/23/17 Collector: David Clayton Wildlife observed: None

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	Purple bluestem	2.7
<i>Aristida stricta</i>	Wiregrass	40
<i>Artemisia campestris</i>	Wormwood	0.34
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	6.1
<i>Croptilon divaricatum</i>	Slender scratch daisy	1.2
<i>Conyza canadensis</i>	Canadian horseweed	0.83
<i>Dichanthelium aciculare</i>	Needle leaf witch grass	0.33
<i>Elephantopus tomentosus</i>	Devil's grandmother	0.15
<i>Eremochloa ophiuroides</i>	Centipede grass	2.7
<i>Eupatorium capillifolium</i>	Dog fennel	1.1

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Eupatorium compositifolium</i>	Yankeeweed	0.84
<i>Heterotheca subaxillaris</i>	Roundleaf bluet	0.35
<i>Hypericum gentianoides</i>	Orange weed	1.2
<i>Ilex vomitoria</i>	Yaupon	2.6
<i>Paspalum notatum</i>	Bahia grass	0.5
<i>Polygonella gracillis</i>	Tall jointweed	0.84
<i>Polypremum procumbens</i>	Rustweed	0.16
<i>Pseudognaphalium obtusifolium</i>	Sweet everlasting	0.33
<i>Rhus copallinum</i>	Winged sumac	0.18
<i>Rubus cuneifolius</i>	Sand black berry	10.5
<i>Schizachyrium sp</i>	Little blue stem	0.7
<i>Trichostema setaceum</i>	Blue curls	0.35
	Bare ground	26

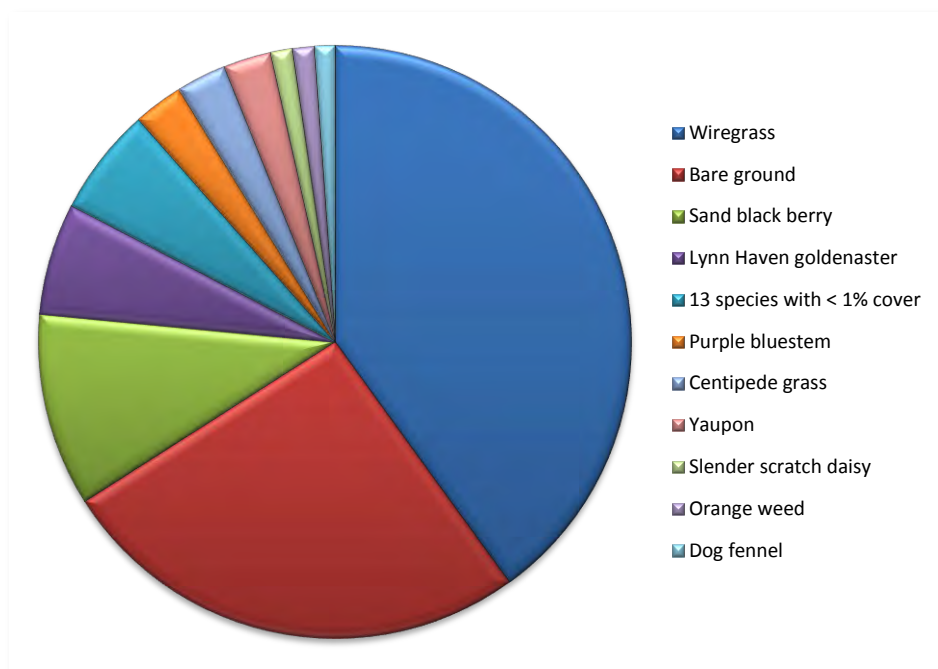


Figure 9. Transect 1: Species Cover and Occurrence (Pine plantation restored to sandhill)

Table 5. Transect 2 Species cover and occurrence (Sandhill Restoration)

Date 10/23/17 Collector: David Clayton Wildlife observed: Titmouse, chipping sparrow
Former Sand pine plantation restored to sandhill

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Agalinis divaricata</i>	Pineland false foxglove	0.7
<i>Andropogon floridanus</i>	Florida bluestem	11.2
<i>Andropogon virginicus</i>	Broom sedge	0.2
<i>Aristida stricta</i>	Wire grass	20
<i>Axonopus furcatus</i>	Big carpet grass	0.2
<i>Balduina angustifolia</i>	Gopher weed	1

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Bulbostylis ciliatifolia</i>	Capillary hairsedge	1.2
<i>Ceanothus microphyllus</i>	New Jersey Tea	0.2
<i>Chrysoma pauciflosculosa</i>	Woody goldenrod	7.5
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	6.5
<i>Dichantherium aciculare</i>	Needle leaf witch grass	1.3
<i>Eragrostis spectabilis</i>	Purple lovegrass	0.2
<i>Eremochloa ophiuroides</i>	Centipede grass	0.3
<i>Eupatorium compositifolium</i>	Yankee weed	0.7
<i>Froelichia floridana</i>	Milkpea	0.3
<i>Hypericum gentianoides</i>	Orange weed	0.5
<i>Ilex vomitoria</i>	Yaupon	0.3
<i>Licania michauxii</i>	Gopher apple	0.3
<i>Pogonia ophioglossoides</i>	Tall jointweed	1.2
<i>Pinus serotina</i>	Narrowleaf silkgrass	0.3
<i>Pteridium aquilinum</i>	Bracken	0.3
<i>Rhynchospora sp.</i>	Sand blackberry	1
<i>Schizachyrium sp.</i>	Little blue stem	5.5
<i>Smilax auriculata</i>	Earleaf greenbrier	0.8
<i>Smilax smallii</i>	Pinebark goldenrod	0.3
<i>Stylisma patens</i>	Coastal plain daisy	0.2
<i>Vaccinium arboreum</i>	Sparkleberry	1.8
	Bare ground	36

