Sand Hill Lakes Mitigation Bank
Combined DEP/USACE Eleventh 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 eleventh 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. Fire enhancement has greatly improved the quality and diversity of 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 functioning as designed.

The 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 2016, a total of 91 species of hydric pine flatwoods species were observed within the pedestrian transect located on the west side of Dry Pond. 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 reintroduction of warm season burns at a two to three year interval. Planted longleaf pine densities remain below 200 trees per acre. In 2016, a total of 107 sandhill species were observed in the uplands adjacent to Little Deep Edge Pond. Surveys of nuisance species (flora and fauna) have been conducted throughout the past eleven years.

Patchy feral hog damage was observed throughout the hydric pine flatwoods restoration in 2016. Two remotely deployed traps were purchased to aide in hog control and the perimeter fencing was repaired to prevent hog access. A total of 24 feral hogs were removed from the SHLMB in 2016. Sixteen feral hogs were captured in a corral style trap and eight were taken during the hunting season. The annual sampling for this report was conducted in 2016 on September 29; October 31st; November 1 - 3, 9, 16, 22, 23 and 29. 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 St. Andrew Bay.

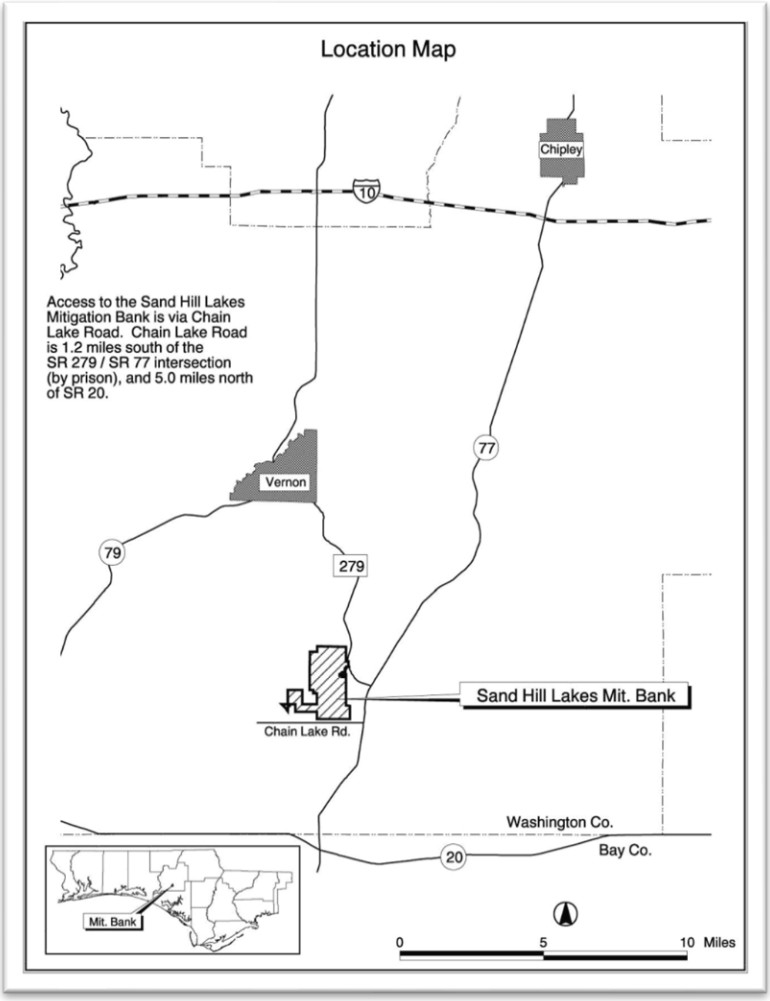

Figure 1. Location Map

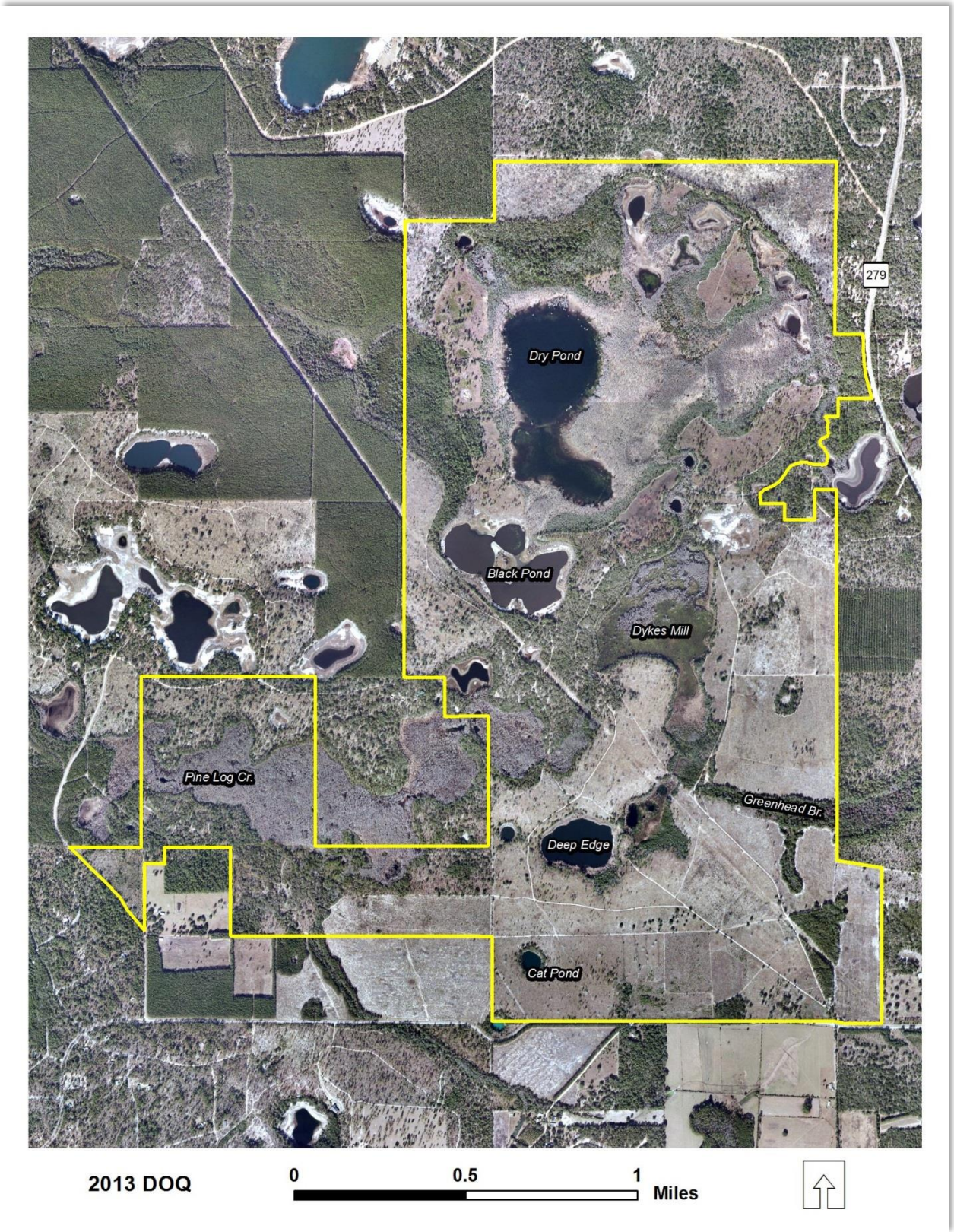

Figure 2. SHLMB boundary map

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 eleventh 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 3/06
Fencing and signage	Completed 3/05
Site security / law enforcement / internal gaiting / road closures	Ongoing
Stabilization of 10 erosion sites	Completed 3/2007
Hydrologic enhancements	
- Replacement of Black Pond dam	Initiated 10/07 Completed 1/08
- Removal of Dykes Mill Pond dam	Initiated 7/06 Completed 8/06
- Removal of road fill at (3) sites	Initiated 7/06 Completed 3/07
- Construction of 2 bridges and replacement of 3 culverts	Initiated 7/06 Completed 3/07
Removal of pine plantation and thinning of slash pine	Initiated 7/07 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, 12/10 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 8/05 Completed required shrub reduction (Gyro-Track) 08/08 Completed Pine thinning 10/07 Fuel reduction burns following timbering harvesting and Gyro-Trac completed 12/08

Restoration Work Activity	Estimated Completion Date
Supplemental wiregrass seeding if necessitated by onsite conditions. 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. Road fill removal areas were planted with sapling cypress and black gum and shrub species in 2009 in accordance with Specific Condition 10. 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.	2008/2012 Planting *Supplemental planting maybe added if poor survival is observed in the future.
Installation of water level gages	Completed 12/05
Baseline assessments of vegetation, First Annual Report	Completed /2006
Fire Management / Monitoring Year 1 / 2nd Annual Report	Completed 2007
Fire Management / Monitoring Year 2/ 3rd Annual Report	Completed 2008
Fire Management / Monitoring Year 3 / 4th Annual Report	Completed 2009
Fire Management / Monitoring Year 4 / 5th Annual Report	Completed 2010
Fire Management / Monitoring Year 5 / 6th Annual Report	Completed 2011
Fire Management / Monitoring Year 6 / 7th Annual Report	Completed 2012
Fire Management / Monitoring Year 7 / 8th Annual Report	Completed 2013
Fire Management / Monitoring Year 8 / 9th Annual Report	Completed 2014
Fire Management / Monitoring Year 9/ 10th Annual Report	Completed 2015
Fire Management / Monitoring Year 10 /11th Annual Report	Completed 2016
Fire Management / Monitoring Year 11 /12th Annual Report	
Fire Management / Monitoring Year 12 /13th Annual Report	
Fire Management / Monitoring Year 13 /14th Annual Report	
Fire Management / Monitoring Year 14 /15th Annual Report	
Perpetual Ecological Management	Year 15+

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, the stabilization of a boat launch (Figures 3 and 4). All water control structures, culverts and road removals and erosion stabilization areas continue to functioning as designed.

