

Sand Hill Lakes Mitigation Bank Combined DEP/USACE Thirteenth 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 thirteenth 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. Four burn cycles have been completed, although communities requiring more frequent fires have had six burns 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 has averaged less than 6 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 2018, a total of 95 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 86.5 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 115 sandhill species were observed adjacent to Little Deep Edge Pond in 2018. Surveys of nuisance species (flora and fauna) have been conducted throughout the past thirteen years.

Feral hog observations were uncommon in 2018. Occasionally a single boar was observed on the game cameras. No hogs were trapped in 2018. The dates of annual sampling for the 2018 annual report were October 22 – 24, and November 19, 20, and 26 – 28. 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.

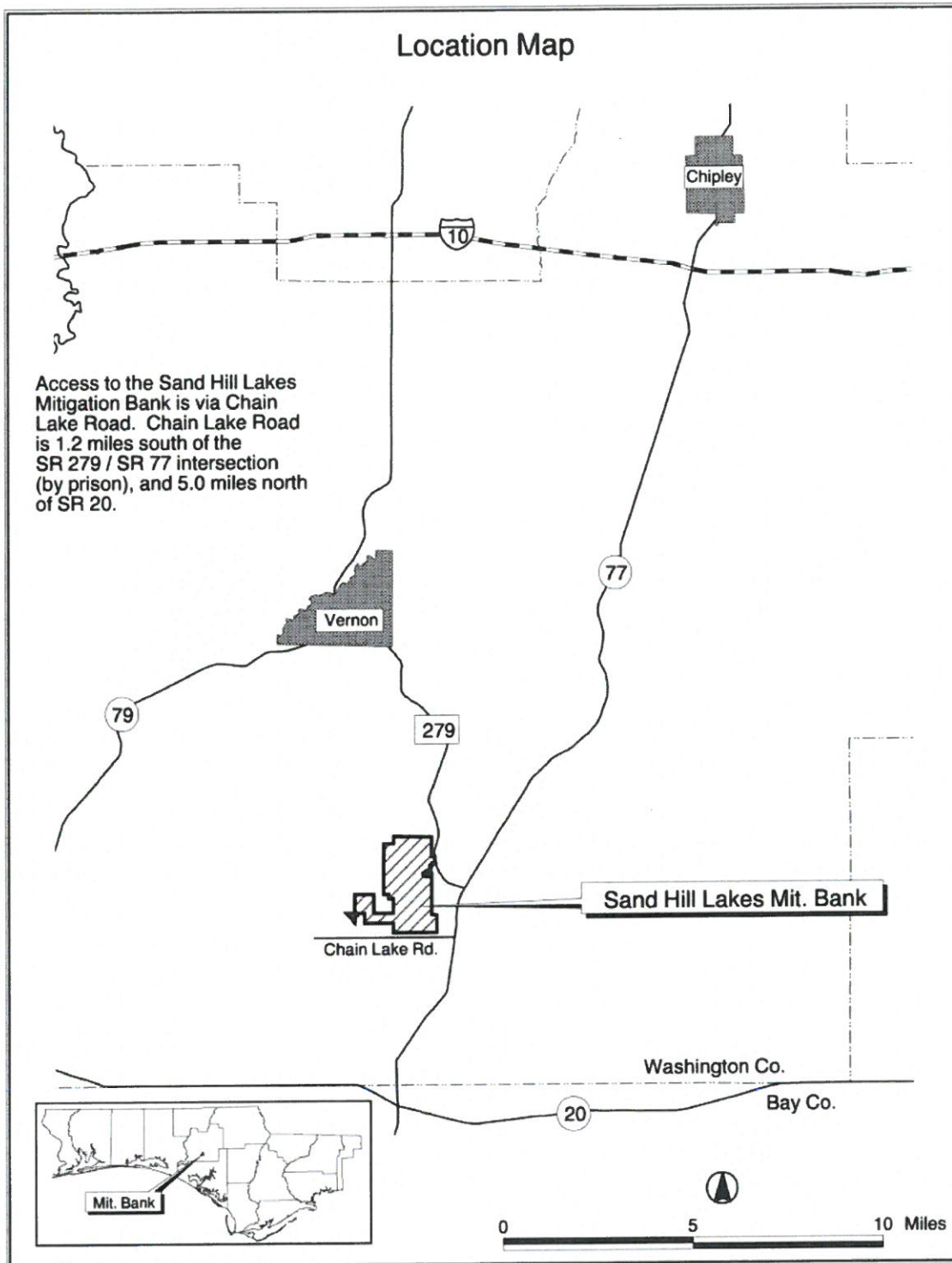


Figure 1. Location Map



2016 DOQ

0 0.5 1 Miles



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 thirteenth 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) 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 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 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	Completed 2019
Fire Management / Monitoring Year 13 /14 th Annual Report	
Fire Management / Monitoring Year 14 /15 th Annual Report	
Perpetual Ecological Management	Year 19+

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.