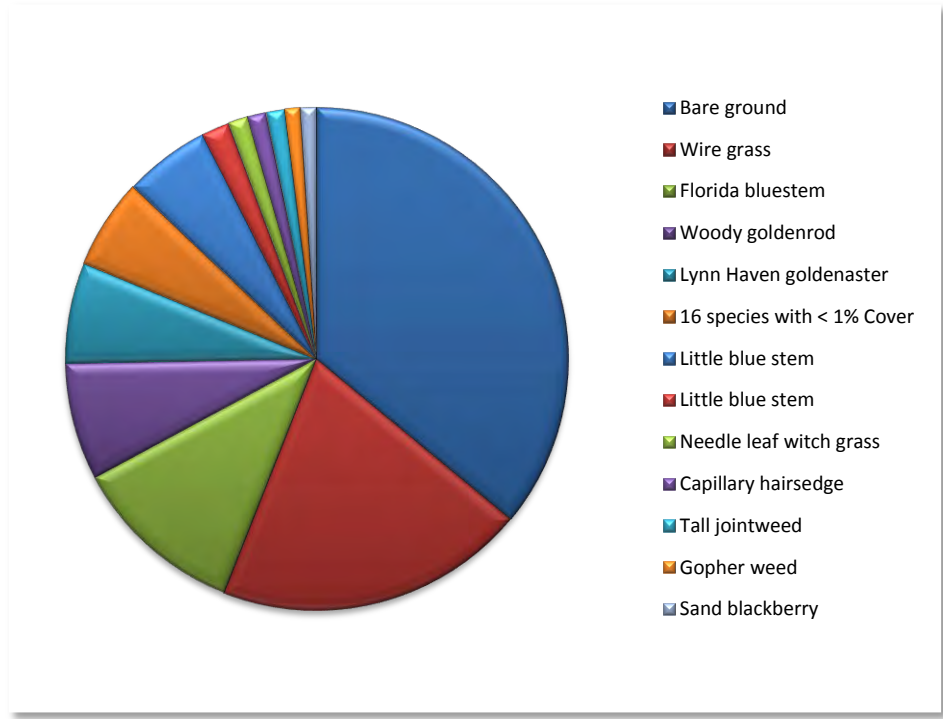


Figure 10. Transect 2 Species cover and occurrence (Sandhill Restoration)

Table 6. Transect 4 Species cover and occurrence (Sandhill Restoration)

Date 11/16/17 Collector: David Clayton

Wildlife observed: Red winged blackbird, bobwhite, catbird

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Agalinis divaricata</i>	Pineland false foxglove	1.8
<i>Andropogon ternarius</i>	Splitbeard bluestem	3
<i>Aristida stricta</i>	Wire grass	46.2
<i>Chamaecrista nictitans</i>	Sensitive pea	0.5
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	8
<i>Conyza canadensis</i>	Canadian horseweed	0.2
<i>Cyperus sp.</i>	Sedge	0.2
<i>Dichaenanthelium sp.</i>	Witch grass	1
<i>Eupatorium compositifolium</i>	Yankeeweed	1.5
<i>Eupatorium mohrii</i>	Mohr's thorough wort	0.2
<i>Euthamia caroliniana</i>	Slender flattop goldenrod	3
<i>Galactia sp.</i>	Milkpea	0.83
<i>Hypericum gentianoides</i>	Orange weed	0.33
<i>Ilex vomitoria</i>	Yaupon	0.83
<i>Lespedeza hirta</i>	Hairy lespedeza	0.7
<i>Paspalum notatum</i>	Bahiagrass	2
<i>Penstemon multiflorus</i>	Beardtongue	1
<i>Pseudognaphalium obtusifolium</i>	Sweet everlasting	0.85
<i>Rhexia mariana</i>	Pale meadow beauty	0.85
<i>Rhynchospora microcarpa</i>	Southern beaksedge	0.5
<i>Rubus cuneifolius</i>	Sand black berry	5.3
<i>Smilax sp.</i>	Smilax	0.2
<i>Solidago fistulosa</i>	Pine barren goldenrod	0.33
<i>Symphotrichum dumosum</i>	Rice button aster	1.5
<i>Vaccinium elliotii</i>	Elliott's blueberry	0.33
<i>Yucca filimentosa</i>	Adam's needle	1.85
	Bare ground	17

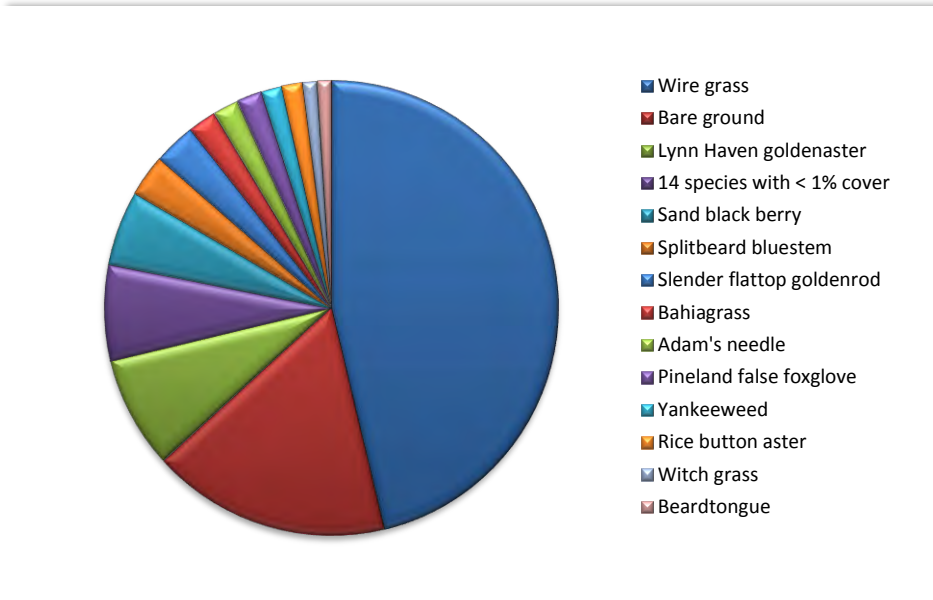


Figure 11. Transect 4 Species Cover and Occurrence (Sand Pine Plantation Restored to Sandhill)

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 91 and 167 trees per acre. Overall health of the planted seedlings was excellent. Most trees were 12-15 feet in height and the average diameter and breast height (DBH) is six inches (Figures 15-17).

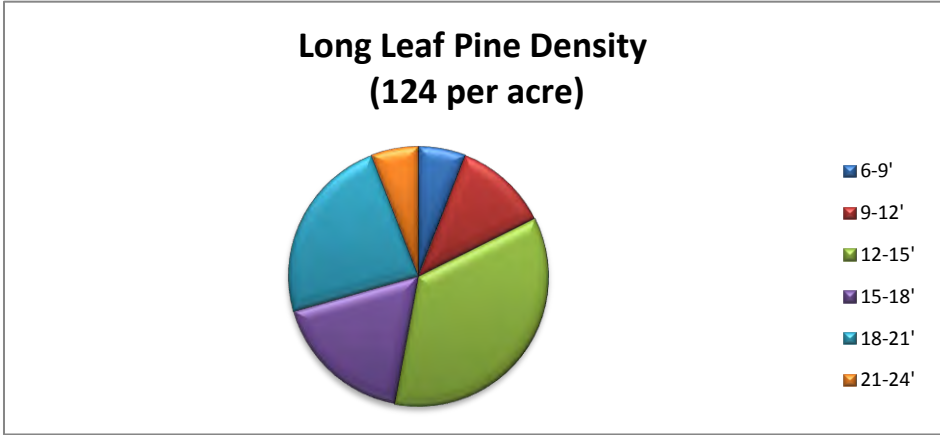


Figure 12. Planted longleaf pine seedlings (Transect 1)

