

Sand Hill Lakes Mitigation Bank
Combined DEP/ACOE Sixth Annual Report
December 2012



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OFFICE OF SUBMERGED LANDS
AND ENVIRONMENTAL RESOURCES

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

**Submitted by David Clayton on behalf of the Northwest Florida Water Management District
In support of specific conditions 26 and 28**

Executive Summary

The Sand Hill Lakes Mitigation Bank (SLMB) consists of approximately 2,155 acres in southern Washington Co. 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 within Township 1 North, Range 14 & 15 West. It contains approximately 850 acres of wetlands, 155 acres of natural lakes and ponds, and 1,150 acres of upland buffer communities. The FDEP permit for the SHLMB was issued September 5, 2005. The ACOE MBI was approved on May 16, 2006. This is the sixth annual combined FDEP and ACOE report for the SHLMB and is written in accordance with Specific Condition 26 of the FDEP permit. A synoptic listing of notable activities conducted prior to this report and those anticipated in the coming year are presented below.

Interim Success Criteria

All interim success criteria have been met since January 2010. The first interim credit release from the FDEP and ACOE was requested and approved in 2010 following site visits and a review of the restoration activities and compliance with the permitted activities. A second interim credit release is anticipated for the spring of 2013. An appropriate number cypress (Dykes Mill Pond shoreline) and have regenerated along Dykes Mill Pond with additional seedlings planted (January 2010). A sufficient number of planted long leaf pine averaging less than 200 trees per acre have survived within the sand hill restoration (formally sand pine plantation 319 acres) (January 2009). Planted and existing wire grass and other sandhill species are increasing in cover and diversity. In addition, wire grass seedlings have been observed adjacent to planted tubelings ensuring greater wire grass cover in the future. In natural areas, the sandhill community is diverse and thriving. It has had sufficient wire grass cover with minimal shrub cover and appropriate tree counts to ensure an open diverse sandhill. The following interim success criteria have been met since 2007. All hydrologic and erosion restoration activities have been completed, the Dykes Mill pond dam has been removed in slough area; prescribed burns have occurred in accordance with the burn plans; and all erosion areas, road removal, dam replacement at Black pond and culvert replacement has been completed. Water level gages were installed and surveyed in on December of 2005 for 10 locations throughout the bank. Data from the water level gages has been read since 2005 this years' data has been included in the annual report. In 2011 and 2012, water levels were again low, resulting from years of drought. All natural and planted areas have increasing vegetation cover and diversity. Less than 1% invasive exotic vegetation and 5 % nuisance native species were observed in the wetland and upland areas. The preservation areas are maintaining or improving function; upland and wet pine flatwoods have measurably increased in herbaceous ground cover and have significantly decreased in shrub cover. Shrub cover is limited to coppice sprouts after the last burn in the wetlands.

Restoration Activities Completed

All restoration activities described in the Mitigation Bank Permit have been implemented and restored habitats are improving with regular burn intervals. All hydrologic restoration activities, harvesting of offside pines, shrub removal in wetlands, thinning of hardwoods in the uplands, and planting of shrub, trees have been completed since 2010. All wire grass planting was completed in 2011.

Perimeter fencing, gates and signage were installed by February 2005. Ongoing law enforcement has been conducted at the site since 2003 with the purchase of the bank property with no violations to date. All fencing and protection of the property has been conducted in accordance with Specific Condition 8 and Attachment A. A conservation easement was recorded for the SHLMB in February of 2006, preserving the wetland, aquatic and upland communities in perpetuity in accordance with Specific Condition 1 and 8. Project oversight was implemented in accordance with Specific Condition 7 of the permit. Duncan Cairns, Tyler Macmillan and David Clayton were approved as QMS officers for the SHLMB. An archeological/historic survey was conducted at the SHLMB and approved by the Florida Division of Historical Resources (DHR) in accordance with Specific Condition 2. All construction and hydrologic restoration activities were conducted in accordance

with Specific Conditions 2-5, 7, 12, and 13. Fire was re-introduced to the SHLMB in the fall of 2004 in accordance with Specific Condition 11 and Attachment E. All initial burns for the wetlands and uplands were completed in December 2006. The majority of the restoration activities were to be initiated during 2005/2006. However, due in part to the delayed permit approvals and a lengthy archeological review by DHR, the initiation of many mitigation activities were initiated approximately a year from the proposed timeline. The initial replanting long leaf pine in the uplands surrounding Black Pond, Cat Pond, and Greenhead branch occurred in December 2004 in accordance with Specific Condition 10c and appendix D of the permit. Long leaf pine planting occurred in the uplands during the winters of 2005 and 2007 in accordance with the Specific Condition 10c and Attachment D. Additional long leaf pine planting occurred in November 2008 in Management Unit 11 where the offsite sand pine or slash pine had been harvested (319 acres) in accordance with Specific Condition 10c. Oak reduction in the uplands was initiated in June 2005 and completed in August 2006 in accordance with specific condition 10b. Construction activities were initiated in July of 2006, in accordance with Specific Conditions 10 and 12 of the permit. All hydrologic enhancements were completed in accordance with the hydrologic plan, Specific Condition 12. Stabilization of erosion areas and re-vegetation, road fill removal, bridge and culvert replacement, Dykes Mill Pond dam removal were completed by March, 2007 and turbidity controls were installed in accordance with Specific Conditions 12 and 13. The replacement of the dam at Black pond was initiated in October 2007 and was completed by January 2008. Removal of off-site sand pine and slash pine plantation was initiated in July 2007 and completed by October 2007 in accordance with Specific Condition 10a. Pond cypress was planted at Dykes Mill Pond in January 2008 and during the drought a significant number of natural cypress seedlings have been observed in accordance with Specific Condition 10c.

Hydric Pine Flatwoods Restoration

Specific Condition 10, Community Restoration

Hydric pine flatwoods restoration was initiated in March of 2007 for the 148 permitted acres. An additional 38 acres Gyro-Trac work was conducted in June and August 2008 in areas that were historically wet pine flatwoods bringing the total acreage of wet pine flatwood restoration to 165 acres. In 2012 an additional 4 acres was added bringing the total to 169 acres of hydric pine flatwood restoration. This area will be planted in the winter of 2012/13 with wire grass and tooth ache grass on 3' centers. All planting was conducted in accordance Specific Condition 10 and Appendix D. Initial wire grass planting occurred in the winter of 2008 with wire grass plugs installed on 3' centers. Wet flatwoods restoration areas converted from shrub/scrub wetlands have changed drastically over the last five years, and are returning to a diverse wet flatwoods. A total of 67 hydric pine flatwoods species have been observed within the 165 acres of hydric pine flatwood restoration during the fall monitoring in 2011. A significant increase from the 2 herbaceous species observed in the baseline. Herbaceous species cover has increased to carry fire across the landscape. Baseline data from the 2006 monitoring event showed a near 100 percent cover of shrubs (primarily black titi) in the former hydric pine flatwoods and fringe wet prairie habitat. Following Gyro-Trac and burn, the shrub cover was reduced to an average of 50%. In 2012, titi shrub coverage has remained very low within the flatwoods, commonly less than 1.6%. Wetland wire grass cover in the wet flatwood restoration sites increased from 0% cover at baseline in 2007 to 8.4% in 2010 and remained at about 8% in 2011, 4 years, but reduced to an average of 4.6% in 2012. This is due to the overtopping of the wire grass by the chalky blue stem. Hopefully, the winter burn will reduce blue stem coverage and stimulate the wire grass. Wet flatwoods species cover has increased from 1% to 67.2% in 2011 an. In 2012, the vegetative cover within the hydric pine flatwoods continued to increase to 78% in part due to significant (53.5%) cover by chalky blue stem. This species is common to the hydric pine flatwoods and cypress strands in the region it is not commonly the dominant species except during an extended drought. Similar cover has been observed in the surrounding dry cypress strands. Bushy blue stem cover should gradually reduce once the wetlands rehydrate as it does not tolerate flooded soils. Averaged shrub cover remained low at 1.5% for black and red titi and 4.4% for fetterbush. Averaged total shrub cover remains at 5.35%. To date within the 165 acres of hydric pine flatwoods restoration site, 1.18 million wire grass 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 2011, 15 acres of hydric pine flatwoods was planted with 72,600 tooth ache grass and 72,600 mixed herbaceous wildflowers (primarily of three species, autumn sneezeweed, variable leaved sunflower and rayless sunflower) with 600 plants representing 22 species collected at Garcon. It is hoped that the added diversity will become established within these 15 acre "islands" and spread across the landscape. In 2012, the planted mixed wildflowers had moderate to good survival in most areas. Plants were vigorous, particularly around Garret Pond. Most had good flowering in October and it hoped they will have a good seed set. During the fall/winter of 2012/2013 and additional 77,440 wire grass and tooth ache grass will be planted in Management Unit 3 (11.5 acres, Hydric Pine Plantation Restoration).

Sandhill Improvement/Restoration Specific Condition 10, Community Restoration

Upland restoration activities were completed in 2011 with the last planting of upland wire grass. It is anticipated that continued warm season burns at 3 year intervals will maintain a high quality, diverse sand hill community. A total of 273 acre of restored sandhills has been planted with over 950,000 wire grass plugs as of December 2011. Hardwoods eradication was again conducted in 2010 and 2011 for portions of the former sand pine plantations where hardwoods were quickly dominating the site and shading out the understory and planted pines. Shrub reduction on 80 acres was completed in 2011. During the fall monitoring 2010 and 2011, sand pine seedlings were observed and increased shrubs in Management Unit 11, the former sand hill pine plantation (383 acres). The sand pine and shrubs were eradicated in 2012 using hand crews.

In the degraded sandhills, Management Unit 12 (263 acres) and portions of Management Unit 10, the targeted oaks have been reduced in number in 2006/2007 and again in 2009 and 2011 for a total of 483 acres of hardwood reduction at the SHLMB, significantly greater than permit requirements (263) but needed to reduce the potential for wildfire and reduce shrub cover that shade the wire grass and associated community. Planted long leaf pine seedlings planted in Management Unit 12 were thinned in a fall burn in 2011 (423 acres) in the area between Cat Pond and Deep Edge. It is anticipated that the resulting open sandhill with diverse species can be maintained by warm season burns on three year intervals. In 2012, 40 acres of hardwood eradication was conducted for portions of management Unit 12 and 11 near the center of the northeast boundary of the SHLMB. This area has a growing population of gopher tortoises, a state threatened species, and ensuring the area is open with a high quality sand hill species is important for maintenance and continued growth of the population. Wire grass cover continues to increase in the sandhill restoration areas as well as an increase in sandhill species. In addition, wire grass seedlings were commonly observed near planted wire grass tubelings. It is hoped that the additional seedlings will ensure that wire grass cover will continue to increase over time.

Controlled Burns Specific Condition 11, Attachment E.

Fire was re-introduced to the SHLMB in the fall of 2004. All initial burns for the wetlands and uplands were completed in December 2006. A total of 2 burn cycles have been completed for the entire SHLMB to date although areas requiring more frequent fires such as sand hills and wet flatwoods have had as many as 4 burn cycles since the bank was established. In 2007, summer burns were re-introduced to portions of the bank. Warm season burns will be conducted in 2008 for 368 acres. A total of 640 acres were burned in Management Unit 2, 3, 10, 11, 12, during the winter of 2009 and 2010. Winter burns were needed due to the higher fuel loads generated from herbicide treatment of the oaks. In 2010, a total of 323 acres were burned, 192 acres during the dormant season and 131 acres during the growing season in Management Unit 10, 11, 12, during 2010. In 2011, a total of 717 acres within the uplands were burned, a 294 acre warm season burn and a 423 acre fall burn conducted in mid-October (Figures 7 and 7a.). Planted long leaf pine seedlings exceeded permit conditions in the uplands of 200 trees per acre. The fall burn was designed to reduce long leaf pine seedling cover by approximately 100-150 trees per acre. The fire along with continued drought reduced planted long leaf pine seedlings. In August of 2012, tree counts confirmed that planted long leaf pine seedling densities were reduced to an average of less than 200 trees per acre in Management Unit 12. A total of 260 acres have so far

been burned in 2012 (Figure 7.) These include 169 acres of sandhill restoration (Management Unit 10) that had the hardwoods reduced in 2011 and 91 acres of hydric pine flatwoods (Management Units 2 and 3). In addition, the remaining 77 acres of hydric pine flatwood restoration (Management Unit 2) will be burned during the winter of 2012/2013.

Nuisance and Exotic Species

Specific Condition 22.

Surveys of nuisance species (flora and fauna) have been conducted throughout the past 6 years. In addition a yearly fall site inspection for nuisance species occurs in conjunction with the annual monitoring as well as day to day monitoring by District and FWC staff. Several small patches of torpedo grass (*Panicum repens*) were treated with Habitat at historic boat launch areas during August and September 2005 and 2007. No live plants were observed during the fall monitoring in 2009. During 2010, a patch of torpedo grass was observed at the boat launch at Dry Pond. The patch was treated by Natur Chem on December 23, 2010 and October 15, 2011. In 2012, minor coverage of torpedo grass was again observed at the larger boat launches. Additional treatments will continue in 2013 as needed. Minor feral hog damage was observed at Dry and Dykes Mill Pond in 2007. Very limited signs of hogs were observed in 2008-2012.

Annual Sampling

Specific Condition 28.

The annual sampling for this report was conducted September 24-28 and October 24-31 2012. Pedestrian surveys were conducted for both wetland and uplands. The pedestrian surveys were very useful in providing detailed species lists and a greater understanding of species diversity for each community. In addition the pedestrian surveys cover far more area than transects and may better evaluate the areas for late successional and threatened or endangered species. In Pedestrian surveys are also useful in identifying pockets of nuisance species and determine fuel loads. Overall, species diversity was excellent throughout the SHLMB and plants were healthy. The number of species observed continues to increase as habitats improve. However, due to the fall burns (10/25/2012) Transect #5 was not sampled as vegetation was reduced to ground level.

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Introduction

The Sand Hill Lakes Mitigation Bank (SLMB) consists of 2,155 acres in the southern portion of Washington Co. 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. It contains approximately 850 acres of wetlands including high quality cypress sloughs and strands, degraded hydric pine flatwoods, bayheads, seepage slopes, and approximately 155 acres of natural solution ponds and shallow, gently-sloped lakes connected by streams and ditches. The remaining 1,150 acres consist of secondary growth upland buffer communities (including high quality and degraded sand hill communities as well as sand pine plantation, slash pine plantation, and mixed hardwoods) (Figure 1a).

The SHLMB occurs on the divide between the Choctawhatchee and St. Andrew Bay watersheds. The majority of the proposed Bank 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, because of the karst nature of the Sand Hill Lakes region, the SHLMB is also a recharge area for Econfina Creek, which, via Deer Point Lake, is the water supply for Panama City.

Figure 1. Location Map

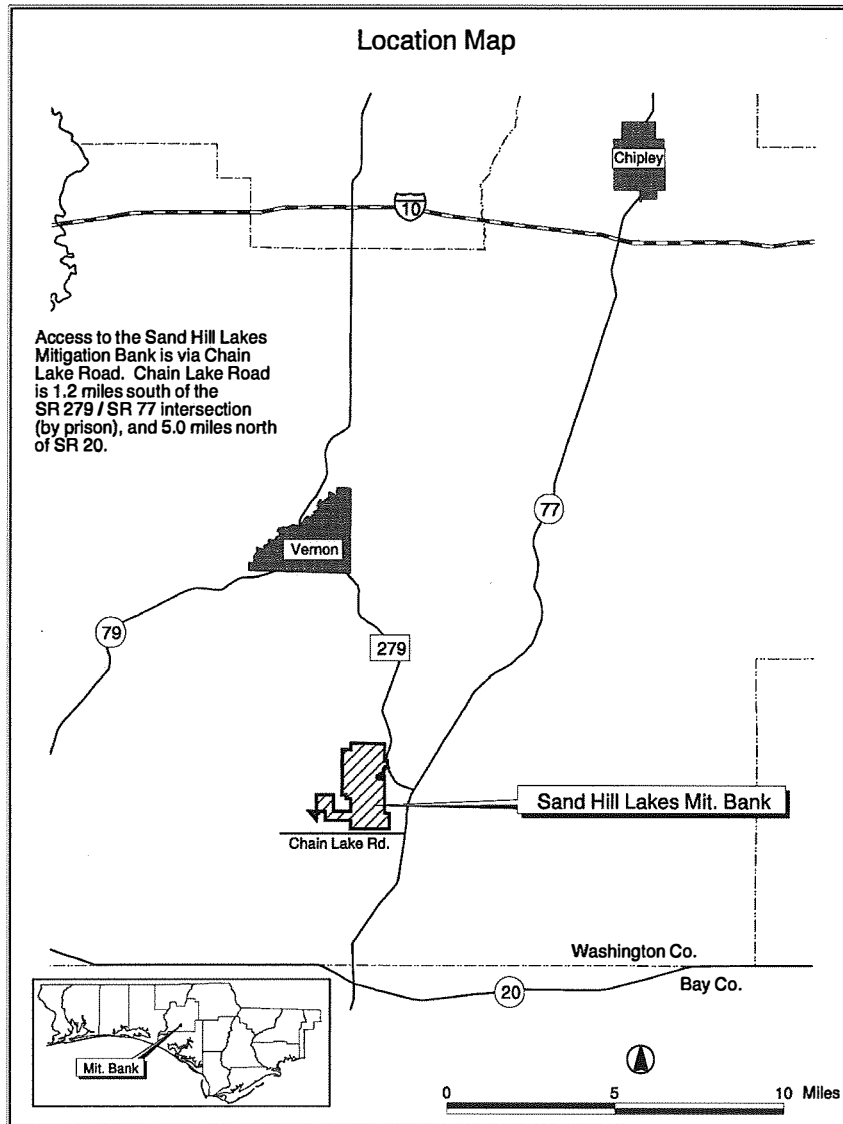
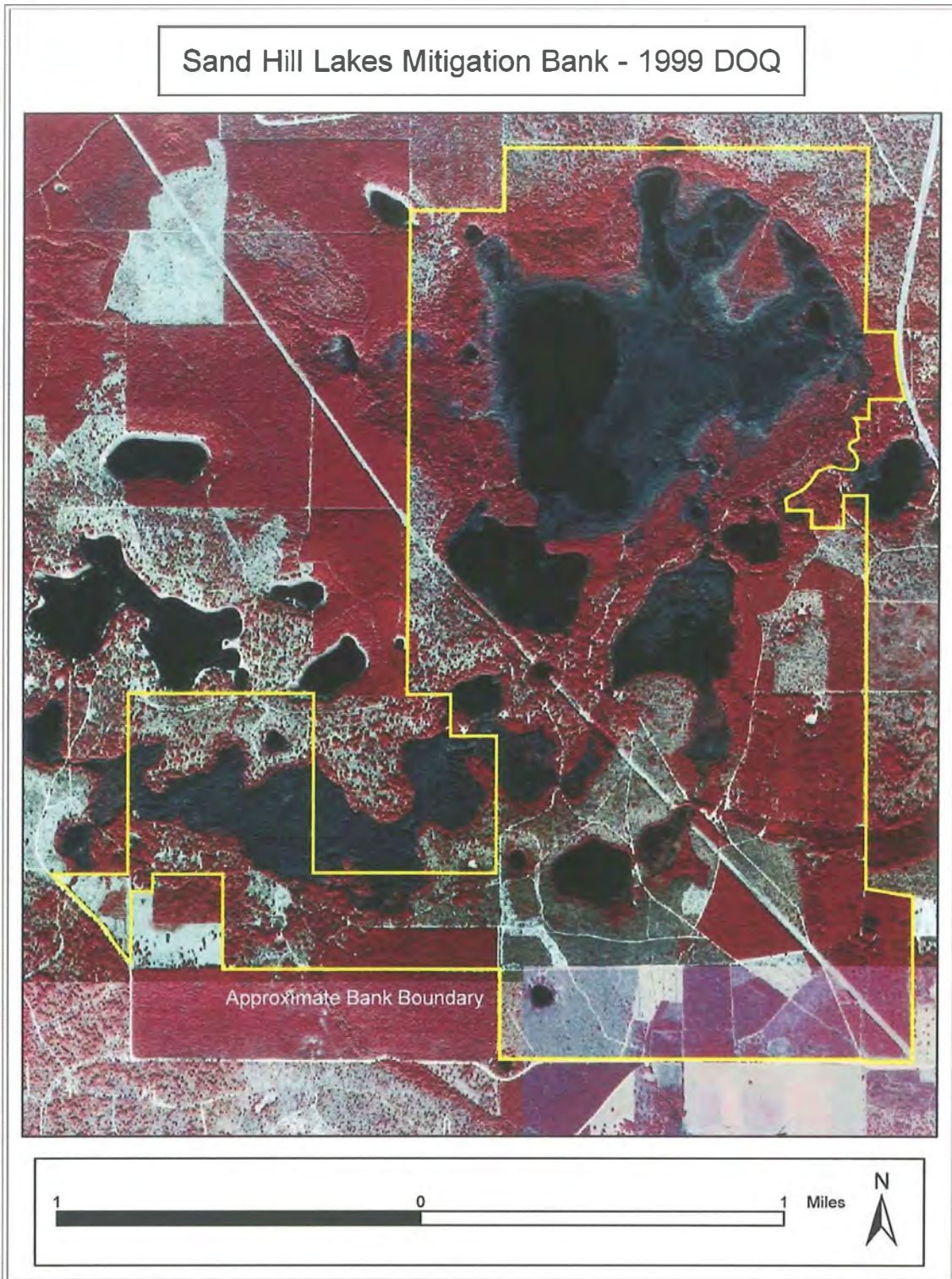


Figure 1a. SHLMB boundary map and habitats



Bank Establishment and Implementation of Permit Requirements Specific Conditions 1-5 7and 8.

The permit for the Sand Hill Lakes Mitigation Bank (SHLMB) was issued by the DEP on September 5, 2005. The ACOE MBI was approved on May 16, 2006. This is the sixth annual combined FDEP and ACOE report for the SHLMB. Perimeter fencing with gates and signs were installed prior to March of 2005. Law enforcement has been conducted at the site since the property was purchased and is ongoing at the SHLMB. No violations have occurred to date at the SHLMB. A conservation easement was recorded for the SHLMB on 2/28/06, preserving the wetland, aquatic and upland communities in perpetuity in accordance with Specific Condition 1. QMS officers Duncan Cairns, Tyler Macmillan and David Clayton were selected by the NFWMD and approved by the DEP and ACOE. In accordance with permit requirements a mitigation fund was established for the bank. An archeological and historic survey was conducted for the SHLMB and approved by the Division of Historical Resources. Construction activities were initiated in July of 2006, in accordance with permit requirements. All mitigation activities listed above were completed by September of 2007.

Mitigation Activities Work Schedule Specific Condition 14.

According to the proposed work schedule for the SHLMB Mitigation Bank Permit and MBI, the majority of the restoration activities were to be initiated during 2005-2006. However, the restoration activities were postponed due to delays in permit issuance, recording of conservation, and additional time needed to complete and approve the archeological study. Consequently, many of the restoration activities were delayed by approximately 1 year. A revised schedule was included in the first monitoring report. In 2008, the majority of the construction and restoration activities were completed and an updated work schedule has been provided (Table 1).

Table 1. Restoration work schedule

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 - Removal of Dykes Mill Pond dam - Removal of road fill at (3) sites - Construction of 2 bridges and replacement of 3 culverts	Initiated 10/07 Completed 1/08 Initiated 7/06 Completed 8/06 Initiated 7/06 Completed 3/07 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 (8/12) Sand pine seedlings were eradicated from 158 acres former sand pine plantation restored to sand hills in August of 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. Hard wood densities were reduced to support a growing population of gopher tortoises. Work was conducted in August of 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 6/07 (Gyro-Track) Completed Pine thinning 10/07 Completed site prep burns following harvest 12/2008
Supplemental wiregrass seeding if necessitated by onsite conditions To date within the 165 acres of hydric pine flatwoods restoration site, 1.18 million wire grass 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 2011, 15 acres of hydric pine flatwoods was planted with 72,600 tooth ache grass and 72,600 mixed herbaceous wildflowers (primarily of three species, autumn sneezeweed, variable leaved sunflower and rayless sunflower) with 600 plants representing 22 species collected at Garcon. In the uplands A total of 273 acre of restored sandhills has been planted with over 950,000 wire grass plugs as of December 2011. In December 2012, a total of 154,880 wire grass and tooth tubelings will be planted in Management Unit 3 (11.5 acres) and an additional 4.5 adjacent acres managed as hydric pine flatwoods bringing the restored acreage of hydric pine flatwoods to 169 acres. Winter 2012/2013 planting 16 acres of wire grass and tooth ache grass on 3' centers in Management Unit 3 and adjacent hydric pine flatwoods.	2008/2012 Planting Completed in 2011*. *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 2004/2005
Fire Management / Monitoring Year 1 / 2 nd Annual Report	Completed 2005/2006 report
Fire Management / Monitoring Year 2/ 3 rd Annual Report	Completed 2007/2008 report,
Fire Management / Monitoring Year3 / 4 th Annual Report	Completed 2009/2010 report
Fire Management / Monitoring Year 4 / 5 th Annual Report	Completed 2010/2011 report
Fire Management / Monitoring Year 5 / 6 th Annual Report	Completed 2012/2013 report
Fire Management / Monitoring Year 6 / 7 th Annual Report	2013/2014 report
Fire Management / Monitoring Year 6 / 8 th Annual Report	2014/2015 report
Perpetual Ecological Management	2016+

Hydrologic Enhancements Specific Condition 12.