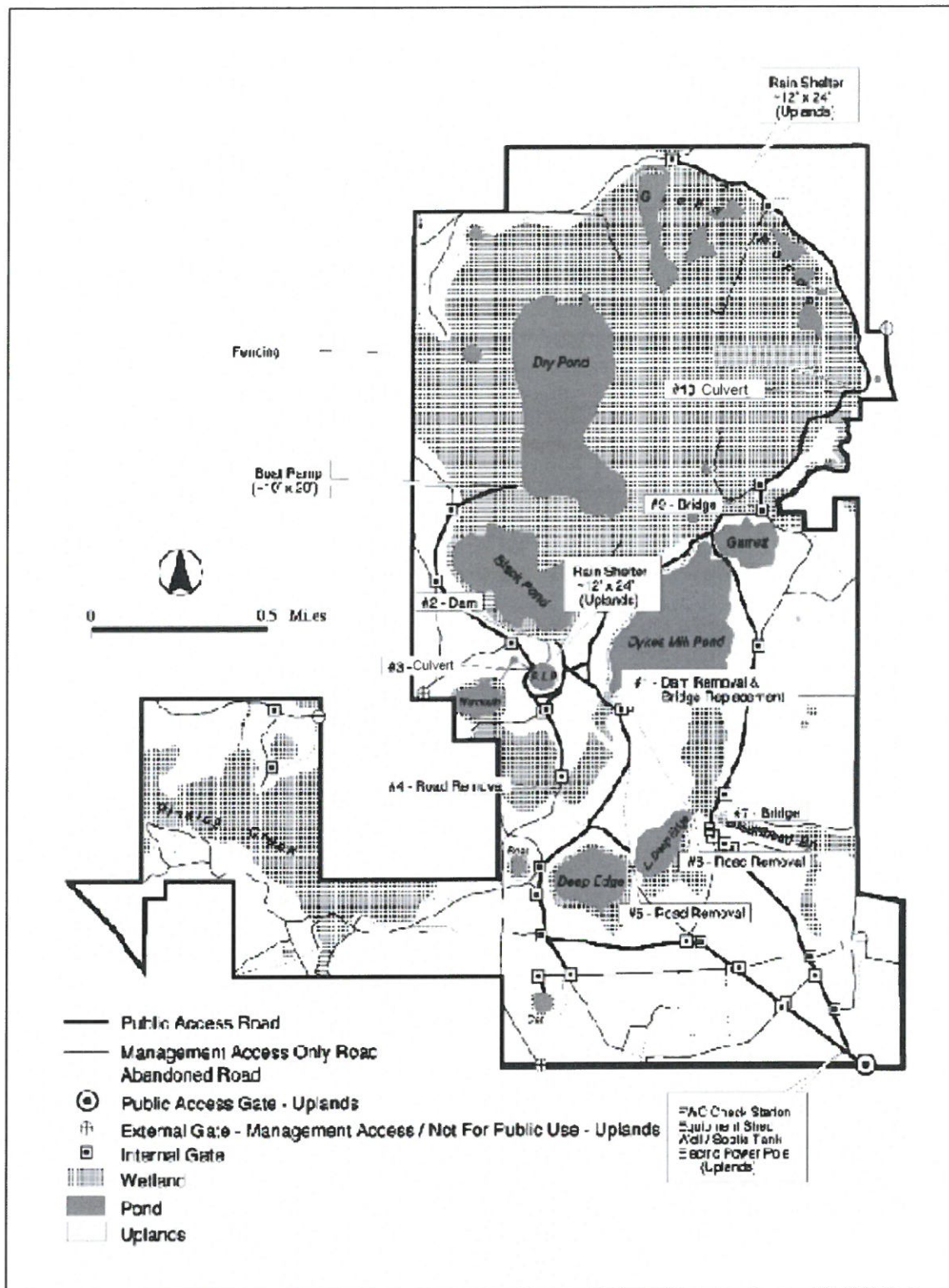


Figure 3. Structures Approved for Construction at the SHLMB

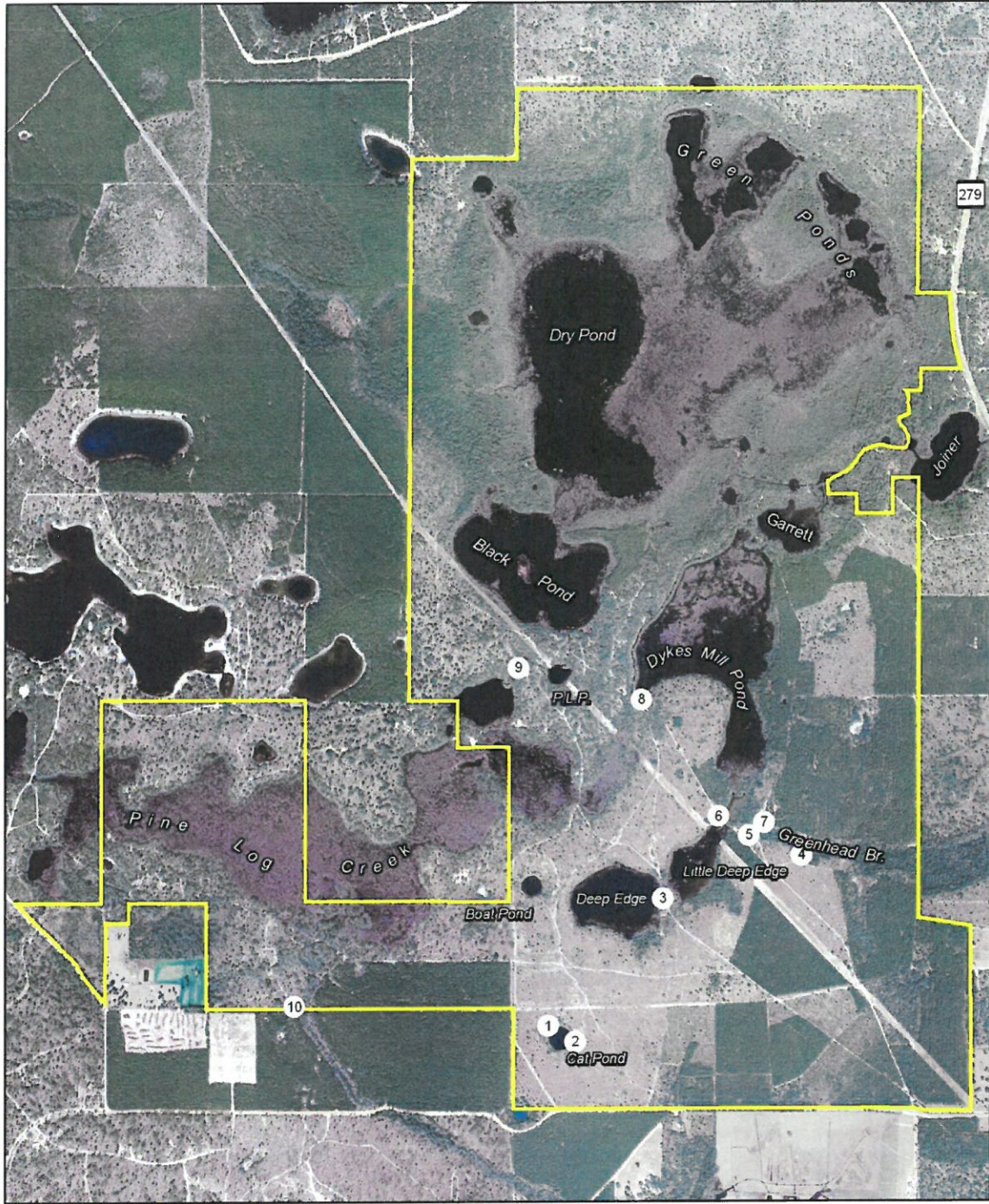


Figure 4. Nine Erosion Stabilization Areas Restored at the SHLMB

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). No burns were conducted during 2017, due to a state-wide fire ban. A total of 990 acres were burned in 2018 at the SHLMB (Figure 6).

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).

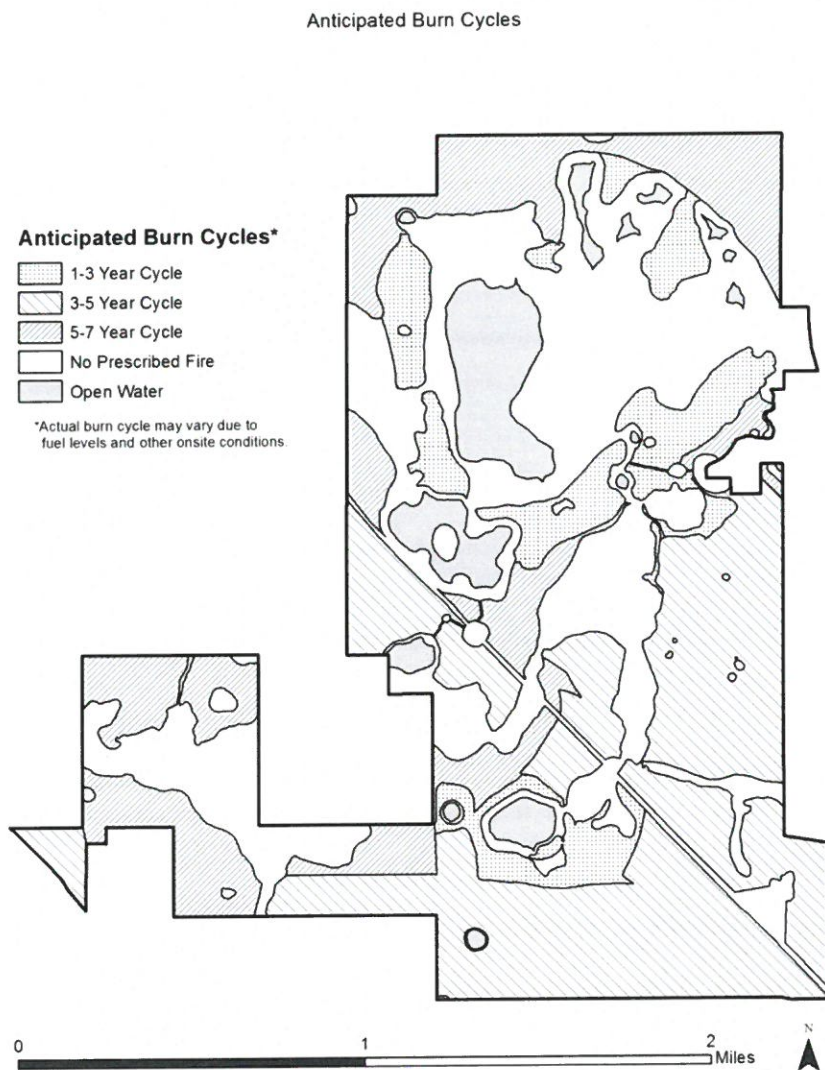


Figure 5. Proposed Burn Cycles

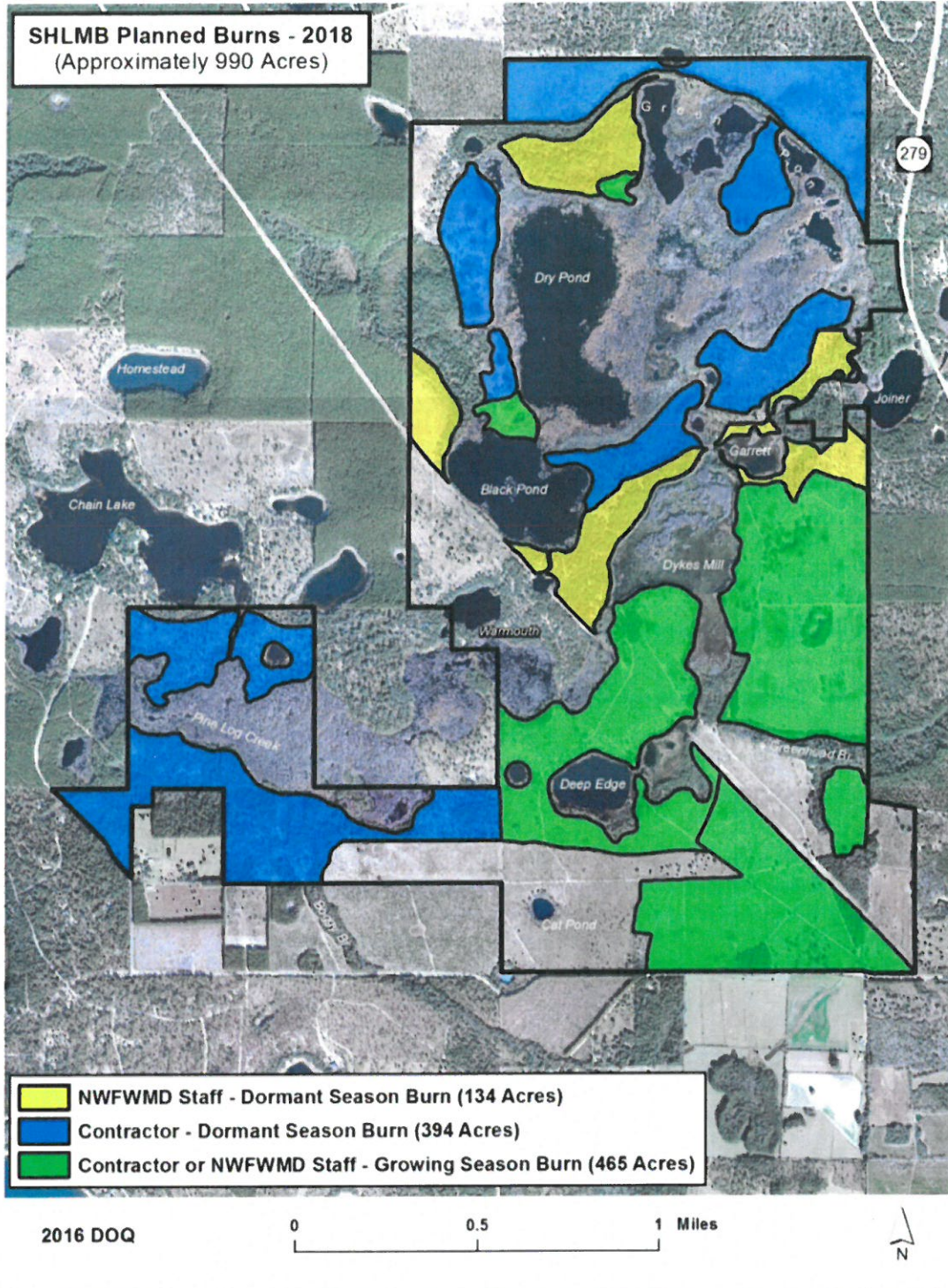


Figure 6. 2018 Burns Conducted at the SHLMB

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 2018.