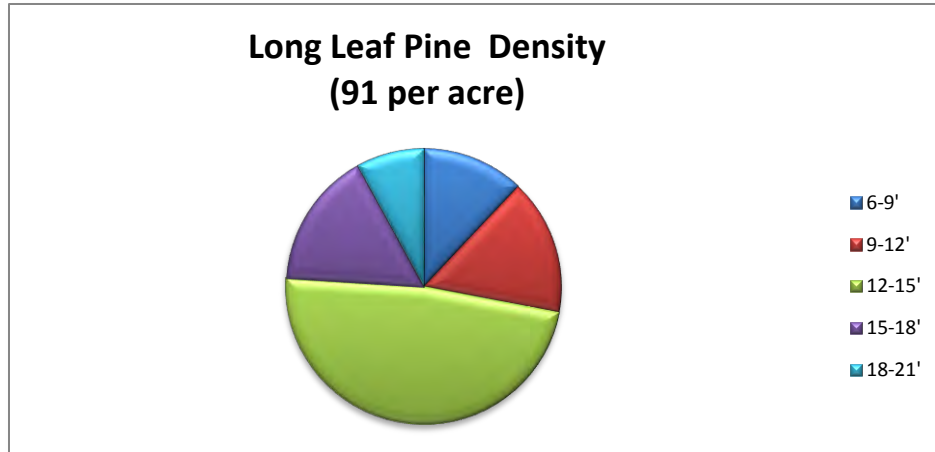


Figure 13. Planted longleaf pine seedlings (Transect 2)

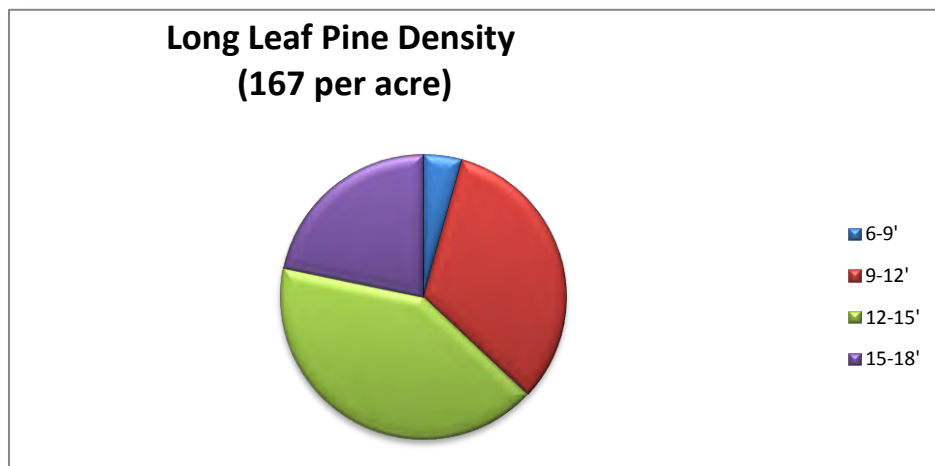


Figure 14. Planted longleaf pine seedlings (Transect 4)
UMAM Polygon I, Management Unit 12- Sandhill Restoration

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 2016 monitoring, 34 species were observed within Transect 3. Nineteen species were observed within Transect 5, a decrease of 22 species from 2015. Wiregrass cover was the greatest cover class observed for both transects with 21% cover observed within Transect 3, and 40 % cover observed in Transect 5. Bare ground cover was 47% within Transect 3 and 36.1% within Transect 5. Late warm season burns appeared to have reduced percent cover and diversity of annuals within the sandhill enhancement areas.

During the 2017 monitoring, 26 species were observed within Transect 3 a reduction of 8 species. Twenty eight species were observed within Transect 5 (Tables 7 and 8; Figures 18 and 19). Wiregrass cover was the greatest cover class observed for both transects with 45.3% cover observed within Transect 3, and 50.5 % cover observed in Transect 5. Bare ground cover was 22% within Transect 3 and 18.6% within Transect 5. The site has recovered in wiregrass cover and reduced bare ground was observed for both transects.

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. Long leaf pine seedlings were estimated at 87 trees per acre in Transect 3 and 101 trees per acre in Transect 5. The area around Transect 5 has been planted with longleaf pine twice and seedlings are starting to emerge from the grass stage. Wiregrass and sandhill vegetation continues to thrive and appears healthy.

Table 7. Transect 3: Species Cover and Occurrence (Sandhill Enhancement)

9/29/16, 11:43 Am Data Collector: David Clayton, Wildlife observed: Red bellied wood pecker, blue jay

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Agalinis divaricata</i>	Pineland false foxglove	1.8
<i>Andropogon floridanus</i>	Florida bluestem	0.5
<i>Aristida stricta</i>	Wire grass	45.3
<i>Baptisia lanceolata</i>	Gopher weed	2.3
<i>Balduina angustifolia</i>	Coastalplain honeycomb-head	6.2
<i>Bulbostylis ciliatifolia</i>	Capillary hairsedge	1.2
<i>Ceanothus microphyllus</i>	New Jersey Tea	0.5
<i>Chrysoma pauciflosculosa</i>	Woody goldenrod	4.5
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	4.8
<i>Eriogonum tomentosum</i>	Dogtongue wild buckwheat	0.16
<i>Eupatorium compositifolium</i>	Yankeeweed	0.3
<i>Galactia sp.</i>	Milkpea	0.3
<i>Gaylussacia dumosa</i>	Dwarf huckleberry	0.33
<i>Hypericum crux-andreae</i>	St. Peter's wort	0.33
<i>Hypericum gentianoides</i>	Orangeweed	1.7
<i>Liatris chapmanii</i>	Chapman's gayfeather	0.17
<i>Paronychia baldwinii</i>	Baldwin's nailwort	1.8
<i>Polygonella gracilis</i>	Wire weed	3.8
<i>Opuntia humifusa</i>	Prickly pear cactus	0.17
<i>Pterocaulon pycnostachyum</i>	Diamond oak	0.17
<i>Quercus incana</i>	Blue jack oak	0.17
<i>Serenoa repens</i>	Saw palmetto	0.17
<i>Smilax auriculata</i>	Earleaf greenbrier	0.17
<i>Solidago fistulosa</i>	Pinebaren goldenrod	0.5
<i>Vaccinium darrowii</i>	Darrow's blueberry	0.33
<i>Vaccinium myrsinites</i>	Shiny blueberry	0.33
	Bare ground	22