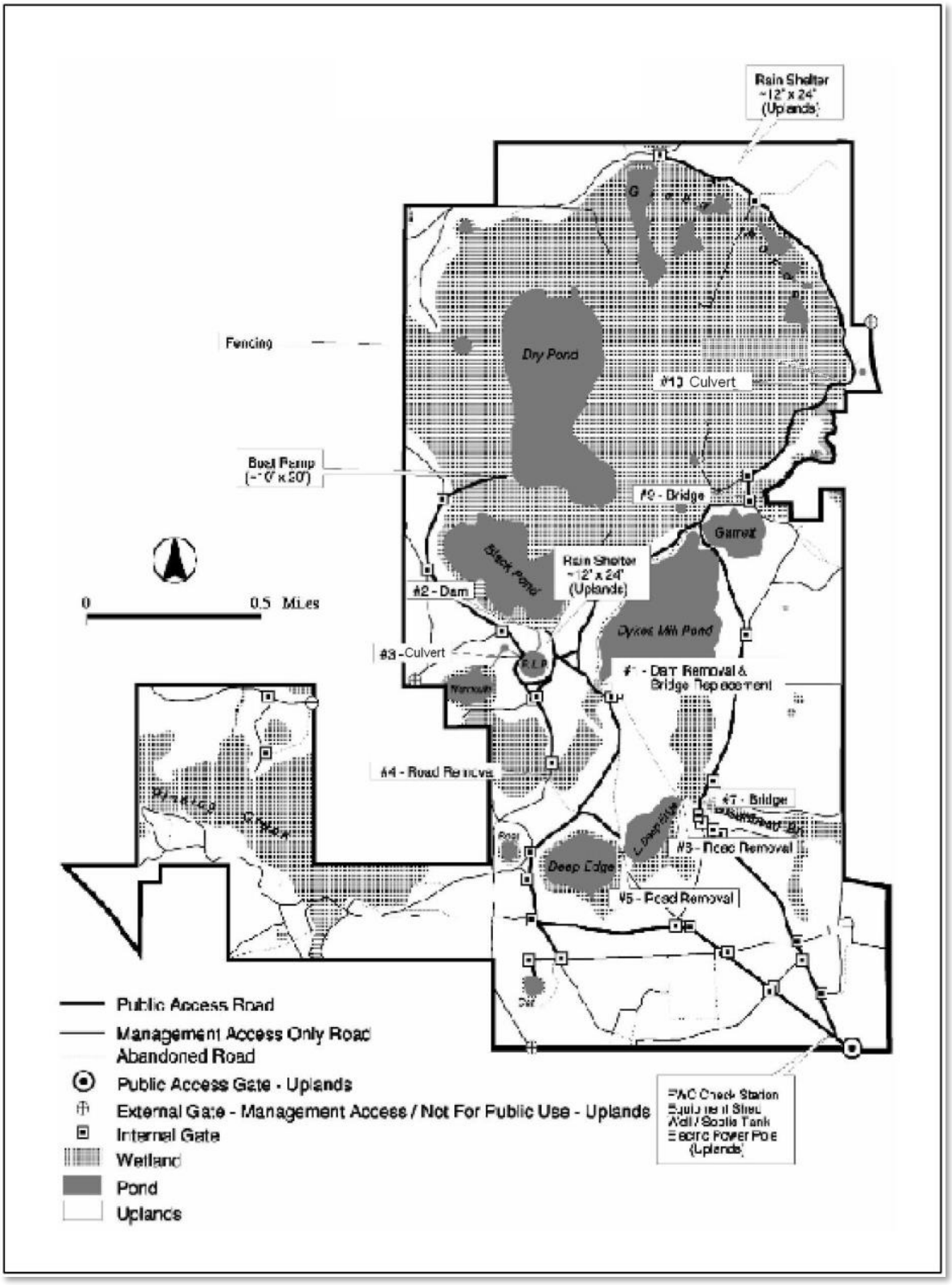

Figure 3. Approved structures

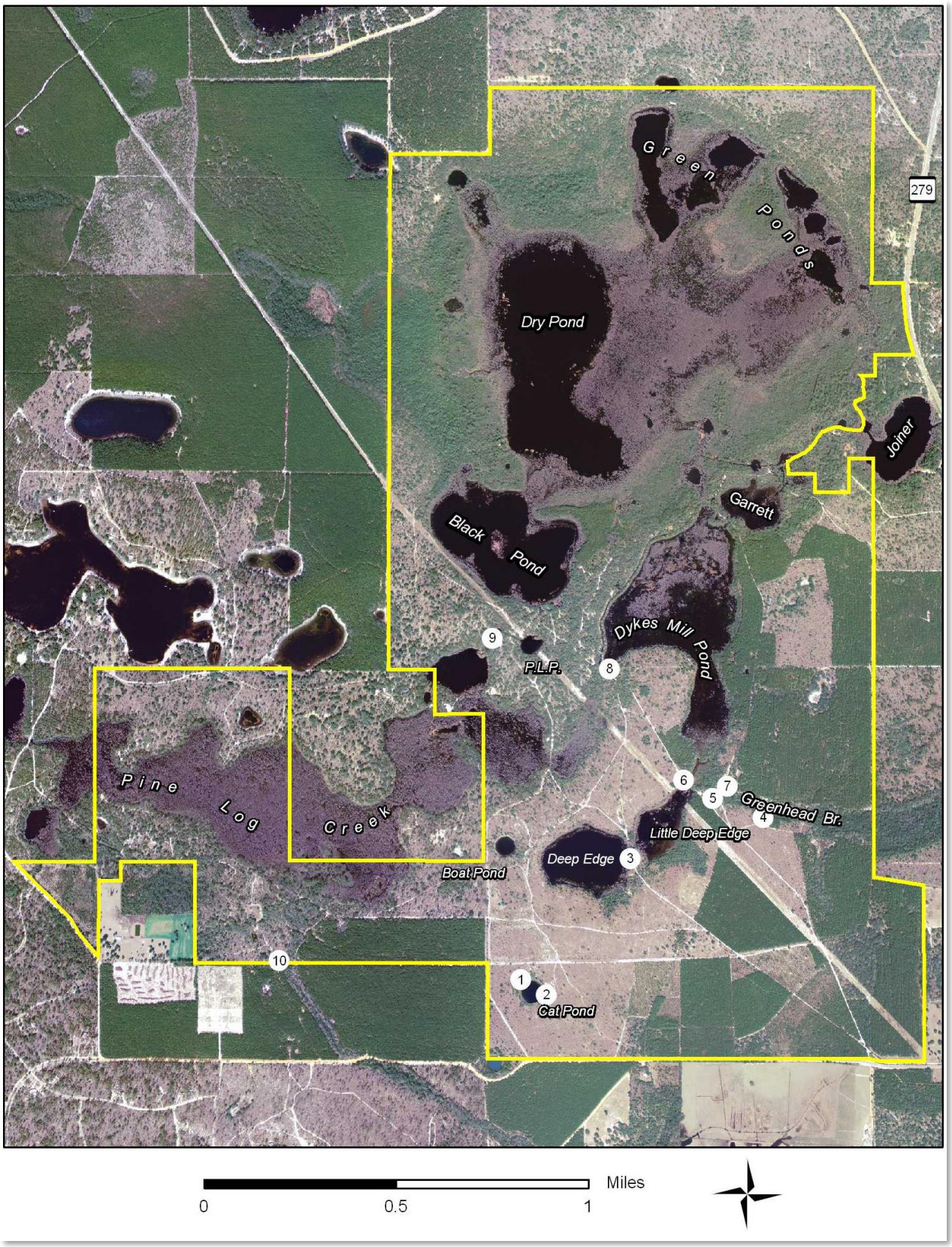

Figure 4. Erosion stabilization areas

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 all burns were completed by December of 2005. Anticipated burn cycles were developed for the SHLMB (Figure 5). During 2016, a total of 830 acres were burned at the SHLMB and include portion of UMAM polygons I, II, III and V (Figure 6). One hundred and twenty five acres were burned during the dormant season and 705 acres were burned during the growing season (Figure 6).