The feral hog removal program at the SHLMB continued in 2018. 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. Minimal feral hog damage was observed in 2018 and only an occasional hog was observed on the game camera. No feral hogs were removed in 2018.

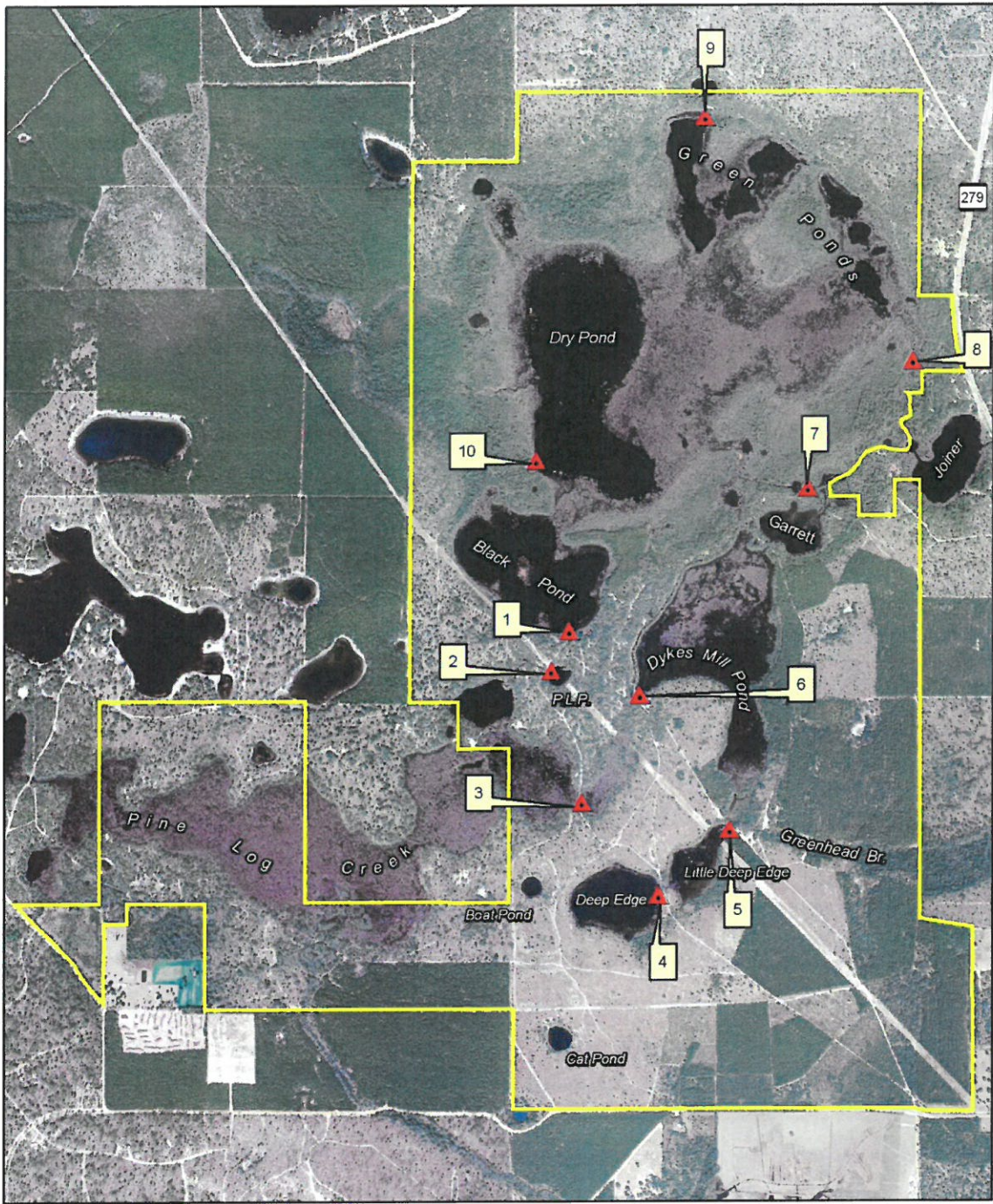
Monthly Water Gage Readings

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). In 2018, the water level gages were not read in November due to disturbances from hurricane Michael. The highest water levels were reported for December for most stations in 2018 (Table 2, Figure 7). Conversely, the lowest gage readings were recorded for January.

Table 2. Water gauge data for the SHLMB

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	1/2/2018	1/2/2018	1/2/2018	1/2/2018	1/2/2018	1/2/2018	1/2/2018	1/2/2018	1/2/2018	1/2/2018
Reading	4.48	~3.00	1.62	1.64	3.22	3.80	1.65	2.70	4.28	4.80
Date	2/1/2018	2/1/2018	2/1/2018	2/1/2018	2/1/2018	2/1/2018	2/1/2018	2/1/2018	2/1/2018	2/1/2018
Reading	4.64	2.96	1.80	1.40	3.26	3.98	3.04	2.75	4.40	4.94
Date	3/1/2018	3/1/2018	3/1/2018	3/1/2018	3/1/2018	3/1/2018	3/1/2018	3/1/2018	3/1/2018	3/1/2018
Reading	Under Water	5.84	3.64	2.64	3.58	4.10	4.56	5.20	Under Water	Under Water
Date	4/4/2018	4/4/2018	4/4/2018	4/4/2018	4/4/2018	4/4/2018	4/4/2018	4/4/2018	4/4/2018	4/4/2018
Reading	6.02	No Gauge	3.25	2.58	3.46	4.06	3.48	4.38	5.83	6.34
Date	5/1/2018	5/1/2018	5/1/2018	5/1/2018	5/1/2018	5/1/2018	5/1/2018	5/1/2018	5/1/2018	5/1/2018
Reading	5.62	4.54	2.64	2.42	3.36	3.94	3.18	4.18	5.42	5.96
Date	6/1/2018	6/1/2018	6/1/2018	6/1/2018	6/1/2018	6/1/2018	6/1/2018	6/1/2018	6/1/2018	6/1/2018
Reading	5.52	4.54	2.66	2.57	3.56	4.26	3.48	4.24	5.34	5.86
Date	7/3/2018	7/3/2018	7/3/2018	7/3/2018	7/3/2018	7/3/2018	7/3/2018	7/3/2018	7/3/2018	7/3/2018
Reading	5.96	4.82	2.86	2.96	3.56	4.31	3.47	4.48	5.65	6.17
Date	8/2/2018	8/2/2018	8/2/2018	8/2/2018	8/2/2018	8/2/2018	8/2/2018	8/2/2018	8/2/2018	8/2/2018
Reading	6.29	5.56	2.84	3.69	4.38	5.02	4.02	5.09	6.10	6.67
Date	9/4/2018	9/4/2018	9/4/2018	9/4/2018	9/4/2018	9/4/2018	9/4/2018	9/4/2018	9/4/2018	9/4/2018
Reading	6.68	5.75	2.50	3.55	4.33	4.34	4.28	5.25	6.78	7.00
Date	10/1/2018	10/1/2018	10/1/2018	10/1/2018	10/1/2018	10/1/2018	10/1/2018	10/1/2018	10/1/2018	10/1/2018
Reading	6.59	5.52	2.47	3.51	4.29	4.09	4.08	5.00	6.29	6.97
Date										
Reading										
Date	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018
Reading	Under Water	Under Water	5.49	3.70	4.30	5.30	Under Water	Under Water	Under Water	Under Water



▲ = Staff Gage (Installed 2005)

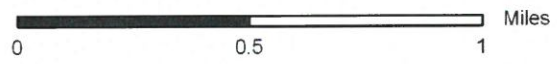


Figure 7. The Ten Staff Gage Locations at the SHLMB

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.nfwwater.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.

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.