Hydrologic enhancements include the complete removal of 2 fill-road crossings, installation of bridges at 3 crossings and 2 culverts and the removal or replacement of 2 failing water control structures, the remediation of 10 erosion areas, the stabilization of 1 boat launching site, and construction of one rain shelter (Figures 3 and 4).

The removal of the failing water control structure at Dykes Mill Pond and construction of three bridges (#1, #3, #7), and two culverts (#9, #10-A-B) was initiated in July 2006 and completed in April of 2007 in accordance with permit conditions (Figure 3). The graded areas were stabilized and seeded in early 2007 with season-appropriate, non-invasive annual grass to reduce potentially turbid runoff. On June 30th, the graded areas were seeded with brown-top millet. Currently all water control structures are functioning properly and water levels have risen to post drought levels.

The removal and re-vegetation of two fill-road crossing was initiated in January of 2007 and completed in March of 2007 (Figure 3). Erosion area #6 was restored in July of 2006 as part of road enhancement project while remediation of the remaining 9 erosion sites was initiated in January and completed in April 2007. Hay bales and silt fences were installed in accordance with the permit requirements (Figure 3 and 4). The areas were planted as each site was completed. Sites were planted in accordance with the approved planting plan. Graded areas were stabilized with annual rye grass and seeded with brown-top millet on June 30, 2007. Sites were monitored during the summer and fall monitoring. Inadvertently, the contractor used Bahia grass hay to stabilize soils at the two erosion areas 1-3 (Cat Pond and the road removal at Deep Edge). The contractor was required to treat each area with herbicide until the Bahia grass was eliminated. Initial treatments occurred in May with subsequent treatments in September. Supplemental wire grass and long leaf pine seedlings will be planted at these sites in 2008. In 2008 seed from the eradicated Bahia grass and or mulch germinated as was again treated with to remove the grass. In addition, poor survival was observed at the erosion sites 1, 2, 4, 5, and 10. Supplemental planting occurred in February 2008 in accordance with the permit requirements. Shrubs were planted at the road fill removal sites in March 2009 in accordance with the planting plan. This action completes the planting requirements for these areas. Additional spot treatments for Bahia grass will continue as needed.

The replacement of the water control structure at Black Pond (#2) was initiated in October 31, 2007 and completed by the end of January 2007.

Finally, the stabilization of one boat launch area on Dry Pond was completed in September 2007. Photographic documentation for all these activities was included in the 2007 report.

Figure 3 - Structures

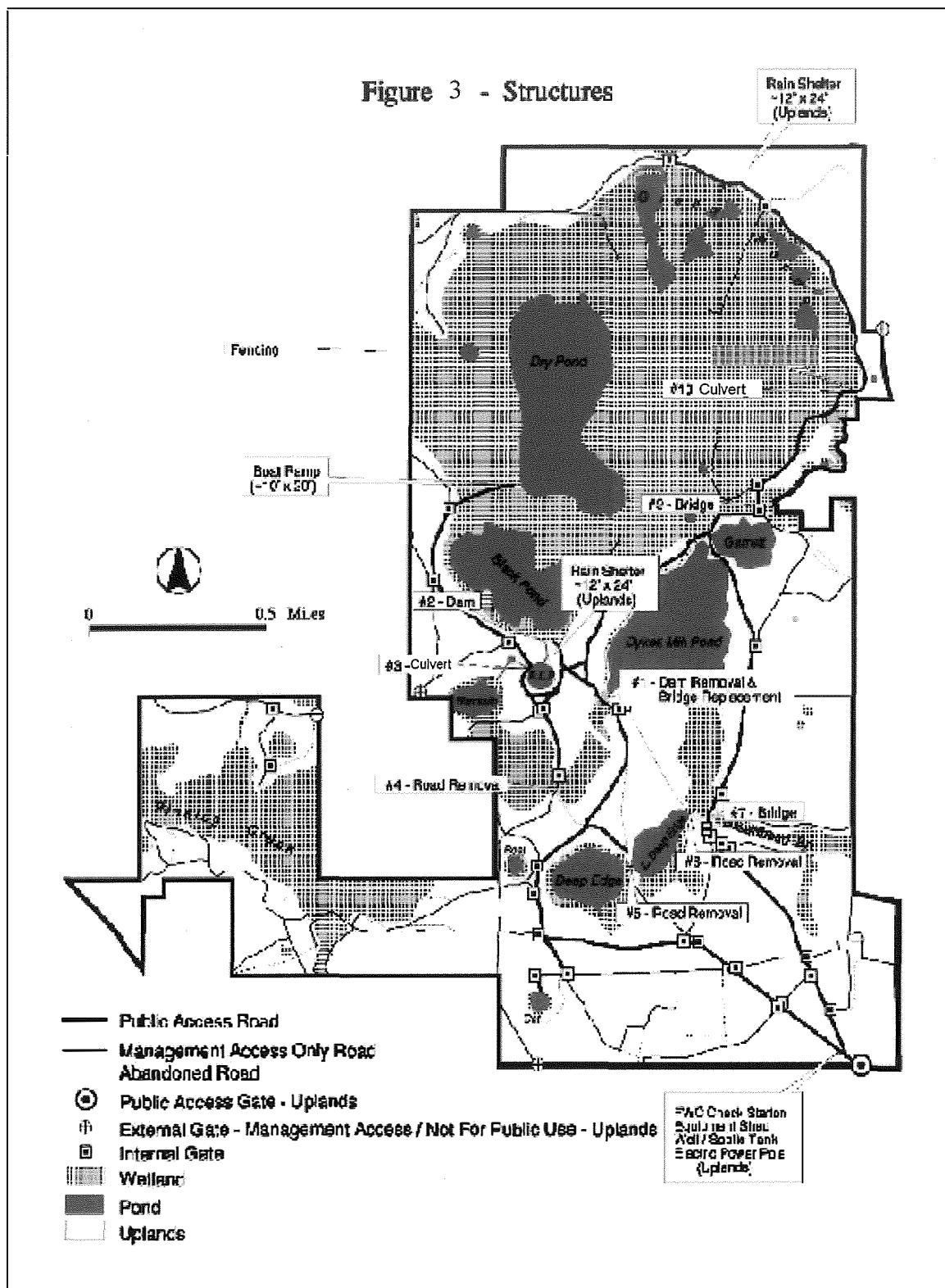
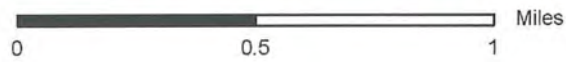
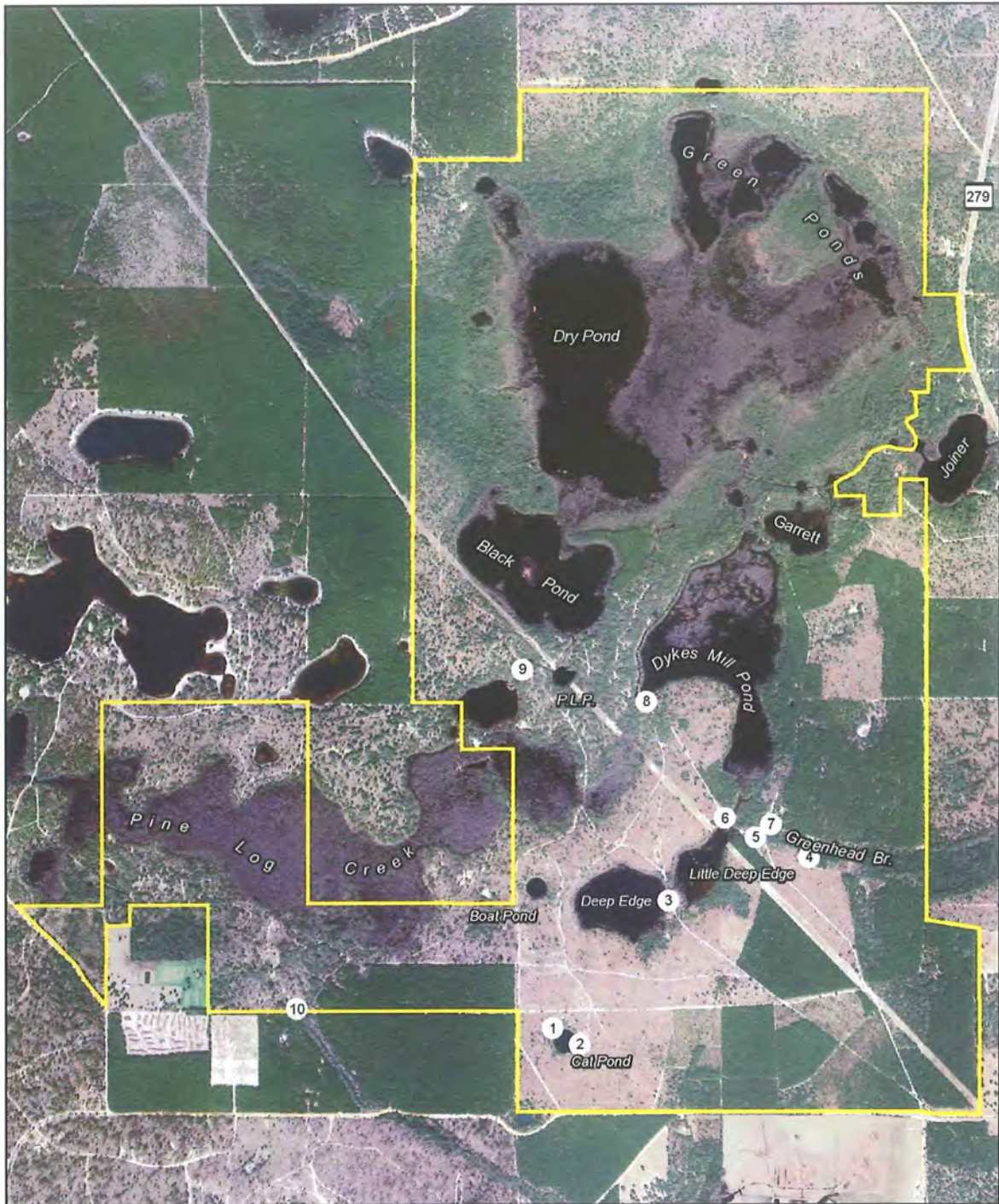


Figure 4 - Erosion Stabilization Sites



Fire Management

Specific Condition 11: Prescribed fire

Attachment E: Fire Management Plan

The bank is divided into 14 Management Units that range from 0.25 to ~580 acres. Prescribed fire is an integral component of the management, enhancement and restoration for six of the management units (Management Units 2, 3, 8, 10, 11, and 12), and will also be used to manage portions of the power line ROW (Figure 5). The remaining Management Units are wetlands or aquatic systems not typically managed with fire, although fire from adjacent Units may be allowed to burn into them when conditions allow. Prescribed burns have generally be conducted during the growing season (March through August), although initial dormant-season fuel-reduction fires have been required in some areas. Burns are planned for 1-3, 3-5 and 5-7 year cycles, although fuel levels, prevailing weather patterns and other on-site conditions may necessitate modification of burn cycles. Burn coverage of 80% or more within a polygon has been considered a successful burn. Prescribed fire is intended to inhibit establishment of woody species, promote fire-adapted species, and stimulate seed production of desirable herbs. Fire prescriptions have been written to comply with open burning laws (Florida Statutes 590) and liability considerations. Safety and protection of property will be the priority concern of the Florida Certified Prescribed Burn Manager (FCMB).

Fire was re-introduced to the SHLMB during the winter of 2004 to portions of Management Unit 11 and 12. Subsequently portions of the sand hills and hydric pine flatwoods were burned during the summer of 2005 with the remaining initial burns completed by December of 2005 in accordance with the Fire Management Plan (Figure 6). In areas with a high fuel loads such as Management Unit 2, 3, 8 and some portions of Management Unit 10 adjacent to Black pond dormant season fuel reduction fires were utilized. However in Management Unit 11 and 12 initial burns reduced fuel loads to the extent that warm season burns were conducted. Wire grass flowered in these areas following the fire and plants appeared healthy. The burns at the SHLMB have also been successful in reducing woody vegetation coverage as well as stimulating a seed bank of fire adapted species. Prior to the initiation of fire, woody goldenrod was the dominant herbaceous species, but the initial fires greatly reduced the woody goldenrod cover and stimulated the wire grass. Currently wire grass is the dominant herbaceous species and the sand hills and wet flatwoods have greatly reduced shrub cover.

In 2007, it was anticipated that 287 acres would be burned during winter 2006/2007. However, due to the extended drought and unsafe fire conditions only 69 acres were burned with 66 acres meeting the 80% requirement. No warm season burns were attempted due to the extended drought.

In 2008, a total of 384 acres of burns are planned at the SHLMB. Warm season burns will be conducted at Garret Pond and adjacent to Pine Log Creek and winter burns will be conducted for the areas with off-site pine removal.

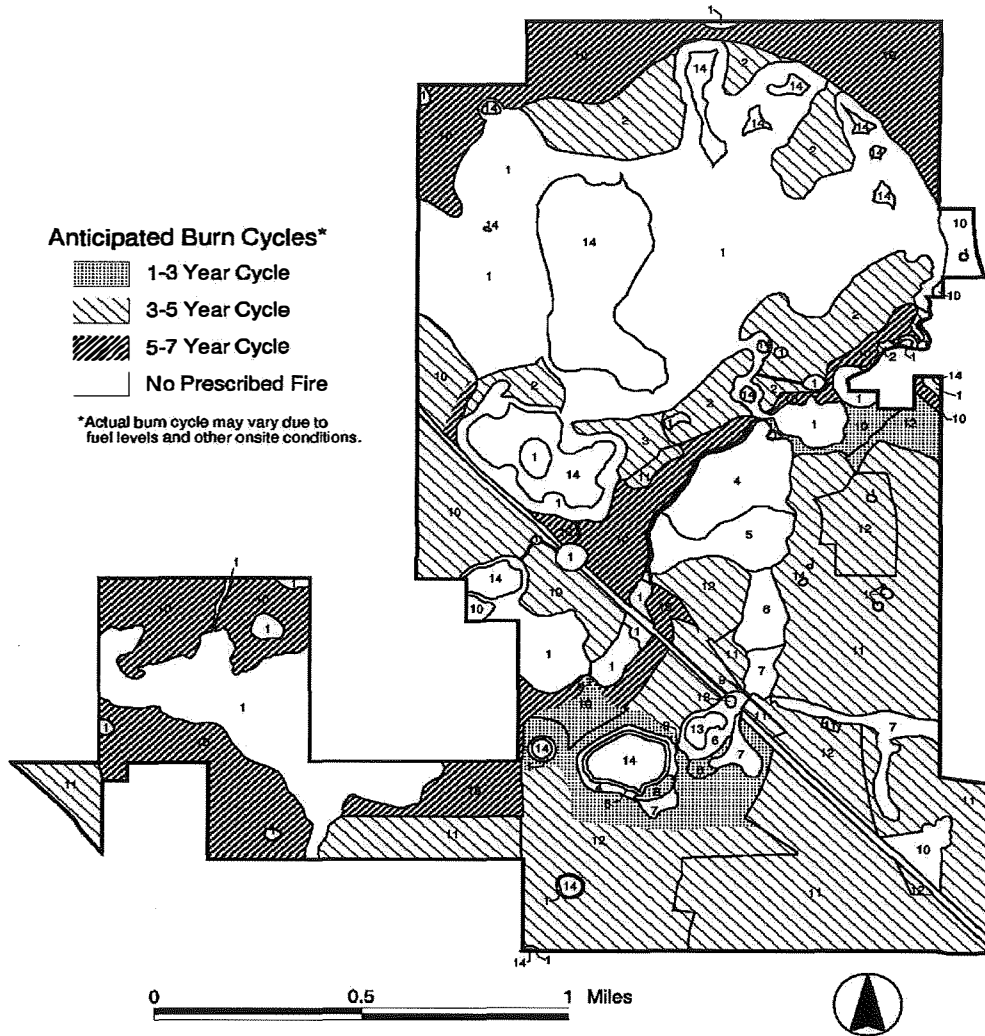
As of 2009, a total of 2 burn cycles have been completed for the entire SHLMB to date although areas requiring more frequent fires such as sand hills and wet flatwoods have had as many as 4 burn cycles completed. During the winter of 2009 a total of 600+ acres were burned in Management Unit 2, 3, 10, 11, 12. Hydric flatwood wetland areas were burned in preparation for planting of wire grass or to reduce the dead shrubs that had been treated with herbicide. In the uplands the sand hill areas that had been treated with ULW to reduce oak coverage were also burned to reduce standing dead shrubs and to stimulate the herbaceous layer.

In 2010, a total of 323 acres were burned, 192 acres were burned during the dormant season and 131 acres were burned during the growing season in Management Unit 10, 11, 12, during 2010.

In 2011, a total of 717 acres were burned in the uplands. A warm season burn was utilized to burn 294 acres and a fall 423 fire was set adjacent to Deep Edge and Little Deep Edge ponds in October to reduce shrub and seedling cover. Planted long leaf pine seedlings exceeded permit conditions in the uplands of 200 trees per acre. This burn was designed to reduce long leaf pine seedling cover by approximately 100-150 trees per acre. Field observations indicate a significant number of long leaf pines had been killed from the fall fire and the areas now on average meet the 200 trees long leaf pine trees per acre.

In 2012, a total of 260 acres have been burned (Figure 7.) These include 169 acres of sandhill restoration that had had the hardwoods reduced in 2011 and 91 acres of hydric pine flatwoods. In addition, the remaining 77 acres of hydric pine flatwood restoration will be burned during the winter of 2012/2013 (Figure 8).

Figure 5 - Anticipated Burn Cycles



Note: Numbers refer to Management Unit No.

Figure 6 - Areas Burned Since Inception of Bank Through 2006

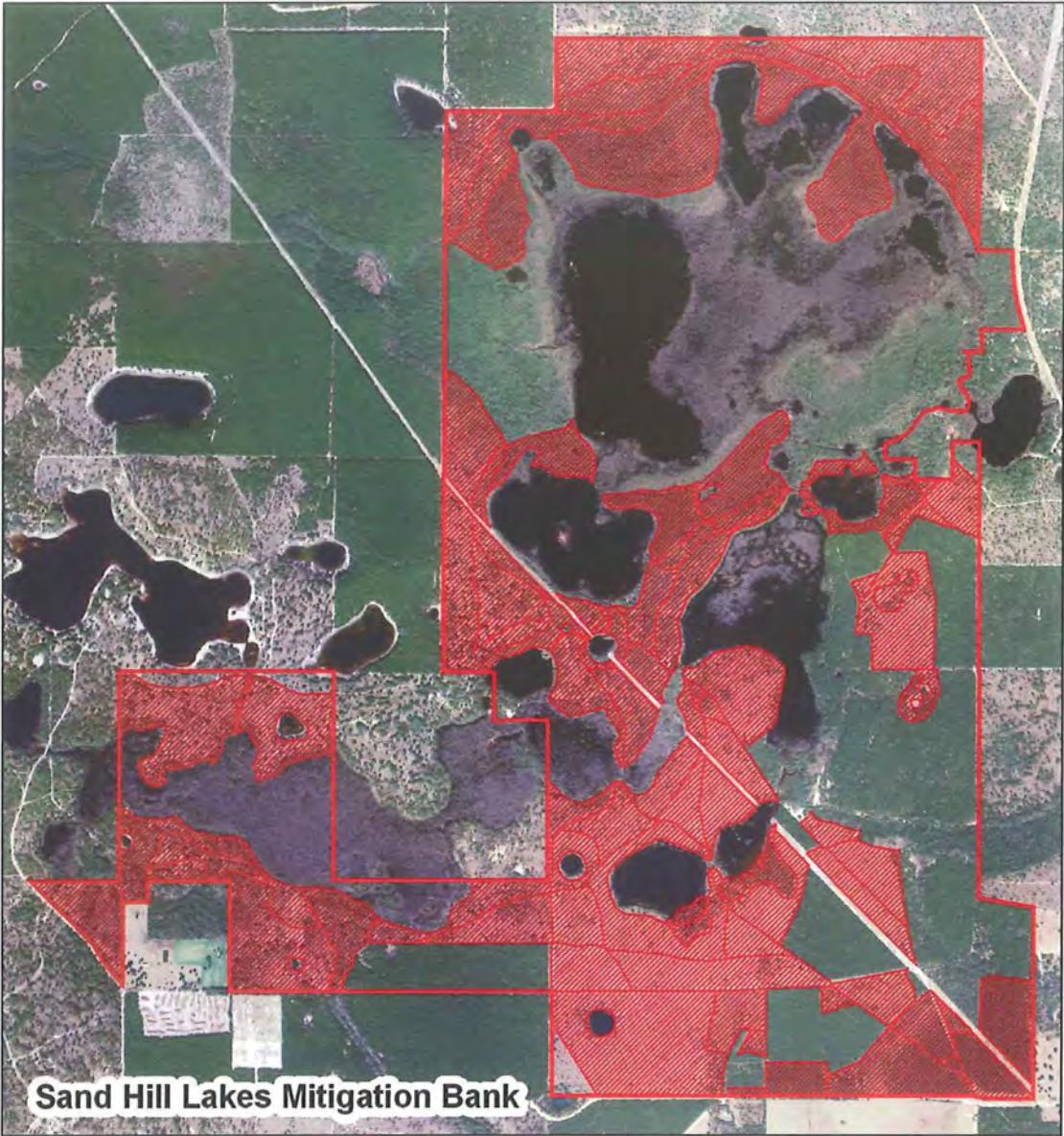
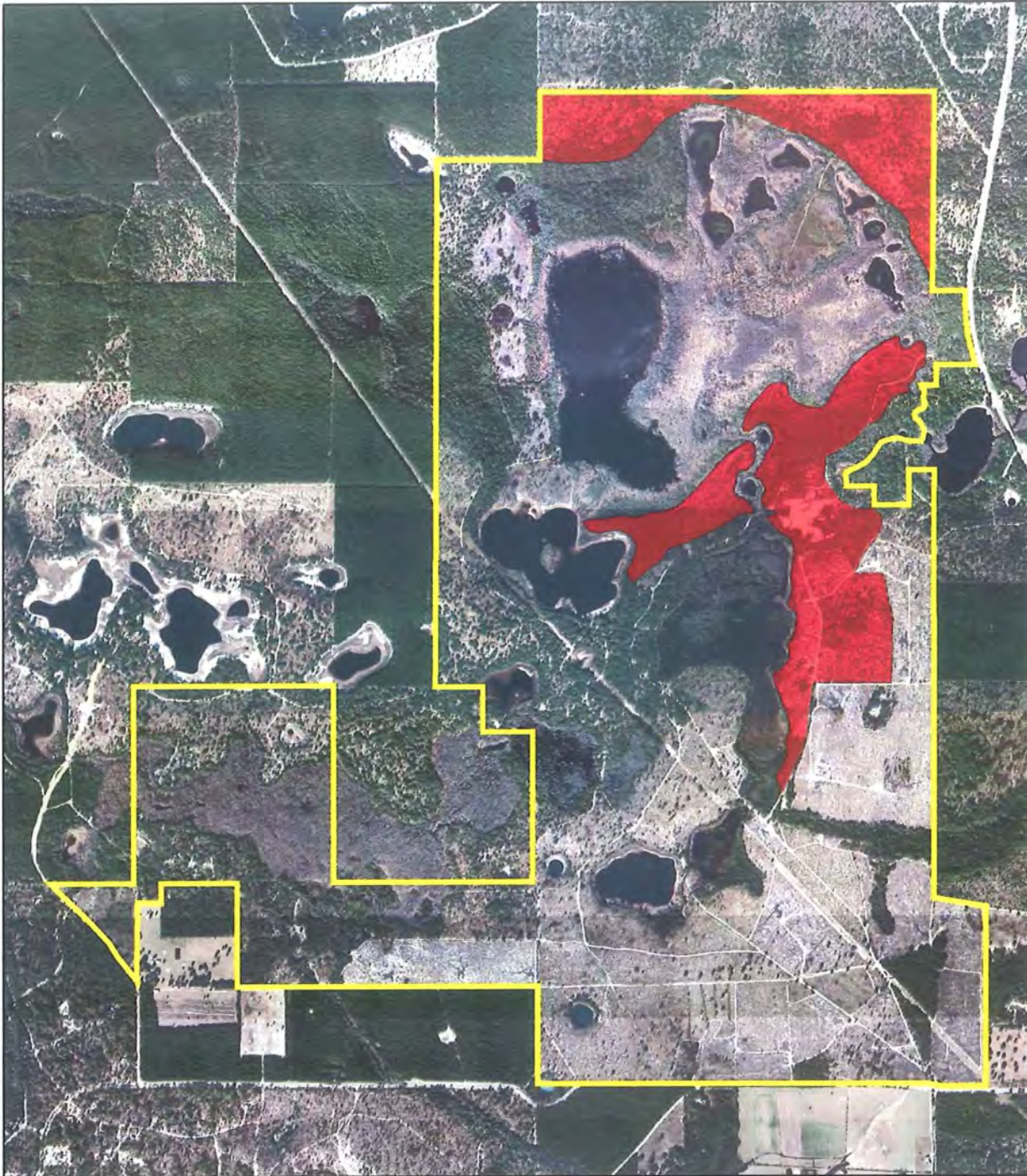