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

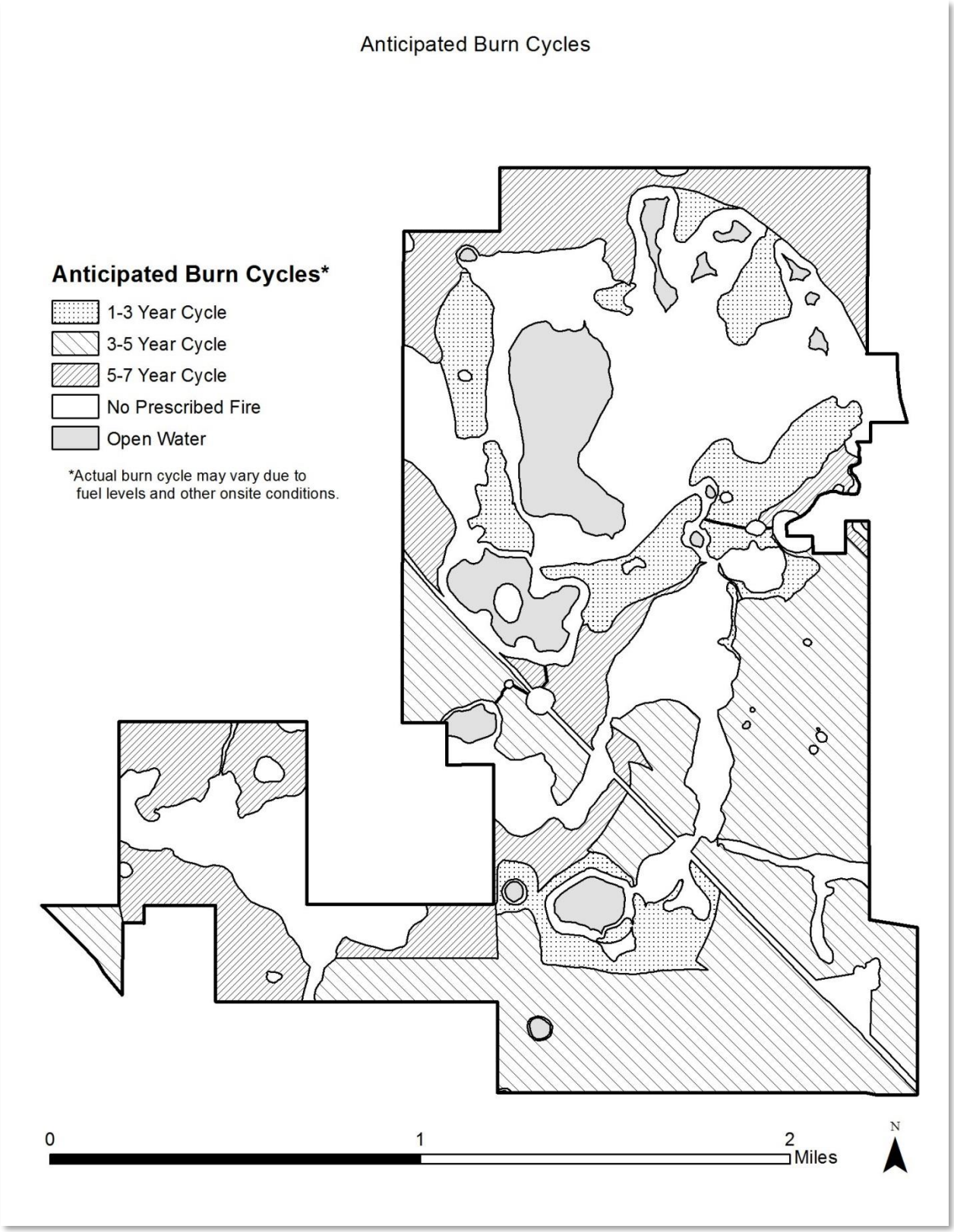

Figure 5. Anticipated burn cycles

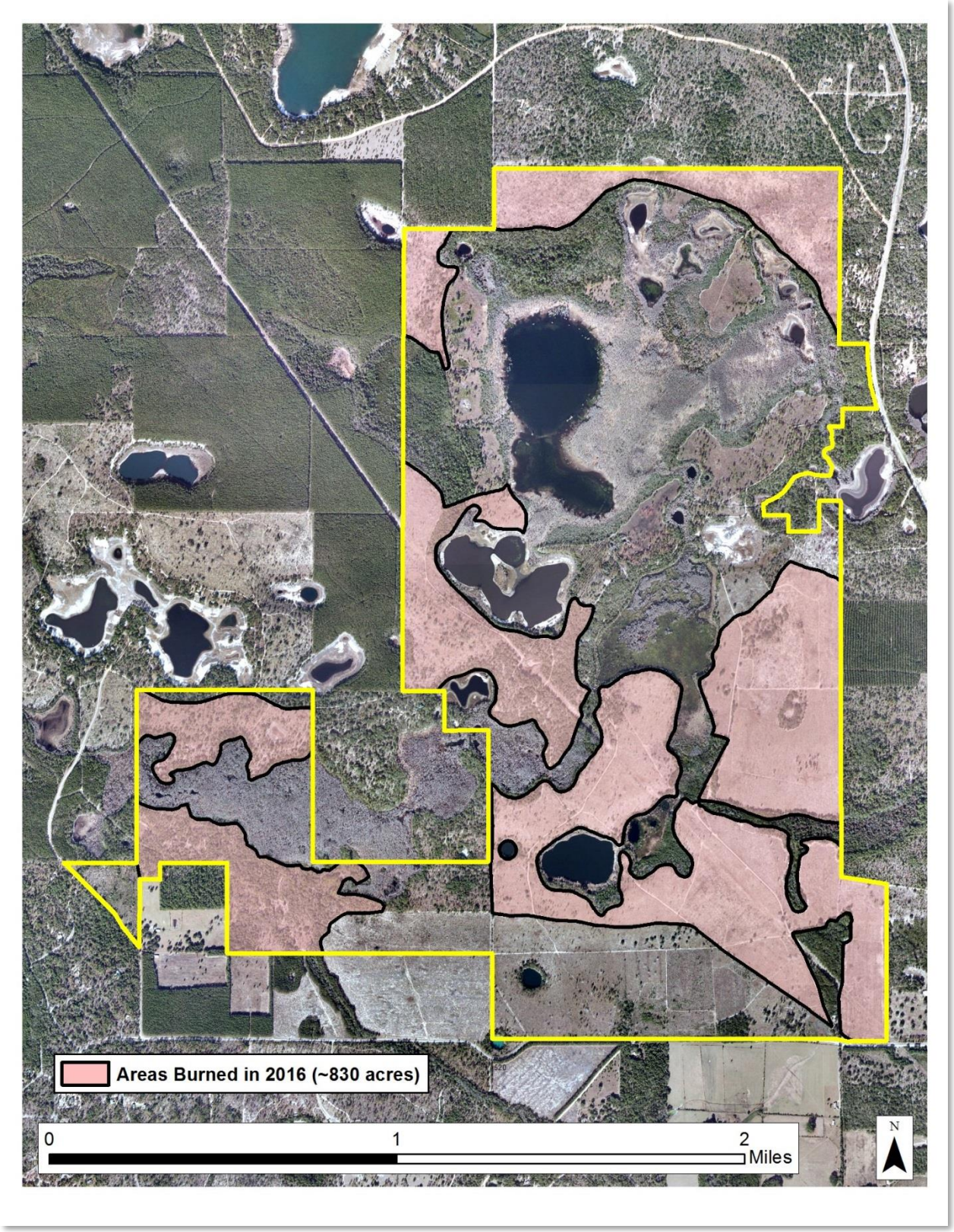

Figure 6. 2016 Dormant and growing season burns

Exotic Fauna and Vegetation
Specific Condition 22, 25

Surveys of nuisance species are conducted throughout the year. Initially small patches of torpedo grass (*Panicum repens*) were observed at the boat launches. These areas have been treated as needed and cover is incidental.

In 2016, Bahia grass (*Paspalum notatum*) coverage exceeded five percent in a 37 acre sandhill restoration area to the east of the check station (UMAM polygon II) (Figure 7). Following the warm season burn in 2014, the Bahia grass seed bank emerged and Bahia grass cover increased significantly. The University of Florida Bahia grass specialist Dr. Anne Blount helped develop a strategy to eradicate the Bahia grass. The Bahia grass was treated in August of 2015 and 2016. The cover of Bahia grass has been reduced to incidental.

Figure 7. Bahia grass eradication on 37 Acres of sandhill restoration

Site evaluations determined that centipede grass (*Eremochloa ophiuriodes*) exceeded five percent cover for 17.2 acres of sandhill restoration adjacent to Greenhead Branch and was treated in August of 2016 (Figure 8). The herbicide treatments were successful in eradicating the Bahia and centipede grasses and no further treatment is needed.

Figure 8. Centipede grass eradication on 17.2 acres of sandhill restoration

In 2016, patchy hog damage was observed throughout the hydric pine flatwoods restoration. The District asked FWC to initiate feral hog control in 2014. To help in hog removal the District purchased two remote deployed circular traps. In addition, damaged fencing has been repaired where hogs were noted entering the bank. Twenty four hogs were removed during 2016, 16 with the electronically deployed traps and eight during the fall hunting season (Table 2).

Table 2. Hog eradication conducted at the SHLMB during 2016.

Date	Hog(s)		Trap Type/Hunting (box, cage, corral)	Comments
	M	F		
6/24/16	x		corral	183 lbs.
6/24/16		x	corral	14 lbs.
6/24/16	x		corral	13 lbs.
6/24/16		x	corral	14 lbs.
6/24/16		x	corral	15 lbs.
6/24/16	x		corral	13 lbs.
6/24/16	x		corral	23 lbs.
6/24/16		x	corral	48 lbs.
6/24/16		x	corral	45 lbs.
6/24/16		x	corral	50 lbs.
6/24/16		x	corral	57 lbs.
6/24/16	x		corral	12 lbs.
6/24/16		x	corral	13 lbs.
6/24/16	x		corral	142 lbs.
6/24/16		x	corral	170 lbs.
6/24/16	x		corral	161 lbs.
10/22/16	x		Hunting	100 lbs.
11/26/16		x	Hunting	70 lbs.
11/26/16	x		Hunting	105 lbs.
12/17/16		x	Hunting	40 lbs.
12/17/16	x		Hunting	60 lbs.
12/17/16	x		Hunting	70 lbs.
12/18/16	x		Hunting	22 lbs.
12/21/16		x	Hunting	25 lbs.

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 NWFWMD (Table 3, Figure 9). In 2016, the Florida Panhandle had slightly above average rainfall from January till April, then a moderate drought in September and November according to NOAA. The highest water levels were reported for February and April for several stations in 2016 (Table 3, Figure 9). Conversely, the lowest gage readings were recorded for November and December (Table 3, Figure 9).

Table 3. Monthly water gage readings for 2016

Sand Hill Lakes Mitigation Bank Water Gauges Readings 2016

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	12/31/2015	12/31/2015	12/31/2015	12/31/2015	12/31/2015	12/31/2015	12/31/2015	12/31/2015	12/31/2015	12/31/2015
Reading	6.20	5.13	3.12	2.62	3.60	4.48	3.66	4.75	5.97	6.48
Date	2/1/2016	2/1/2016	2/1/2016	2/1/2016	2/1/2016	2/1/2016	2/1/2016	2/1/2016	2/1/2016	2/1/2016
Reading	underwater	5.90	3.78	3.20	3.56	4.18	4.48	5.00	underwater	underwater
Date	3/1/2016	3/1/2016	3/1/2016	3/1/2016	3/1/2016	3/1/2016	3/1/2016	3/1/2016	3/1/2016	3/1/2016
Reading	underwater	5.64	3.70	3.36	3.60	4.03	4.18	4.78	6.60	underwater
Date	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/1/2016	4/1/2016
Reading	underwater	6.10	3.75	3.46	3.63	4.25	4.74	5.37	underwater	underwater
Date	5/2/2016	5/2/2016	5/2/2016	5/2/2016	5/2/2016	5/2/2016	5/2/2016	5/2/2016	5/2/2016	5/2/2016
Reading	underwater	5.78	3.78	3.45	3.48	4.40	4.40	4.92	underwater	underwater
Date	6/1/2016	6/1/2016	6/1/2016	6/1/2016	6/1/2016	6/1/2016	6/1/2016	6/1/2016	6/1/2016	6/1/2016
Reading	5.82	4.65	3.76	3.36	3.45	3.83	3.22	3.98	5.64	6.14
Date	7/1/2016	7/1/2016	7/1/2016	7/1/2016	7/1/2016	7/1/2016	7/1/2016	7/1/2016	7/1/2016	7/1/2016
Reading	5.62	4.42	2.42	3.36	3.50	4.14	3.34	3.96	5.40	5.94
Date	8/1/2016	8/1/2016	8/1/2016	8/1/2016	8/1/2016	8/1/2016	8/1/2016	8/1/2016	8/1/2016	8/1/2016
Reading	5.10	3.84	2.13	3.08	3.34	4.06	2.26	3.52	4.86	5.42
Date	9/1/2016	9/1/2016	9/1/2016	9/1/2016	9/1/2016	9/1/2016	9/1/2016	9/1/2016	9/1/2016	9/1/2016
Reading	5.55	4.35	2.49	3.12	3.42	4.17	3.36	4.37	5.33	5.86
Date	10/3/2016	10/3/2016	10/3/2016	10/3/2016	10/3/2016	10/3/2016	10/3/2016	10/3/2016	10/3/2016	10/3/2016
Reading	5.02	3.77	2.06	2.56	3.50	3.94	2.32	3.58	4.80	5.32
Date	10/31/2016	10/31/2016	10/31/2016	10/31/2016	10/31/2016	10/31/2016	10/31/2016	10/31/2016	10/31/2016	10/31/2016
Reading	4.48	~ 3.00	1.36	1.86	3.12	3.68	0.00	2.88	4.32	4.84
Date	12/1/2016	12/1/2016	12/1/2016	12/1/2016	12/1/2016	12/1/2016	12/1/2016	12/1/2016	12/1/2016	12/1/2016
Reading	4.20	~ 2.70	0.00	1.25	2.94	3.78	0.00	2.40	3.99	4.50