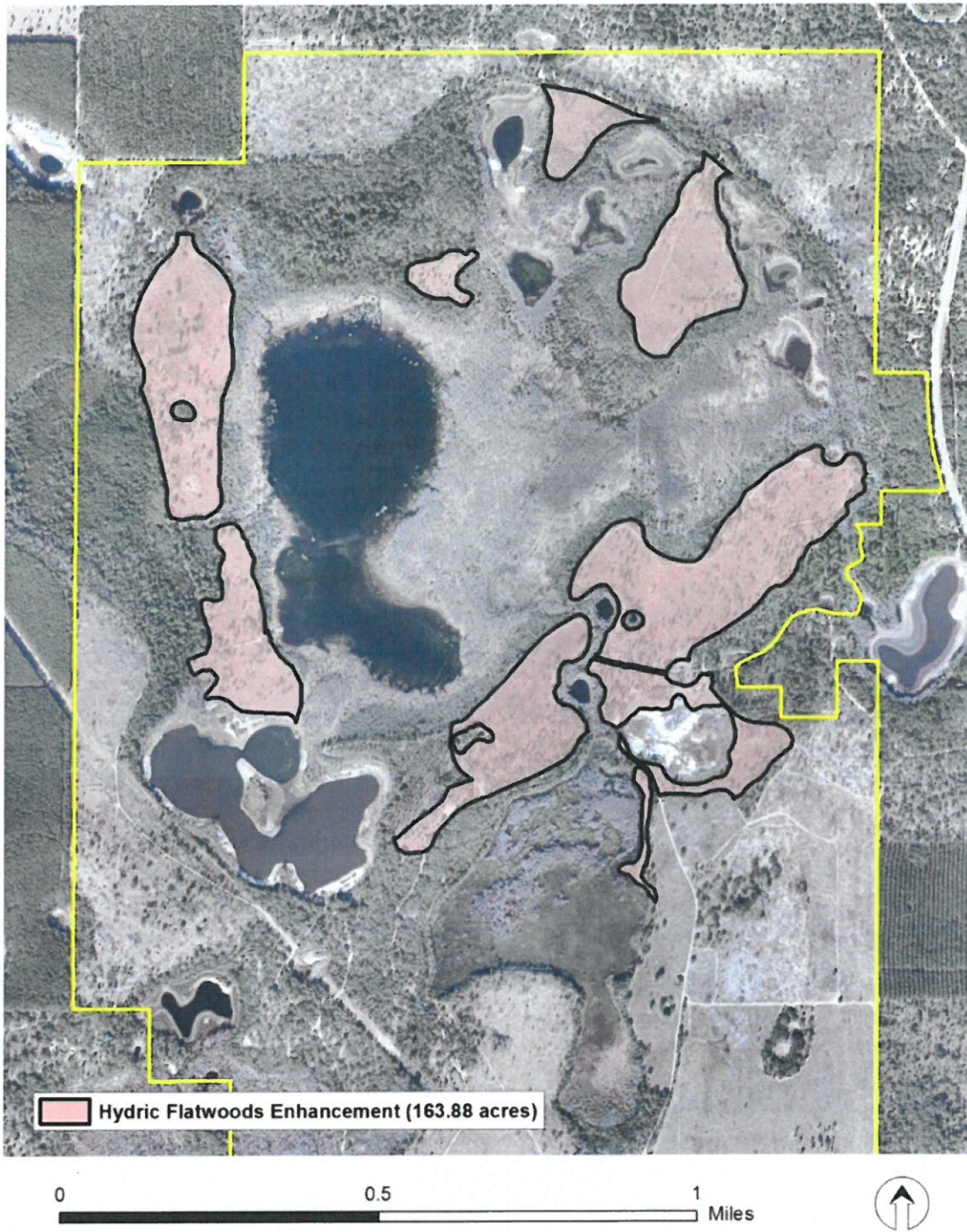


Figure 8. Hydric Pine Flatwoods Restoration Areas (Revised) (163.88 Acres)

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 annual monitoring for this report was conducted in 2018 on October 22 – 24, and November 19, 20, and 26 – 28 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 2017-2018 Annual report by the Florida Fish and Conservation Commission was completed in January 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: <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.

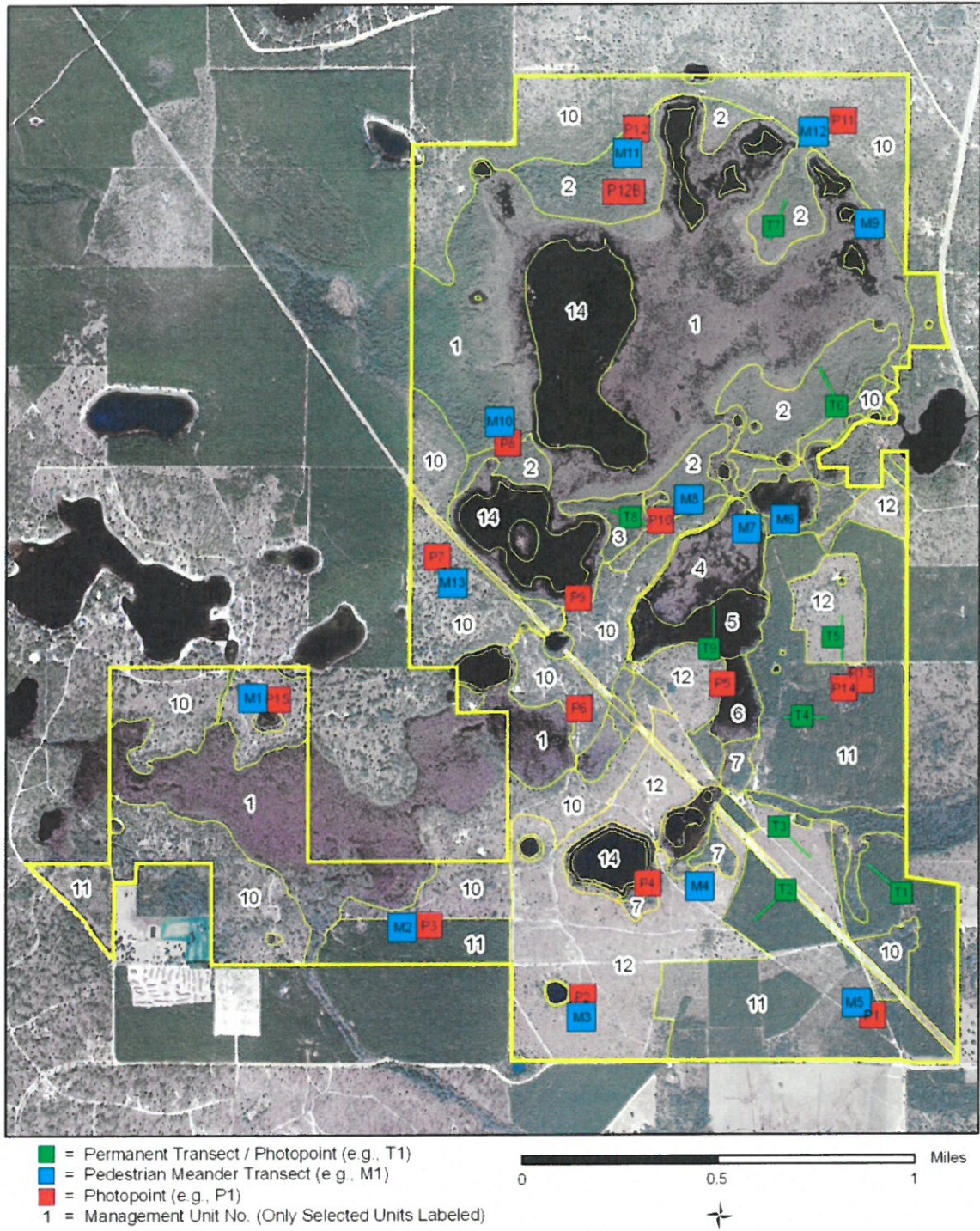


Figure 9. Monitoring Locations

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 2017 monitoring, 22 species were observed in Transect 1, 27 in Transect 2, and 26 in Transect 4. Wiregrass had the greatest vegetative cover for each transect ranging from 46.2 percent in transect 1 to 20 percent in Transect 2 and 26 percent in Transect 4. Bare ground ranged from 17 percent in Transect 1 to 36 percent 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.

During the 2018 monitoring, 16 species were observed in Transect 1, 24 in Transect 2, and 26 in Transect 4. (Tables 3-5; Figures 10-12). Wiregrass had the greatest vegetative cover for each transect ranging from 32 percent in transect 1 to 30 percent in Transect 2 and 35 percent in Transect 4. Bare ground ranged from 51.3 percent in Transect 2 to 37.3 percent in Transect 2. The number of species observed was significantly lower and bare ground was greater due to a late August burn that removed annual species and reduced overall species cover.