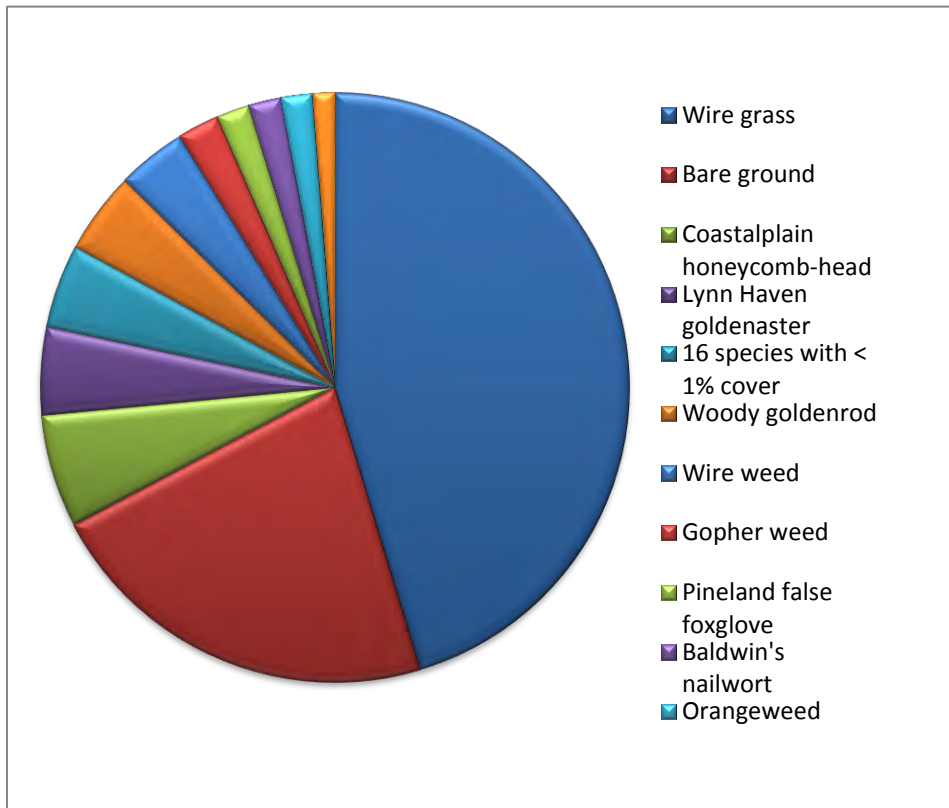


Figure 15. Transect 3: Species cover and occurrence (Sandhill Enhancement)

Table 8. Transect 5: Species Cover and Occurrence (Sandhill Restoration)

11/22/16, Data Collector: David Clayton, Wildlife observed: Mourning Dove

<u>Scientific Name</u>	<u>Common Name</u>	<u>Percent Cover</u>
<i>Aristida stricta</i>	Wiregrass	40
	Bare ground	36.1
<i>Liatris chapmanii</i>	Chapman's shooting star	6.5
<i>Solidago odora</i>	Sweet goldenrod	3.2
<i>Pityopsis graminifolia</i>	Narrowleaf silkgrass	2.7
<i>Andropogon floridanus</i>	Florida bluestem	2.2
<i>Licania michauxii</i>	Gopher apple	1.8
<i>Liatris pauciflora</i>	Fewflowered gayfeather	1.1
<i>Chrysoma pauciflosculosa</i>	Woody goldenrod	0.83
<i>Pteridium aquilinum</i>	Brachen	0.83
<i>Symphotrichum walteri</i>	Walter's aster	0.83
<i>Andropogon gyrans</i>	Elliot's bluestem	0.7
<i>Quercus incana</i>	Bluejack oak	0.7
<i>Vaccinium myrsinites</i>	Shiny blueberry	0.7
<i>Eriogonum tomentosum</i>	Common buckwheat	0.5
<i>Smilax bona-nox</i>	Greebriar	0.5

<u>Scientific Name</u>	<u>Common Name</u>	<u>Percent Cover</u>
<i>Panicum virgatum</i>	Switch grass	0.33
<i>Bulbostylis ciliatifolia</i>	Capillary hairsedge	0.16
<i>Quercus laevis</i>	Turkey oak	0.16
<i>Quercus virginiana</i>	Live oak	0.16

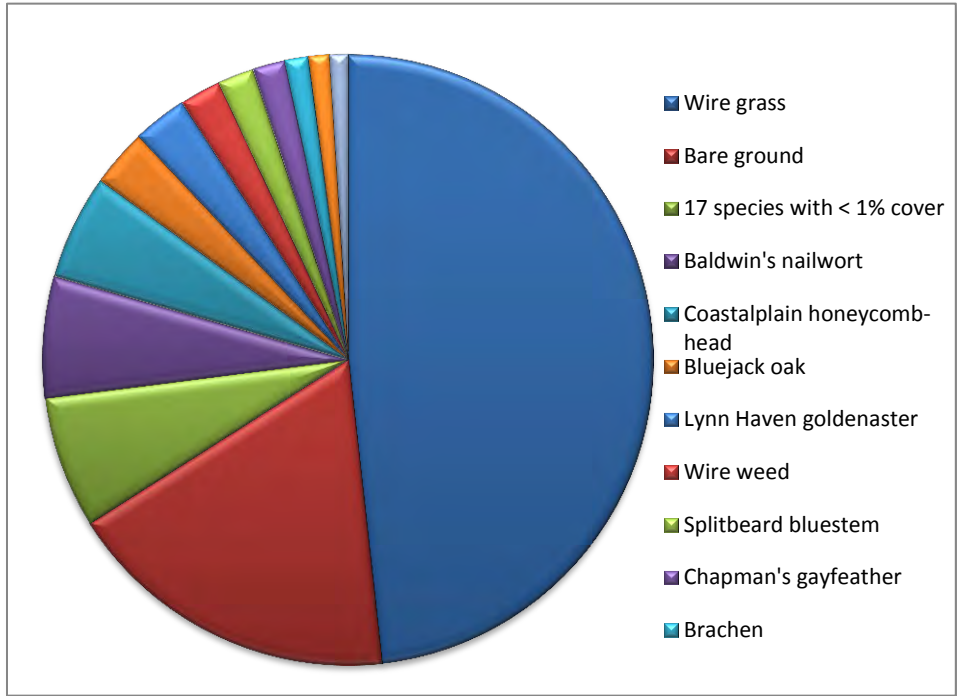


Figure 16. Transect 5: Species cover and occurrence (Sandhill Enhancement)

Planted Longleaf Pine Seedlings

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

In 2017, the survival of longleaf pine seedlings was 87 per acre in Transect 3 and 101 in Transect 5. Tree height was variable. Trees appear healthy and vigorous (Figure 20 and 21).