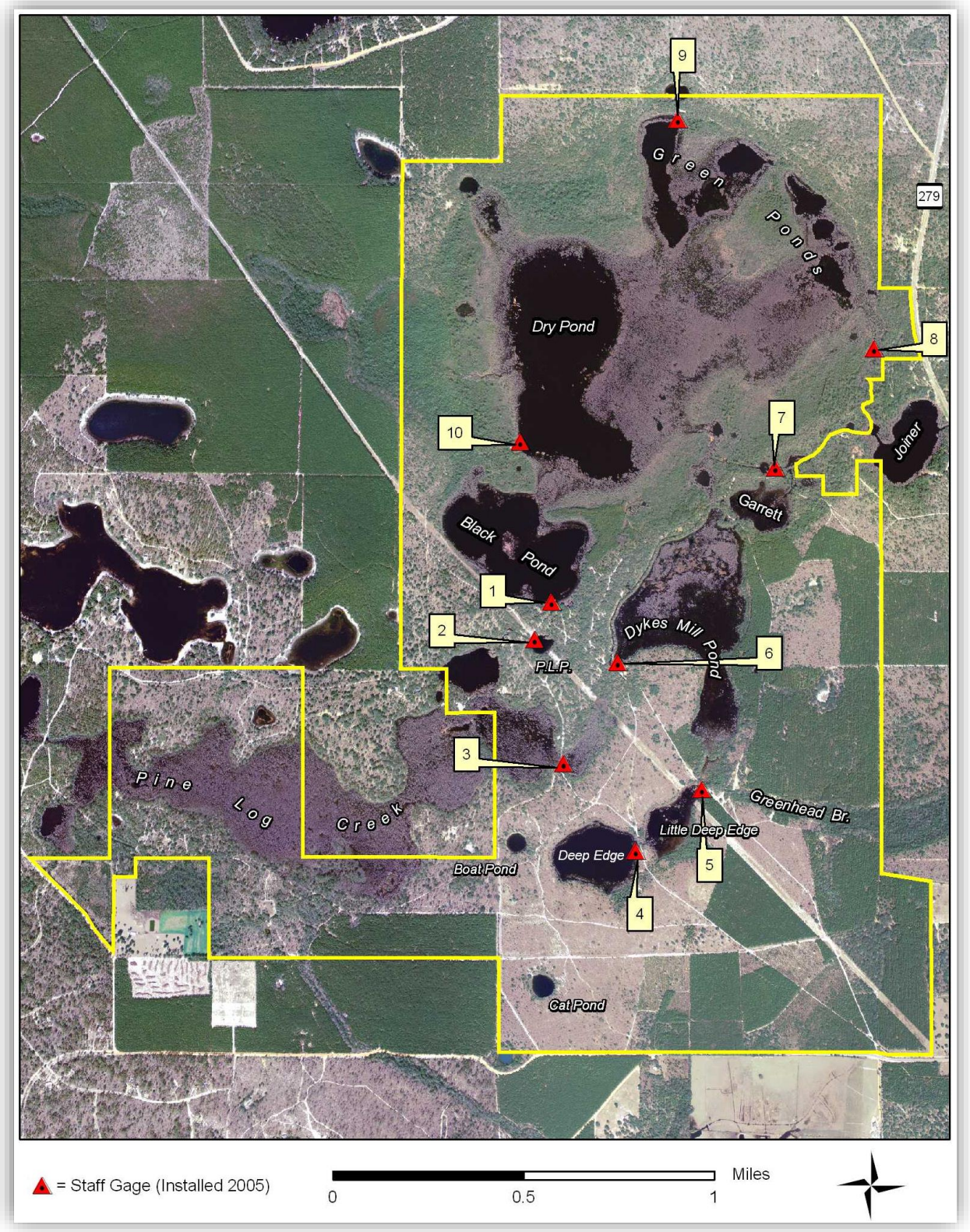

Figure 9. Staff gage locations

Sandhill Restoration

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

Oak eradication in UMAM polygon I was initiated in August 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 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

Six hundred forty six 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). Current longleaf pine densities range between 100 – 174 trees per acre.

Upland Wiregrass Planting
Specific Condition 10c

In areas with less than 25% wiregrass cover, a supplemental wiregrass planting occurred. Two hundred ninety-eight acres of restored sandhills w planted with 1,387,870 wiregrass plugs (UMAM polygon II). Survival of the wiregrass in the uplands has averaged 80%. Seedling wiregrass has been commonly observed.

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 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-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 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 flatwood community continues to develop and increase in cover and diversity.

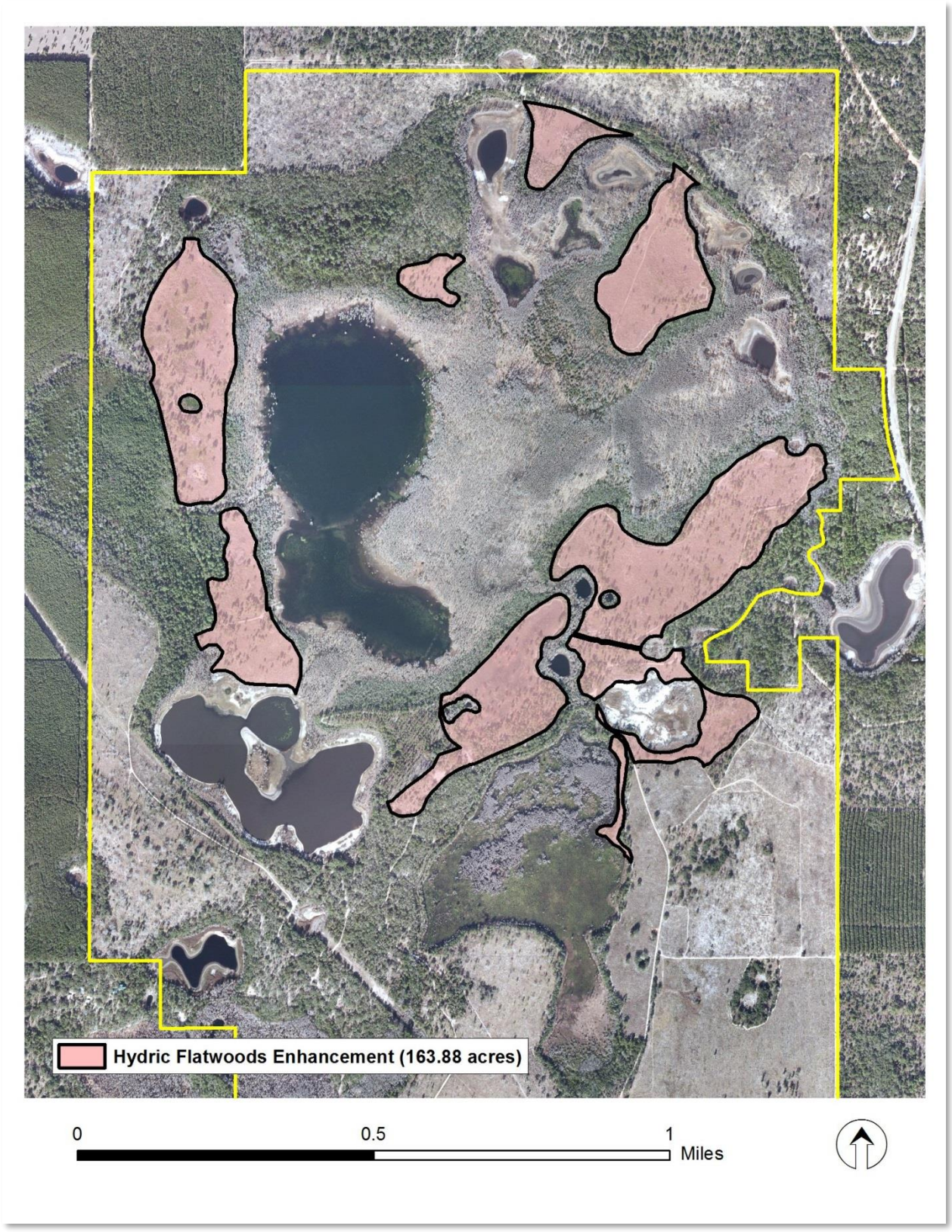

Figure 10. Hydric pine flatwoods restoration areas (Revised)(163.88 acres)

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 including oblique aerials are located at: http://www.nwfwmdwetlands.com/index.php.

Annual monitoring for this report was conducted on September 29; October 31st; November 1 - 3, 9, 16, 22, 23 and 29 in 2016 in accordance with Specific Condition 28. Pedestrian surveys were conducted for both wetland and uplands. The pedestrian surveys were particularly useful in providing detailed species lists and in identifying community diversity. Species diversity was 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 2014-2015 Annual report by the Florida Fish and 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 eleventh 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 (and bare ground or open water) 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 bare ground, water, individual species and groups. These include wetland species, invasive exotic, and nuisance species present.

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.nwfwmdwetlands.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.

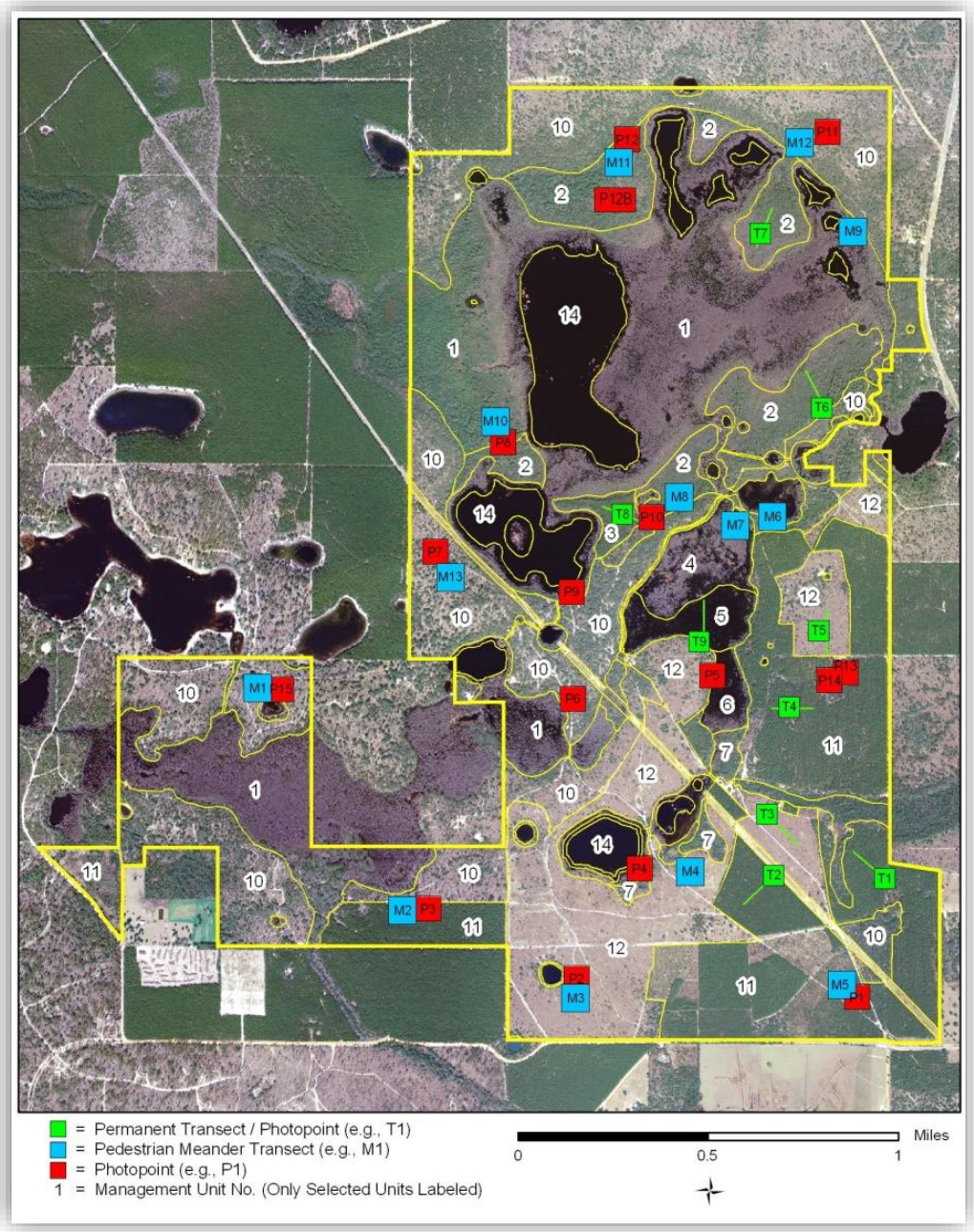

Figure 11. Monitoring locations

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 2015 monitoring, 25 species were observed in Transect 1, 23 in Transect 2, and 25 in Transect 4. (Tables 4-6; Figures 12-14). Wiregrass had the greatest vegetative cover for each transect ranging from 24.5% in transect 1 to 28% in Transect 2 and 24.5% in transect 4. Bare ground cover ranged from 17% in Transect 1 to 55.7% in Transect 4. The area surrounding transect 4 had been treated over the summer with herbicide to reduce centipede grass cover. The increase in bare ground is attributed to the herbicide treatment. The cover of centipede grass exceeds permit conditions within Transect 1 and will be treated in the summer of 2016.

During the 2016 monitoring, 14 species were observed in Transect 1, 20 in Transect 2, and 18 in Transect 4. (Tables 4-6; Figures 12-14). 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 cover 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 maybe 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.