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 2009. The area is burned on a two to three-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 11/20/18 Collector: David Clayton Wildlife observed: None

Scientific Name	Species	Percent Cover
<i>Andropogon ternarius</i>	Splitbeard bluestem	1
<i>Aristida stricta</i>	Wiregrass	32
<i>Artemisia campestris</i>	Wormwood	0.16
<i>Axonopus furcatus</i>	Big carpetgrass	0.6
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	1.8
<i>Dichanthelium aciculare</i>	Needle leaf witch grass	0.16
<i>Diospyros virginiana</i>	Persimmon	1.3
<i>Eremochloa ophiuroides</i>	Centipede grass	1.3
<i>Eupatorium compositifolium</i>	Yankee weed	0.16
<i>Houstonia procumbens</i>	Innocence	0.16

Scientific Name	Species	Percent Cover
<i>Paspalum notatum</i>	Bahia grass	0.6
<i>Pityopsis graminifolia</i>	Narrowleaf silkgrass	0.6
<i>Polgonella gracillis</i>	Tall jointweed	0.6
<i>Rubus cuneifolius</i>	Sand black berry	14
<i>Rumex hastatulus</i>	Dock	0.6
<i>Schizachyrium sp</i>	Little blue stem	0.16
	Bare ground	45.5

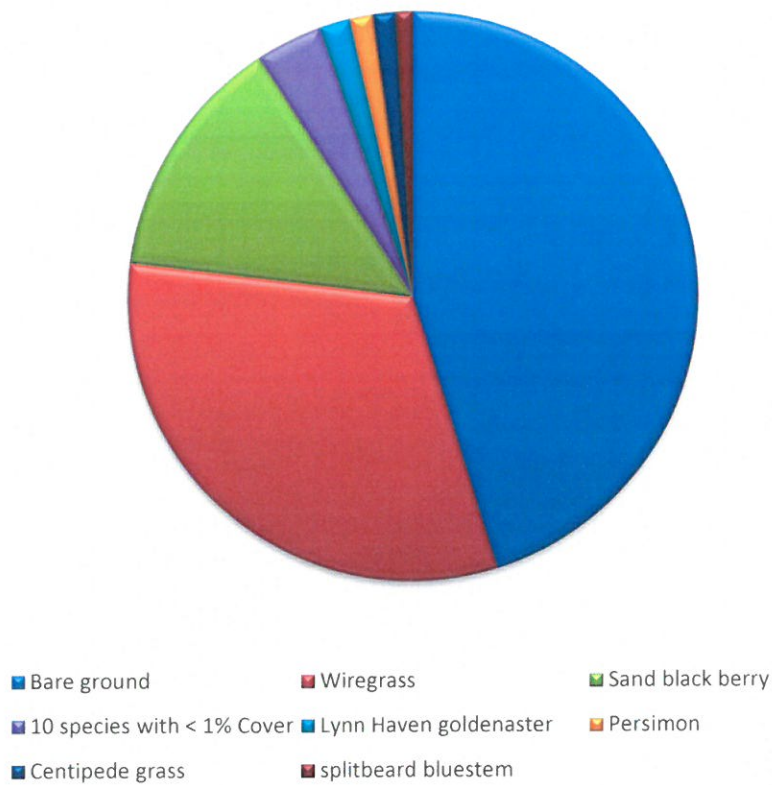


Figure 10. Transect 1: Sand pine plantation restored to sandhill

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

Date 11/20/18 Collector: David Clayton Wildlife observed: Titmouse

Scientific Name	Species	Percent Cover
<i>Andropogon ternarius</i>	Splitbeard bluestem	4
<i>Aristida stricta</i>	Wiregrass	30
<i>Baptisia lanceolata</i>	Gopher weed	1
<i>Bulbostylis ciliatifolia</i>	Capillary hairsedge	0.33

Scientific Name	Species	Percent Cover
<i>Ceanothus microphyllus</i>	New Jersey Tea	1.5
<i>Chrysoma pauciflosculosa</i>	Woody goldenrod	2.5
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	0.33
<i>Dichantheium aciculare</i>	Needle leaf witch grass	0.33
<i>Diospyros virginiana</i>	Persimmon	0.66
<i>Eriogonum tomentosum</i>	Wild buckwheat	0.16
<i>Eupatorium compositifolium</i>	Yankee weed	0.16
<i>Euphorbia floridana</i>	Florida spurge	0.16
<i>Gaylussacia dumosa</i>	Dwarf huckleberry	0.33
<i>Gaylussacia frondosa var. tomentosa</i>	Blue huckleberry	0.66
<i>Geobalanus oblongifolius</i>	Gopher apple	1.3
<i>Houstonia procumbens</i>	Innocence	0.16
<i>Lespedeza hirta</i>	Hairy lespedesia	0.33
<i>Liatris chapmanii</i>	Chapman's gayfeather	0.33
<i>Opuntia humifusa</i>	Prickly pear	0.5
<i>Polygonum pinicola</i>	Tall jointweed	0.16
<i>Pteridium aquilinum</i>	Bracken fern	0.33
<i>Quecus laevis</i>	Turkey oak	0.83
<i>Solidago odora</i>	Pine barrens goldenrod	1.3
<i>Vaccinium darrowii</i>	Darrow's blueberry	1.3
	Bare ground	51.3

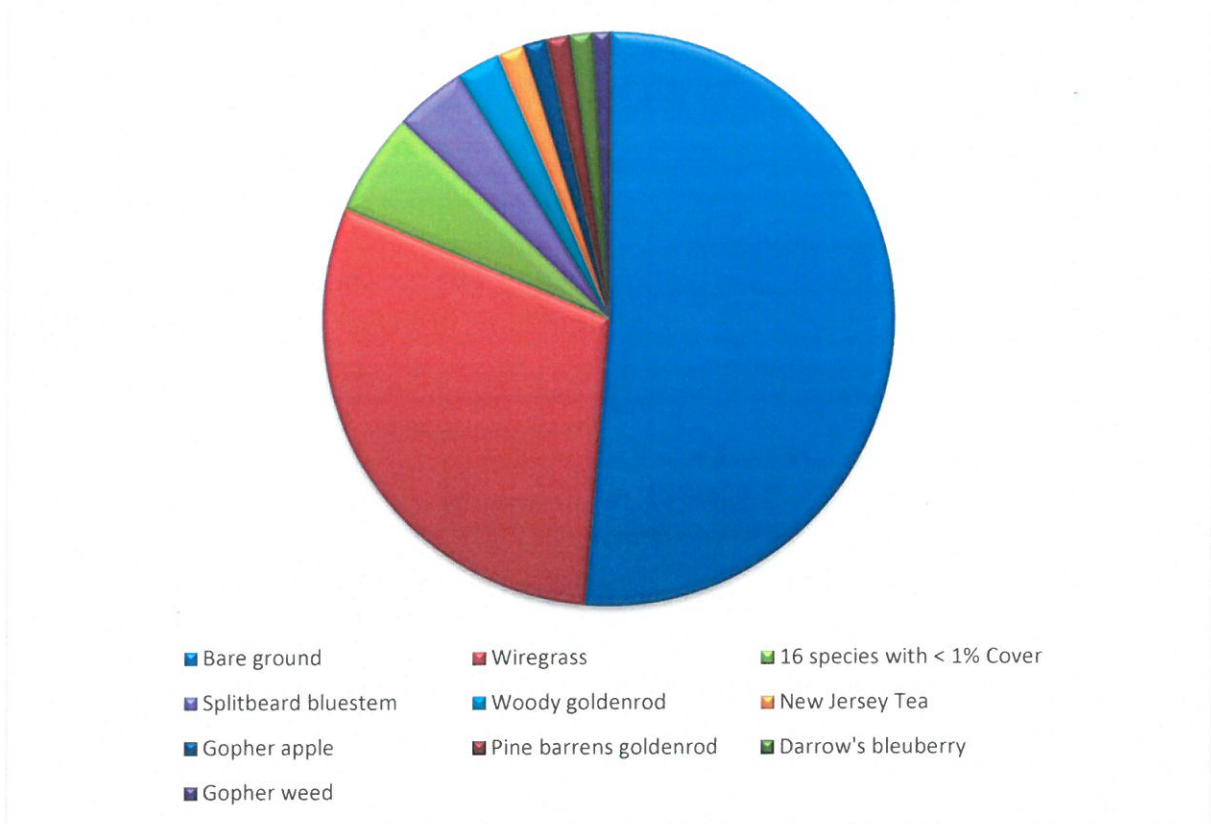


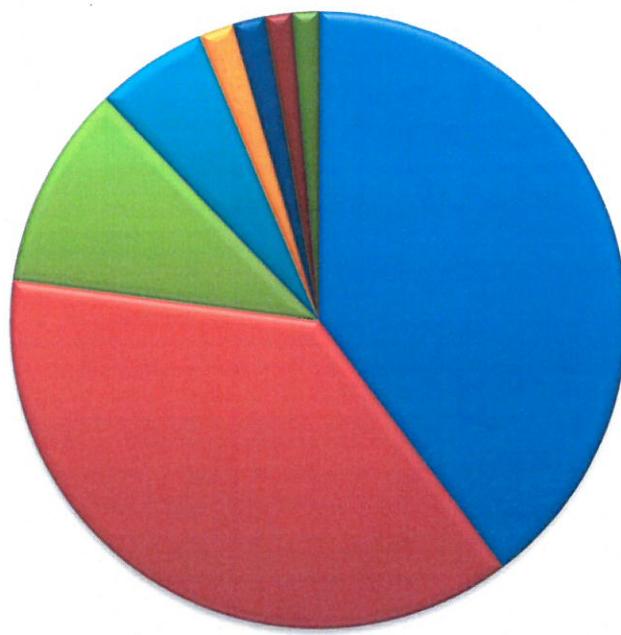
Figure 11. Transect 2: Sand pine plantation restored to sandhill

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

Date: 11/26/18 Collector: David Clayton Wildlife observed: Red winged blackbird, bobwhite, catbird

Scientific Name	Species	Percent Cover
<i>Agalinis divaricata</i>	Pineland false foxglove	1.8
<i>Andropogon ternarius</i>	Splitbeard bluestem	3
<i>Aristida stricta</i>	Wiregrass	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>Dichaanthelium 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

Scientific Name	Species	Percent Cover
<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>Symphyotrichum dumosum</i>	Rice button aster	1.5
<i>Vaccinium elliotii</i>	Elliott's blueberry	0.33
<i>Yucca filamentosa</i>	Adam's needle	1.85
	Bare ground	17



- Bare ground
- Wiregrass
- Lynn Haven goldenaster
- 18 species with < 1% Cover
- Sand black berry
- Yankeeweed
- Witch grass
- Rabbit bells
- Slender flattop goldenrod

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 84 and 178 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 seven inches (Figures 13-15).