Figure 7. 2012 Burns at SHLMB (260 Acres)

Fall Burns 2012 at SHLMB

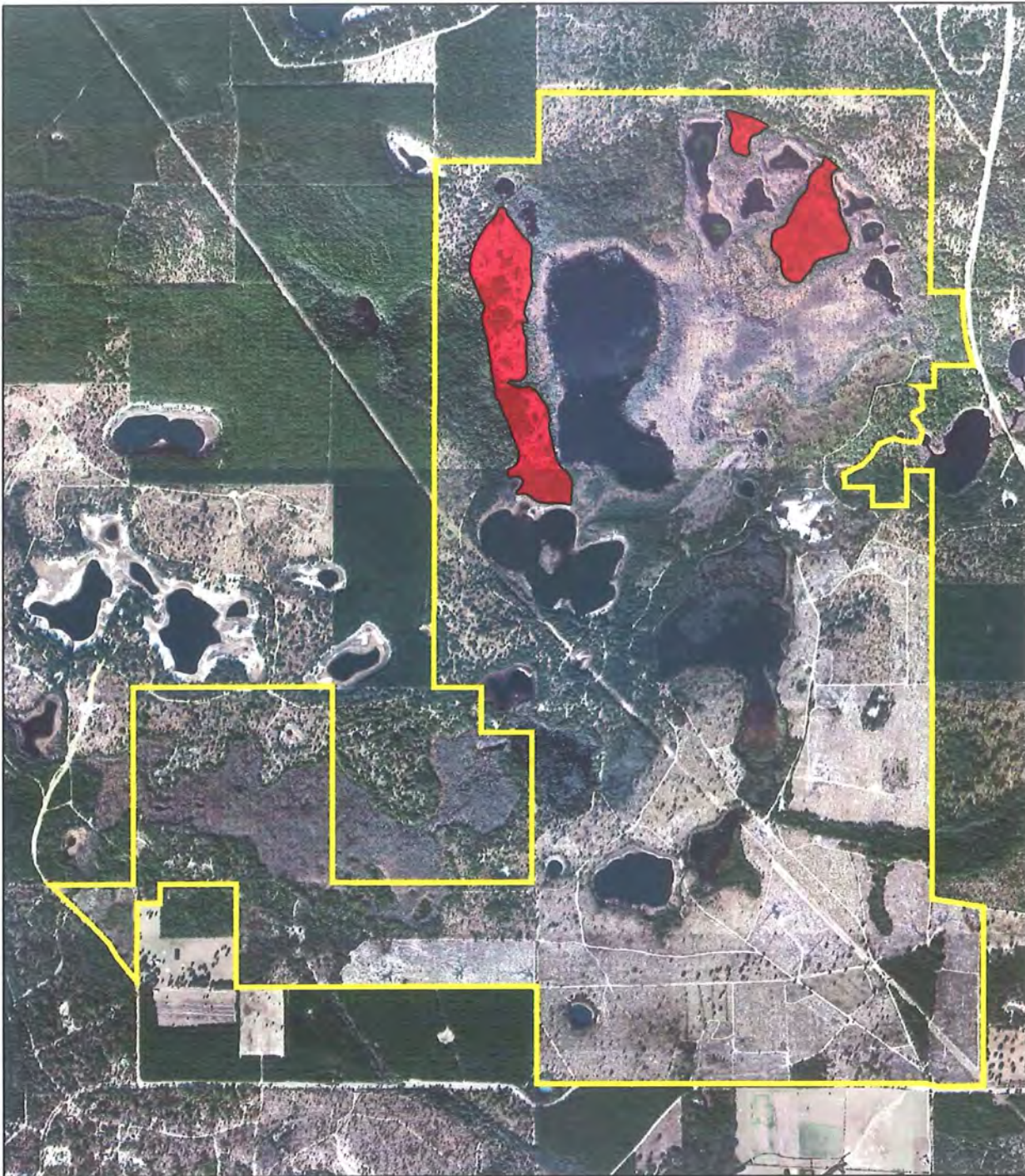


Northwest Florida Water Management District
Sand Hill Lakes Mitigation Bank (SHLMB)
Burn Areas (~260 Acres)
Section 6, Township 1 North, Range 14 West
Washington Co., Florida

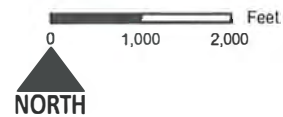


Figure 8. SHLMB 2012/2013 Hydric Pine Winter Burn (77 Acres)

Planned Winter Burns 2012/2013



Northwest Florida Water Management District
Sand Hill Lakes Mitigation Bank (SHLMB)
Winter Burns (~77 Acres)
Section 6, Township 1 North, Range 14 West
Washington Co., Florida



Exotic Fauna and Vegetation Specific Condition 22, 25.

Site-wide: Invasive exotics cover is less than 1% cover in any one acre and nuisance native species are less than 5% cover in any one acre.

Surveys nuisance species have been conducted throughout the year. In 2006, one female hog was trapped and patches of torpedo grass were observed at historic boat launches. These areas were treated by the Bureau of Invasive Plant Management on July 20th 2006. In 2007, several small patches of torpedo grass were again observed at the historic boat launch areas of several ponds. These areas were treated twice with Habitat on July 26th and August 6, 2007. No visible living plant material was observed during subsequent site visits or during the 2008 fall monitoring. Inadvertently the contractor working on the road removal and stabilization of erosion areas used inappropriate Bahia grass hay to stabilize the soils for erosion areas 1 and 2 and 3 the road removal between Deep Edge and Little Deep Edge. The contractor was required to treat these areas with herbicide until the Bahia grass was killed. Treatments occurred in May and September. No living material was observed during the fall monitoring. In the summer of 2008, small patches of Bahia grass developed from the seed bank in the road removal areas and were again treated twice in 2009. In addition, scattered Bahia grass plants were observed on 83 acres adjacent to Green Head Branch that had been planted in sand pine and 53 acres adjacent to the check station that had been planted in slash pine. Based on weeds associated with these areas, it is probably that these sites had been used for agriculture or pasture prior to conversion to sand pine plantations. The Bahia grass in these areas was treated by hand crews twice in 2009 and Bahia grass cover was greatly reduced. In 2010 hand treatment will continue in the areas described above. Some hog damage was observed in 2008 during the drought adjacent to Dry Pond and the Green ponds. However, very limited signs of hogs were observed in 2009, 2010, and 2011. In 2009 and again in 2010, several packs of dogs were observed chasing wildlife harassing day visitors. The County Sherriff and animal control were contacted and helped remove the dogs. It is believed the matter has been resolved. During 2010, a patch of torpedo grass was observed at the boat launch at Dry Pond. The patch was treated by Natur-Chem on December 23, 2010. In 2011, a total of 22 acres of Bahia grass were treated in areas that are being restored to Sandhills from slash pine plantation. Bahia grass cover was less than 5% but increasing. Two successive treatments have resulted in less than 1% cover of the 22 acres. In 2011, minor coverage of torpedo grass was observed at the same boat launch and treated. Similarly in 2012, minor coverage of torpedo grass was again observed at some of the boat launch areas. Torpedo grass will continue to be treated as needed.

Monthly Water Gage Assessments: Attachment H. Monitoring

Water levels gauges were installed and surveyed in on December of 2005 for 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, natural channel from Joiner Lake to the Green Pond, Green Ponds, and Dry Lake (Table 2, Figure 9). The gauges are read monthly by the Florida Wildlife Conservation Commission staff and the results submitted to the NFWFMD (Table 2, Figure 9). In 2006, the water levels were above the gages until April, then from May to December then

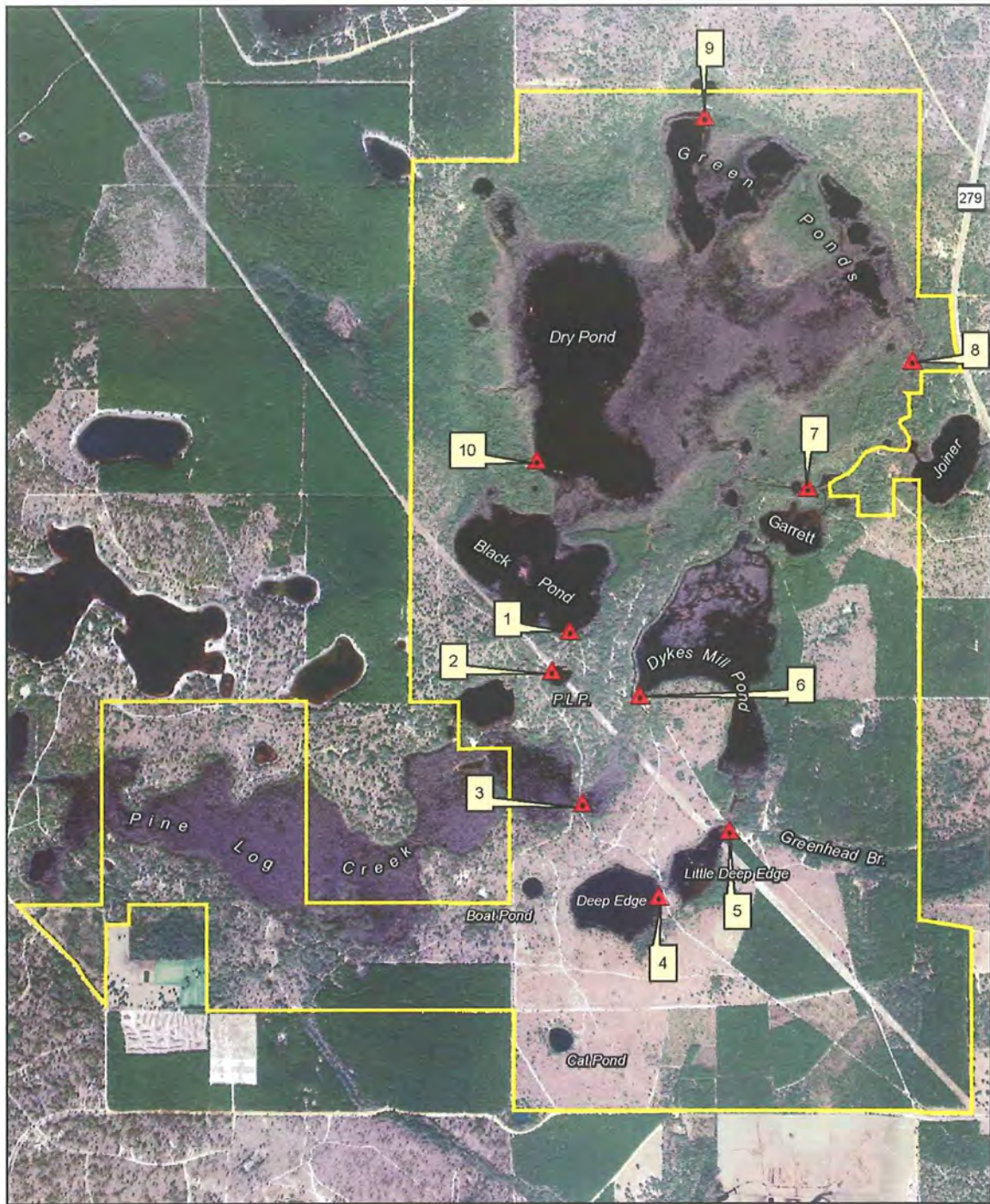
Table 2. Monthly Water Gage Readings for 2012

Carter Tract Water Gauges Readings 2012

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	1/2/2012	1/2/2012	1/2/2012	1/2/2012	1/2/2012	1/2/2012	1/2/2012	1/2/2012	1/2/2012	1/2/2012
Reading	below gauge	below gauge	below gauge	below gauge	1.09	2.80	below gauge	below gauge	below gauge	.60
Date	2/1/2012	2/1/2012	2/1/2012	2/1/2012	2/1/2012	2/1/2012	2/1/2012	2/1/2012	2/1/2012	2/1/2012
Reading	below gauge	below gauge	below gauge	below gauge	.96	2.94	below gauge	below gauge	below gauge	.58
Date	3/2/2012	3/2/2012	3/2/2012	3/2/2012	3/2/2012	3/2/2012	3/2/2012	3/2/2012	3/2/2012	3/2/2012
Reading	below gauge	below gauge	below gauge	below gauge	1.15	3.22	2.40	below gauge	below gauge	.90
Date	4/2/2012	4/2/2012	4/2/2012	4/2/2012	4/2/2012	4/2/2012	4/2/2012	4/2/2012	4/2/2012	4/2/2012
Reading	below gauge	below gauge	below gauge	below gauge	2.24	3.38	2.76	below gauge	below gauge	2.02
Date	5/1/2012	5/1/2012	5/1/2012	5/1/2012	5/1/2012	5/1/2012	5/1/2012	5/1/2012	5/1/2012	5/1/2012
Reading	below gauge	below gauge	below gauge	below gauge	1.80	3.00	below gauge	below gauge	below gauge	1.42
Date	6/1/2012	6/1/2012	6/1/2012	6/1/2012	6/1/2012	6/1/2012	6/1/2012	6/1/2012	6/1/2012	6/1/2012
Reading	below gauge	below gauge	below gauge	below gauge	.90	2.72	below gauge	below gauge	below gauge	.98
Date	7/2/2012	7/2/2012	7/2/2012	7/2/2012	7/2/2012	7/2/2012	7/2/2012	7/2/2012	7/2/2012	7/2/2012
Reading	below gauge	below gauge	below gauge	below gauge	0.98	2.94	below gauge	below gauge	below gauge	1.02
Date	8/1/2012	8/1/2012	8/1/2012	8/1/2012	8/1/2012	8/1/2012	8/1/2012	8/1/2012	8/1/2012	8/1/2012
Reading	below gauge	below gauge	below gauge	below gauge	1.45	3.04	below gauge	below gauge	below gauge	.88
Date	9/3/2012	9/3/2012	9/3/2012	9/3/2012	9/3/2012	9/3/2012	9/3/2012	9/3/2012	9/3/2012	9/3/2012
Reading	below gauge	below gauge	below gauge	below gauge	2.16	3.45	below gauge	below gauge	below gauge	1.35
Date	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012	10/1/2012
Reading	below gauge	below gauge	1.30	below gauge	2.85	3.67	1.98	below gauge	below gauge	1.85
Date	11/5/2012	11/5/2012	11/5/2012	11/5/2012	11/5/2012	11/5/2012	11/5/2012	11/5/2012	11/5/2012	11/5/2012
Reading	below gauge	below gauge	below gauge	below gauge	2.40	3.32	below gauge	below gauge	below gauge	1.35
Date	12/3/2012	12/3/2012	12/3/2012	12/3/2012	12/3/2012	12/3/2012	12/3/2012	12/3/2012	12/3/2012	12/3/2012
Reading	below gauge	below gauge	below gauge	below gauge	2.00	3.32	below gauge	below gauge	below gauge	1.02

<Gage = Water level was down slope of staff gage. DRY = Site is dry. No data – site was inaccessible or unread

Figure 9 - Water Level Staff Gage Locations



▲ = Staff Gage (Installed 2005)

0 0.5 1 Miles



water levels were below the staff gages for all but Little Deep Edge and Dykes Mill Pond. The drought continued in 2007 and 2008. In 2009, the extended drought subsided and the Green Ponds that had dried down, along with the Power line pond and Pine Log Creek and Joiner canal were once again filled with water and the water levels at Deep Edge, Black and Dry Pond levels returned to pre-drought levels. The water levels in 2010 were more typical of a normal water year, similar to 2009. Heavy rains in February and March of 2010 raised water levels submerging the gages in Black Pond, Green Ponds and Dry Ponds. Deep Edge, a karst and ground water dependent pond, however, staged up much slower than the other ponds showing a lag of two months before the water level was high enough to record a positive reading. In 2011, there was a continued drought and with little rainfall. Water levels at most of the water bodies were below the gauge from June till December. Despite the return to a “normal” rainfall year in 2012, according to the NOAA drought index map, the ponds and water bodies remained at or near draw down conditions. The exceptions being Deep Edge Pond, Dry Pond and Dykes Mill Pond’s where water levels remained above the staff gages. Deep Edge and Dykes Mill Pond may have more stable water levels as they receive ground water from seepage stream and Deep Edge has a groundwater connection.

Sand Hill Restoration

Activities: oak & sand pine eradication, long leaf pine planting, wire grass planting

Specific Condition 10, Community restoration

Oak eradication, Specific Condition 10b.

A total of 1,150 acres longleaf pine / wiregrass community, live oak forest and other buffer habitats occur on the SHLMB. The NFWFMD will provide perpetual ecological management for these habitats. Oak eradication in Management Unit 12 was completed for the majority of the site in August of 2005 with a small remaining portion completed in September of 2006. Turkey and live oaks were reduced to less than 150 trees per acre and stumps were painted with an approved herbicide to reduce stump sprouts. Similarly, oak coverage was reduced for significant acreage in Management Unit 10 in September of 2006. These areas have excellent wire grass cover and a developed understory of sand hill species. To date a total of 550 acres of sandhills have had the oaks thinned, far exceeding permit requirements (Figure 10).

In 2007, these areas were again burned, but it was noted that the thinned oaks and hardwoods had re-sprouted and oak densities from the sprouts had increased exceeding target densities. These areas were monitored in 2008, and increasing cover of oaks was observed.

In April of 2009, a comprehensive field review of the uplands at the SHLMB was conducted to determine if additional oak reduction was required. It was determined that oak numbers from re-sprout were significant and threatened to shade out the wire grass and the oak numbers should be further reduced. Two treatment types were utilized, hand application for small areas or areas adjacent to acceptable oak numbers, and aerial application to treat large areas. The prescription was based on previous experience in similar habitats and a rate of 1.67 pounds per acre of Velpar ULW (granular herbicide) was applied to 546 acres in May of 2009. In 2010, the areas with the wire grass browning appeared much healthier and are starting to recover.

In 2011, hardwood eradication was conducted within a total of 355 acres. Target species within Management Unit 10 included sparkleberry, high bush blue berry, water oak and diamond oak that grew rapidly following the Velpar treatment. In addition, oaks and persimmons were removed from 144 acres in Management Unit 12. Persimmon was the dominant tree with over 300 per acre and benefitted from the Velpar treatment. The combination of hand removal and prescribed fire should lower tree densities to meet release criteria densities.

In 2012, a total of 158 acres of former sand pine plantation restored to Sand Hill community had sand pine seedlings eradicated in August (Figure 10). Results of the treatment were excellent and no further seedlings are expected to emerge from the seed bank. In addition 40 acres of hardwoods were thinned in Management Unit 11 and portions of Management Unit 12 (Figure 10a.). An expanding population of gopher tortoise, a state threatened species occur in the area. Developing hardwoods were degrading the habitat by shading out wire grass and other sandhill grasses and forbs. The eradication of the hardwoods is expected to improve gopher tortoise habitat as well as ensure favorable conditions for wire grass and other sand hill species.

Pine Plantation Harvest and Restoration Activities

Specific Condition 10a.

Restoration activities for the existing sand pine plantation (~385 acres) and slash pine plantations (11.5 acres) were initiated in June, 2007. The sand pine and slash pine plantations harvest began on June 15 and completed in November 16, 2007. All sand pine and slash pine scheduled for removal was completed in accordance with permit requirements. These areas were burned in the fall of 2008 and 319 acres were replant in the winter of 2008/2009 with long leaf pine. The planted long leaf pine established well with excellent survival. Following the sand pine plantation harvest, in 2007, remnant shrubs and hardwood cover that had been suppressed by the pine overstory has greatly increased in the last three years. Following the removal of the sand pine, shrubs that had been suppressed by limiting light, emerged and were starting to shade out the developing understory. In 2010, a total 150 acres of shrub reduction was conducted in areas of Management Unit 12. The hardwood stems were hand cut and painted with Garlon to prevent re-sprouting.

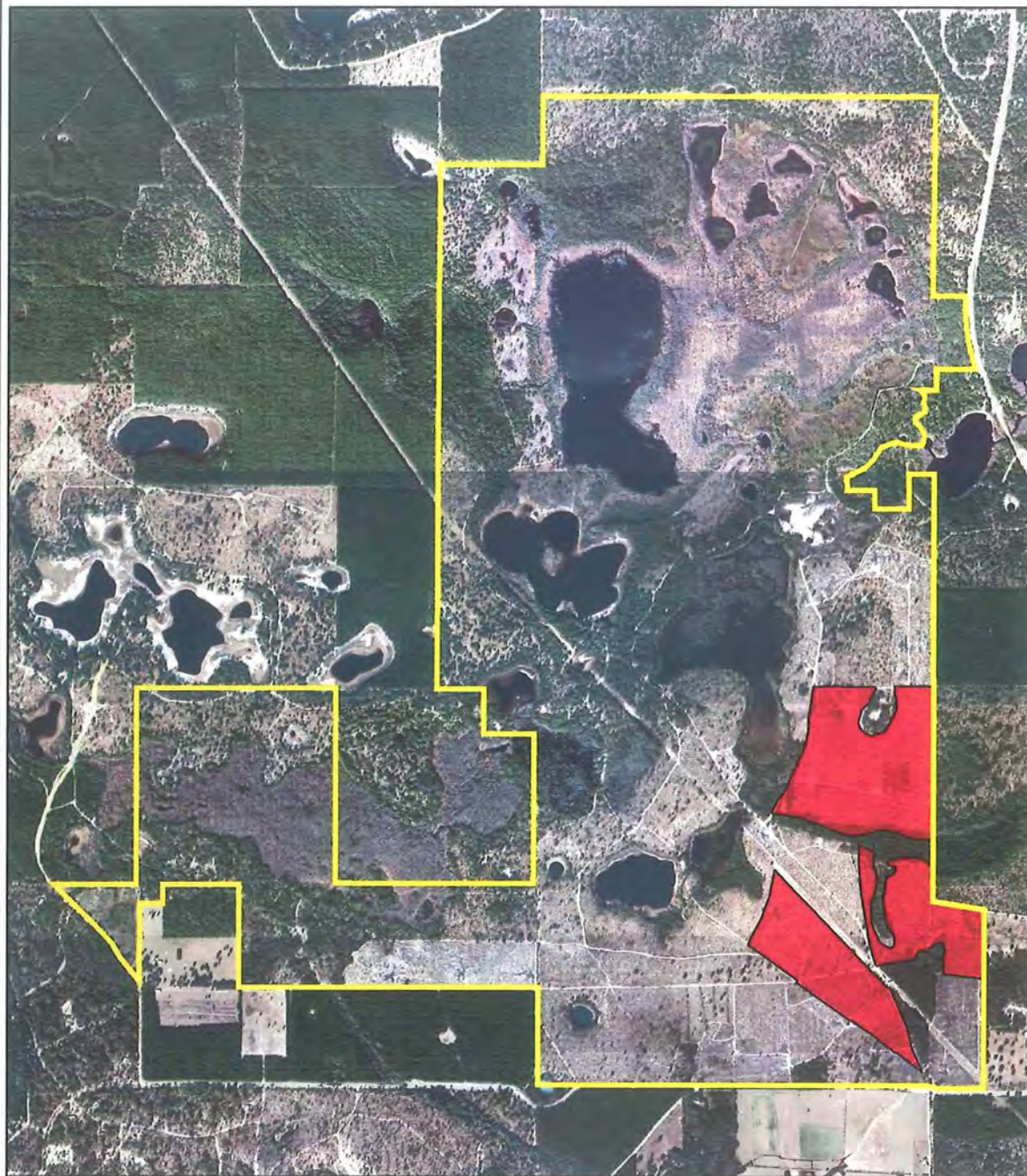
Long Leaf Pine Planting

Specific Condition 10c. Attachment D.