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 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)

11/22/16, 11:55 AM Data Collector: David Clayton Wildlife observed: none

Scientific Name	Common Name	Percent Cover
	Bareground	46
Aristida stricta	Wiregrass	31
Rubus cuneifolius	Sand blackberry	12
Andropogon virginicusvar. glaucus	Chalky bluestem	2
Eupatorium compositifolium	Yankeeweed	1.5
Aristida purpurascens	Arrowfeather three awn	1.3
Pityopsis graminifolia	Narrowleaf silkgrass	1.2
Coleataenia anceps	Beaked panicum	1
Artemisia campestris subsp. caudata	Field wormwood	0.5
Chrysopsis lanuginosa	Lynn Haven goldenaster	0.34
Dichanthelium aciculare	Needleleaf witchgrass	0.34
Opuntia humifusa	Prickleypear	0.34
Andropogon virginicus	Broom grass	0.2
Eremochloa ophiuroides	Centipede grass	0.2
Polygonella gracilis	Tall jointweed	0.2

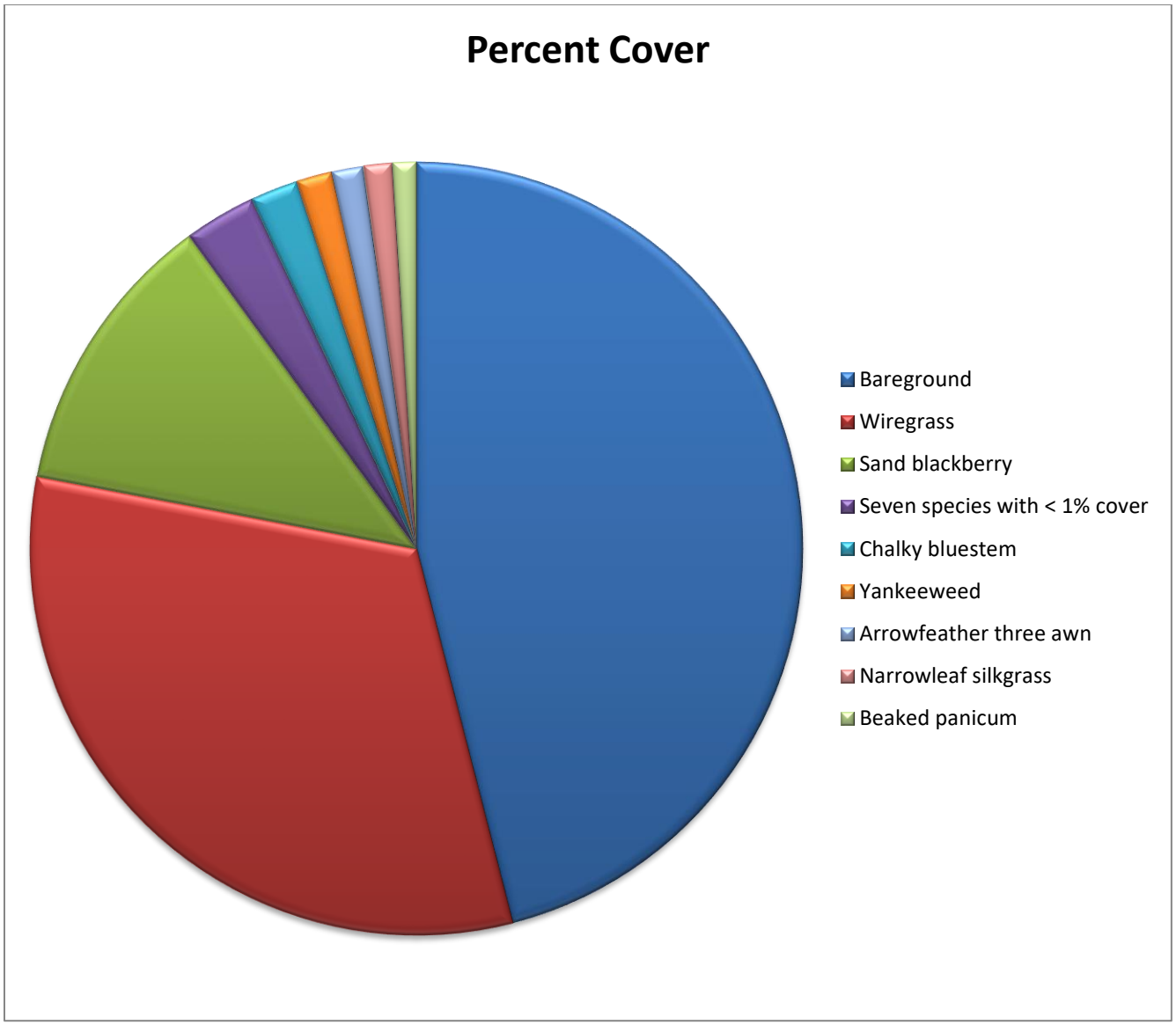

Figure 12. Transect 1: Sand pine plantation restored to sandhill

Table 5. Transect 2 Species cover and occurrence (Sandhill Restoration)
11/22/16, Data Collector: David Clayton Wildlife observed: none

Scientific Name	Common Name	Percent Cover
	Bare ground	57
Aristida stricta	Wiregrass	17
Andropogon virginicus L. var. glaucus	Chalky bluestem	3.5
Aristida purpurascens	Arrowfeather three awn	3.5
Chrysoma pauciflosculosa	Woody goldenrod	3.5
Eupatorium compositifolium	Yankeeweed	2.7
Dichanthelium aciculare	Needleleaf witchgrass	2.5
Licania michauxii	Gopher apple	2.2
Andropogon arctatus	Pinewoods bluestem	1.5

Chrysopsis lanuginosa	Lynn Haven goldenaster	1.4
Digitaria filiformis	Slender crabgrass	0.83
Ceanothus microphyllus	Littlebuck brush	0.83
Bulbostylis ciliatifolia	Capilary hairsedge	0.7
Andropogon virginicus	Broomsedge	0.6
Galactia volubilis	Eastern milkpea	0.5
Paspalum setaceum	Thin paspalum	0.5
Quercus laevis	Turkeyoak	0.33
Vaccinium myrsinites	Shiny blueberry	0.33
Paspalum notatum	Bahiagrass	0.17
Penstemon multiflorus	Manyflowered beardtongue	0.17
Solidago fistulosa	Pinebarrens goldenrod	0.17

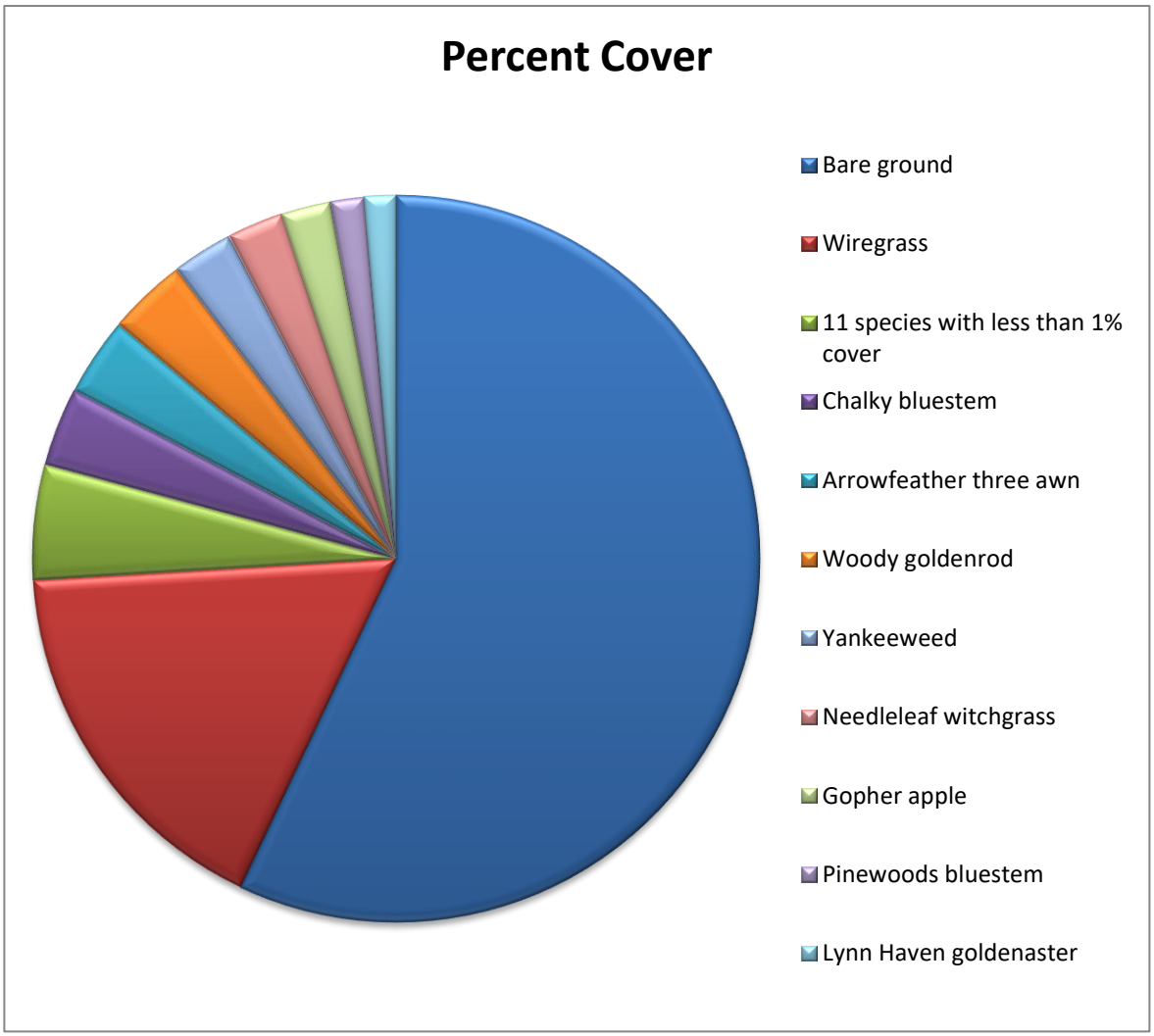

Figure 13. Transect 2 Species cover and occurrence (Sandhill Restoration)

Table 6. Transect 4 Species cover and occurrence (Sandhill Restoration)
11/22/16, Data Collector: David Clayton Wildlife observed: chipping sparrow

Scientific Name	Common Name	Percent Cover
	Bare ground	54.3
Aristida stricta	Wiregrass	25.6
Rubus cuneifolius	Sand blackberry	5.7
Chrysopsis lanuginosa	Lynn Haven goldenaster	4.5
Bulbostylis ciliatifolia	Capilary hairsedge	2.6
Dichanthelium aciculare	Needleleaf witchgrass	1.5
Pinus palustris	Longleaf pine	1.16
Eupatorium compositifolium	Yankeeweed	0.83
Aristida purpurascens	Arrowfeather three awn	0.66
Chrysoma pauciflosculosa	Woody goldenrod	0.5
Vitis rotundifolia	Muscadine	0.5
Andropogon virginicus	Broomgrass	0.33
Coleataenia anceps	Beaked panicum	0.33
Cyperus retrofractus	Rough flatsedge	0.33
Andropogon virginicus L. var. glaucus	Chalky bluestem	0.16
Hypericum gentianoides	Orangeweed	0.16
Ilex vomitoria	Yaupon	0.16
Quercus hemesphaerica	Diamond oak	0.16
Stylisma patens	Dawnflower	0.16