Long Leaf Pine (84 per acre)

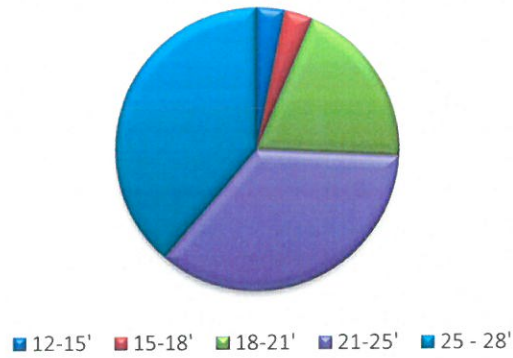


Figure 13. Planted longleaf pine seedlings (Transect 1)

Long Leaf Pine (98 per acre)

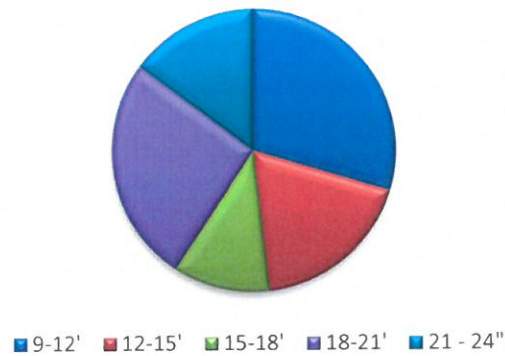


Figure 14. Planted longleaf pine seedlings (Transect 2)

Long Leaf Pine (178 per acre)

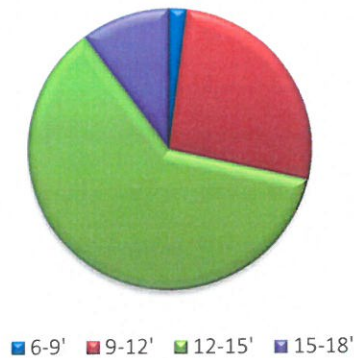


Figure 15. Planted longleaf pine seedlings (Transect 4)

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 2017 monitoring, 26 species were observed within Transect 3 a reduction of 8 species. Twenty-eight species were observed within Transect 5. Wiregrass cover was the greatest cover class observed for both transects with 45.3 percent cover observed within Transect 3, and 50.5 percent cover observed in Transect 5. Bare ground cover was 22 percent within Transect 3 and 18.6 percent within Transect 5. The site has recovered in wiregrass cover and reduced bare ground was observed for both transects.

During the 2018 monitoring, 23 species were observed within Transect 3 a reduction of three species. Thirty species were observed within Transect 5 an increase of two species (Tables 6 and 7; Figures 16 and 17). Wiregrass cover was the greatest cover class observed for both transects with 21.3 percent cover observed within Transect 3, and 33.2 percent cover observed in Transect 5. Bare ground cover was 42 percent within Transect 3 and 30.5 percent within Transect 5. The reduced cover, species composition and increase in bare ground was due to a late season burn in early September.

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 116 trees per acre in Transect 3 and 109 trees per acre in Transect 5. Most of the trees 12 – 15' tall with a DBH of 7". Wiregrass and sandhill vegetation continues to thrive and appears healthy (Figure 18 and 19).

Table 6. Transect 3: Species Cover and Occurrence (Sandhill Enhancement)
11/26/18, 11:43 Am Data Collector: David Clayton, Wildlife observed: None

Scientific Name	Species	Percent Cover
<i>Andropogon ternarius</i>	Splitbeard bluestem	11.3
<i>Aristida stricta</i>	Wiregrass	21.3
<i>Baptisia lanceolata</i>	Gopher weed	0.2
<i>Bulbostylis ciliatifolia</i>	Capillary hairsedge	0.7
<i>Ceanothus microphyllus</i>	New Jersey Tea	0.5
<i>Chrysoma pauciflosculosa</i>	Woody goldenrod	9.2
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	0.33
<i>Dichantheium aciculare</i>	Needleleaf witchgrass	4
<i>Diospyros virginiana</i>	Persimmon	0.33
<i>Eragrostis sp.</i>	Lovegrass	0.33

Scientific Name	Species	Percent Cover
<i>Eriogonum tomentosum</i>	Wild buckwheat	0.2
<i>Geobalanus oblongifolius</i>	Gopher apple	1
<i>Lespedeza hirta</i>	Hairy lespedeza	0.83
<i>Paspalum laeve</i>	Field paspalum	0.2
<i>Pityopsis graminifolia</i>	Narrowleaf silkgrass	0.5
<i>Polygonella gracilis</i>	Wire weed	0.5
<i>Opuntia humifusa</i>	Pricklypear cactus	0.33
<i>Pteridium aquilinum</i>	Bracken fern	1.3
<i>Schizachyrium sp</i>	Little blue stem	1
<i>Smilax sp</i>	Greenbrier	0.33
<i>Solidago fistulosa</i>	Pinebaren goldenrod	0.5
<i>Stylisma patens</i>	Coastalplain dawnflower	1.2
	Bare ground	42

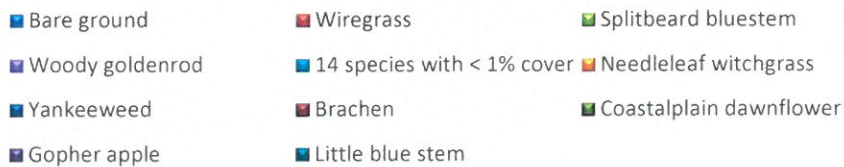
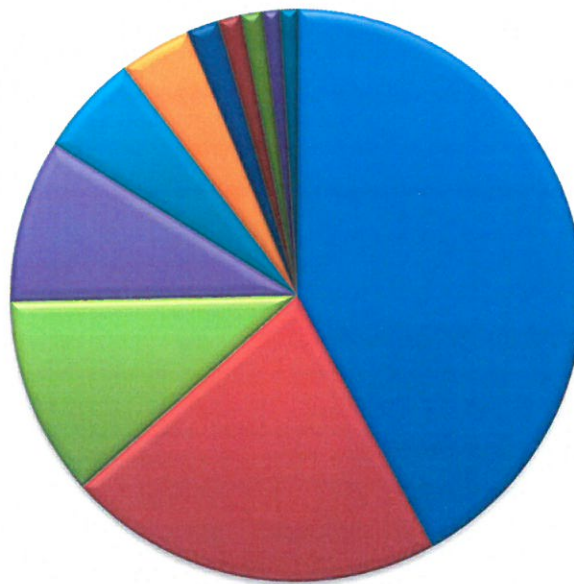


Figure 16. Transect 3: Species cover and occurrence (Sandhill Enhancement)

Table 7. Transect 5: Species Cover and Occurrence (Sandhill Restoration)
11/27/28, Data Collector: David Clayton, Wildlife observed: chipping sparrow

Scientific Name	Species	Percent Cover
<i>Andropogon ternarius</i>	Splitbeard bluestem	6.8

Scientific Name	Species	Percent Cover
<i>Aristida stricta</i>	Wiregrass	33.2
<i>Crataegus michauxii</i>	Michaux's Hawthorn	0.33
<i>Cyperus sp.</i>	Sedge	0.16
<i>Dichaenanthelium sp.</i>	Witch grass	0.66
<i>Diospyros virginiana</i>	Persimmon	1.5
<i>Eriogonum tomentosum</i>	Dogtongue wild buckwheat	0.16
<i>Eupatorium compositifolium</i>	Yankee weed	0.33
<i>Geobalanus oblongifolius</i>	Gopher apple	1.5
<i>Happlopappus divaricatus</i>	Scratch daisy	0.16
<i>Liatris chapmanii</i>	Chapman's gayfeather	2.8
<i>Licania michauxii</i>	Gopher apple	1.5
<i>Opuntia humifusa</i>	Pricklypear cactus	0.33
<i>Panicum virgatum</i>	Switch grass	0.16
<i>Penstemon multiflorus</i>	Beardtongue	0.66
<i>Pityopsis graminifolia</i>	Narrowleaf silkgrass	7
<i>Pteridium aquilinum</i>	Bracken fern	1.3
<i>Quercus incana</i>	Bluejack oak	0.66
<i>Quercus laevis</i>	Turkey oak	0.66
<i>Ruellia ciliosa</i>	Ciliate wild petunia	0.16
<i>Scleria ciliata</i>	Fringed nutsedge	1.5
<i>Stillingia sylvatica</i>	Queen's delight	0.33
<i>Stylisma patens</i>	Coastalplain dawnflower	0.16
<i>Symphyotrichum dumosum</i>	Rice button aster	1.5
<i>Vaccinium darrowii</i>	Darrow's blueberry	1.5
<i>Yucca filamentosa</i>	Adam's needle	0.16
	Bare ground	30.5