Prior to permit issuance, longleaf pine seedlings were planted in portions of Management Unit 12 in the winter of 2004. However, intense winter burns in early 2007 destroyed most of the planted. Additional plantings of longleaf pine at a rate of 436 trees per acre occurred in Management Unit 12 and portions of Management Unit 10 during the dormant season of 2007/2008. In 2011, fall burns were used to reduce long leaf pine densities in the restored sandhill. During the next fall sampling, the long leaf pine densities will be determined. In 2012, long leaf pine counts revealed near failure of long leaf pine plantings for Management Unit 10 at the most northern part of the bank near the Green Ponds and for a small component of Management Unit 12 found within the sandhill restoration east of Dykes Mill Pond. Management Unit 10 was historically a sandhill that in the absence of fire had become hardwood dominated. Following the initial fires, suppressed wire grass and sand hill species emerged. While the primary management prescription for this area was fire on 5 year intervals, based on remnant vegetation, additional fires and Velpar (granular herbicide) was used to eradicate hardwoods. The area was then planted with long leaf pine, and wire grass, however due to the drought tree survival was poor and a supplemental long leaf pine planting is needed to help move fire across the landscape (Figure 10b).

Figure 10. 2012 Sand Pine Seedling Eradication (158 acres) (Management Unit 11, Restored Sandhill)

Sand Pine Seedling Eradication - August, 2012



Northwest Florida Water Management District
Sand Hill Lakes Mitigation Bank (SHLMB)
Sand Pine Seedling Eradication (~158 Acres)
Section 6, Township 1 North, Range 14 West
Washington Co., Florida



Figure 10a. 2012 Hardwood Eradication (40 acres) (Management Unit 11 - 12 Restored Sandhill)



Northwest Florida Water Management District
Sand Hill Lakes Mitigation Bank (SHLMB)
Hardwood Eradication (~40 Acres)
Section 6, Township 1 North, Range 14 West
Washington Co., Florida

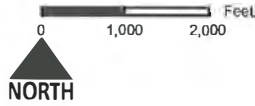
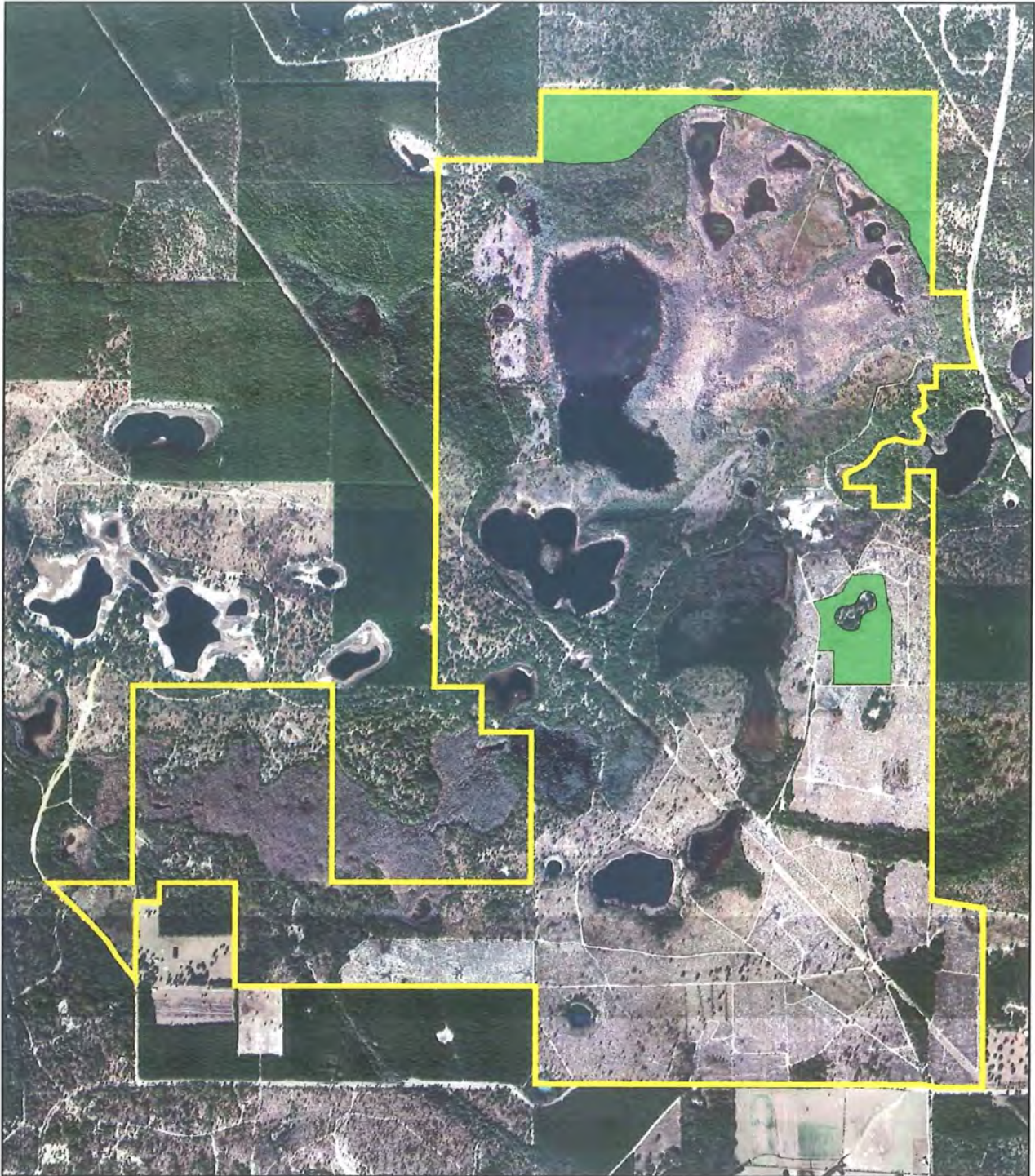
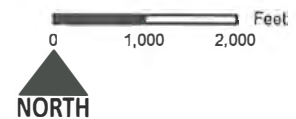


Figure 10b. Long Leaf Pine Planting (202 acres) Winter of 2012/2013

Longleaf Pine Seedling Planting - Winter 2012/13



Northwest Florida Water Management District
Sand Hill Lakes Mitigation Bank (SHLMB)
Planting Areas (~120 Acres, 303 trees/acre)
Section 6, Township 1 North, Range 14 West
Washington Co., Florida



Upland Wire Grass Planting
Specific Condition 10c, Attachment D.

The majority of the areas with sand pine plantation had remnant sand hill species in the understory prior to harvest of the sand pine. Once the sand pine was removed, the sand hill seed bank and remnant wire grass greatly increased in cover in response to added light. However, in areas where few sand hill species were observed or areas without wire grass, wire grass tubelings have been planted. Due to limited seed source a maximum of 30 acres each year was planted in accordance with the permit requirements. In 2008, 53 acres of historic sand hill were planted with upland wire grass tubelings on 3' centers (256,520 plants). In 2009, an additional 27 acres of upland wire grass tubelings were planted on 3' centers (130,680 plants) in areas where the sand hill species were absent. An additional 30 acres of upland wire grass tubelings were planted in 2010. As of December 2011, a total of 170 acres of upland wire grass tubelings have been planted for a total of 822,800 tubelings. Upland wire grass planting was completed for the sandhills in December of 2011.

Wet Flatwoods Restoration
Specific Condition 10c Attachment D.

According to the permit requirements, 147 acres of wet flatwood restoration was scheduled to occur at the SHLMB, Management Unit 2. However, District staff identified and additional 18 acres that were historic wet flatwoods and added this acreage to Management Unit two for a total acreage of 165 acres of wet flatwoods restoration (Figure 11). Standing biomass of shrubs (primarily titi, gallberry and fetterbush) has been reduced to ground level with the use of a Gyro-Trac followed by winter burns. The Gyro-Track work was initiated on March 13 and was completed by August 20, 2007. The black titi in these areas was extremely thick often with a dbh of 10-14" and 25 – 30' tall. Even with the large "tree" size black titi, the Gyro-Track was excellent in reducing the thick dense shrub cover to ground level. There were no noticeable track marks or ruts left by the Gyro-Track. The mulch within these areas was allowed to dry for several months prior to burning. Sites were burned in December of 2007.

By March 2008, it was apparent, that while the shrub cover was greatly reduced, re-sprouting of the shrubs had occurred in all Gyro-Trac areas. Average shrub densities were determined through randomly established transects and stems per meter squared were determined. In areas with a hot fire 50-80 stems per meter squared were observed while in areas with an incomplete burn, 100 to 135 stems per meter squared were common. Based on these observations, the shrubs would return if not significantly reduced further. In an effort to determine if selected herbicides could aid in reducing shrubs numbers to an acceptable level, two polygons, the Whale, a 12 acre polygon adjacent to the Dry Pond parking, and a 16.2 acre polygon adjacent to Dry Pond and the slash pine restoration sites were chosen. These two areas were treated twice by Entrix with appropriate wetland approved herbicides, once in July and again in September. The 16.2 acre polygon was burned in the winter of 2008-2009 with a very hot fire. The 16.2 acre polygon was planted with wire grass plugs while the whale, had previously been direct seeded with wire grass seed. Preliminary results indicate that the shrub cover was greatly reduced from greater than 85% cover to less than 15% cover. Based on the positive results in these areas, herbicide was used to reduce shrub cover throughout the 165 acres of wet flatwood restoration. In 2008, 2009, and 2010 a total of 165 acres of wet pine flatwoods areas that had shrub reduction were treated with selective herbicides to further reduce shrub cover. Shrubs were hand treated two times in 2008, April and October, three times in 2009, (April, July and October) and two times in July and September of 2010. In 2007, following the Gyro-Trac treatment followed by a burn, the shrub densities were reduced from nearly 100% at the baseline to 49%. Following the burn in areas where the herbicide work was initiated going into the fall, percent cover in those areas averaged 5% shrub cover, while areas that were treated one year following average

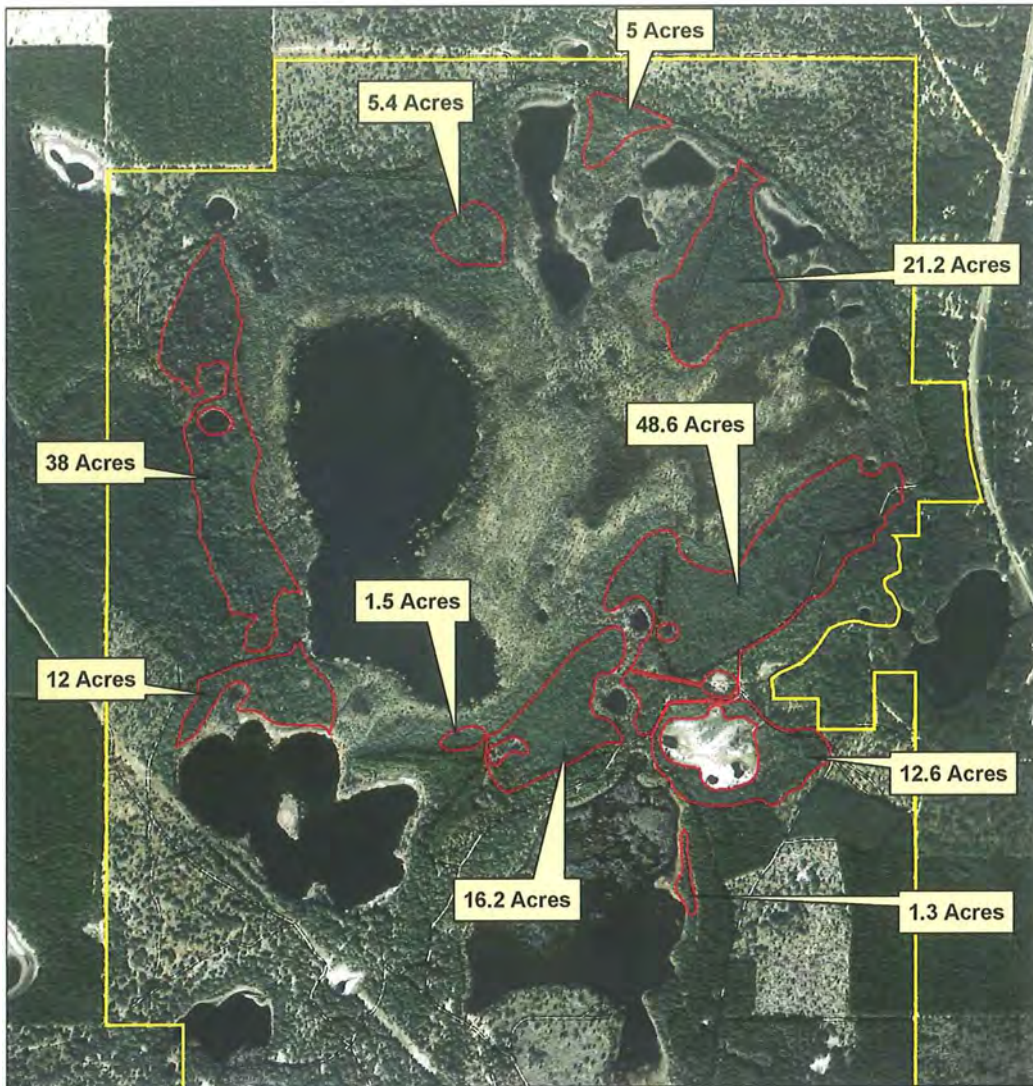
16.2% cover in 2010. Overall the flatwood restoration sites averaged 10% shrub cover 3 years following the implementation of restoration activities.

Additional spot treatments to further reduce shrub densities will continue in 2011, however, the sites are developing as wet pine flatwoods. It is not anticipated that extensive herbicide use will be needed in the future once warm season burns can be established. Bare ground averaged 39% in 2008 and increased to 55% due to the reduction in shrub cover. The planting of additional wire grass plug and wet flatwood species should increase species diversity and cover over time. The occurrence of herbaceous wet flatwood species averaged 1 species in 2007, but has increased to 8 species in 2010. Percent cover of herbaceous wet flatwood species averaged 8.7%, in 2007, and increased by 12% to 20.7 % in 2010. Wire grass cover also increased from an average 2% in 2008 to 9% in 2010, a 7% increase.

The initial wire grass planting on 3' centers (800,000 tubelings) for the wet flatwoods areas (165 acres) was completed in 2009. In April of 2010, these areas were evaluated for wire grass survival and density of plants. Some areas had excellent survival of wire grass plugs while only about half of the wire grass plugs survived in other areas. As a result an additional 8,834 tubelings were planted in areas with poor survival. The final planting occurred in the winter of 2011. To date within the 165 acres of hydric pine flatwoods restoration site, 1.18 million wire grass 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 2011, 15 acres of hydric pine flatwoods was planted with 72,600 tooth ache grass and 72,600 mixed herbaceous wildflowers (primarily of three species, autumn sneezeweed, variable leaved sunflower and rayless sunflower) with 600 plants representing 22 species collected at Garcon. It is hoped that the added diversity will become established within these 15 acre "islands" and spread across the landscape. In 2012, the planted mixed wildflowers had moderate to good survival in most areas. Plants were vigorous in most areas, particularly around Garret Pond. Most had good flowering in October and it hoped they will have a good seed set.

In Management Unit 3, Planted slash pine area restored to wet flatwoods), the shrub layer was limited due to the dense overstory of planted pine. Wet flatwood herbaceous species were more common in these areas after the initial warm season burn (2006) and recent slash pine thinning (2007). The initial fire in this area reduced most of the shrubs to coppice sprouts. It was hoped that the shrubs in this area could be managed through successive warm season fires. The fire was conducted for Management Unit 3 in December 2008. The burn had good coverage and shrubs were reduced to the ground level. However, shrub cover increased following the thinning of the pine, and the area was burned during the winter of 2009/2010. In 2010, the restored wet flatwoods were again treated with select herbicide applied with hand crews to further reduce the shrub cover. In 2012, tree counts determined that the area needed to be re-thinned to meet permit requirements. Trees were thinned to less than 200 trees per acre in late summer 2012 (Figure 12). During the fall/winter of 2012/2013 and additional 77,440 wire grass and tooth ache grass will be planted in Management Unit 3 (11.5 acres, Hydric Pine Plantation Restoration). An additional 3.5 adjacent acres of hydric pine plantation will also receive wire grass and tooth ache tubelings on 3' centers (14,520 each) (Figure 12).

Figure 11. Pine Flatwood Restoration Areas
Brush Reduction



Northwest Florida Water Management District
Sand Hill Lakes Mitigation Bank (SHLMB)
Brush Reduction (Gyro-Track Mulching) - ~165 Acres
Section 6, Township 1 North, Range 14 West
Washington Co., Florida

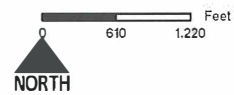
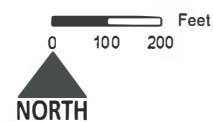


Figure 12. Slash Pine Thinning/Wire grass/toothache grass planting areas (16 acres) (Winter 2012/2013).

Slash Pine Thinning, Toothache & Wiregrass Planting - 2012



Northwest Florida Water Management District
Sand Hill Lakes Mitigation Bank (SHLMB)
Slash Pine Thinning,
Toothache & Wiregrass Planting Areas (~16 Acres)
Section 6, Township 1 North, Range 14 West
Washington Co., Florida



Annual Monitoring

In accordance with Specific Condition 26, and 28, all sampling locations have been identified (Figure 13). Fall monitoring methods as well as data analysis are described below. Pedestrian surveys and photographic documentation for each year can be found at the District's website: <http://www.nwfwmdwetlands.com/index.php>. Similarly, Oblique aerials of the SHLMB for each monitoring year can be found at the District website (see above).

The 2011-12 Annual report by the Florida Fish and Conservation Commission was completed in October 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 second annual monitoring report for the SHLMB.

The percent vegetation cover was monitored at transect locations shown in Figure 13. One-meter square quadrats were established along 600' transects at 20' intervals. In addition, each transect contained a permanently established photographic documentation stations, where qualitative quadrat (north, east, south, and west) observations were recorded (Appendix 4). Transect termini will be marked using iron rebar surrounded by PVC pipe.

Vegetation species coverage statistics were developed from the recorded coverage of each species (or bare ground or open water) within a given quadrat. 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, such as wetland species, invasive exotic and nuisance species, and 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 will be 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>. **Please note: photographic station 12 was abandoned as it was not placed in the correct habitat. The photographic station was inadvertently placed in a mesic hammock on the edge of management unit 2. To remedy this, a new photo point 12b was established in the in management unit 2 to the south of the original photo point (Figure 13).**

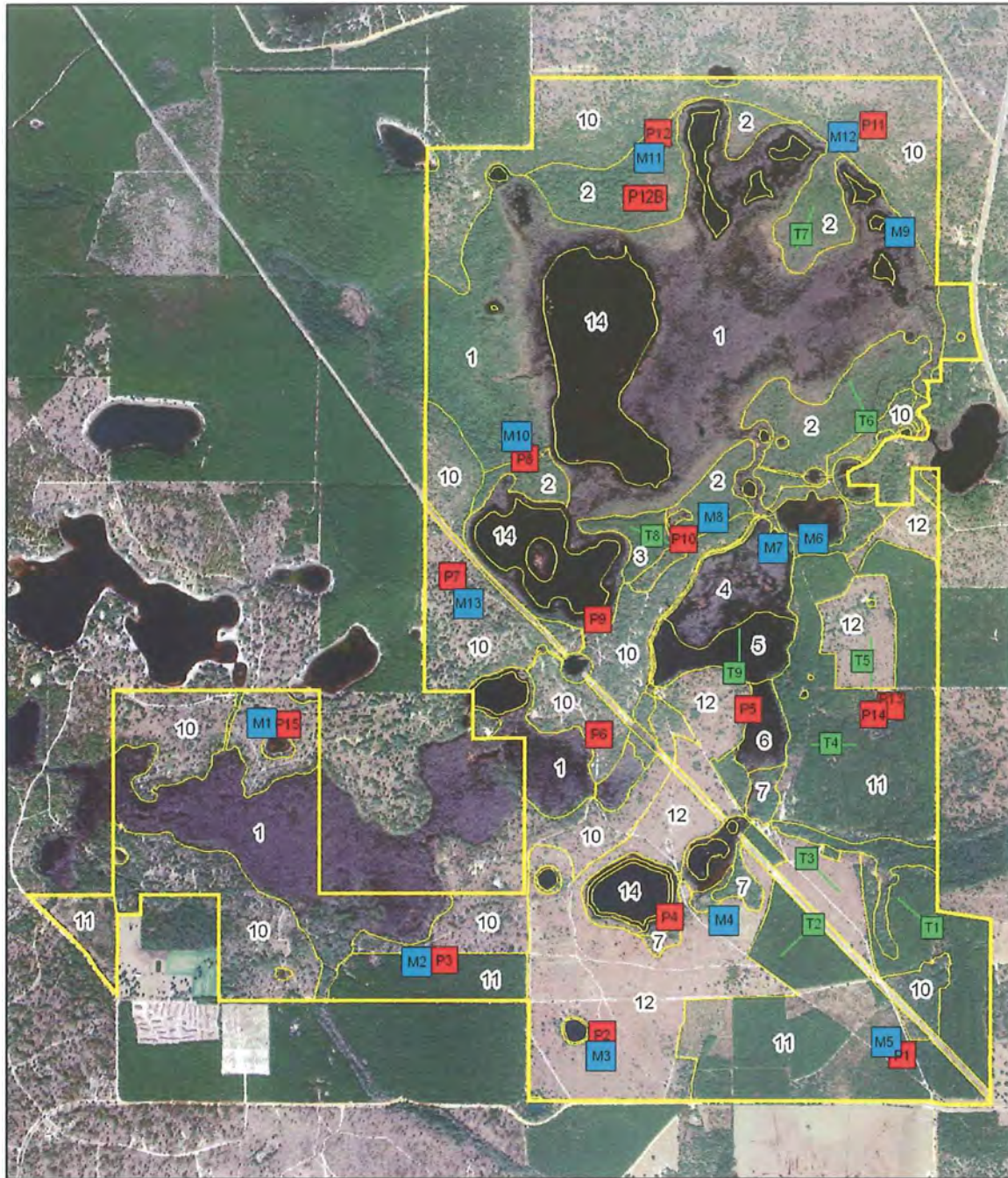
Wildlife Utilization:

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

Fuel loads and prescribed fires within wet flatwood and sandhill communities: Semi-annual status reports will detail the condition of the communities relative to the need and potential for a burn, the conditions required

for the next desirable burn, and the anticipated timeframe for the next burn. This data was included for each pedestrian survey transect found on the District website (see above).

Figure 13 - Monitoring Locations



- = Permanent Transect / Photopoint (e.g., T1)
- = Pedestrian Meander Transect (e.g., M1)
- = Photopoint (e.g., P1)
- 1 = Management Unit No. (Only Selected Units Labeled)

0 0.5 1 Miles



Results and Discussion

UMAM Polygon II, Management Unit 11- Sand Pine Plantation

UMAM Polygon II, Management Unit 11, consists of 383.484 acres of planted sand pine plantation that will be converted to long leaf pine and sand hill habitat. Baseline conditions indicated a sand pine canopy with nearly 100 percent canopy closure and an average of 446 sand pine trees per acre occur in the sand pine plantations. Removal of the sand pine was completed in November 2007. Three transects (transect #1, #2 and #4) were located within UMAM Polygon II, Management Unit 11.

In 2008, a total of 10 species were observed in transect 1, 16 in transect 2, and 20 in transect 4. Two transects (1 and 4) lost one and two species respectively, while transect two increased by 11 species. Wire grass was observed only in transect 2 with 8.5% cover, an increase of 3% cover from last year and was the dominant species occurring in that transect. The dominant cover class for all transects was bare ground with a range of 82% bare ground (transect 2) to 40% bare ground (transect 4). Bare ground was greatly reduced from the previous year along each transect. The exotic species Bahia grass (*Paspalum notatum*) was observed in transects 1 and increased from 0.1% cover to 0.7% cover. Bahia grass was also observed in transect 4 reduced from 1.5% cover to one percent cover. However, centipede grass increased in cover from 10.6% to 23.2% cover and again was the dominant species within that transect. Herbicide treatments targeting Bahia and centipede grass without impacting the native species will be applied in spring and fall of 2009.

In 2009, a total of 19 species were observed in transect 1, 23 in transect 2, and 23 in transect 4. Increasing species numbers were observed in all transects ranging from an increase of 9 species in transect 1 to 3 in transect 4. A total of 11 species common to sandhills were found in transect 1, 21 in transect 2, and 17 in transect 4. Since the sand pine plantation was removed there has been increasing numbers of sand hill species were observed. Wire grass was observed in transects 2 and 4. Percent cover of wire grass had increased from 8.5% to 25.7% cover in transect 2 and from 3% cover to 12.3 % cover in transect 4 within the last year. Transect 1 will be planted in wire grass tubelings during the winter of 2009. Vegetative cover continues to increase for transect 1 and 2 with 35.9 % cover for transect 1, and 34% cover in transect 2. Cover was slightly reduced from 48% cover to 40% cover in transect 4 potentially due to herbicide treatment of the centipede and Bahia grass. Bahia grass was again observed in transect 1 and cover increased from 0.7% cover to 3% cover. Bahia grass was treated last year and will continue to be treated in the following year. However, while Bahia grass cover was greater than desired in transect 1, the cover of Bahia grass is spotty and below 2% cover for the polygon.