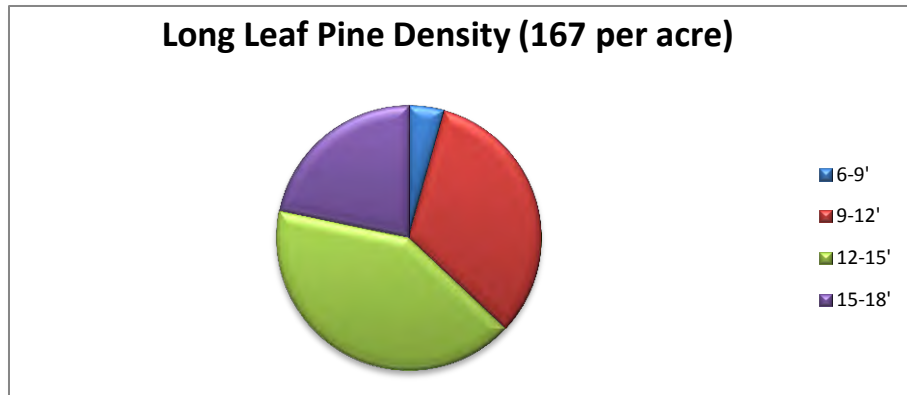


Figure 17. Planted longleaf pine seedlings (Transect 3)

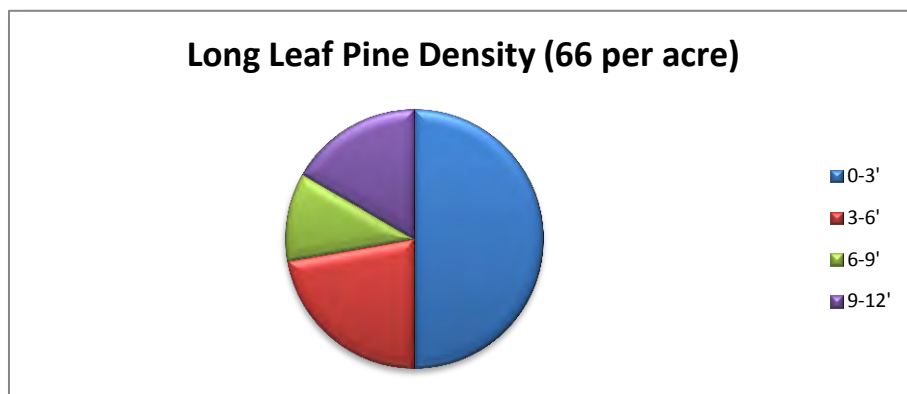


Figure 18. Planted longleaf pine seedlings (Transect 5)

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 2016 monitoring, 29 species were observed. The diversity of the site continues to improve as the site develops. Bare ground cover increased slightly to 27.33% in the last year. Hydric pine flatwood species dominate the site with over 72% cover.

During the 2017 monitoring, 31 species were observed a slight increase from the previous year. The diversity of the site continues to improve as the site develops. Bare ground significantly decreased to 2.7 % cover. Grasses and sedges dominated the vegetative cover (66.5%cover) (Table 9; Figure 22).

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 9. Transect 8. Species Cover and Occurrence (Hydric Pine Flatwoods Restoration)
Date 11/108/17 Collector: David Clayton Wildlife observed: red bellied woodpecker

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Andropogon glomeratus</i>	Bushy bluestem	33
<i>Andropogon glomeratus var. glaucopsis</i>	Purple bluestem	4.7
<i>Aristida stricta</i>	Wiregrass	5.7
<i>Axonopus furcatus</i>	Big carpetgrass	0.7
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass	0.9
<i>Carex glaucescens</i>	Clustered sedge	4.5
<i>Centella asiatica</i>	Centella	4
<i>Dicanthelium sp.</i>	Witchgrass	9.8
<i>Eleocharis sp.</i>	Spikerush	0.9
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	0.45
<i>Euthamia caroliniana</i>	Slender flattop goldenrod	0.45
<i>Gelsemium sempervirens</i>	Yellow jessamine	1.6
<i>Hypericum cistifolium</i>	Roundpod St. John's wort	0.45
<i>Hypericum sp.</i>	St. John's wort	3
<i>Ilex myrtifolia</i>	Myrtleleaved holly	0.45
<i>Kelochloa verrucosa</i>	Warty panic grass	0.45
<i>Lachnanthes caroliniana</i>	Red root	5.2
<i>Ludwigia leptocarpa</i>	Anglestem primrose willow	0.9
<i>Lycopodiella alopecuroides</i>	foxtail club-moss	0.2
<i>Oldenlandia uniflora</i>	Clustered mille grains	0.7
<i>Panicum heitomon</i>	Maidencane	0.7
<i>Paspalum laeve</i>	Field paspalum	1.8
<i>Pinus elliotii</i>	Slash pine	1.6
<i>Rhexia mariana</i>	Pale meadowbeauty	0.2
<i>Rhynchospora microcephala</i>	Bunched beaksedge	4.3
<i>Smilax bona-nox</i>	Catbriar	0.22
<i>Solidago stricta</i>	Pine barren goldenrod	0.45
<i>Sphagnum sp.</i>	Sphagnum	6.4
<i>Viola lanceolata</i>	Early bog violet	0.22
<i>Xyris caroliniana</i>	Yelloweyed grass	1.6
<i>Xyris sp.</i>	Yelloweyed grass	1.8
	Bareground	2.7