Percent Cover

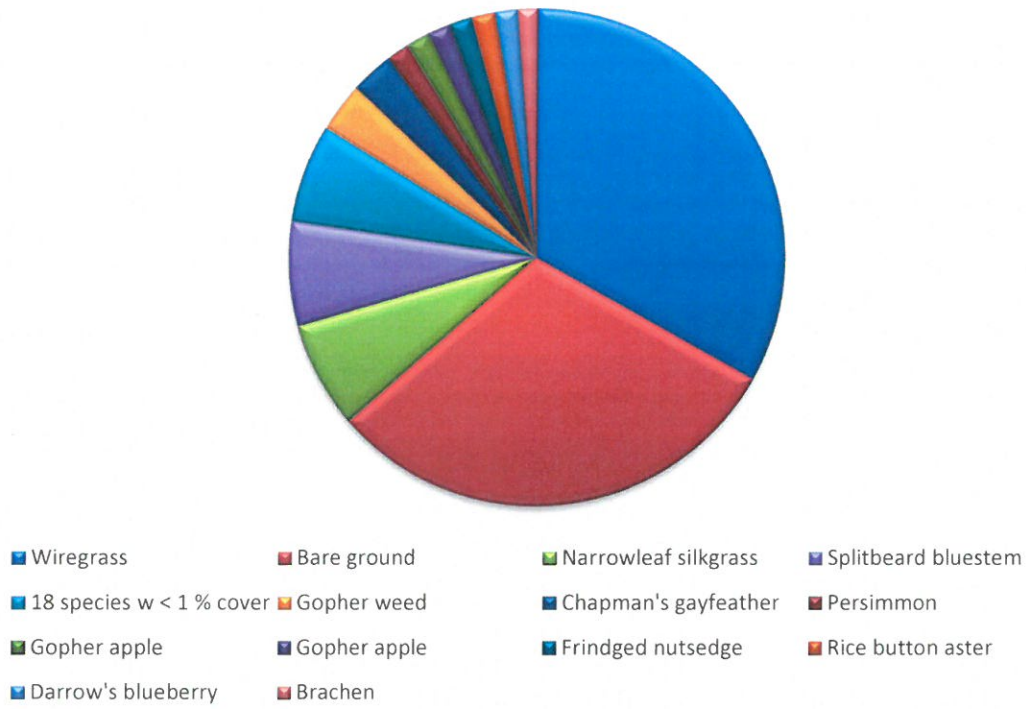


Figure 17. Transect 5: Species cover and occurrence (Sandhill Enhancement)

Planted Longleaf Pine Seedlings

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

In 2018, the survival of longleaf pine seedlings was 116 per acre in Transect 3 and 109 in Transect 5. Tree height was variable. Trees appear healthy and vigorous (Figure 20 and 21).

Long Leaf Pine (116 per acre)

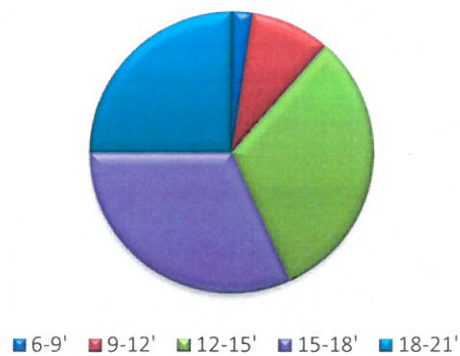


Figure 18. Planted longleaf pine seedlings (Transect 3)

Long Leaf Pine (109 per acre)

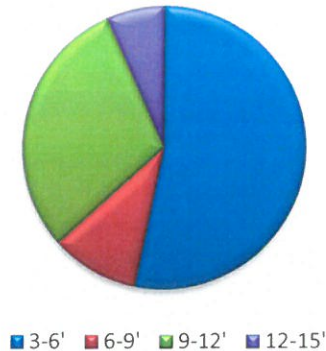


Figure 19. Planted longleaf pine seedlings (Transect 5)

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 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 percent cover. Grasses and sedges dominated the vegetative cover (66.5 percent cover).

During the 2018 monitoring, 29 species were observed a slight decrease from the previous year. The diversity of the site continues to improve as the site develops. Bare ground remained low at 5.6 percent cover. Grasses and sedges dominated the vegetative cover (60.3 percent cover) (Table 8; Figure 20).

Interim Success Criteria:

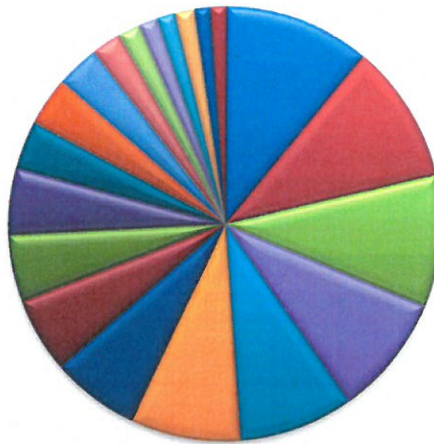
The management activities used to restore UMAM VII, Management Unit 3 have been completed. A diverse wet flatwoods understory continues to develop.

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

Date 11/27/18 Collector: David Clayton Wildlife observed: none

Scientific Name	Species	Percent Cover
<i>Andropogon glomeratus</i>	Bushy bluestem	9
<i>Aristida stricta</i>	Wiregrass	5
Scientific Name	Species	Percent Cover

<i>Centella asiatica</i>	Centella	3.2
<i>Coleataenia rigidula</i>	Red-top panicum	0.8
<i>Ctenium aromaticum</i>	Toothache grass	0.2
<i>Cyperus sp.</i>	Cyperus	1.4
<i>Eleocharis sp.</i>	Spikerush	3.6
<i>Eragrostis elliotii</i>	Elliott lovegrass	0.2
<i>Eupatorium mohrii</i>	Mohr's thoroughwort	3.6
<i>Euthamia caroliniana</i>	Slender flattop goldenrod	1.2
<i>Fuirena breviseta</i>	Umbrella-grass	0.6
<i>Hypericum sp.</i>	St. John's wort	6.6
<i>Juncus megacephalus</i>	Large-headed rush	1.6
<i>Lachnocaulon anceps</i>	Whitehead bog button	0.8
<i>Lachnanthes caroliniana</i>	Red root	1.4
<i>Lycopus rubellus</i>	Water horehound	0.6
<i>Morella cerifera</i>	Wax myrtle	1.4
<i>Muhlenbergia expansa</i>	Cutover muhlygrass	0.6
<i>Paspalum laeve</i>	Field paspalum	8.6
<i>Pluchea longifolia</i>	Longleaf camphorweed	2.2
<i>Rhynchospora sp.</i>	Bunched beaksedge	11
<i>Rubus trivialis</i>	Dewberry	0.6
<i>Solidago stricta</i>	Pine barren goldenrod	9.8
<i>Sphagnum sp.</i>	Sphagnum	1.2
<i>Vaccinium darrowii</i>	Darrow's blueberry	0.2
<i>Woodwardia virginica</i>	Virginia chain fern	0.2
<i>Xyris sp.</i>	Yelloweyed grass	8.2
	Bareground	5.6



- | | | |
|-----------------------------|------------------------|-------------------------|
| ■ Bunched beaksedge | ■ Clustered sedge | ■ Pine barren goldenrod |
| ■ Bushy bluestem | ■ Field paspalum | ■ Yelloweyed grass |
| ■ St. John's wort | ■ Bareground | ■ Wiregrass |
| ■ 11 species with <1% Cover | ■ Spikerush | ■ Mohr's thoroughwort |
| ■ Centella | ■ Longleaf camphorweed | ■ Large-headed rush |
| ■ Cyperus | ■ Red root | ■ Wax myrtle |
| ■ Slender flattop goldenrod | ■ Sphagnum | |

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 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 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 percent for Transect 6 and 1.8 for Transect 7. Vegetative cover exceeds 95 percent for both transects and bare ground is minimal.

During the 2018 monitoring, 26 and 17 species were observed within Transect 6 and 7, respectively, similar with the observations in 2017 (Table 9 and 10; Figure 21 and 22). Hydric pine flatwood species dominated both transects. Shrub cover was 0.33 percent for Transect 6 and 5.6 for Transect 7. Vegetative cover exceeds 85 percent for both transects.