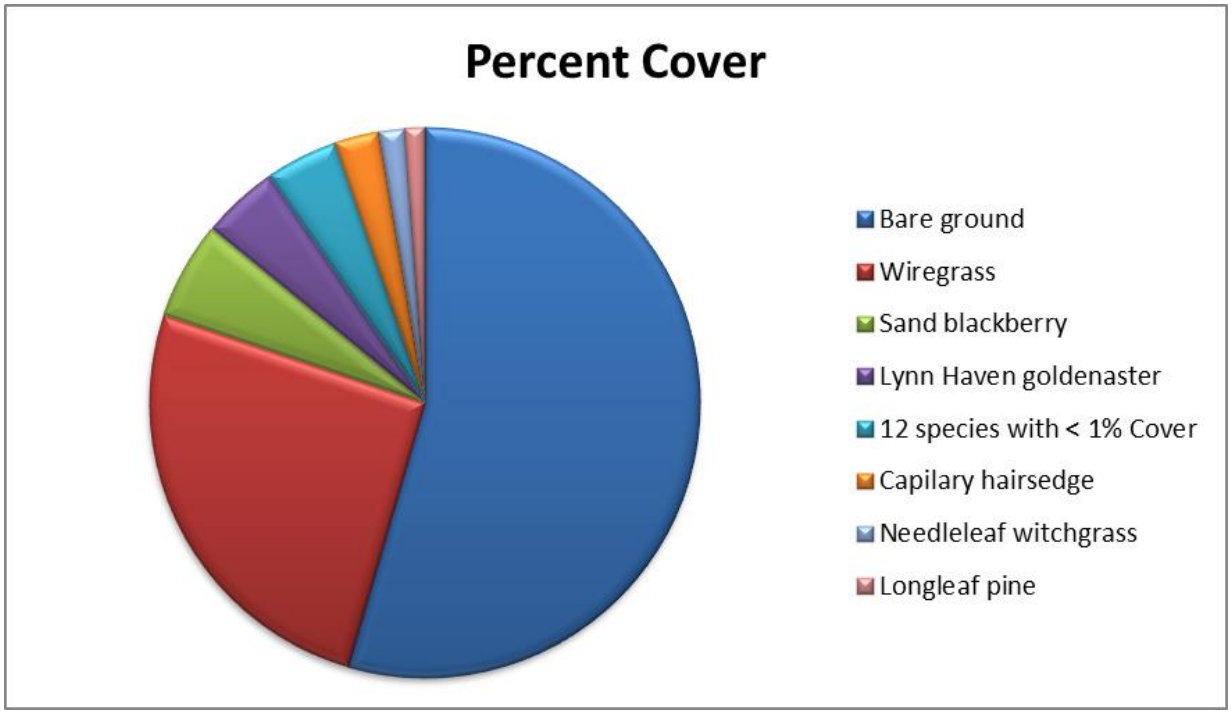

Figure 14. Transect 4: Sand pine plantation restored to sandhill

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 164 and 174 trees per acre. Overall health of the planted seedlings was excellent. Most trees are 9-12 feet' or 12-15 feet in height and the average diameter and breast height (DBH) is 5 inches (Figures 15-17).

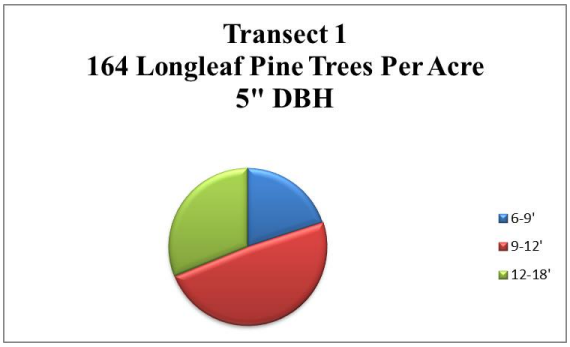

Figure 15. Planted longleaf pine seedlings (Transect 1)

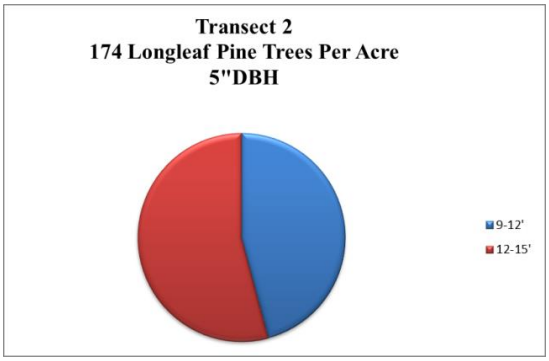

Figure 16. Planted longleaf pine seedlings (Transect 2)

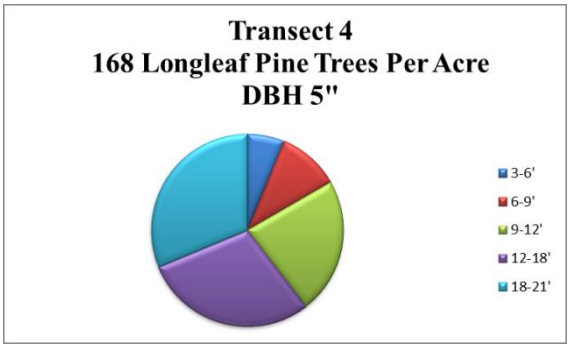

Figure 17. Planted longleaf pine seedlings (Transect 4)

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 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 2015 monitoring, 34 species were observed within Transect 3, an increase of five species from 2014. Forty-one 41 species were observed within Transect 5, an increase of 21 species from 2014 (Tables 7 and 8; Fogures 18 and 19). Wiregrass cover was the greatest cover class observed for both transects with 37% cover observed within Transect 3, and 47% cover observed in Transect 5. Bareground cover was appropriate for sandhill communities, with 25% cover within Transect 3 and 20% within Transect 5. Cover of woody species is low and the diversity of forbs is good and continues to improve.

During the 2016 monitoring, 34 species were again observed within Transect 3. Nineteen species were observed within Transect 5, a decrease of 22 species from 2016 (Tables 7 and 8; Figures 18 and 19). 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. Later warm season burns appeared to have reduced percent cover and diversity of annuals within the sandhill enhancement areas.

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 averaged of 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 grass 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

Scientific Name	Common Name	Percent Cover
	Bare ground	47
Aristida stricta	Wiregrass	20.5
Chrysoma pauciflosculosa	Woody goldenrod	5.1
Liatris chapmanii	Chapman's shooting star	4.3
Quercus laevis	Turkeyoak	3.5
Chrysopsis lanuginosa	Lynn Haven goldenaster	3.3
Bulbostylis ciliatifolia	Capilary hairsedge	3
Andropogon arctatus	Pinewoods bluestem	2.1
Diospyros virginiana	Common persimmon	1
Andropogon virginicus L. var. glaucus	Chalky bluestem	0.83
Pteridium aquilinum	Brachen	0.73
Vaccinium myrsinites	Shiny blueberry	0.7

Hypericum tetrapetalum	Four petaled St. John's wort	0.66
Solidago odora	Sweet goldenrod	0.66
Galactia volubilis	Eastern milkpea	0.6
Liatris pauciflora	Fewflowered gayfeather	0.6
Rhynchosia cytisoides	Royal snoutbean	0.6
Licania michauxii	Gopher apple	0.53
Vaccinium darrowii	Darrow's blueberry	0.5
Dichanthelium aciculare	Needleleaf witchgrass	0.46
Solidago fistulosa	Pinebarrens goldenrod	0.36
Ilex glabra	Gallberry	0.33
Paspalum setaceum	Thin paspalum	0.33
Quercus incana	Bluejack oak	0.33
Smilax bona-nox	Greebriar	0.26
Ceanothus microphyllus	Littlebuck brush	0.2
Opuntia humifusa	Prickleypear	0.2
Stylisma patens	Dawnflower	0.2
Mimosa quadrivalvis L. var. angustata	Sensitive briar	0.16
Polygala polygama	Racemed Milkwort	0.16
Eupatorium mohrii	Mohr's thorough wort	0.13
Eriogonum tomentosum	Common buckwheat	0.1
Rhus copallinum	Winged sumac	0.1
Pityopsis graminifolia	Narrowleaf silkgrass	0.06

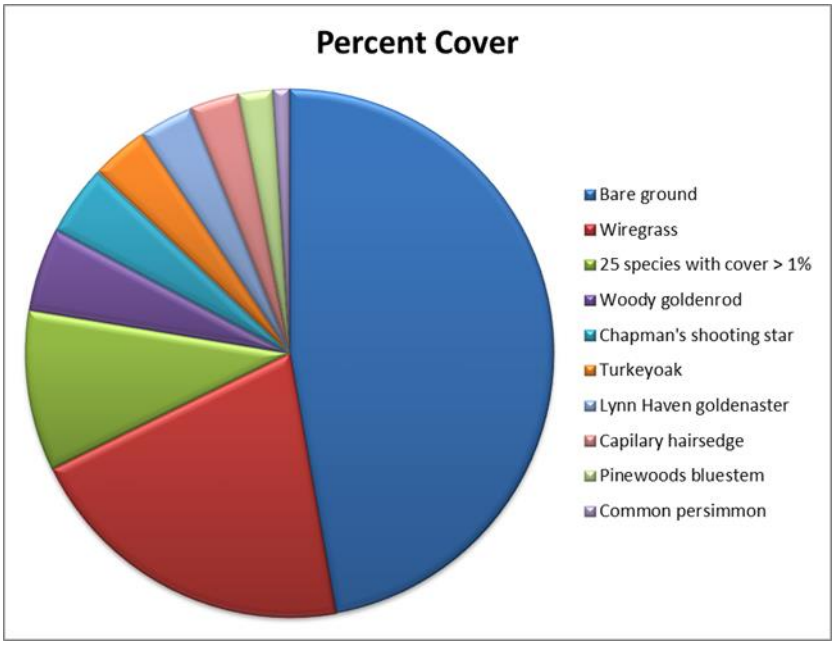

Figure 18. Transect 3: Species cover and occurrence (Sandhill Enhancement)

Table 8. Transect 5: Species Cover and Occurrence (Sandhill Enhancement)
11/22/16, Data Collector: David Clayton, Wildlife observed: Mourning Dove

Scientific Name	Common Name	Percent Cover
Aristida stricta	Wiregrass	40
	Bare ground	36.1
Liatris chapmanii	Chapman's shooting star	6.5
Solidago odora	Sweet goldenrod	3.2
Pityopsis graminifolia	Narrowleaf silkgrass	2.7
Andropogon floridanus	Florida bluestem	2.2
Licania michauxii	Gopher apple	1.8
Liatris pauciflora	Fewflowered gayfeather	1.1
Chrysoma pauciflosculosa	Woody goldenrod	0.83
Pteridium aquilinum	Brachen	0.83
Symphyotrichum walteri	Walter's aster	0.83
Andropogon gyrans	Elliot's bluestem	0.7
Quercus incana	Bluejack oak	0.7
Vaccinium myrsinites	Shiny blueberry	0.7
Eriogonum tomentosum	Common buckwheat	0.5
Smilax bona-nox	Greebriar	0.5
Panicum virgatum	Switch grass	0.33
Bulbostylis ciliatifolia	Capilary hairsedge	0.16
Quercus laevis	Turkey oak	0.16
Quercus virginiana	Live oak	0.16