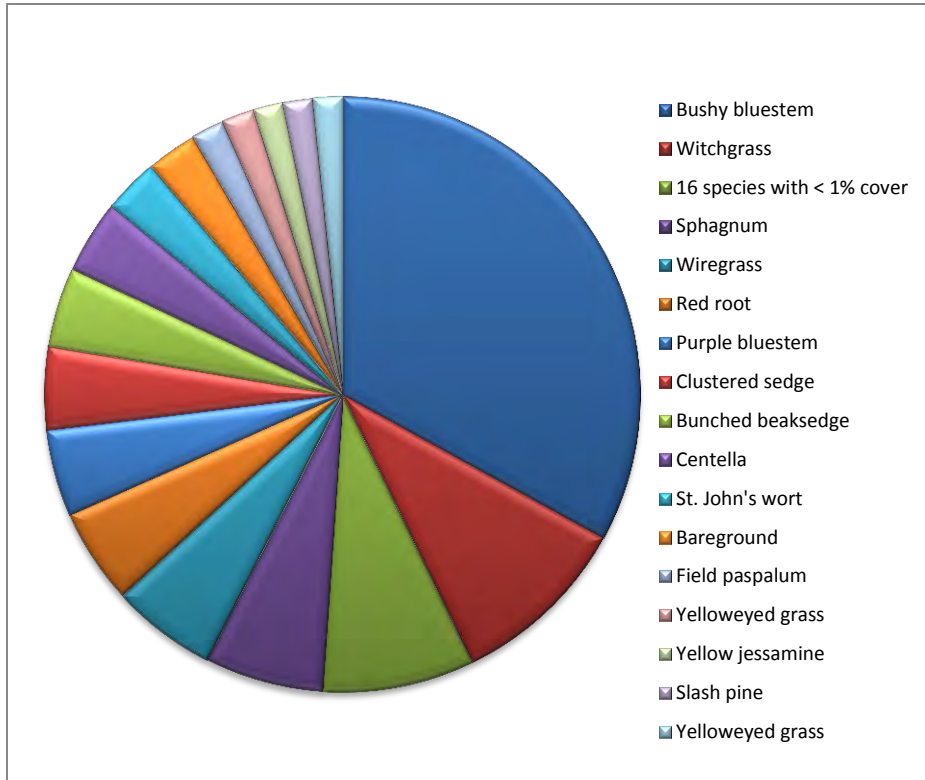


Figure 19. Transect 8: Species cover and occurrence (Hydric Pine Flatwoods Restoration)

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 tubelings 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 2016 monitoring, 21 species were observed in transects 6 and 17 for Transect 7 (Table 10 and 11; Figure 23 and 24). Hydric pine flatwood species dominated both transects. Shrub cover was less than two percent for each transect. Vegetative cover exceeds 80% for both transects. Transect 6 and 7 are dominated by grasses and sedges.

During the 2017 monitoring, 25 and 19 species were observed within Transect 6 and 7, respectively, a slight increase from 2016 (Table 10 and 11; Figure 23 and 24). Hydric pine flatwood species dominated both transects. Shrub cover was 2.4% for Transect 6 and 1.8 for Transect 7. Vegetative cover exceeds 95% for both transects and bare ground is minimal.

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%. Despite extensive wiregrass planting, cover remains low and survival has been significantly reduced by prolonged flooding. A total of 100 species were observed within the hydric pine flatwood adjacent to Dry Pond from pedestrian transects, a significant increase from the 2 herbaceous species recorded during the baseline documentation.

Table 10. Transect 6. Species Cover and Occurrence (Hydric Pine Flatwoods)
Date 11/15/1 Collector: David Clayton Wildlife observed: red bellied woodpecker

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Andropogon glomeratus</i>	Bushy bluestem	57
<i>Andropogon glomeratus var. glaucopsis</i>	Purple bluestem	4.9
<i>Anthraenantia rufa</i>	Purple silkyscale	1
<i>Aristida stricta</i>	Wire grass	1.3
<i>Bidens mitis</i>	Burmarsh merigold	0.2
<i>Centella asiatica</i>	Spadeleaf	0.83
<i>Cliftonia monophylla</i>	Titi	0.2
<i>Eubotrys racemosus</i>	Swamp doghobble	0.2
<i>Eupatorium compositifolium</i>	Yankeeweed	0.83
<i>Eupatorium leptophyllum</i>	False fennel	0.83
<i>Euthamia caroliniana</i>	Slender flattop goldenrod	1.9
<i>Hypericum sp.</i>	St. John's wort	1.2
<i>Ilex glabra</i>	Gallberry	0.83
<i>Lachnanthes caroliniana</i>	Carolina redroot	3.1
<i>Lyonia lucida</i>	Fetterbush	2.4
<i>Photinia pyrifolia</i>	Red chokeberry	1
<i>Pinus elliotii</i>	Slash pine	1.7
<i>Rhexia alifanus</i>	Savannah meadow beauty	1.2
<i>Rhexia virginica</i>	Handsome harry	1.7
<i>Rhynchospora plumosa</i>	Plumed beaksedge	10
<i>Smilax laurifolia</i>	Catbriar	0.2
<i>Solidago fistulosa</i>	Pine barren goldenrod	0.5
<i>Sphagnum sp.</i>	Sphagnum moss	2.2
<i>Woodwardia virginica</i>	Virginia chain fern	0.2
<i>Xyris sp.</i>	Yellow-eyed grass	1
	Bare ground	2.8

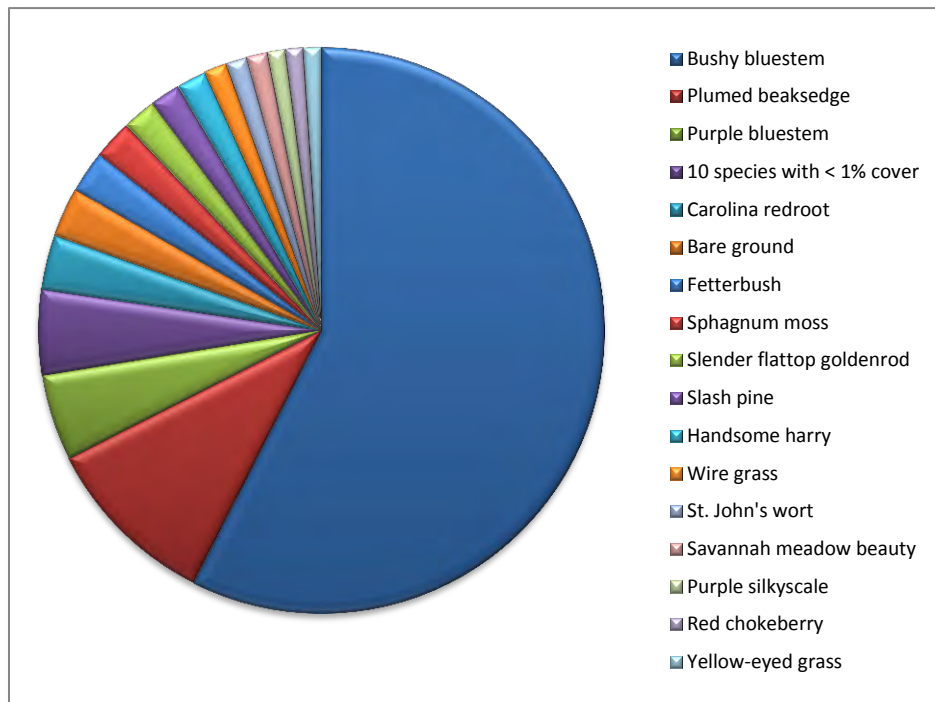


Figure 20. Transect 6. Species cover and occurrence (Hydric Pine Flatwoods Restoration)