In 2010, a total of 17 species were observed in transect 1, 32 in transect 2, and 28 in transect 4. Increasing species numbers were observed in all transects ranging from an increase of 3 species in transect 1 to 9 in transect 4. A total of 11 species common to sandhills were found in transect 1, 21 in transect 2, and 17 in transect 4. Since the sand pine plantation was removed there has been increasing numbers of sand hill species. Wire grass was planted in the uplands associated with Transects 1 and 4 and was persistent in Transect 2. Percent cover of wire grass cover was observed to be 14% in transect 1, 27% in Transect 2 and 21% in Transect 4. Wire grass cover continues to increase within each transect. Vegetative cover continues to increase for transect 1 and 2 with 50 % cover for transect 1, and 54% cover in transect 2 (up about 20%). Cover in Transect 4 significantly increased from 40 to 70%. Bahia grass was again observed in transect 1 and 4, (0.16 and 3.3 respectively) though cover was insignificant in Transect 1. Bahia grass will continue to be treated as needed. Centipede grass cover was also observed in Transects 1 and 3 with a 4.4% and 5.8% cover and will be treated in 2011. In addition, worm wood will be treated along transect 1 in 2011.

In 2011, a total of 21 species were observed in transect 1, 18 in transect 2, and 24 in transect 4. This represents a decrease in number of species along each transect and maybe due to a late summer burn. A total of 11 species common to sandhills were found in transect 1, 18 in transect 2, and 19 in transect 4. Wiregrass had the greatest cover of any species in transect 1 and 2. Along transect 4, it was second in cover with 15% to Lynn Haven golden aster with 17.2% cover. Wire grass cover ranged from 9.5% in transect 1 to 35.3% found in transect 2. Wire grass was planted in the former sand pine plantations in the area of Transects 1 and 4 and was persistent in Transect 2. Wire grass cover continues to increase within each transect. Overall vegetative cover was similar to 2010. Bahia grass was observed only along transect 4 with 3.3% cover. Bahia grass will continue to be treated as needed. Centipede grass cover was observed in Transects 1 with less than 1% cover and 1% cover in transect 4. Centipede grass will be treated as needed. Worm wood which also had been treated in previous years did not have significant cover in 2011.

In 2012, a total of 21 species were observed in transect 1, 27 in transect 2, and 28 in transect 4. This represents an increase number for transects 2 and 4, while transect 1 remained at 21 species (Table 3, 4, 5 and Figures 14, 15 and 16). Percent vegetative cover increased significantly from 2010. Transect 1 increased by 18% to 68% cover, Transect two increased by 16.8% to 66.8% and Transect 4 had a moderate increase of 8% to 78% cover. A total of 16 species common to sandhills were found in transect 1 and increase of 5 species, 26 in transect 2, and increase in 8 species, and 22 in transect 4, an increase of 3 species. Wiregrass had the greatest cover of any species for each transect with an average cover of 21.7%. Wire grass cover increased greatly in transects 1 and 4 from less than 10% to 18.5% but was reduced from 35.3% in transect 2 to 28 %. The plants appeared healthy it is unclear why the reduced cover was observed. Wire grass cover ranged from 9.5% in transect 1 to 35.3% found in transect 2. Wire grass was planted in the former sand pine plantations in the area of Transects 1 and 4 but was persistent in Transect 2. Wire grass seedlings were commonly observed adjacent to planted plugs along transects 1 and 4. This natural recruitment is an excellent sign to maintain and increase wire grass cover. The sandhill species appear to be increasing in cover and there is less cover by weedy species and the sites are starting to look more like adjacent sandhills.. Bahia grass was observed only along transect 1 with 1% cover and 4 with 0.6 % cover. This cover is reduced in transect 4 and appears under control. Bahia grass will continue to be treated as needed. Centipede grass cover was observed in Transects 1 with less than 2.5% cover and 3.8% cover in transect 4. Centipede grass will be treated as needed in these areas. Worm wood cover which had been significant was not observed in 2012.

Interim Success Criteria:

The sand pine plantation was harvested in 2007. Site preparation burns occurred during the winter of 2008 and the area that included transect 4 and transect 2 was planted in the winter of 2008/2009 with long leaf pine. Wire grass tubelings were planted on 3' centers in the former sand pine plantations in 2008 and completed in 2009. Additional warm season burns were attempted in the summer of 2011. Wire grass cover continues to increase and is the dominant species for all 3 transects. Number of species common to sandhills also continues to increase as well as overall species coverage. Overall species cover is up significantly from 2010 at over 66% cover for Transects 1 and 2 and near 80% for Transect 4. Planted long leaf pine densities remain below 200 trees per acre and many are now over 6' tall. The average DBH was 2.6". Trees are healthy and vigorous. Bahia grass cover, and worm wood has been significantly reduced to minimal cover. Centipede grass cover has increased by 1.5 to 2.8% and will continue to be treated as needed. The entire area is scheduled for burns in 2013.

Table 3. Transect 1 Species cover and occurrence (Former Sand Pine Plantation)

21 species, Wren, Titmouse	Transect #1 10/24/12	11:00 AM
Species	Common Name	Percent Cover
<i>Andropogon gyrans</i>	Elliott's bluestem	0.33
<i>Andropogon virginicus</i>	Broomsedge	2.17
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	18.6
<i>Chrysopsis lanuginosa</i>	Lynn Haven golden aster	13.3
<i>Croptilon divaricatum</i>	Slender scratch daisy	1.3
<i>Cyperus</i> sp	Cyperus	0.17
<i>Diodia teres</i>	Poor Joe	0.33
<i>Eragrostis elliottii</i>	Elliott's lovegrass	0.5
<i>Eremochloa ophiuroides</i>	centipede grass	2.5
<i>Eupatorium compositifolium</i>	yankeeweed	1.3
<i>Euphorbia floridana</i>	Florida spurge	0.16
<i>Lechea sessiliflora</i>	pineland pinweed	0.33
<i>Pinus palustris</i>	Longleaf pine	5.3
<i>Opuntia humifusa</i>	pricklypear	0.33
<i>Paspalum notation</i>	Bahia grass	1
<i>Pseudognaphalium obtusifolium</i>	sweet everlasting	1.18
<i>Quercus hemesphaerica</i>	Diamond oak	0.33
<i>Rubus cuneifolius</i>	sand blackberry	14.1
<i>Schizachyrium scoparium</i>	little bluestem	1.8
<i>Scoparia dulcis</i>	Sweet broom	2.8
<i>Solidago fistulosa</i>	Pine barren goldenrod	0.17
	Bare Ground	32

Figure 14. Sand Pine Plantation Restored to Sandhill (Transect 1)

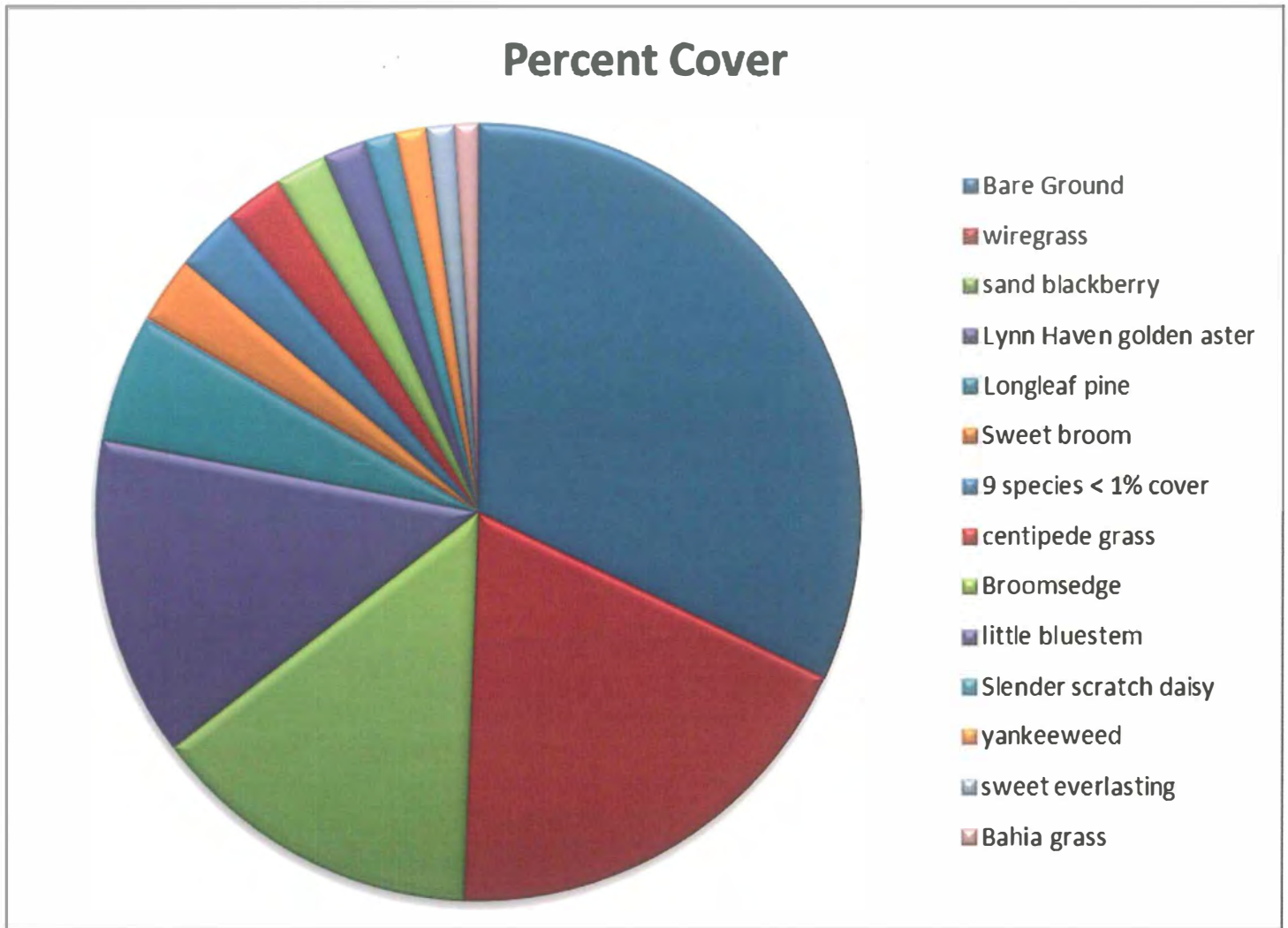


Table 4. Transect 2. Species cover and occurrence (Sand Pine Plantation)

Transect #2	27 species	
10/25/2012	9:00 AM	
Species	Common Name	Percent Cover
<i>Agalinis divaricata</i>	pineland false foxglove	1
<i>Andropogon gyrans</i>	Elliott's bluestem	3.3
<i>Andropogon virginicus</i>	broomsedge bluestem	1.8
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	28
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	2
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	3
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	8
<i>Cyperus</i> sp.	Cyperus	0.17
<i>Dichanthelium aciculare</i>	needleleaf witchgrass	4.2
<i>Eragrostis elliotii</i>	Elliott's lovegrass	0.17
<i>Eupatorium compositifolium</i>	yankeeweed	1.3
<i>Gelsemium sempervirens</i>	yellow jessamine	2
<i>Hypericum gentianoides</i>	orangegrass	1.5
<i>Lechea sessiliflora</i>	pineland pinweed	0.17
<i>Liatris gracilis</i>	slender gayfeather	0.17
<i>Liatris tenuifolia</i>	shortleaf gayfeather	0.17
<i>Licania michauxii</i>	gopher apple	0.33
<i>Lupinus diffusus</i>	skyblue lupine	1.2
<i>Paspalum laeve</i>	field paspalum	0.6
<i>Pinus paulistris</i>	Longleaf pine	0.33
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass	0.7
<i>Polygonella gracilis</i>	tall jointweed	1.2
<i>Pteridium aquilinum</i>	bracken fern	0.34
<i>Quercus laevis</i>	Turkey oak	0.17
<i>Schizachyrium scoparium</i>	little bluestem	4.2
<i>Smilax auriculata</i>	earleaf greenbrier	0.17
<i>Tephrosia chrysophylla</i>	hoary pea	0.33
	bare ground	33.2

Figure 15. Transect 2: Species Cover and Occurrence (Sand Pine Plantation)

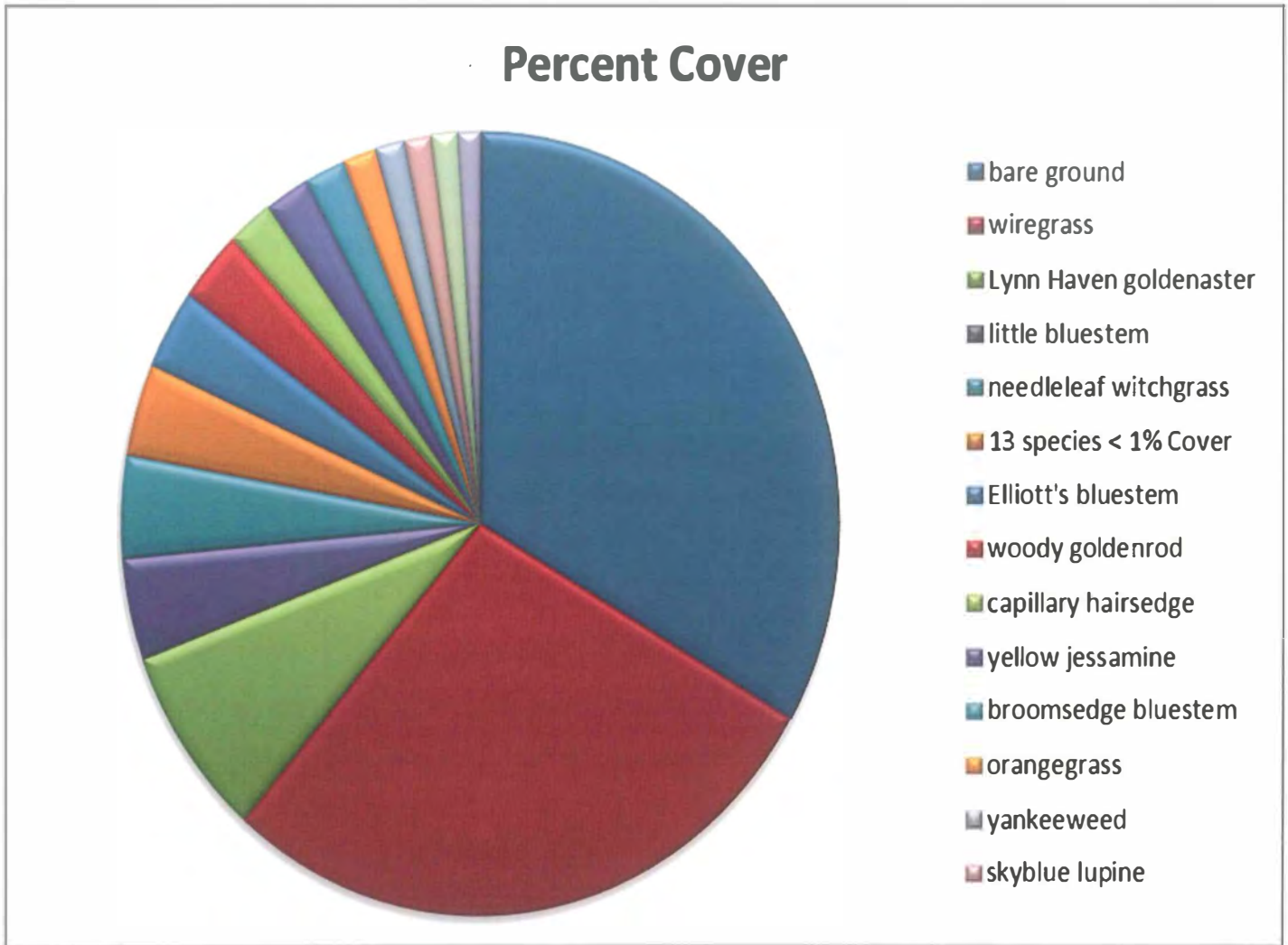
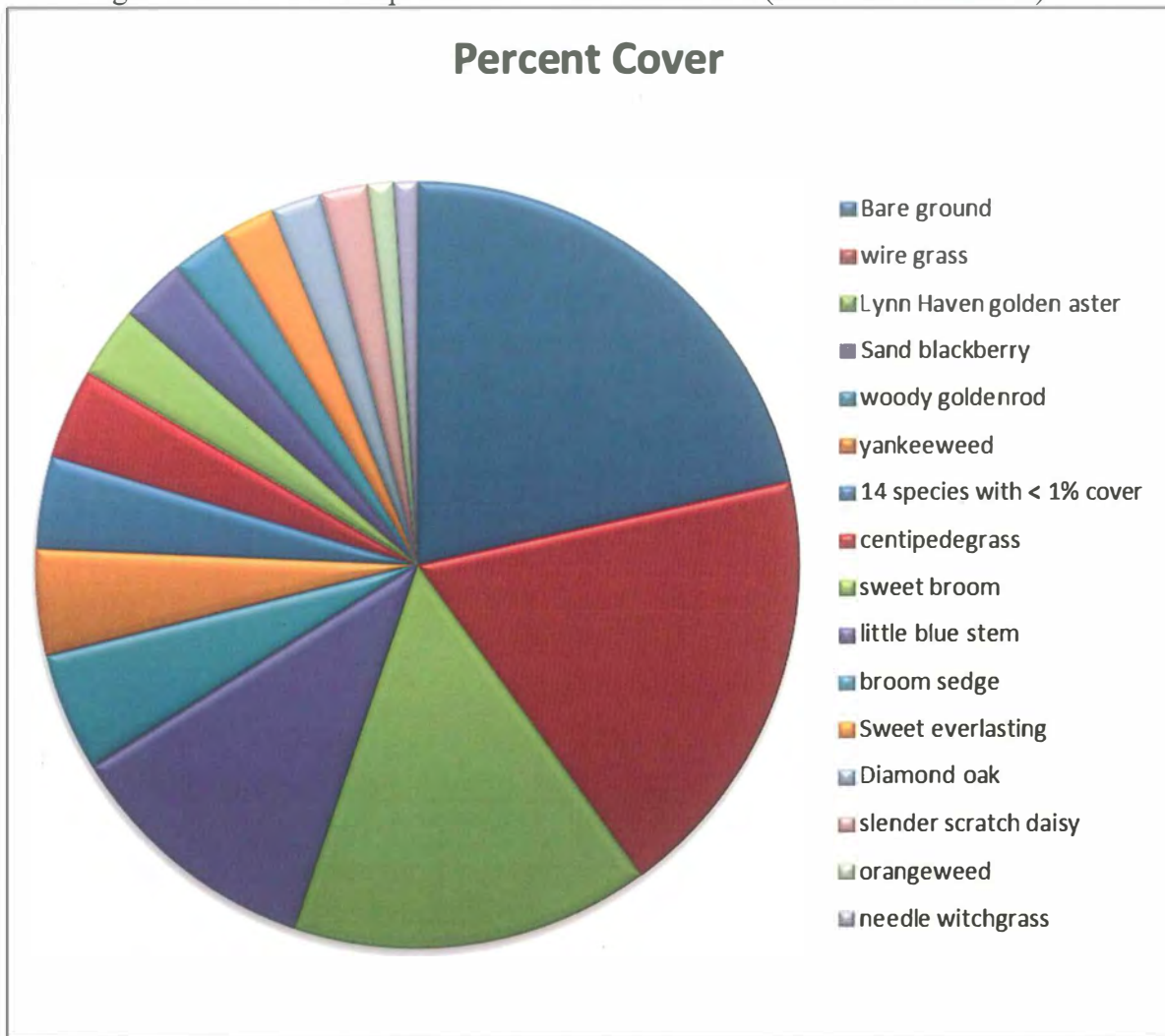


Table 5. Transect 4. Species cover and occurrence (Sand Pine Plantation)

Transect 4	10/30/2012	11:00 AM
28 species		
Species	Common Name	Percent Cover
<i>Andropogon virginicus</i>	broom sedge	2.3
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wire grass	18.5
<i>Chrysopsis lanuginosa</i>	Lynn Haven golden aster	15.2
<i>Croptilon divaricatum</i>	slender scratch daisy	2
<i>Crotalaria spectabilis</i>	showy rattlebox	0.167
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	5
<i>Cyperus</i> sp.	cyperus	0.167
<i>Dichanthelium aciculare</i>	needle witchgrass	1
<i>Diospyros virginiana</i>	common persimon	0.3
<i>Eremochloa ophiuroides</i>	centipede grass	3.8
<i>Eupatorium compositifolium</i>	yankeeweed	4.5
<i>Hypericum gentianoides</i>	orangeweed	1.1
<i>Indigofera hirsuta</i>	hairy indigo	0.33
<i>Lechea sessiliflora</i>	pineland pinweed	0.5
<i>Liatris chapmanii</i>	Chapman's gayfeather	0.3
<i>Opuntia humifusa</i>	prickly pear	0.33
<i>Paspalum notatum</i>	Bahia grass	0.6
<i>Physalis arenicola</i>	Cypress groundcherry	0.16
<i>Pinus palustris</i>	Longleaf pine	0.3
<i>Polygonella gracilis</i>	tall jointweed	0.3
<i>Prunus</i> sp.	<i>Prunus</i> sp.	0.16
<i>Pseudognaphalium obtusifolium</i>	Sweet everlasting	2.3
<i>Quercus hemaespherica</i>	Diamond oak	2.1
<i>Rubus cuneifolius</i>	Sand blackberry	11
<i>Schizachyrium scoparium</i>	little blue stem	2.8
<i>Scoparia dulcis</i>	sweet broom	3
<i>Tephrosia elliotii</i>	hoary pea	0.16
<i>Yucca filimentosa</i>	Adam's needle	0.167
	Bare ground	21.5

Figure 16. Transect 4: Species Cover and Occurrence (Sand Pine Plantation)



Planted Long Leaf Pine Seedlings

Long leaf pine seedlings were planted in the sandhills at a rate of 436 trees per acre. Permit conditions require an average of 100-200 long leaf pine trees per acre. If long leaf pine seedling densities are greater than 200 trees per acre, the pines shall be thinned to achieve the target stocking rate. Planted tree densities are determined by counting all the seedlings in a 20' X 600' plot co-located with each transect. Each tree seedlings counted and measured by size class and notes on tree condition are included.

The survival of long leaf pine seedlings along each transect was observed to be within the 100-200 tree per acre requirements found in the permit. A total of 141 long leaf pine seedlings were observed along transect 1, 138 for transect 2, and 182 in transect 4 (Figure 17-19). Overall health of the planted seedlings was excellent. Most of the trees are now in the 2'-5' size class and many are over 5'. Average dbh is 2.6".