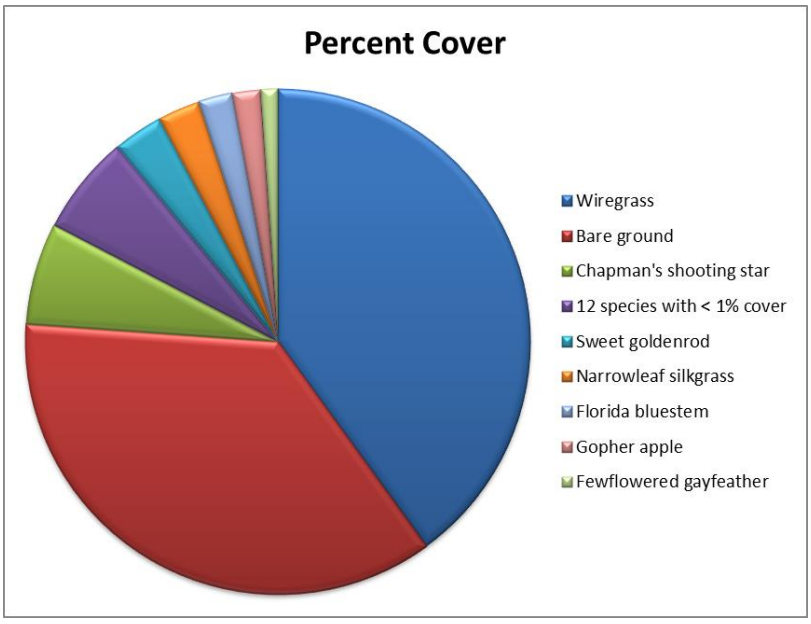

Figure 19. Transect 5: Species cover and occurrence (Sandhill Enhancement)

Planted Longleaf Pine Seedlings

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

In 2016, the survival of longleaf pine seedlings was 87 per acre in Transect 3 and 101 in Transect 5. There was a significant increase in tree density along Transect 5, due to recovery and growth of planted seedlings during the previous year. Remaining trees appear healthy (Figure 20 and 21).

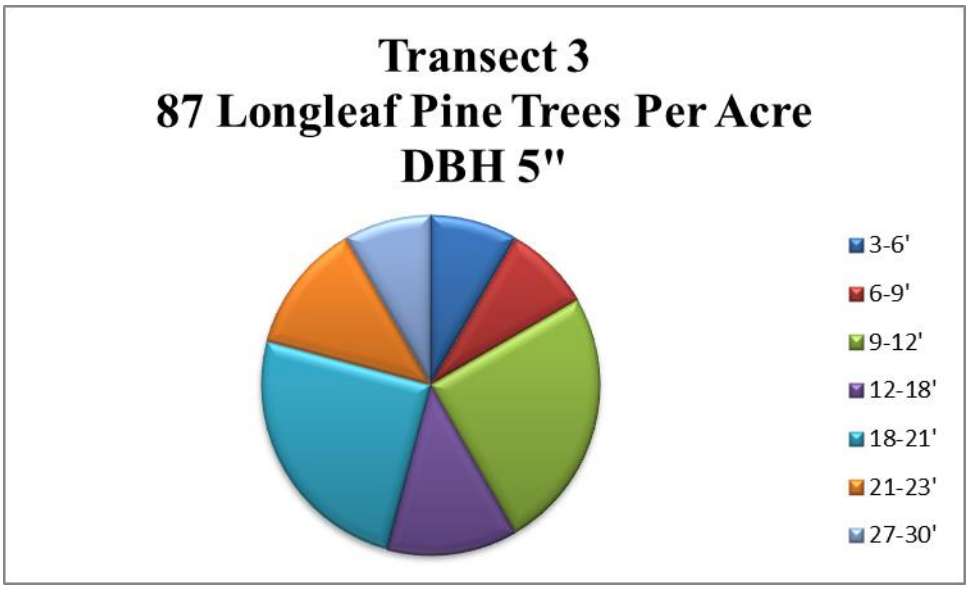

Figure 20. Planted longleaf pine seedlings (Transect 3)

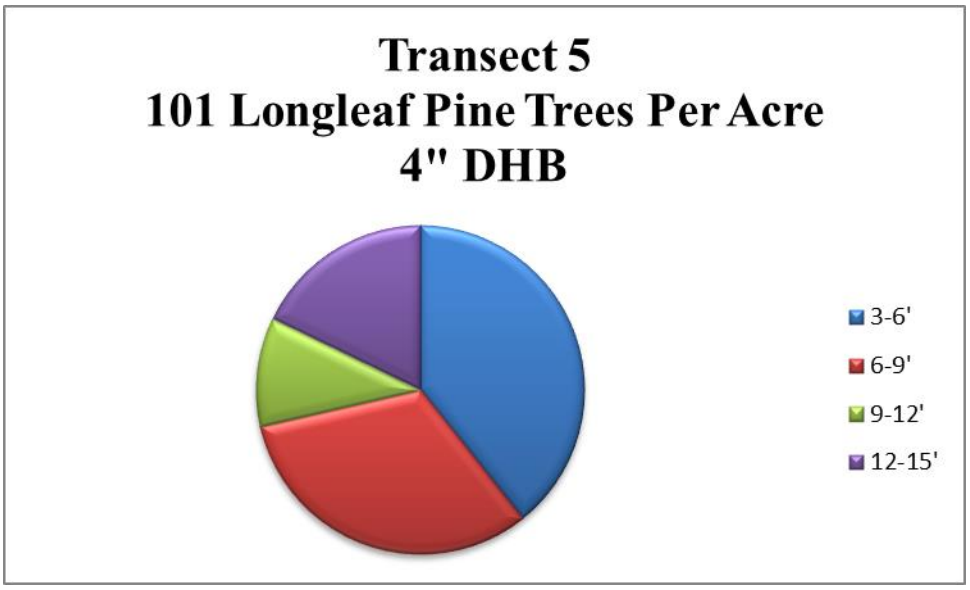

Figure 21. Planted longleaf pine seedlings (Transect 5)

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. This area is burned on a two year rotation. Baseline monitoring indicated a total of 17 species. Nine of the species were shrubs.

During the 2015 monitoring, 30 species were observed. Bare ground cover has been reduced significantly in the last year. In 2014, bare ground was 20.83% while in 2015 was reduced to 7.5% cover. Hydric pine flatwood species dominate the site with over 85.7% cover (Table 9; Figure 22).

During the 2016 monitoring, 35 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 (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 Restoration)
11/9/16, 10:00 AM, Wildlife observed: Titmouse Data Collector: David Clayton

Scientific Name	Common Name	Percent Cover
	Bare ground	27.33
Paspalum laeve	Field paspalum	15.3
Rhynchospora microcephala	Bunched beaksedge	11.5
Andropogon glomeratus	Bushy bluestem	7.2
Aristida stricta	Wiregrass	4.3
Xyris caroliniana	Yelloweyed grass	2.7
Centella asiatica	Centella	2.6
Lachnanthes caroliana	Red root	2.5
Eleocharis sp.	Spikerush	2.33
Axonopus furcatus	Big carpetgrass	2.3
Euthamia caroliniana	Slender flattop goldenrod	2
Lindernia dubia	Moist bank pimpernel	1.8
Andropogon sp.	Bluestem	1.7
Carex glaucescens	Clustered sedge	1.67
Xyris sp.	Yelloweyed grass	1.6
Myrica cerifera	Wax myrtle	1.5
Coleataenia anceps	Beaked panic grass	1.3
Pluchea foetida	Stinking camphorweed	1.3
Solidago odora	Sweet goldenrod	1.3
Rhexia mariana	Pale meadowbeauty	1.2

Helianthus angustifolius	Swamp sunflower	0.83
Sphagnum sp.	Sphagnum	0.67
Hypericum crux-andreae	St. Peter's wort	0.5
Kellochloa verrucosa	Warty panic grass	0.5
Oldenlandia uniflora	Clustered mille graines	0.5
Panicum virgatum	Switchgrass	0.5
Rubus argutus	Sawtooth blackberry	0.5
Cyperus retrofractus	Rough flatsedge	0.33
Gelsemium sempervirens	Yellow jessamine	0.33
Hypericum cistifolium	St. John's wort	0.33
Sporobolus junceus	Pineywoods dropseed	0.33
Viola lanceolata	White bog violet	0.33
Ilex cassinemyrtifolia	Myrtle-leaved holly	0.2
Pinus elliottii	Slash pine	0.2
Rhexia alifanus	Savannah meadowbeauty	0.2
Agalinis divaricata	Pineland false foxglove	0.16
Lycopus rubellus	Waterhorehound	0.16

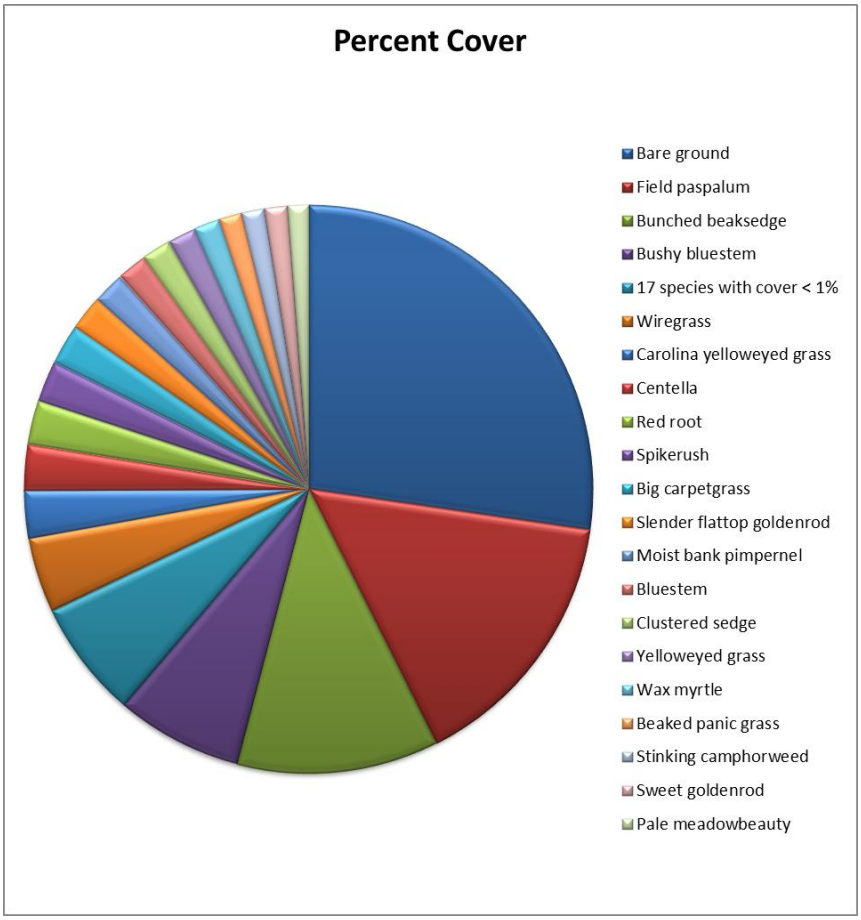

Figure 22. Transect 8: Species cover and occurrence

UMAM Polygon V, Management Unit 2, Hydric Pine Flatwoods

UMAM Polygon V, Management Unit 2 **c**onsists of 165 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.

During the 2015 monitoring, 22 species were observed in transects 6 and 14 for Transect 7 (Table 10 and 11; Figure 23 and 24). Significant portions of each transect were submerged for three months in 2014. 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 is dominated by grasses and sedges while Transect 7 is dominated by redroot cover.

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.