Table 11. Transect 7. Species and Occurrence (Hydric Pine Flatwoods Restoration)

Date 10/26/17 Collector: David Clayton Wildlife observed: turtle dove

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Andropogon glomeratus</i>	Bushy bluestem	40
<i>Aristida stricta</i>	Wire grass	1.3
<i>Calamovilfa curtissii</i>	Curtiss' sandgrass	2.6
<i>Euthamia caroliniana</i>	Slender flattop goldenrod	0.66
<i>Gelsemium sempervirens</i>	Yellow jessamine	0.16
<i>Ilex myrtifolia</i>	Myrtle leaved holly	1.2
<i>Kelochloa verrucosa</i>	Warty panic grass	0.16
<i>Lachnanthes caroliniana</i>	Carolina redroot	34.2
<i>Lyonia lucida</i>	Fetterbush	1.8
<i>Pinus elliotii</i>	Slash pine	0.5
<i>Rhexia alifanus</i>	Savannah meadow beauty	0.33
<i>Rhexia nashii</i>	Maid marian	0.16
<i>Rhus copallinum</i>	Winged sumac	0.83
<i>Rhynchospora plumosa</i>	Plumed beaksedge	0.66
<i>Rubus argutus</i>	Sawtooth blackberry	0.16
<i>Smilax laurifolia</i>	Catbriar	0.66
<i>Solidago fistulosa</i>	Pine barren goldenrod	1.5
<i>Sphagum sp.</i>	Sphagnum moss	0.5

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Woodwardia virginica</i>	Virginia chain fern	7.7
	Bare ground	4.8

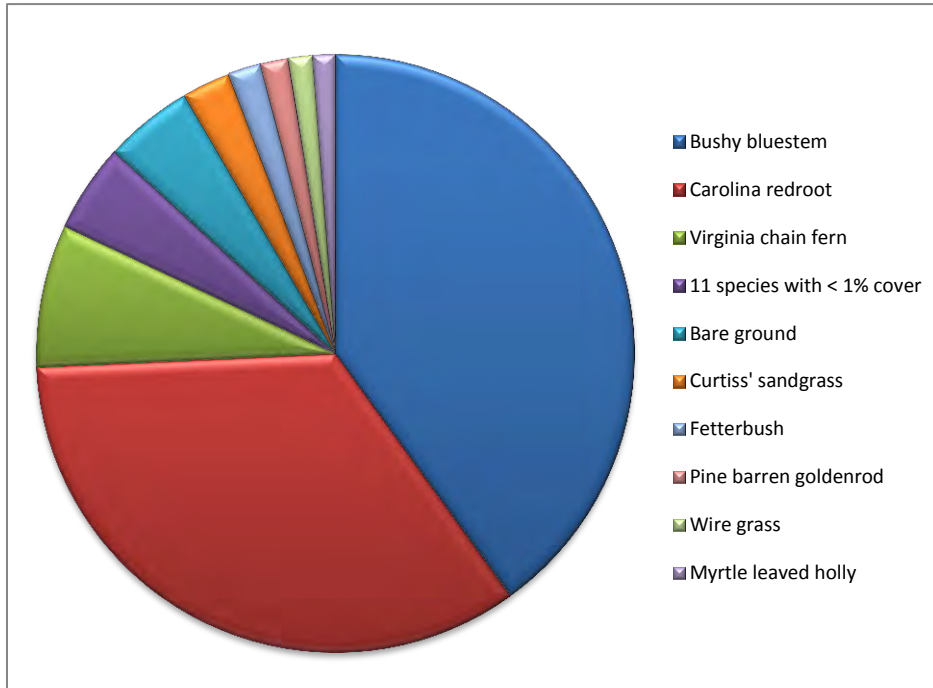


Figure 21. Transect 7. Species cover and occurrence (Hydric Pine Flatwoods)

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). The majority of the area is dominated by water lilies and other aquatic submerged vegetation.

Fall sampling did not occur for Transect 9 in 2016. Monitoring took place later than in previous years and several freezes occurred before sampling was attempted. The water lily leaves had senesced from reduced water temperatures and freezes. At the time sampling was attempted it would not provide an accurate evaluation of the Dykes Mill Pond vegetation cover. Sampling next year will occur in September to more accurately evaluate this system.

In 2017, a total of 10 species were observed along Transect 9 (Table 12, Figure 25). The aquatic vegetation is thriving providing important habitat for wildlife. Fragrant water lily represented the dominant cover class with 40% cover followed by agal bullrush with 26 % cover. Open water has steadily decreased from 38% from baseline sampling to 4% in 2017. Water depth averaged 0.8 meter.

Table 12. Transect 9. Species and Occurrence (Dykes Mill Pond Restoration)

Date 10/25/17 Collector: David Clayton Wildlife observed: Kingfisher, Great Egret

<u>Scientific Name</u>	<u>Species</u>	<u>Percent Cover</u>
<i>Nymphaea odorata</i>	Fragrant water lily	40
<i>Websteria confervoides</i>	Agal bullrush	26
<i>Utricularia purpurea</i>	Easter purple bladderwort	10
<i>Eleocharis cellulosa</i>	Gulf coast spikerush	5
<i>Eleocharis sp.</i>	Spikerush	4
<i>Sphagnum</i>	Sphagnum	3
<i>Utricularia cornuta</i>	Horned bladderwort	3
<i>Xyris sp.</i>	Yellow eyed grass	2.4
<i>Rhynchospora microcephala</i>	Bunched beaksedge	1
<i>Centella asiatica</i>	Spadeleaf	0.2
<i>Lachnocaulon anceps</i>	Whitehead bogbutton	0.2
<i>Lycopodiella alopecuroides</i>	Foxtail club-moss	0.2
<i>Sagittaria latifolia</i>	Duck potato	0.2
	Open water	4