Figure 17 Planted Long Leaf Pine Seedlings (Transect 1)

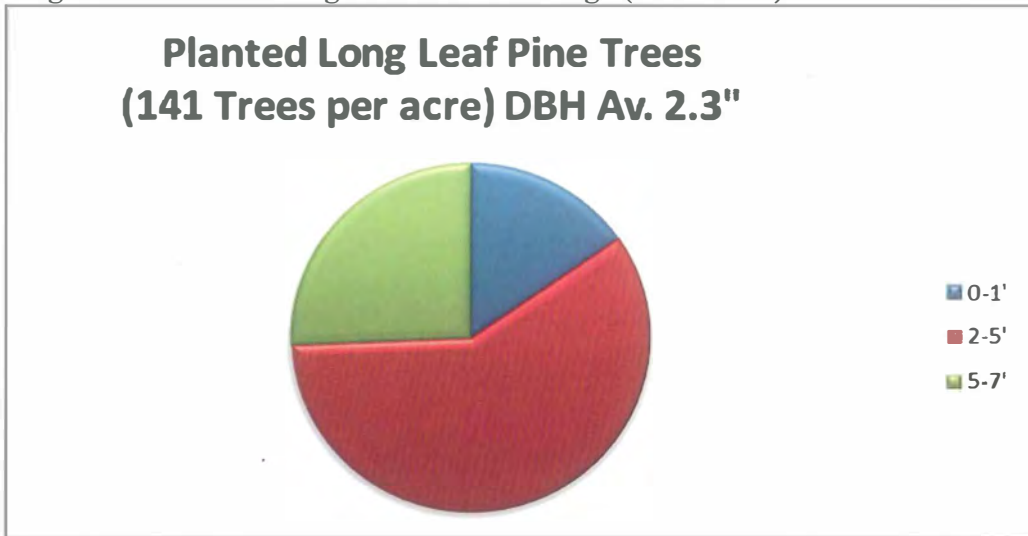


Figure 18 Planted Long Leaf Pine Seedlings (Transect 2)

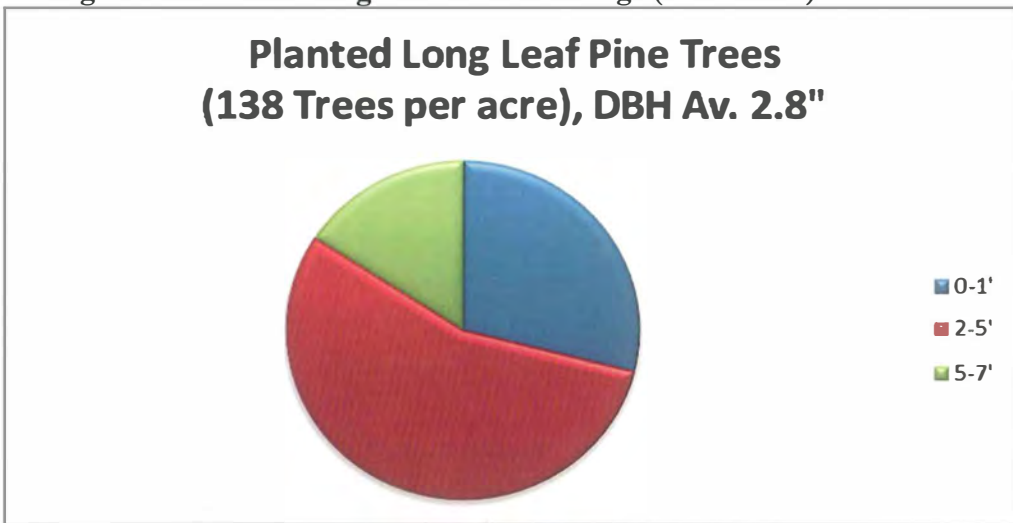
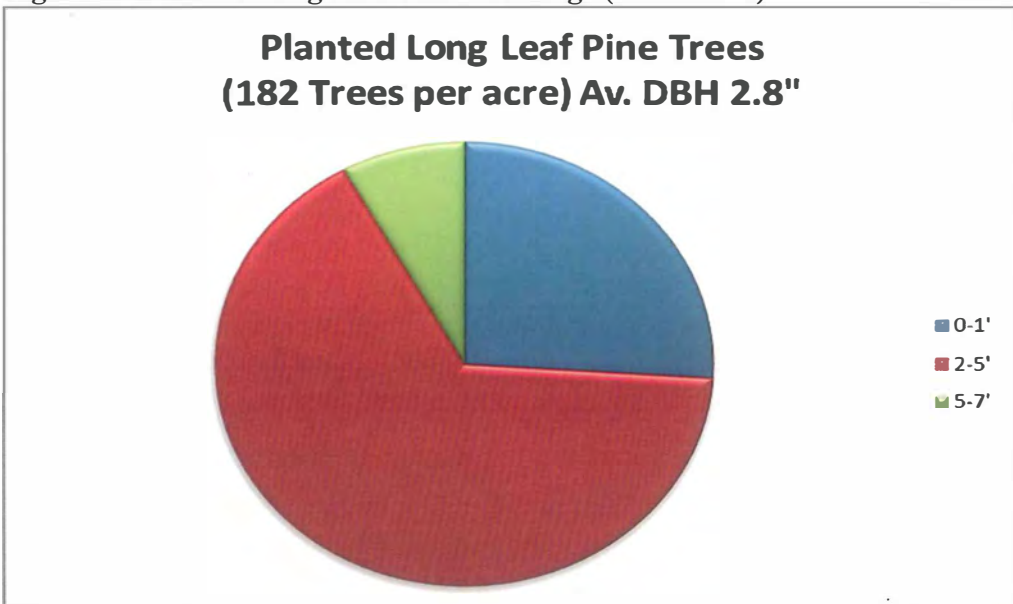


Figure 19 Planted Long Leaf Pine Seedlings (Transect 4)



UMAM Polygon I, Management Unit 12- Sand Hill

UMAM Polygon I, Management Unit 12, consists of 263.52 acres. This polygon is dominated by a sand hill community with an overstory dominated by turkey and live oaks with scattered remnant longleaf pine and an understory dominated by wire grass and a wide variety of herbaceous species. Reclamation activities within this upland community include re-introduction of fire, thinning of oaks to less than 150 trees per acre and planting of long leaf pine seedlings at a density not to exceed 200 trees per acre at final release. Fire was re-introduced to this area during the winter of 2004. A winter burn scheduled for the areas that had oak reduction. Prior to the re-introduction of fire, the dominant understory species was woody goldenrod. Oaks were thinned for the majority of Management Unit 12 in August of 2005. However, the portion of Management Unit 12 which contains Transect 5 was thinned in September of 2006. The re-introduction of fire and thinning of the turkey and live oaks have led to significant changes in the species composition. Two transects (transect #3 and #5) were located within UMAM Polygon I, Management Unit 12, and reflect baseline conditions (Table 6, 7 and Figure 16, 17). Longleaf pines were planted in portions of UMAM polygon I, Management Unit 12 in the winter of 2004. However, longleaf pines were only observed in Transect 3 in 2006. A belt transects 600' feet in length and 30' feet in width was co-located with the vegetation transect. The number, height and condition of each planted tree were recorded. A total of 36 trees were observed or an average of 871 trees per acre. However, the winter burn in 2006 was extremely intense and killed nearly all planted pines. A total of 2 seedling pines were observed in 2007 both close to the ground and in the grass stage. During 2008 monitoring, two planted pine seedlings were again observed, both in the grass stage. These areas were planted with less than 300 trees per acre during the winter of 2008.

In 2006, a total of 23 species were observed in transect 3 and 31 species in transect 5. A diverse understory of plants typical of sand hill vegetation was observed within each transect. No nuisance or exotic species cover occurred within these transects. The greatest cover class for each transect was bare ground with 47.5% (transect 3) and 68.5% for transect 5. Wire grass was the dominant vegetative species for both transects with 27.2 % cover for transect 3 and 22.2% cover for transect 5. A total of 12 species, Elliot's bluestem, wiregrass, Coastalplain honeycombhead, woody goldenrod, silver croton, witch grass, persimmon, pineland spurge, milk pea, pineweed, gopher apple and bracken fern were common to both transects.

In 2008, a total of 18 species were observed in transect 3 and 27 species in transect 5 slightly higher for transect 3 and lower for transect 5 than last year. A diverse understory of sand hill vegetation was observed again this year and no nuisance or exotic species were observed (Table 6, 7, Figure 16 and 17). The greatest cover class again was bare ground with 36.1% cover for transect 3 and 37% for transect 5. The amount of bare ground for each transect was greatly reduced and may be due to the re-introduction of fire. Wire grass was again the dominant vegetative species for both transects with 34% for transect 3 and 38% cover for transect 5. Wire grass cover increased by 6.8% for transect 3 and 15.8% cover for transect 5. A total of 9 species were common to both transects.

In 2009, a total of 26 and 29 species were observed within transects 3 and 5 respectively. The number of species is lower for transect 3 by three species and slightly higher by two species for transect 5. A diverse understory of sand hill vegetation was again observed during this monitoring event. No nuisance or exotic species were observed (Table 6, 7, Figure 17 and 18). The greatest cover class was bare ground for transect 3 with 44% cover while wire grass cover was the great percent cover with 42.5% cover for transect 5. Wire grass was again the dominant vegetative species for both transects with 39% for transect 3 and 42.8% cover for transect 5. Wire grass cover increased by 5% for transect 3 and 4.8% cover for transect 5.

In 2010, a total of 27 and 30 species were observed within transects 3 and 5 respectively. This represents a significant increase in species (12) for Transect 3 and a slight increase of one for Transect 5. A diverse understory of sand hill vegetation was again observed during this monitoring event. No nuisance or exotic species were observed (Table 6, 7, Figure 17 and 18). Bare ground for transect 3 with 38% cover while wire grass cover was the great percent cover with 30% cover for transect 5. This represents a decrease for both transects. Wire grass was again the dominant vegetative species for both transects with 31.2% for transect 3 and 34% cover for transect 5. Wire grass cover decreased by 5% for transect 3 and 8.8% cover for transect 5 and perhaps due to an intense spring burn followed by a prolonged summer drought. Seed set in these areas was poor though many flowering heads were observed.

In 2011, Transects 3 and 5 were not sampled due to a late fall burn used to reduce planted pine numbers to less than 200 per acre. The burn reduced herbaceous cover to the ground level. Without vegetative cover resulting from the previous year's growth, no meaningful data analysis could occur. Sampling in this area was postponed until 2012.

In 2012, only Transect 3 was sampled. Vegetation in the area of Transect 5 was burned 10/25/2012 in preparation for pine planting and in most areas the vegetation was burned to the ground. A total of 30 species were observed within transects 3 a slight increase in species number from 2010. A diverse, healthy understory of sand hill vegetation was again observed during this monitoring event. No nuisance or exotic species were observed (Table 6, Figure 19). Bare ground for transect 3 was 38.3 % cover while wire grass cover was 31%. Both bare ground and wire grass cover have remained constant over the last 2 years. Cover of woody species is low and the diversity of forbs is good.

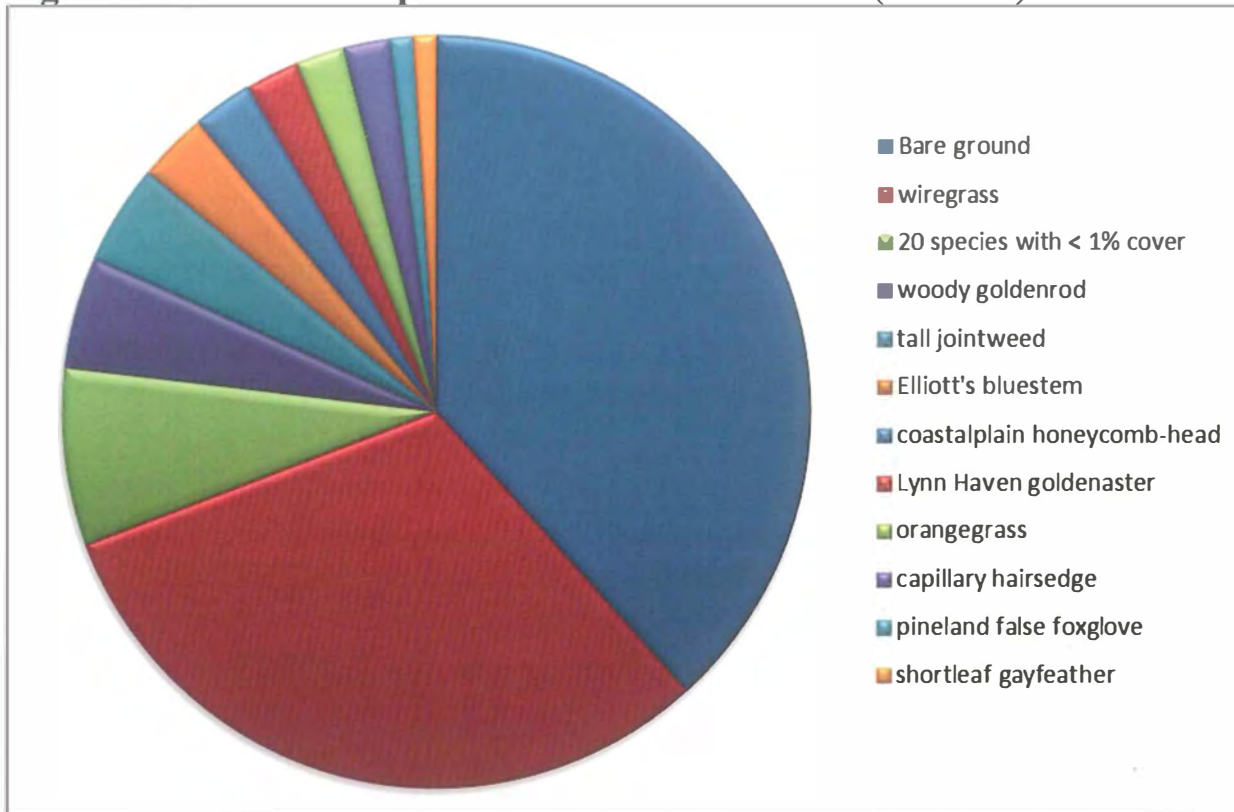
Interim success Criteria:

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 long leaf pine have been planted. In June of 2009, due to an increase in oak sprouts from the felled trees in the sand hills, ULW, and herbicide selective for oaks. It is hoped that this will reduce oak cover to less than the 150 oaks per acre required by the permit. No nuisance or exotic species occurred were observed within transects, fire adapted species dominate the vegetative cover, while wood species cover has been greatly reduced. Long leaf pine seedlings are well within permit conditions at an average of 73 long leaf pine trees per acre, less than 200 trees per acre, Trees appear vigorous and many are now over 5' in height. Average DBH is 3". Wire grass and sandhill vegetation continues to thrive and remains a wire grass dominated sanhill with good diversity in the understory.

Table 6. Transect 3: Species Cover and Occurrence (Sandhill)

Transect 3	10/25/2012	12:30 pm
	30 species	
Species	Common Name	Percent cover
<i>Agalinis divaricata</i>	pineland false foxglove	1
<i>Andropogon gyrans</i>	Elliott's bluestem	3
<i>Aristida stricta</i> var. <i>beyrichiana</i>	wiregrass	31
<i>Balduina angustifolia</i>	coastalplain honeycomb-head	2.6
<i>Bulbostylis ciliatifolia</i>	capillary hairsedge	2
<i>Chrysoma pauciflosculosa</i>	woody goldenrod	4.8
<i>Chrysopsis lanuginosa</i>	Lynn Haven goldenaster	2.3
<i>Croptilon divaricatum</i>	slender scratchdaisy	0.2
<i>Eriogonum tomentosum</i>	dogtongue wild buckwheat	0.33
<i>Gaylussacia dumosa</i>	dwarf huckleberry	0.2
<i>Hypericum gentianoides</i>	orangegrass	2.1
<i>Lechea sessiliflora</i>	pineland pinweed	0.2
<i>Liatris chapmanii</i>	Chapman's gayfeather	0.9
<i>Liatris tenuifolia</i>	shortleaf gayfeather	1
<i>Licania michauxii</i>	gopher apple	0.33
<i>Opuntia humifusa</i>	pricklypear	0.33
<i>Pinus palustris</i>	longleaf pine	0.18
<i>Pityopsis graminifolia</i>	narrowleaf silkgrass	0.2
<i>Polygonella gracilis</i>	tall jointweed	4.3
<i>Pteridium aquilinum</i>	bracken fern	0.5
<i>Quercus incana</i>	bluejack oak	0.17
<i>Quercus laevis</i>	turkey oak	0.7
<i>Schizachyrium scoparium</i>	little bluestem	0.83
<i>Scoparia dulcis</i>	Sweet broom	0.5
<i>Serenoa repens</i>	saw palmetto	0.2
<i>Seymeria pectinata</i>	Piedmont blacksenna	0.17
<i>Smilax bonna-nox</i>	cat briar	0.33
<i>Solidago fistulosa</i>	pinebarren goldenrod	0.33
<i>Tephrosia elliotii</i>	hoary pea	0.17
<i>Vaccinium myrsinites</i>	shiny blueberry	0.83
	Bare ground	38.3

Figure 20. Transect 3: Species Cover and Occurrence (Sandhill)



Planted Long Leaf Pine Seedlings

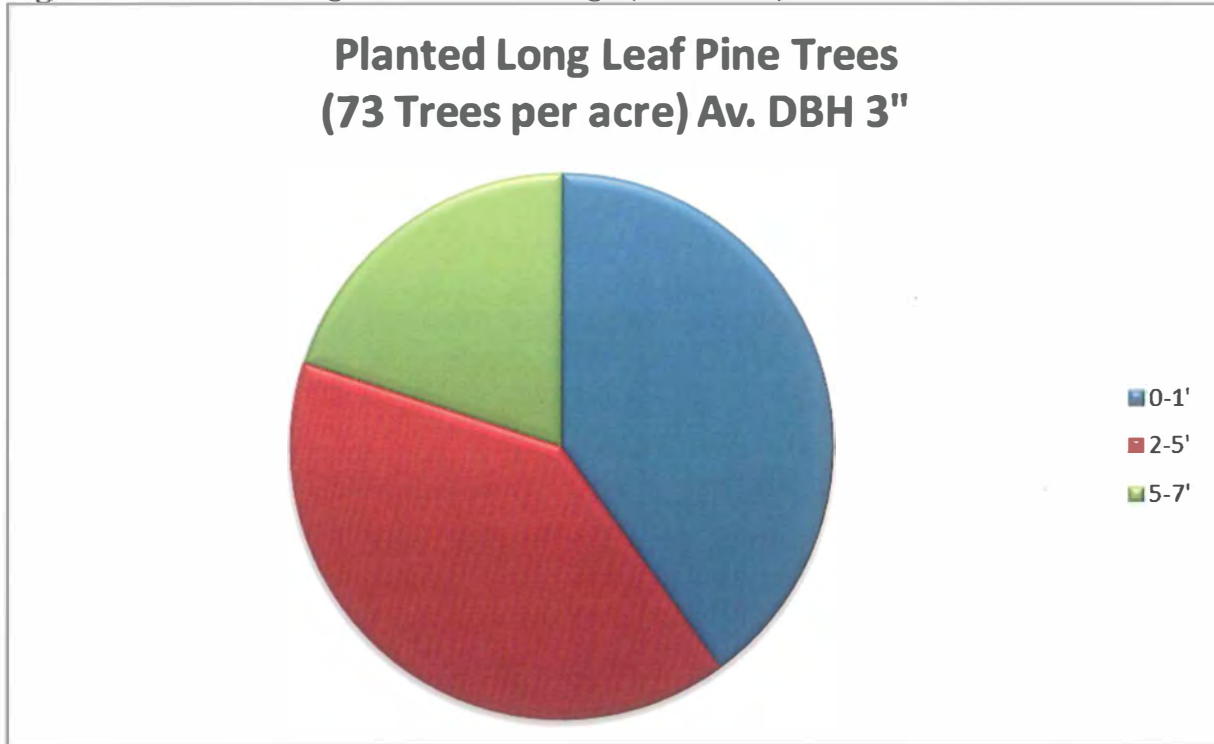
Long leaf pine seedlings were planted in the sandhills at a rate of 436 trees per acre. Permit conditions require an average of 100-200 long leaf pine trees per acre. If long leaf pine seedling densities are greater than 200 trees per acre, the pines shall be thinned to achieve the target stocking rate. Planted tree densities are determined by counting all the seedlings in a 20' X 600' plot co-located with each transect. Each tree seedlings counted and measured by size class and notes on tree condition are included.

In 2010, the survival of long leaf pine seedlings along each transect was observed to be within the 100-200 tree per acre guidelines. A total of 127 trees per acre were observed along Transect 3, and 42 along Transect 5 (Figure 22 and 23). Overall health of the planted seedlings was excellent, only 3 trees per transect were in poor condition, while the remaining trees were found to be in excellent condition. The majority of the trees along each transect were observed within the 0-5" size class. However, the trees along Transect 3, which are approximately 2 years older were starting to bolt, and were found to be from 0.5 size class to 25-50" size class.

In 2011, the survival of long leaf pine seedlings was not assessed. The site had recently been burned and many of the long leaf pine seedlings appeared charred. It was not known at the time of sampling which trees were alive due to loss of needles and stem charring.

In 2012, the survival of long leaf pine seedlings was 73 per acre in Transect 3. Overall health of the planted seedlings was excellent. Many of the trees are near 5' in height and the average DBH was 3" (Figure 20).

Figure 21. Planted Long Leaf Pine Seedlings (Transect 3)



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 that will be restored to a hydric pine flatwood. The overstory was dominated by planted slash pine. The shrub and understory was largely been shaded out by the near complete canopy closure of the slash pine. Pines were thinned to 225 trees per acre in 2007. Following the initial burn in the summer of 2005, it was determined that the shrubs could be kept to coppice sprouts with successive warm season burns. In winter 2011, wire grass tubelings will be planted on 3' centers throughout the polygon.

In 2006, a total of 17 species were observed. The majority of the species were common to wet flatwoods. No nuisance or exotic species were observed. The greatest cover class observed was bare ground at 80.5%. The dominant vegetation was black ti ti with 6.5 percent coverage. The total shrub coverage was approximately 12%. No wire grass was observed within this polygon.

In 2007, a total of 18 species were observed, similar to baseline observations. The majority of the species were common to wet flatwoods. No nuisance or exotic species cover was observed. The greatest cover class was again bare ground with 77.3 percent cover. The slight increase in vegetative cover may be due to increased light reaching the understory since the dense pine canopy has been thinned. Swamp dog hobble had the greatest percent vegetative, each with 5 percent. Black titi cover was reduced from 6.5 % to 3.7%. This represents a reduction in black titi cover from the baseline observations. Overall shrub coverage within this polygon slightly increased from 12% in 2006 to 13.4% in 2007 and herbaceous cover has increased from last year. Wildlife observations included a blue jay, towhee, and cardinal.

In 2008, a total of 30 species were observed. The majority of the species were common to wet flatwoods. No nuisance or exotic species were observed. Bare ground again had the largest cover class with 58% down from 77.3% the year before. Black titi had the greatest cover class of the vegetation with 5.4%, increasing

by 1.7%. Overall shrub cover within the polygon has increased from 13.4% in 2007 to 17% in 2008. Herbaceous cover also continues to increase over time. In 2008, herbaceous cover along the Transect increased to 23.7%.

In 2009, a total of 28 species were observed. The majority of the species were common to wet flatwoods. No nuisance or exotic species were observed. Bare ground again had the largest cover class with 52% down from 58% the year before. Muscadine grape had the greatest cover class of the vegetation with 9.5%. Shrub cover within the polygon has decreased significantly from 17% in 2008 to 8.5% in 2009. Herbaceous cover also continues to increase over time. In 2008, the herbaceous cover increased to 30% and increase of 6.3% from the previous year.

In 2010, a total of 27 species were observed, similar to 2009. The majority of the species were common to wet flatwoods. No nuisance or exotic species were observed. Bare ground again had the largest cover class with 58.7%, very similar to the previous three years, due in large part to reduced light levels due to tree canopy. Red topped panicum had the greatest cover class of the vegetation with 13%. Shrub cover within the polygon has decreased significantly to less than 1% following a year of herbicide treatment. Herbaceous cover is expected to increase once the trees are thinned.

In 2011, a total of 20 species were observed, a reduction of 7 species from previous years. The majority of the species were common to wet flatwoods. No nuisance or exotic species were observed. Bare ground again had the largest cover class with 66.5%, a reduction of almost 8% cover. Field paspalum which had not been observed in previous sampling had the greatest amount of cover with 8%. Shrub cover within the polygon has remained very low. Herbaceous cover is expected to increase once the trees are thinned and more light can penetrate to the ground cover.

In 2012, a total of 10 species were observed, a reduction of 10 species from previous years. The majority of the species were common to wet flatwoods. Species and cover reduction is due to the re-harvest of the pine trees to meet permit conditions in August of 2012. The area did not have much time to recover prior to sampling. No nuisance or exotic species were observed.

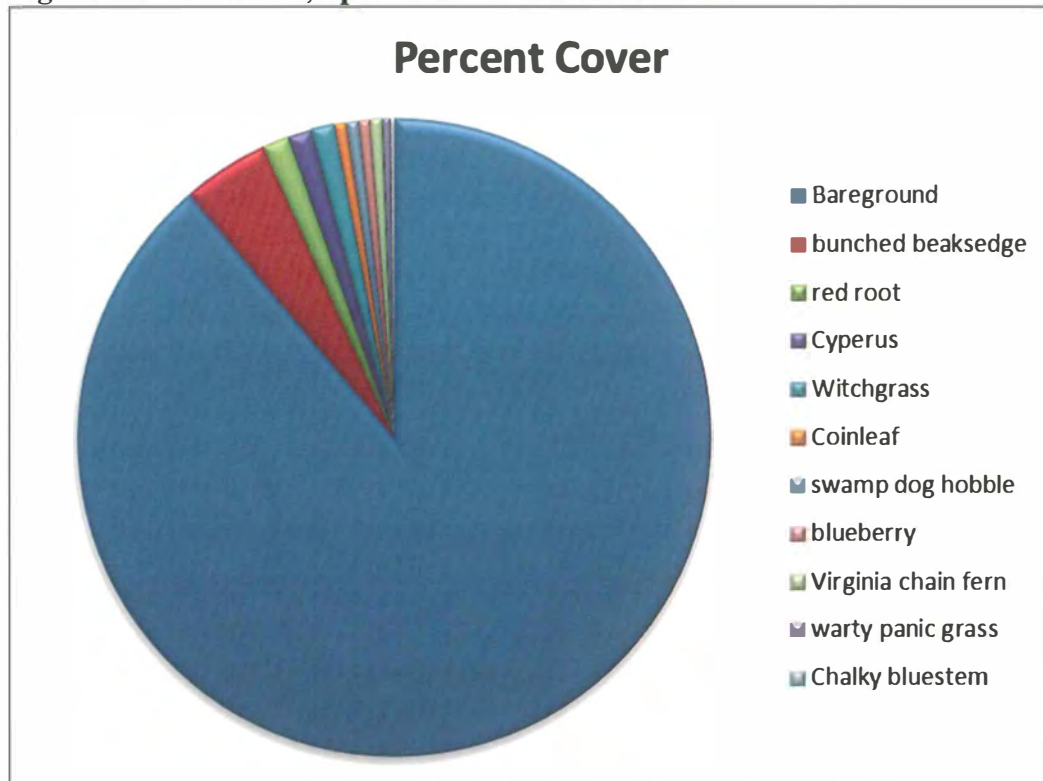
Interim success Criteria:

The management activities used to restore UMAM VII, Management Unit 3 have been implemented and interim management activities completed. A diverse wet flatwoods understory has started to develop from the seed bank, but cover has been somewhat limited due to excessive shading from trees. The initial tree harvest resulted in over 300 trees per acre. The forested canopy was further reduced in August of 2012 to less than 200 trees per acre. A supplemental wire grass and tooth ache grass planting will occur in the winter of 2012/2013. No exotic or nuisance species were observed.