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 reduced by prolonged flooding within the hydric pine flatwoods. A total of 91 species were observed within the hydric pine flatwood restoration within one of the pedestrian transects in 2016, a significant increase from the 2 herbaceous species recorded during the baseline documentation.

Table 10. Transect 6. Species Cover and Occurrence (Hydric Pine Flatwoods)
11/16/16, 4:30 PM, Wildlife observed: None Data Collector: David Clayton

Scientific Name	Common Name	Percent Cover
	Bare ground	14.1
Andropogon glomeratus	Bushy bluestem	45.2
Rhynchospora microcephala	Bunched beaksedge	14.6
Lachnanthes caroliana	Red root	6
Andropogon sp.	Bluestem	4
Kellochloa verrucosa	Warty panic grass	2.8
Woodwardia virginica	Virginia chain fern	2.5
Rhexia alifanus	Savannah meadowbeauty	2.2
Aristida stricta	Wiregrass	2
Euthamia caroliniana	Slender flattop goldenrod	1.3
Sphagnum sp.	Sphagnum	1.2
Hypericum sp.	St. John's wort	0.83
Lyonia lucida	Fetterbush	0.5
Pinus elliottii	Slash pine	0.5

Quercus laurifolia	Laurel oak	0.5
Xyris sp.	Yelloweyed grass	0.5
Saccharum giganteum	Sugarcane plumegrass	0.33
Centella asiatica	Centella	0.16
Cliftonia monophylla	Black titi	0.16
Eupatorium compositifolium	Yankeeweed	0.16
Rhexia nashii	Maid marian	0.16
Rubus argutus	Sawtooth blackberry	0.16

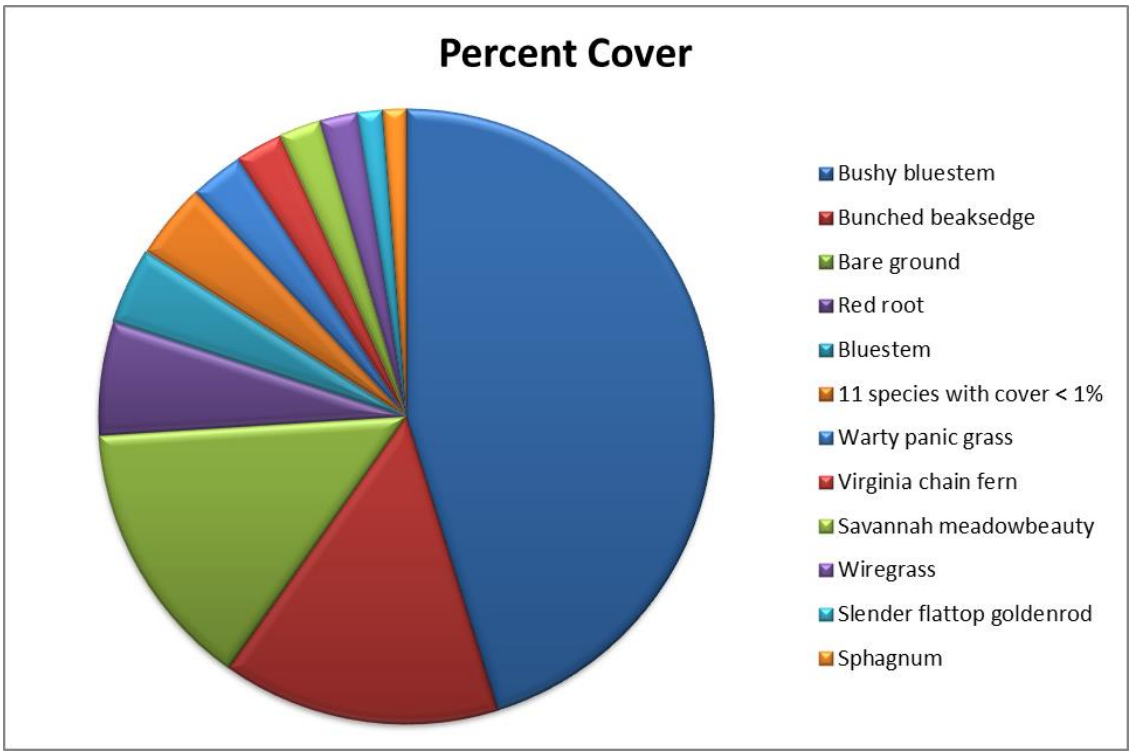

Figure 23. Transect 6. Species cover and occurrence (Hydric Pine Flatwoods Restoration)

Table 11. Transect 7. Species and Occurrence (Hydric Pine Flatwoods Restoration)
11/09/16, 4:09 PM, Wildlife observed: None Data Collector: David Clayton

Scientific Name	**Common Name**	**Percent Cover**
	Bare ground	12.3
Andropogon glomeratus	Bushy bluestem	44.2
Lachnanthes caroliana	Red root	25
Woodwardia virginica	Virginia chain fern	7.3
Sphagnum sp.	Sphagnum	2.2
Rhynchospora microcephala	Bunched beaksedge	2
Cliftonia monophylla	Black titi	1.2
Lycopus rubellus	Waterhorehound	1.1
Rhexia virginica	Handsome harry	1.1

Vaccinium corymbosum	Highbush blueberry	1
Xyris sp.	Yelloweyed grass	0.8
Aristida stricta	Wiregrass	0.7
Andropogon sp.	Bluestem	0.3
Euthamia caroliniana	Slender flattop goldenrod	0.3
Ilex myrtifolia	Myrtleleaved holly	0.3
Ilex vomitoria	Yaupon	0.1
Lyonia lucida	Fetterbush	0.1
Pinus elliottii	Slash pine	0.1

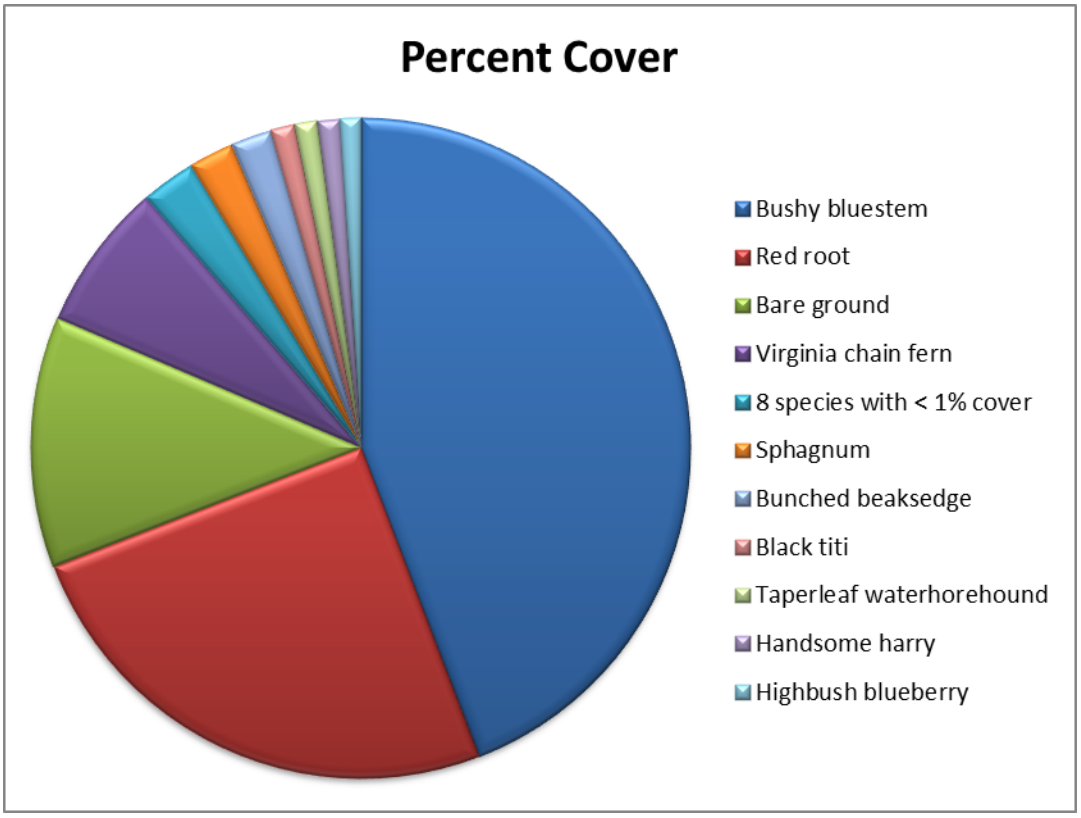

Figure 24. Transect 7. Species cover and occurrence (Hydric Pine Flatwoods)

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.

In 2015, 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, nearly doubling over the last year to 50% followed by lavender bladderwort with 17.7% cover, slightly lower than the previous year. Open water has steadily decreased from 38% from baseline sampling to 17% in 2015.

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.

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 1.5-2 feet 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 NWFWMD website at http://www.nwfwmdwetlands.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. Twenty-one herbaceous species were observed in M8, while 19 herbaceous species were observed in M9. Wildlife was abundant.

In 2015, 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 2016, a total of 47 species were observed along M8, and 46 species along M9. This is the same as the previous year for each transects. Water levels were below normal pool at the time of sampling. Plants are vigorous and thriving and diversity is good. 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 2016.

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 shrub species during baseline monitoring.

In 2015, a total of 89 species were observed along the meandering transect of M 10, decrease of four species from last year. This area continues to develop and has good diversity. A total of 41 species were observed along M11, an increase of seven species. Minimal shrub cover was observed and the sites continue to develop. Hog damage was observed within the hydric pine flatwoods restoration.

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 2016.

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 2015, a total of 86 species were found along Transect M1, a decrease of eight species. Most of the species not observed were shallow rooted emergent whose habitat is currently flooded with 6-8-inches of water. This area is a combination of several habitats as it grades towards the pond. The pond has been above normal pool for the last two years and slash pines that ringed the pond have died. A total of 64 species were found along M2, a decrease of nine species from 2014. A late season fire may have reduced species diversity in this area. Fifty-six species were observed within M12, including the addition of three species. This area also was burned late in the fire season and annual species may have been removed during the burn. A total of 70 species were observed along M13, a reduction of three species. This area is scheduled for a burn in 2106 to help reduce woody vegetation and stimulate the wiregrass.

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 70 species were observed along M13 same as the previous year.

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 good to excellent and oaks and other hardwood cover have been reduced to appropriate levels.

Management Unit 11, UMAM Polygon II, **Upland 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 pines, reintroduction of burns, re-planting with longleaf pine, and the addition of wiregrass as needed. 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. During baseline monitoring, wiregrass was the dominant grass species. However, the shrub layer overtopped the wiregrass and hardwood cover shaded out the understory.

In 2015, a total of 75 species were observed, and increase of 18 species from last year. Species diversity is similar in appearance to undisturbed sandhills within the region.

In 2016, a total of 75 species were again observed. Species diversity is similar to undisturbed 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 trees are emerging from the grass stage.

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 ≤ 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.

In 2015, a total of 75 species were observed along M3, the same as the previous year. Ninety-two species were observed along M4, an increase of 12 species.

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. 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 2015, water levels remained at normal pool or above. A total of 66 species were observed along M6, a reduction of five species while 42 species were observed along M7, slight increase in species observed. Vegetation appears healthy and vigorous. Some species are absent due to flooding at the lower elevations where they had migrated during the drought and have not yet recovered.

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.

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.

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David C. Clayton
Restoration Ecologist
Environmental Scientist
Qualified Mitigation Supervisor