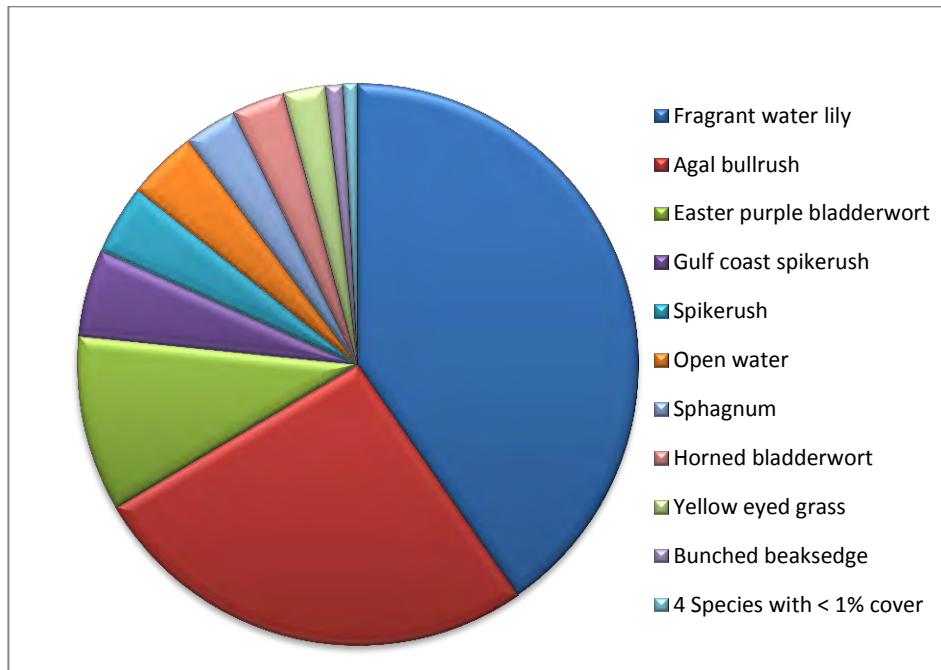


Figure 22. Transect 9. Species cover and occurrence (Dykes Mill Pond)

Interim Success Criteria:

The hydrologic restoration associated with Dykes Mill Pond (UMAM VI) has been completed. The dam was removed and new bridge was completed in April of 2007. Water levels are 1 to 1.2 meters lower than baseline conditions. Cypress trees and black gums were planted along the edges of this system in the winter of 2007/2008. Aquatic vegetation cover has increased over the last several years.

Qualitative Monitoring

Materials and Methods

Qualitative vegetation monitoring include 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 as long as 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 13 provides the location and coverage of transects and the data sheets and site photos can be found on the NFWMD website at <http://www.nfwmdwetlands.com/index.php>

Results and Discussion

A total of 13 pedestrian transects were located at the SHLMB (Figure 13). Three pedestrian surveys were located 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 located 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 2016, a total of 47 species were observed along M8, and 46 species along M9. This is the same for M8 and last year for both transects. The increase in species observed is probably due a return of ponds to normal pool from drought conditions. Water levels remained at or above normal pool for most of the year. Plants are vigorous and thriving and diversity is good. No nuisance or exotic species were observed.

In 2017, a total of 45 species were observed along M8, and 37 species along M9. This is similar to the previous year for M8 and 9 lower for 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% per acre, nuisance vegetation cover < 5% per acre, and maintaining or improving in ecological function. Water levels were at or above normal pool until September of 2017.

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) were located in Management Unit 2, UMAM Polygon V. Both of these degraded hydric pine flatwoods were dominated by dense shrub cover and species during baseline monitoring.

In 2016, a total of 91 species were observed along the meandering transect of M 10, an increase of two species from last year. This area continues to develop and has good diversity. A total of 43 species were observed along M11, an increase of two species from 2015. The area around M11 was inundated from February through the end of April. Minimal shrub cover was observed within M10, but increasing shrub cover was observed at M11. A warm season burn is planned for M11 in 2017 that should help in shrub control. These sites continue to develop. Hog damage was observed within the hydric pine flatwoods restoration. Trapping and hunting removed eighteen hogs in 2017.

In 2017, a total of 100 species were observed along the meandering transect of M 10, an increase of nine species from the previous year. This area continues to develop and has good diversity. A total of 46 species were observed along M11, an increase of three species from 2016. These sites continue to develop and diversity increase. No hog damage was observed within the restoration area in 2017.

Interim Success Criteria:

Interim success criteria have been met for this area. No exotic species were observed and shrub cover has been maintained at less than 2%. Herbaceous groundcover and diversity continues to increase and prescribed burns have been conducted in accordance with fire management plan.

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

Management Unit 10, UMAM Polygon III consists of 493.852 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, 29 species within M2, 26 species within M12, and 54 species occurred within M13. In Transect M1, a Florida threatened species, Gulf coast lupine (*Lupinus westianus*), was located throughout the sandhill. Gopher tortoise burrows were observed along pedestrian transects M12 and M13.

In 2016, a total of 87 species were found along Transect M1, an increase of one species. Due to above average rainfall in the first 4 months of the year, many of the shallow rooted emergent species were not observed due to flooding of habitat. This area is a combination of several habitats as it grades towards the pond. A total of 66 species were found along M2, a decrease of two species from 2015. A total of 57 species were observed along M12 and 70 were along M13 same as the previous year.

In 2017, a total of 90 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 72 species were found along M2, a decrease of six species from 2016. Along M12 a total of 59 species were observed, and increase of two species from 2016. Transect M13 had 80 species observed in 2016, an increase of 10 species. All of these sites were scheduled for a burn in 2017 and are proposed for burning in 2018.

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. One 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 2016, a total of 75 species were again observed. Species diversity is similar to sandhills within the region. Once the canopy fully develops it should appear similar to the surrounding sandhill community.

In 2017, a total of 74 species were observed. Species diversity is similar to sandhills within the region. Once the canopy fully develops it should appear similar to the surrounding sandhill community.

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 12 to 15' 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 (7 trees, 2 shrubs, 2 vines, and 24 herbs) within pedestrian Transect M3, while 68 species (8 trees, 9 shrubs, 2 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 2016, a total of 81 species were observed along M3, six greater than the previous year. A total of 107 species were observed along M4, an increase of 15 species.

In 2017, a total of 90 species were observed along M3, nine greater than the previous year. A total of 119 species were observed along M4, an increase of 12 species. 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.

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 2016, water levels were slightly above normal pool for the first five months and slightly below normal pool from September till the end of December. A total of 71 species were observed along M6, an increase of five species while 44 species were observed along M7, slight increase in species observed. Vegetation appears healthy and vigorous.

In 2017, water levels were above normal pool for most of the year, and were just below normal pool in November and December. A total of 72 species were observed along M6, an increase of a species while 38 species were observed along M7, slight decrease from the previous year. Vegetation appears healthy and vigorous.

Interim Success Criteria:

No nuisance or exotic species were observed. Wetland vegetation is the dominant within both sites. Species appear healthy 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.

David C. Clayton
Qualified Mitigation Specialist
Environmental Scientist IV