Table 7. Transect 8: Species Cover and Occurrence (Restored Hydric Slash Pine from Pine Plantation)

Transects 8	2:15 PM	10/25/2012
Harvested late August 2012.		Catbird
Thinned to < 200 trees per acre confirmed with 1/4 acre plots		10 species
Species	Common name	Percent Cover
Andropogon virginicus var. glaucus	Chalky bluestem	0.2
Centella asiatica	Coinleaf	0.6
Cyperus sp.	Cyperus	1.2
Dichanthelium sp.	Witchgrass	1.2
Eubotrys racemosa	swamp dog hobble	0.6
Lachnanthes caroliana	red root	1.4
Panicum verrucosum	warty panic grass	0.4
Rhynchospora microcephalla	bunched beaksedge	4.4
Vaccinium elliotii	blueberry	0.6
Woodwardia virginica	Virginia chain fern	0.6
	Bareground	88.8

Figure 22. Transect 8, Species Cover and Occurrence



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

UMAM Polygon V, Management Unit 2 consists of 165 acres of fire suppressed shrub dominated hydric pine that will be restored to a hydric pine flatwood. The overstory is dominated by a near impenetrable shrub layer with a largely lacking tree canopy and herbaceous layer. Reclamation activities within this polygon include removal of shrub overstory with a Gyro-trac followed by continued treatment with selective herbicides if necessary, re-introduction of fire, planting of longleaf and slash pine trees at a rate of 436 trees per acre, planting wiregrass tubelings on 3' centers, and monitoring for nuisance / exotic plant species. If the seed bank does not respond, additional keystone flatwood species will be introduced as tubelings.

Fire was re-introduced into this polygon during the summer of 2005. Two transects, 6 and 7 were established in different portions of the hydric pine flatwoods. The warm season burn was effective in reducing the overstory of shrubs in transect 7, however, by the time of the initial sampling event, the majority of the shrubs had sprouted from the roots and already formed an extremely dense shrub layer approximately 3-4' in height. The fire was less effective in the area surrounding transect 6. Most of the shrubs within this transect did not burn.

In 2006, a total of 14 species were observed within the transect 6 and 16 in transect 7. Seven species were common to both sites, and all were shrubs. Both sites were dominated by shrubs with little overstory and little to no understory species due to the extremely thick near 100% shrub cover. No exotic species were observed. The greatest cover class observed for both transects was black titi with 69.87 % cover in transect 6 and 31.77 percent cover in transect 7. No wire grass was observed within this polygon. One other shrub species Fetterbush (15.3%) had significant cover within transect 6, myrtle leaved holly (15.4%) had significant cover in transect 7. Little bare ground was observed in transect 6 (3.7%) while 11.5% bare ground was observed in transect 7.

In 2007, a total of 12 species were observed within transect 6 and 9 in transect 7. Transect 6 had a similar species composition to the baseline while transect 7 had significantly fewer species. Seven species were common to both sites, and all were shrubs. Both sites were dominated by 3-3.5' shrubs though each had an herbaceous component. While this did not represent significant cover in transect 6, 3.7% cover in transect 7 was red root, and early colonizing wetland species. The greatest cover class for both transects was bare ground with 40.8% for transect 6 and 48.2% cover for transect 7. This represents a significant shift in cover from black titi to bare ground due to the Gyro-Trac. Black titi cover was also greatly reduced from nearly 70% to 14% in transect 6 and from 31.77% to 28.1% cover in transect 7. The relative minor decrease in black titi cover in transect 7 may be the result of the intense warm season fire in 2006. Fetterbush was the dominant species by cover in transect 6 while black titi remained the dominant plant species by cover in transect 7. Continued management activities will further reduce shrub coverage.

In 2008, wiregrass tubelings on 3' centers was planted in the winter of 2007/2008. A total of 24 species were observed within transect 6 and 16 in transect 7. The represents a 50% increase in transect 6 and 56% increase in species in transect 7. The seed bank along both transects has started to respond and herbaceous species not identified previously have emerged. A total of 10 new herbaceous species were observed along transect 6 and 7 new herbaceous species in transect 7. Shrub cover along transect 6 increased from 3.7% to 47.57% an increase of 43.87% and along transect 7 remained approximately the same 48.1% in 2007 to 48.38% in 2008. Shrub levels at each site were beyond acceptable levels. Test plots using selective herbicides that eradicate target shrubs without impacting the native understory showed great promise. In the test plots, shrub levels were reduced from near 50% cover to less than 15% with two applications. In 2009, these treatments will be expanded across the landscape.

In 2009, a total of 14 species were observed in transect 6 and 14 in transect 7. This is a significant drop in species observed along transect 6 but a similar number of species observed along transect 7. The drop in species along transect 6 may be due to a reduction in shrub species found in transect 6. Six shrub species found in transect 6 in 2008 were absent in 2009, probably from the selective herbicide treatment. However the number of shrub species remained constant along transect 7. Herbaceous species cover along transect 6 was slightly lower in 2009 with 7.1%, down from 10.4 %. Similarly along transect 7 herbaceous cover was down from 12.07% in 2008 to 10.45 in 2009. However wire grass cover increased from 2% for transect 6 and 7 in 2008 to 3.8% for transect 6 and 2.8% in transect 7 in 2009. Nuisance shrub cover along transect 6 decreased dramatically from 47.57% in 2008 to 23% in 2009. Similarly, shrub cover along transect 7 decreased from 43.87% cover in 2008 to 25.2 along transect 7. This represents about a 48 and 60% reduction in shrub cover over the last year respectively for transect 6 and 7.

In 2010, a total of 14 species were observed in transect 6 and 13 in transect 7, about the same as in 2009. Five shrub species found in transect 6 and 6 shrubs were observed in transect 7, similar to 2009. Shrub cover continued to be reduced further for both transects in 2010. Shrub cover along transect 6 was reduced by 5% to 5.6% while shrub cover observed in transect 7 was reduced by 8.5% to 16.7% in 2010. The wire grass cover increased by about 5% for each transect in 2010 to a bit over 8%. Percent cover of bare ground was 54.5 along transect 6 and 57% along transect 7. Percent cover from wet flatwoods species was 40% for transect 6 and 26.3% along transect 7, representing an increase from 2009.

In 2011, a total of 10 species were observed in transect 6 and transect 7, four and three species less than in the previous year. Part of the reason for a reduction in species observed may be due to a reduction of shrub species found within the transect. Only two shrub species found in transect 6, two less than the previous year while 4 shrub species were observed in transect 7, two less than in 2010. Shrub cover along transect 6 increased by to 11.7% in 2011. While black titi cover remained at 4%, the increase was due to re-sprouting and germination of fetterbush cover. However, shrub cover along transect 7 was significantly reduced from 16.7% in 2010 to 4.66% in 2011. Averaged shrub cover remained less than 3% for black and red titi and 4% for fetterbush. Averaged total shrub cover remains at 5.35%. Additional herbicide treatments will be used as needed to keep cover below 5%. The wire grass cover for each transect remained at approximately 8%. Percent cover of bare ground dropped significantly from 54.5% to 32.8% for transect 6 and from 57% to 35% along transect 7. Percent cover from wet flatwoods species was 57.1% for transect 6 and 60.42% along transect 7, representing significant increase from the previous year. However, there was a significant increase in cover of bushy blue stem. Bushy blue stem cover was 22.8% in transect 6 and 35.1% cover in transect 7. Though this species is common to the hydric pine flatwoods and cypress strands in the region it is not commonly the dominant species unless there is an extended drought. Similar cover has been observed in the surrounding dry cypress strands. Bushy blue stem cover is expected to become reduced when the wetlands rehydrate as it does not tolerate flooded soils.

In 2012, a total of 8 species were observed in transect 6 and 13 for transect 7, two species less in transect 6 and three additional species in transect 7 less than the previous year. The reduction in species in transect 6 is due to a loss of shrub species while the gain in transect 7 was an increase in hydric pine flatwoods species. Combined shrub cover in 2012 was 8.1% or a reduction of 3.6% from the previous year. Black and red titi cover was less than one percent. The only shrub with significant cover was fetter bush with 6.8% along transect 6 but had 2% cover along transect 7. Additional herbicide treatments may be needed to keep this cover low. Averaged shrub cover for the two transects was 5.9%. This represents a reduction of 4.1%. The wire grass cover was 6.7% for transect 6 and 2.5% for transect 7. This is probably due to the increase in chalky blue stem cover that overtopped the wire grass. In wetter areas the blue stem was less vigorous and wire grass cover was greater. Percent cover of bare ground was greatly reduced to about 22.5% for each transect due in part to the increase in chalky blue stem cover. Chalky blue stem cover was 53 % in transect 6 and 54% cover in transect 7. While shrub cover is controlled the increase in chalky blue stem has

increased. Winter burns should significantly reduce the cover of the chalky blue stem and hopefully stimulate the wire grass and seed bank. In restoration projects conducted by the FWC, the chalky blue stem coverage tended to increase for several years then gradually decreased in coverage. Returning to more normal rainfall and regular burns are hoped to help reduce the chalky blue stem cover.

Interim Success Criteria:

The restoration activities for UMAM V, Management Unit 2 were completed by 2007. Fire was introduced in 2005 and a second site prep burn occurred in December of 2007. A Gyro-Trac was employed (April-July) to reduce the shrub cover to basal sprouts. Baseline data from the 2006 monitoring event showed a near 100 percent cover of shrubs (primarily black titi) in the former wet flatwoods and fringe wet prairie habitat. Following Gyro-Trac and burn, the shrub cover was reduced to an average of 50%. In areas where we used herbicide the first fall after Gyro-Trac and burn, in two years we have an average of 5% shrub cover (2010). However in areas where we waited one year following Gyro-Trac and burn before applying herbicide the shrub cover averages 16.2% and an overall site average of 10% (2010). Wire grass cover increased by an average of 5% to 8% and wet flatwoods species cover increased to an average of 33% from a baseline of near 0% in 2007.

Wire grass tubelings and long leaf pine seedlings were planted in late December/January 2008. No exotic vegetation has been observed at any time in this polygon. In 2008, the herbaceous species observed within the polygon greatly increased by more than 50%, indicating that the seedbank was responding to the shrub reduction. The planted wire grass was observed with 65% survival. During 2009, wire grass survival dropped to about 45% and an additional 8,834 tubelings were planted in areas with poor survival in December 2010. Wire grass cover continues to increase in the planted areas went from 0% cover at baseline (2007) to 8.4% in 2010. Additional 182,710 wire grass plugs, 182,710 cut over muhly grass plugs,

The hydric pine flatwoods restoration site (165 acres) was planted with wire grass plugs in 2008 (798,600) plugs. Additionally, 199,650 wire grass plugs along with 50,000 tooth ache grass tubelings were added in 2010. Finally in 2011 an additional 182,710 wire grass and gulf muhly grass plants were added to 151 acres of the hydric pine flatwoods restoration area. In addition 15 acres of hydric pine flatwoods was planted with 72,600 tooth ache grass and 72,600 mixed herbaceous wildflowers (primarily of three species, autumn sneezeweed, variable leaved sunflower and rayless sunflower) with 600 plants representing 22 species collected at Garcon. It is hoped that the added diversity will become established within these 15 acre "islands" and spread across the landscape. To date within the 165 acres of hydric pine flatwoods restoration site, 1.18 million wire grass 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. This represents the final planting for these areas. Wildflower plantings had good to moderate survival and many were observed blooming this fall. In the fall winter 2012/2013, the entire 165 acres have been scheduled to be burned. On October 26, 2012, a total of 88 acres of the hydric pine flatwoods restoration area were burned. The remaining 77 acres will be burned during the winter of 2012/2013.

Table 8. Transect 6 Species Cover and Occurrence (Hydric Pine Flatwoods)

chipping sparrow		
Transect 6	10/31/2012	3:00 PM
Hydric Pine Flatwoods	8 species	
Species	Common name	Percent Cover
<i>Andropogon virginicus</i> var. <i>glaucus</i>	Chalky bluestem	53
<i>Aristida stricta</i> var. <i>beyrichiana</i>	Wiregrass	6.7
<i>Cliftonia monophylla</i>	black titi	0.5
<i>Ilex myrtifolia</i>	myrtle-leaved holly	0.8
<i>Lachnanthes caroliana</i>	red root	1.5
<i>Lyonia lucida</i>	fetterbush	6.8
<i>Pinus elliotii</i>	slash pine	1.8
<i>Rhynchospora microcephalla</i>	bunched beaksedge	6.5
	Bareground	22.5

Figure 23. Transect 6 Species Cover and Occurrence (Hydric Pine Flatwoods)

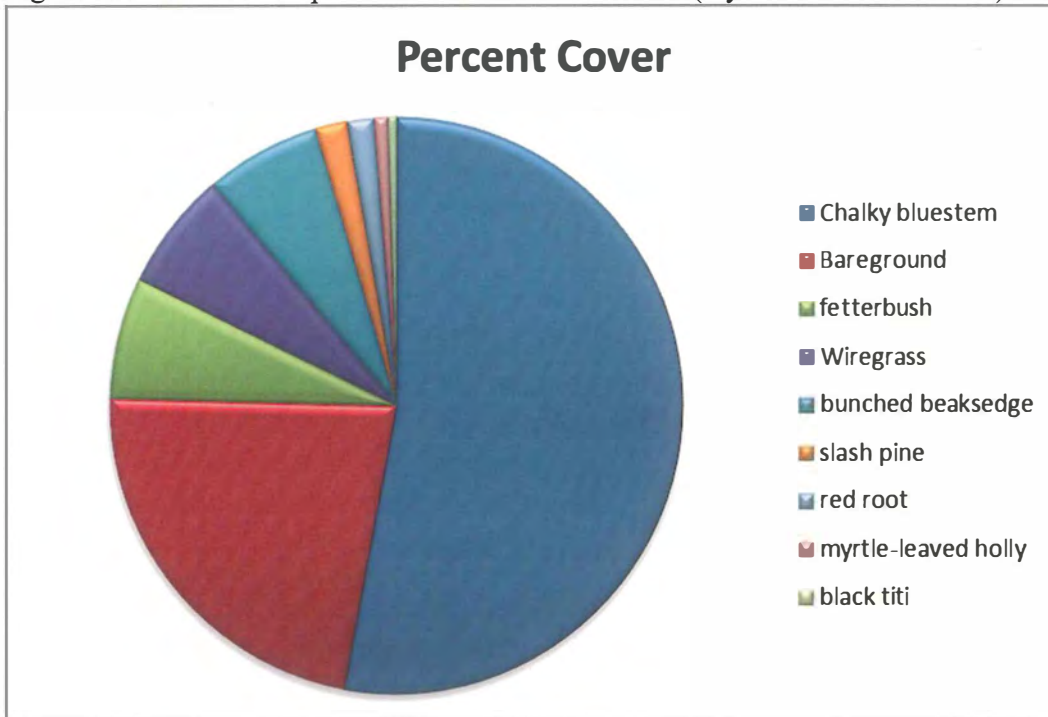
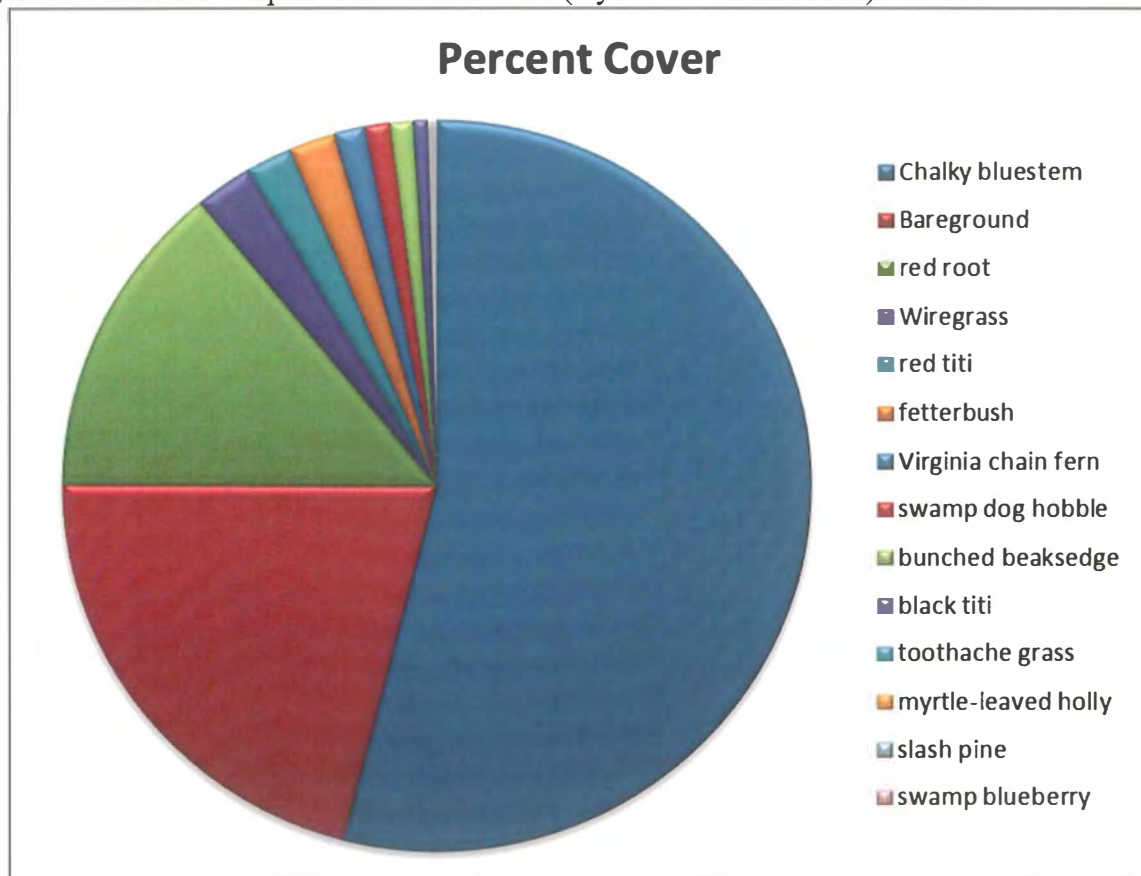


Table 9. Transect 7. Species and Occurrence (Hydric Pine Flatwoods)

Transect 7	10/31/2012	11:00 AM
Hydric Pine Flatwoods	Blue Jay, Quail, chipping sparrow (13 sp)	
Species	Common name	Percent Cover
<i>Andropogon virginicus</i> var. <i>glaucus</i>	Chalky bluestem	54
<i>Aristida stricta</i> var. <i>beyrichiana</i>	Wiregrass	2.5
<i>Cliftonia monophylla</i>	black titi	0.6
<i>Ctenium aromaticum</i>	toothache grass	0.1
<i>Cyrilla racemiflora</i>	red titi	2
<i>Eubotrys racemosa</i>	swamp dog hobble	1.1
<i>Ilex myrtifolia</i>	myrtle-leaved holly	0.1
<i>Lachnanthes caroliana</i>	red root	14
<i>Lyonia lucida</i>	fetterbush	2
<i>Pinus elliottii</i>	slash pine	0.1
<i>Rhynchospora microcephalla</i>	bunched beaksedge	1
<i>Vaccinium corymbosum</i>	swamp blueberry	0.1
<i>Woodwardia virginica</i>	Virginia chain fern	1.3
	Bareground	21.1

Figure 24. Transect 7. Species 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) that will be restored to slough/marsh. The overstory for most of the area is absent though a fringe of cypress remains along the ponds edge. The majority of the area is dominated by water lilies and other aquatic submerged vegetation. Reclamation activities within this polygon include the removal of Dykes Mill Pond dam, and spanning the gap with railcar bridge, planting of cypress and black gum saplings and planting the area with herbaceous and shrub species, if after 2 years, the native wetland understory is < 50%. Dykes Mill Pond was removed in August of 2006 and bridge construction completed in April 2007. With the removal of the dam there have been great changes to the pond. By September 2007 most of the pond had evaporated leaving only small flooded areas. Wet prairie vegetation has greatly spread across the newly exposed sediments and a braided stream channel has emerged across most of the previously flooded area. Sampling last year occurred from a canoe while this year I was able to walk across the entire pond. Since then water levels have increased and average slightly more than 2.7 feet in depth (Figure 23).

In 2006, a total of 7 species were observed within transect 9. The species were common to freshwater marshes within the region. No exotic species were observed. The dominant species observed was fragrant water lily with 45 % cover. Florida yellow bladderwort was also common with 19.2 % cover. Open water was common with 34% cover, indicating that much of the transect occurs in what is currently a pond. Wildlife was observed included wood ducks and a great egret.

In 2007, a total of 11 species were observed within transect 9. Species were common to wet prairies with some minor freshwater marsh species. This represents a major shift in species composition and reflects the shift from an aquatic to wet prairie. No exotic species were observed. Fragrant water lily cover was greatly reduced from 45% in 2006 to 3.23% cover in 2007. Florida yellow bladderwort was not observed within the transect and open water was also greatly reduced from 34% cover to 2.2 % cover. Another significant occurrence was the cover of bare ground which did not exist in 2006, but represented 41% of the cover in 2007. The two dominant plant species were horned beaksedge with 30% cover and a beaksedge that was not in flower with 12% cover, both species common to wet soils and not tolerant of aquatic systems. A species of note, *Drosera intermedia* (Water Sundew) a state threatened species was commonly observed. Wildlife observations included a pair of sandhill cranes (State Threatened species), fresh hog tracks, little blue heron, great egret, and chipping sparrows.

In 2008, a total of nine species were observed along transect 9. Followed by two years of drought, Dykes Mill ponds water level came up flooding most of the historic foot print. The removal of the dam reduced the water level by approximately 6' but not the expected 20 to 30'. The transect was flooded with 6" to 3' of water. Water lilies and aquatic vegetation abound and are thriving providing important habitat for wildlife. An alligator nest was observed along the bank and baby alligators were observed with their 6' mother during sampling. Open water was the dominant cover class with 46.3 percent cover. The dominant vegetative species was fragrant water lily with 33 percent cover.

In 2009, a total of 9 species were again observed along transect 9. Water levels remained high flooding most the historic footprint. The entire transect length was inundated with 4" to 3' of water. Water lilies and aquatic vegetation abound and are thriving providing important habitat for wildlife. Open water was the dominant cover class with 38 percent cover. The dominant vegetative species was fragrant water lily with 35.3 percent cover.

In 2010, a total of 9 species were again observed along transect 9. Water levels have been reduced in the pond by about 1.5-2 feet since removing the dam. Water depth ranged from about 6" at the beginning of transect to about 3', averaging slightly less than 2.5', though water depth is quite variable across the transect

(Figure 28). Since reclamation activities took place Dykes Mill Pond water levels appear to have stabilized at approximately 1.5' lower than baseline conditions. Water lilies and aquatic vegetation abound and are thriving providing important habitat for wildlife. Agal bulrush represented the dominant cover class for the transect with 45% cover followed by fragrant water lily with 29% cover, down from 35.3% cover the following year. Open water decreased from 38% to 14.73%, a 23% reduction, potentially from the reduced water levels and increased light penetrance supportive to aquatic vegetation.

In 2011, the transect was not sampled due to freezing temperatures that caused the water lilies and other aquatic vegetation senesce and not allow an accurate analysis of biomass.