Interim Success Criteria:

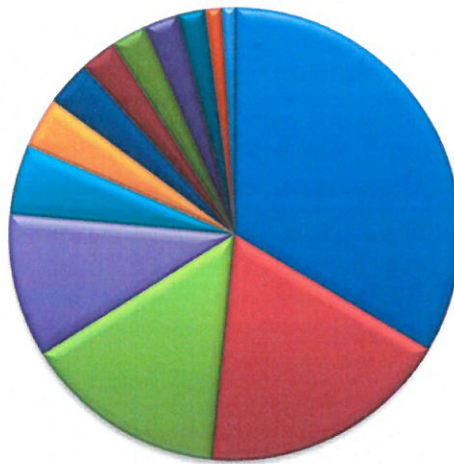
The restoration activities for UMAM V, Management Unit 2 were completed by 2007. Fire was introduced in 2005. A Gyro-Trac shrub reduction was initiated in April 2007 and completed in August 2008. Baseline data from the 2006 monitoring event showed 100 percent cover of shrubs for both sites. Herbicide 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 95 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 11/28/18 Collector: David Clayton Wildlife observed: none

Scientific Name	Species	Percent Cover
<i>Andropogon glomeratus</i>	Bushy bluestem	33.5
<i>Andropogon glomeratus var. glaucopsis</i>	Purple bluestem	2
<i>Aristida stricta</i>	Wiregrass	3.2
<i>Asclepias tuberosa</i>	Butterflyweed	0.16
<i>Centella asiatica</i>	Spadeleaf	0.33
<i>Eragrostis elliotii</i>	Elliot's lovegrass	0.16
<i>Erastima uniflora</i>	Clustered mille grains	1.16
<i>Euthamia caroliniana</i>	Slender flattop goldenrod	2.5
<i>Hypericum cistifolium</i>	Roundpod St. Johns-wort	0.16
<i>Hypericum microsepalum</i>	Flatwoods St. Johns-wort	2.5
<i>Ilex myrtifolia</i>	Myrtle-leaved holly	0.33
<i>Kelochloa verrucosa</i>	Warty panicgrass	1
<i>Lachnanthes caroliniana</i>	Carolina redroot	0.5
<i>Lycopodiella alopecuroides</i>	Fox-tailed clubmoss	0.8
<i>Lyonia lucida</i>	Fetterbush	0.33
<i>Rhexia alifanus</i>	Savannah meadowbeauty	0.5
<i>Rhexia mariana</i>	Pale meadowbeauty	0.16
<i>Rhexia nuttallii</i>	Nuttall's meadowbeauty	0.33
<i>Rhexia virginica</i>	Handsome harry	2.6
<i>Rhus copallinum</i>	Winged sumac	0.16
<i>Rhynchospora plumosa</i>	Plumed beaksedge	18
<i>Rubus pensilvanicus</i>	Sawtooth blackberry	0.5
<i>Solidago fistulosa</i>	Pine barren goldenrod	0.33
<i>Sphagnum sp.</i>	Sphagnum moss	3.6
<i>Woodwardia virginica</i>	Virginia chain fern	10.3
<i>Xyris sp.</i>	Yellow-eyed grass	0.33
	Bare ground	14.6

Percent Cover



- Bushy bluestem
- Virginia chain fern
- Wiregrass
- Flatwoods St. Johns-wort
- Warty panicgrass
- Plumed beaksedge
- 15 species with < 1% cover
- Handsome harry
- Purple bluestem
- Bare ground
- Sphagnum moss
- Slender flattop goldenrod
- Clustered mille grains

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

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

Date 11/28/18 Collector: David Clayton Wildlife observed: Great egret

Scientific Name	Species	Percent Cover
<i>Andropogon glomeratus</i>	Bushy bluestem	22.5
<i>Andropogon glomeratus var. glaucopsis</i>	Purple bluestem	1.6
<i>Aristida stricta</i>	Wiregrass	2.3
<i>Cliftonia monophylla</i>	Black titi	3.3
<i>Dichaanthelium sp.</i>	Witch grass	0.33
<i>Eleocharis sp.</i>	Spikerush	0.5
<i>Eupatorium mohrii</i>	Mohr's thorough wort	0.33
<i>Euthamia caroliniana</i>	Slender flattop goldenrod	0.33
<i>Ilex myrtifolia</i>	Myrtle leaved holly	1.3
<i>Lachnanthes caroliniana</i>	Carolina redroot	4.4
<i>Lyonia lucida</i>	Fetterbush	1.3
<i>Leucothoe axillaris</i>	Doghobble	1
<i>Rhexia mariana</i>	Pale meadow beauty	5.2
<i>Rhexia virginica</i>	Handsome Harry	6
<i>Rhus copallinum</i>	Winged sumac	0.33
<i>Rhynchospora plumosa</i>	Plumed beaksedge	1
<i>Solidago fistulosa</i>	Pine barren goldenrod	1.8

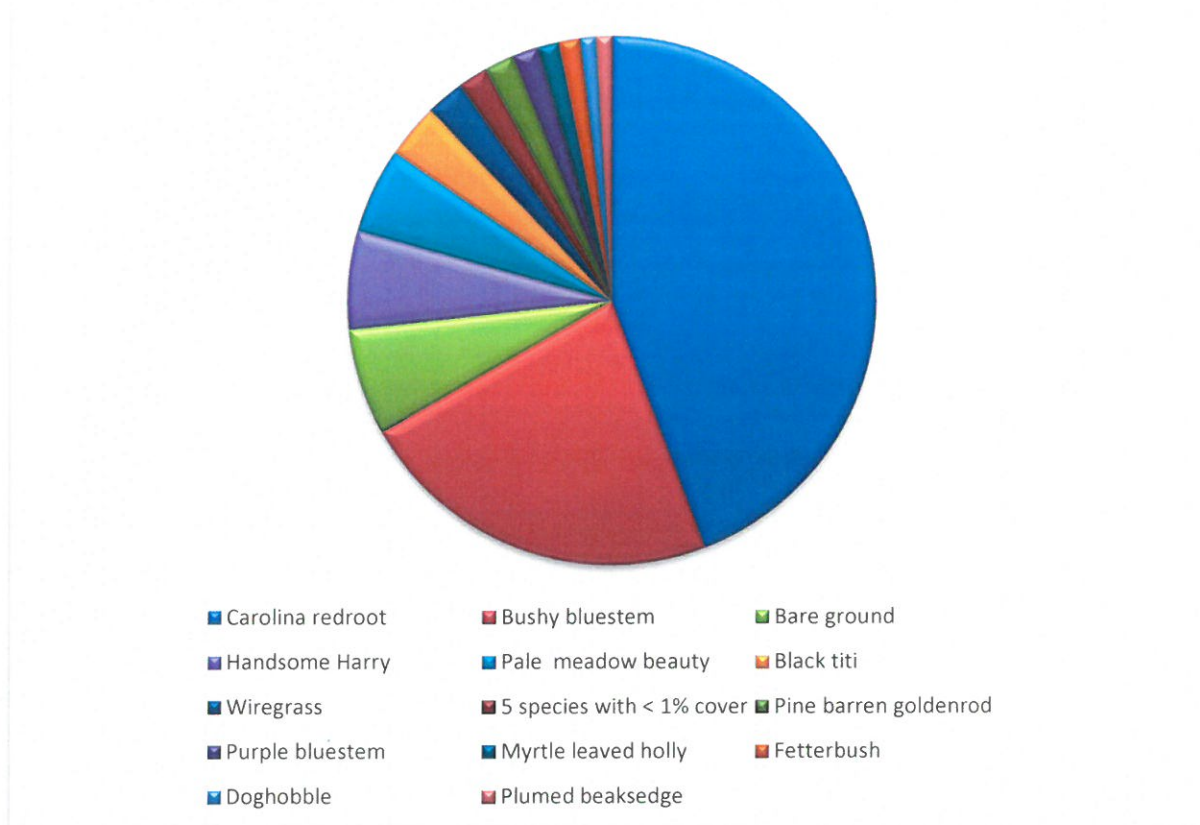


Figure 22. Transect 7. Species cover and occurrence (Hydric Pine Flatwoods)

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 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 percent cover followed by algal bull rush with 26 percent cover. Open water has steadily decreased from 38 percent from baseline sampling to 4 percent in 2017. Water depth averaged 0.8 meter.

In 2018, sampling was not conducted at Dykes Mill Pond due to complications from Hurricane Michael.

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 9 provides the location and coverage of transects and the data sheets and site photos can be found on the NFWMD website at <https://www.nfwmd.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 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 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.

In 2018, a total of 48 species were observed along M8, and 47 species along M9. This is like the previous year for M8 and an increase of ten species within 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 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 2017, a total of 100 species were observed along the meandering transect of M10, 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.

In 2018, a total of 95 species were observed along the meandering transect of M10, a decrease of five species from the previous year. This area continues to develop and has good diversity. A total of 46 species were again observed along M11. These sites continue to develop and diversity increase. No hog damage was observed within the restoration area in 2018.

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 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 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 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.

In 2018, 92 species were found along Transect M1, an increase of two species. This area is a combination of several habitats as it grades towards the pond. A total of 71 species were observed within M2. A total of 67 species were determined for M12 an increase of eight species. Transect M13 had 77 species, a decrease of three species. These sites were burned in 2018. Sites that were burned in late August and early September had reduced species occurrences.

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 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 like the surrounding sandhill community.

In 2018, a total of 77 species were observed along M5. Species diversity is like 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 15 to 18' 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 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. In 2018, a total of 76 species were observed along M3, a reduction of 14 species. A total of 115 species were observed along M4. Often over 90 species have been observed within these areas. Floristically, they are typical of high quality sandhills within the region. Reduced species occurrences occurred primarily due to late season burns that removed annual species.

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 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.

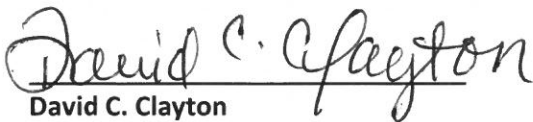
In 2018, water levels were above normal pool for most of the year. A total of 80 species were observed along M6, an increase of eight species while 56 species were observed along M7 and increase of fifteen species. Vegetation appears healthy and vigorous.

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