In 2012, a total of 9 species were again observed along transect 9 (Table 10, Figure 23). Water levels have been reduced in the pond by about 1.5-2 feet since removing the dam. Water depth ranged from about 6' at the beginning of transect to about 3', though water depth is quite variable across the transect (Figure 24). Since reclamation activities took place Dykes Mill Pond water levels appear to have stabilized at approximately 1.5' lower than baseline conditions. Water lilies and aquatic vegetation abound and are thriving providing important habitat for wildlife. Agal bulrush represented the dominant cover class with 37.7 % cover followed by fragrant water lily with 34.7% cover. This represents a decrease in agal bulrush cover but slight increase in water lily cover. Cover increased slightly for yellow eyed grass and Gulf coast spike rush. Open water has steadily decreased from 38% to 14.73% to 13.1% in 2012. This could be the result of several years of reduced water depth and increase in rooted vegetation.

Interim Success Criteria:

The management activities used to restore UMAM VI, Management Unit 5 have been completed. The archeological study was completed and the dam removed in August of 2006. The new bridge was completed in April of 2007. Since the removal of the dam the pond drained during the drought and much of the dry pond area was dominated by grasses and sedges. In 2008, the water levels increased and a shallow pond formed in 2008. Water levels have stabilized 1.5-2 feet lower than when the dam was in place. Cypress trees and black gums were planted along the edges of this system in the spring of 2007/2008. Shrub cover adjacent to Dykes Mill Pond was reduced using a Gyro-Trac in 2007. In 2010 and 2011, the area supported a diverse herbaceous cover dominated by wetland grasses and *Rhynchospora*, and provided excellent habitat for birds, small reptiles and amphibians. Open water has decreased overtime and water lily, yellow eyed grass and gulf coast spike rush cover has increased slightly over time.

Table 10. Transect 9. Species and Occurrence (Dykes Mill Pond)

Transect 9		
Date 10/31/12	Grebe, Great Egret	Time:4:30 pm
Collector: David Clayton		Condition, Fair and cool
Wildlife observed: great egret	9 species	
Scientific name	Species	Percent Cover
Eleocharis cellulosa	Gulf coast spikerush	2.5
Hypericum sp.	St. John's wort	3
Nuphar advena	Yellow Pond Lily	1.2
Nymphaea odorata	Fragrant water lily	34.7
Pontederia cordata	Pickerel weed	1.5
Taxodium ascendens	Pond cypress	0.3
Utricularia floridana	Florida bladder wort	1.2
Websteria confervoides	Agal bullrush	37.6
Xyris sp.	Yellow eyed grass	4.8
	Open water	13.1

Figure 25. Species Cover and Occurrence for Transect 9.

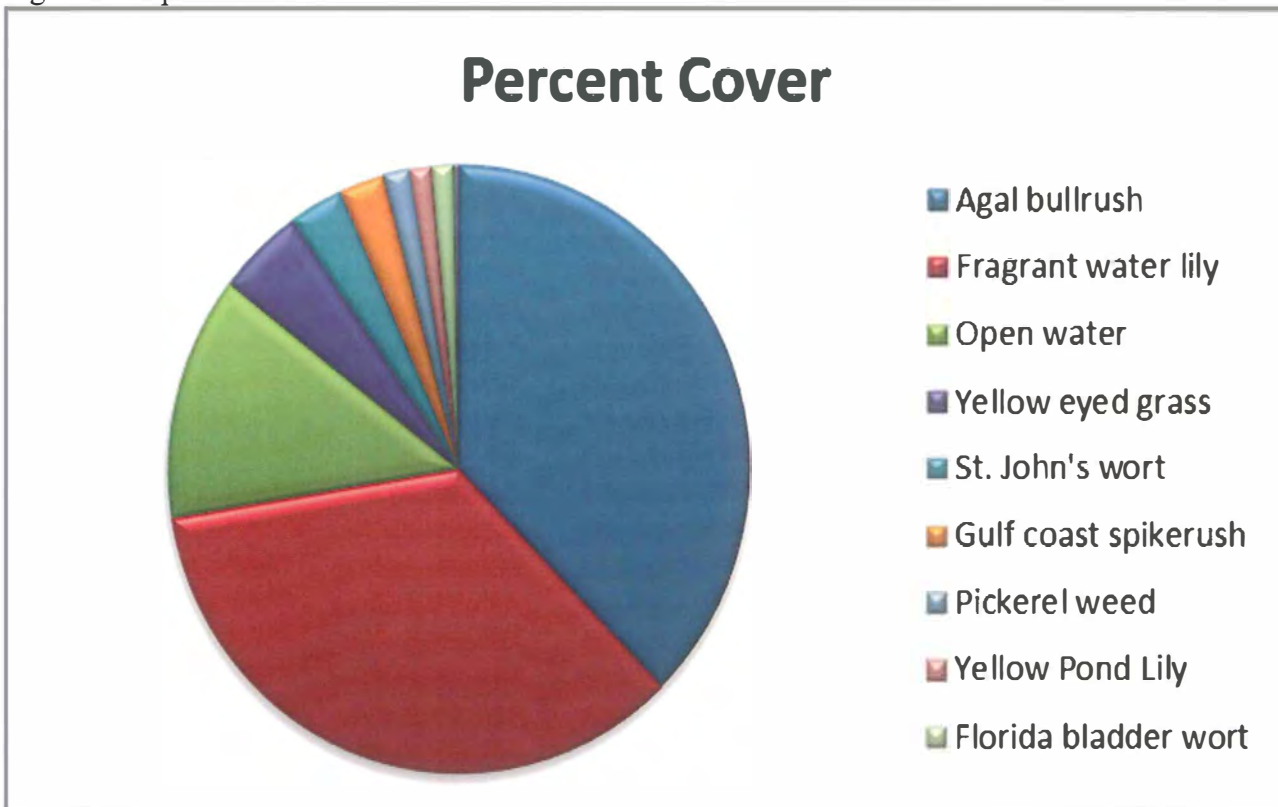
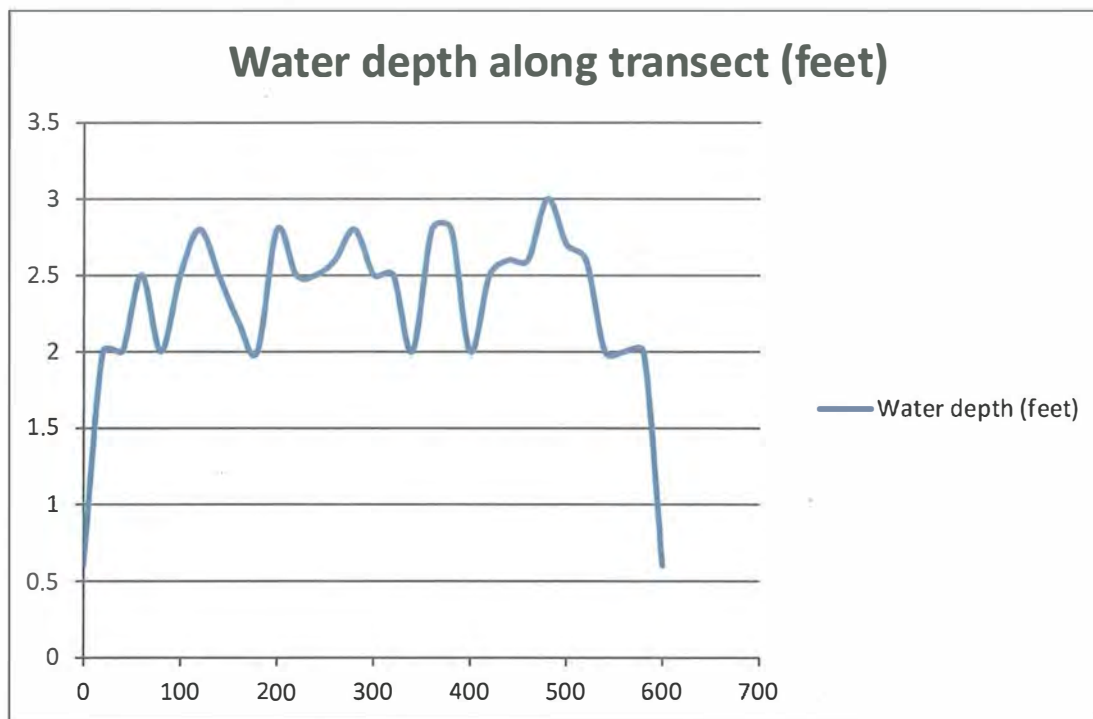


Figure 26. Water Depth at Dykes Mill Pond Across the Transect



Qualitative Monitoring

Materials and Methods

Qualitative vegetation monitoring will 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 intended to provide information useful in management and to determine the success of management activities. A walk path traversed as much habitat as possible. 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 and health were provided for each walk-path. Fuel load for each habitat was determined and the presence of any threatened or endangered species were recorded. Plants were listed in the data sheet in the following categories (tree, shrub, vine or herbaceous) to give a better understanding of composition of the habitat. Wildlife observations were also recorded for each walk-path (Figure 13) provides the location and coverage of transects and the data sheets can be found in (Appendix 4).

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 (Appendix 7).

Management Unit 1, UMAM Polygon IV, Preserved High Quality Forested and Herbaceous Wetlands

Management Unit 1, UMAM Polygon IV consists of 574.839 acres of a wide variety of preserved wetland habitats including approximately FLUCCS: 621 – Cypress, 617 – Mixed Wetland Hardwoods, 644 – Emergent Aquatic Wetlands, 611 – Bay Swamps, 641 – Freshwater Marshes, 616 – Inland Ponds and Sloughs, 640 – Vegetated Non-Forested Wetlands and 643 – Wet Prairies. The management goal for this polygon is the 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, while the third pedestrian survey path (M10) was located in an overgrown hydric pine flatwoods. However it is suggested that this transect be kept but the designation and analysis changed to the more appropriate Management Unit 2, UMAM Polygon V.

In 2006, a total of 38 species were observed in M8, while 32 species were observed in M9. Twenty nine of the species were common to both transects. Five tree species were observed in M8 while 3 tree species were observed for M9. Eight and nine shrub species were observed in M9 and M8 respectively, though cover of shrubs was not significant. Twenty one herbaceous species were observed in M8, while 19 herbaceous species were observed in M9. No nuisance or exotic species were found in M8, though a small patch of torpedo grass was observed in M9. Fuel load was low for each area and no threatened or endangered species were observed. Water levels in both areas were extremely low due to the drought and many of the herbaceous species such as pickerel weed, duck potato (*Sagittaria latifolia*) and fragrant water lily (*Nymphaea odorata*) had browned or appeared dead. Cypress seedlings were numerous in both areas. Wildlife was abundant.

In 2007, a total of 39 species were observed for M8 similar in number to last year four new species, bushy bluestem, beauty berry, sweet pepperbush, and pale meadow beauty were observed. These were observed in the normal pool area and germinated due to the prolonged drought that has left the lake beds dry. Three species previously observed, water shield, bog buttons, and bladder wort were not observed, primarily due to the absence of an aquatic habitat. Along M9, a total of 31 species were observed, again similar in number to last year. However 8 species were not observed this year and include water shield, clustered sedge, Virginia willow, silver bay, pickerel weed, duck potato, bladderwort and yellow eyed grass. These are primarily aquatic species and were not found on the dry lake beds. Nine additional species were observed including bushy bluestem, sedge, black titi, witch grass, yaupon, sweet gum, savannah meadow beauty and American cupscale. The new species with the exception of the American cupscale are facultative wet species that have invaded the dry lake beds. Shrub cover for both transects was very low. No nuisance or exotic species were observed. Fuel load was low for each area and no threatened or endangered species were observed. Water levels in both areas were extremely low due to the drought and many of the herbaceous aquatic species were absent. A wildfire occurred within this polygon and destroyed approximately 12 acres of cypress by burning the roots and occasionally the trunk of the cypress. Details on the wildfire have been recorded in the Fire Management section. Aside from the continued drought this polygon is very similar to last year.

In 2008, a total of 42 species were observed in M8 and increase of 3 species, swamp dog hobble, swamp laurel oak and savannah meadow beauty (Appendix 4).

. Bladderwort and bog buttons were again not observed in these areas along with water shield and Marsh St. Johns wort. The area is starting to recover from the prolonged drought. Water levels were about ½” above the soil surface and aquatic plants were starting to emerge. Along transect M9, a total of 36 species were observed, a slight increase from the previous year (Appendix 4). Water levels were starting to increase in this area with the average water depth approximately 2” in depth. The species observed were transitional or upland species that had germinated in the wetland during the drought and included groundsel tree, winged sumac and pine barren goldenrod. As the system recovers and water levels increase it is expected that the system will recover and the upland species will be removed by increasing water levels. No nuisance or exotic species were observed. Fuel load was low for each area and no threatened or endangered species were observed. Water

levels in both areas were extremely low due to the drought and many of the herbaceous species aquatic species were absent. Wildlife observed included chipping sparrows, southern cricket frogs, a kingfisher and a red bellied wood pecker.

In 2009, a total of 39 species were observed along M8, probably a result of recovering from the drought. Water shield and St. John's wort were again observed now that the water has returned. Dog fennel, red root, and *Centella* were again observed within the area. Water levels were between 12" and 14". Along M9, a total of 44 species were observed a marked increase from the low of 36 from the previous year. Many of the wetland herbaceous species absent in the drought have returned and are flourishing once again. No nuisance or exotic species were observed in this area nor any threatened or endangered species.

In 2010, a total of 46 species were observed along M8 and M9. Water levels are back to pre-drought conditions and the wetland vegetation is again thriving. Species diversity is good. Dog fennel cover is limited to patches along the uplands. A small patch of torpedo grass was observed and treated with herbicide at one of the boat launches.

In 2011, a total of 38 species were observed along M8, and 41 species along M9. The SHLMB is again suffering from a drought. Lake beds were dry at the time of the sampling limiting the aquatic vegetation observed. Dog fennel and flat topped golden rod were observed in the dry sand of M8. M9 is located in the green ponds. Only small pools remain in this area due to the drought. Aquatic vegetation is absent and limited littoral vegetation has survived the dry conditions. Species diversity should return once the rains return.

In 2012, a total of 51 species were observed along M8, and 47 species along M9. This is an increase in 13 and 6 species respectively. While the rainfall this year was considered "normal" the SHLMB wetlands are close to or at drawdown conditions. Lake beds were mostly dry at the time of the sampling limiting the aquatic vegetation observed. Water levels were slightly above or just below the soil surface. Dog fennel and flat topped golden rod were observed in the dry sand of M8. M9 is located in the green ponds. Pools of water remain in the bottom of the ponds, some larger or smaller depending on the pond. Aquatic vegetation is largely absent and limited littoral vegetation has survived the dry conditions. Species diversity should return once the water table recovers.

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 are again low due to the drought, but the side is dominated by appropriate wetland species.

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 areas are overgrown, degraded hydric pine flatwoods dominated by a variety of tree and shrub species. Both areas were burned during the summer of 2005, though fuel loads in both areas are moderate and additional fires are warranted. Dominant species cover along M10 was black ti ti with some silver bay and slash pine, while M11 was moved slightly in 2007 to better reflect the wet flatwoods. The previous transect was located in a mixed bayhead. Wire grass was present in M11, but absent in M10.

In 2006, a total of 32 species (8 trees, 17 shrubs, 4 vines and 3 herbaceous species) were observed along M10.

In 2007, shrub reduction was completed in both areas using a Gyro-Track. Shrubs were thinned in June and the areas were burned in December 2007. A total of 40 species were observed in along M10 while 16 species were observed in M11. No nuisance exotic species were observed in either area. The increase in species along M10 may be due to increased access to the area due to the Gyro-Track and the fact that the site is more of a mixture of wet flatwoods with species from an adjacent bayhead. Successive fires should remove the bayhead species. A total of 22 species were observed along M11 in 2007. The lower number of species found in M11 is more reflective of a site that had been overgrown with shrubs and recently reduced to ground level by the gyrotrack. Over time it is expected a greater number of species will germinate from the seed bank. Wildlife observed included robin, kingfisher, black vulture, phoebe, anole and cardinal.

In 2008, a total of 51 species were observed, eleven species more than the year before. The seed bank has started to respond in this area and additional species observed were primarily herbaceous species commonly found in wet flatwoods. Shrubs in this area had also increased in cover and will be targeted in the coming year with selective herbicides to reduce shrub cover while preserving the understory vegetation. A total of 26 species were observed along M11 in 2008, an increase of 4 species. No nuisance or exotic species were observed during the 2008 sampling. A minor amount of hog damage was observed adjacent to polygon, and trappers have been notified. Wildlife observed included titmouse, red bellied wood pecker, flicker, blue jay and raccoon tracks.

In 2009, a total of 54 species were observed within the meandering transect of M 10. This represents an increase of 3 species. Several shrub species that had been a problem in the area were not observed in this year's sampling. The species observed were common to wet flatwoods. Targeted shrub densities have greatly decreased in these areas and wire grass will be planted in the winter of 2009/2010. A total of 28 species were observed along M11, a slight increase from the previous year. This area continues to develop, and additional herbicide work is needed here to insure that the shrub density continues to decline. Positioned adjacent to the Green Ponds, this area should have good natural recruitment. No nuisance or exotic species were observed. Wildlife observed included deer tracks and a titmouse.

In 2010, a total of 68 species were observed within the meandering transect of M 10 and increase of 14 species. A total of 37 species were observed along M11, an increase of 9 species. This area continues to develop, and additional herbicide work is needed here to insure that the shrub density continues to decline. Positioned adjacent to the Green Ponds, this area should have good natural recruitment. No nuisance or exotic species were observed. Wildlife observed included deer tracks and a titmouse.

In 2011, a total of 51 species were observed along the meandering transect of M 10, similar to 2009 but a reduction in overall species probably due to the drought. A total of 36 species were observed along M 11, similar to previous years. This year bushy blue stem cover greatly increased and may have made finding additional species problematic. In addition, the continued drought may have prevented some wetland species from thriving.

In 2012, a total of 84 species were observed along the meandering transect of M 10, and a total of 46 species were observed along M 11. This is a significant increase of 33 species along transect 10 and an increase of 10 species along transect 11. Seven of the species observed were from the planted wildflowers introduced in the winter of 2012. These species were all found in flower and it is hopeful that the seed will spread the species across the landscape. Both sites continue to develop in species density and coverage typical of a hydric pine flatwoods.

Interim Success Criteria:

Interim success criteria have been met for this area. These included exotic vegetation cover < 2% per acre, nuisance native vegetation cover < 5% per acre, increasing herbaceous groundcover, decreasing density of woody shrub layer, planted pines are surviving and healthy and prescribed burns have been conducted in accordance with fire management plan. These sites were burned in December 2007 and were burned again in 2009. Positioned adjacent to the Green Ponds, this area should have good natural recruitment. Wildlife observed included deer, fence lizard tracks and chipping sparrows. Due to the numbers of existing pine trees this area will not need supplemental tree planting. Both sites were historically wet flatwoods that were degraded to shrub wetlands in the absence of a regular fire regime. Shrub densities were initially near 100% cover and were reduced with the use of a Gyro-Trac followed by burning and the use of selective herbicides. Shrub cover has been significantly reduced and herbaceous cover has significantly increased. These areas were planted with wire grass plugs in 2008 and M10 had tooth ache grass added. Additional wire grass was added to both areas during the winter of 2010. An additional 182,710 wire grass and gulf muhly grass plants were added to 151 acres of the hydric pine flatwoods restoration area. In addition, 15 acres of hydric pine flatwoods was planted with 72,600 tooth ache grass and wildflowers (primarily of three species, autumn sneezeweed, variable leaved sunflower and rayless sunflower), However an additional, 600 plants representing 22 species collected at Garcon Point and plants were also established at the SHLMB. This represents the final planting for these areas. The large increase of 33 species along transect 10, in part reflects the increased species diversity due to these plantings as well as the seed bank. M11 also continues to increase in diversity by 10 species in 2012 from the seed bank and seed drift from flatwoods communities.

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 the preservation and the re-introduction of fire to upland sandhill communities dominated by oaks. Management activities include the introduction of fire using dormant season burns, and the eventual introduction of growing-season burns (anticipated 3 to 5-year and 5 to 7-year burn cycles), and the reduction of oak in portions of management unit as selected by QMS (Qualified Mitigation Supervisor), and monitoring for nuisance / exotic plant species. Other management activities may include the supplemental planting of longleaf pine (436 trees per acre) and wiregrass (6' centers or direct seeding as 2-5 pounds per acre as determined by the QMS. Live and turkey oaks were selectively harvested from portions of Management Unit 10, UMAM Polygon III in September of 2006. As a result the fuel load is high for most of these areas and a prescribed burn is scheduled for a dormant season burn in the winter of 2008/2009. Good coverage of wire grass was observed throughout Management Unit 10 so no additional planting will be required. Initial burns for portions of Management Unit 10 were conducted during the growing season. Wire grass was observed in flower for these areas. Continued warm season burns should ensure an increasing cover of wire grass throughout the polygon. Four transects were located within Polygon 10, M1, M2, M12 and M13).

In 2006, two transects M1 with 44 species (9 trees, 5 shrubs, 3 vines and 27 herbs) and M13 with 54 species (9 trees, 6 shrubs, 2 vines and 37 herbs) were species rich, while M2 with 29 species (6 trees, 6 shrubs, 3 vines and 14 herbs) and M12 with 26 species (12 trees, 3 shrubs, 3 vines and 8 herbs) were generally lacking a diverse herbaceous cover. This may be due to the shading of the understory by overstory oaks. However, all of the transects had between 19 and 35 species in common. Scattered diamond oak and sand pine may also be reflective of a historic lack of fire. No nuisance exotic coverage was observed, though a small patch of Bahia grass was found at the gate adjacent to the road for the transect M1. In the transect M1, a Florida threatened species Gulf coast lupine (*Lupinus westianus*) was located throughout the sand hill upland while smooth barked St. John's wort, a Florida Endangered species, was located adjacent to the solution pond 1. Gopher tortoise burrows were observed along pedestrian transects M12 and M13.

In 2007, two transects, M1 was observed with 67 species (10 trees, 16 shrubs, 3 vines and 38 herbaceous species) while, along M13 62 species (9 trees, 7 shrubs, 3 vines and 43 herbaceous species) was observed (Appendix 4). Along M2 38 species (8 trees, 5 shrubs, 2 vines and 23 herbaceous species) were observed and 34 species were observed along transect M12 (13 trees, 4 shrubs, 3 vines and 14 herbaceous species) (Appendix 4). M1 had 5 newly observed species and 3 species were not observed in 2007 and were sky blue lupine, bladderwort and yellow eyed grass. Ten new species were observed along M13 and two species, dwarf huckleberry and bracken fern were not observed. Along M2 13 additional species were observed while, 4 species Florida jasmine, red chokeberry, pale meadow beauty and lopsided Indian grass were not observed. Finally, M12 also had 13 additional species observed while 5 species were not observed and included American holly, gopher apple, sand pine, shiny blueberry, and Adam's needle. The observation of additional species may be due to increased scrutiny of the polygon and habitat improvement due to successive fires. Aside from a small patch of Bahia grass at the entrance to M1 no nuisance or exotic species were observed. Gulf coast lupine was observed at two transects, M1 and M13. Sand pine and Florida jasmine may have been removed by earlier fires. The habitat all appears healthy and vigorous. These areas were burned during the winter burns in December of 2007. Wildlife observed included a downy woodpecker, pileated woodpecker, raccoon tracks, otter tracks, gopher tortoise, deer tracks, turkey tracks, cardinal, towhee, titmouse and mockingbird.

This polygon is represented by four transects, M1, M2, M12 and M13. In 2008, M1 was observed with 69 species, 2 species greater than in 2007. M2 was observed with 35 species, three fewer than the previous year. In 2008, M12 was observed with 44 species, 10 species greater than in 2007 and M 13 was observed with 59 species, three species fewer than in 2007. Species observed were typical of sand hill species. Gulf coast lupine was again observed in this location and is thriving in M1, M2 and M13. Wire grass continues to thrive in these areas. No nuisance or exotic species were observed, except for a small area at the entrance to M1.

This polygon is represented by four transects, M1, M2, M12 and M13. In 2009, M1 was observed with 74 species, 4 species greater than in 2008. This area is recovering from the drought and many of the species not observed adjacent to the pond have been seen again with the filling of the pond. The associated uplands are in increasing in fuel and will be burned in 2010. M2 was again observed with 35 species. This area is managed under a 5-7 year burn cycle and as fuels increase perhaps species may become less common that require more light. A total number of 48 species were associated with M12, four greater than the previous year. A selective herbicide was used in this area to reduce the cover of hardwoods and help release the wire grass. Several hard wood species cover was dramatically reduced in this area. Along M 13, 64 species, five species greater than in 2008 were observed. Species observed were typical of sand hill species. Gulf coast lupine was again observed in this location and is thriving in M1, M2 and M13. Wire grass continues to thrive in these areas. No nuisance or exotic species were observed, except for a small area at the entrance to M1.

This polygon is represented by four transects, M1, M2, M12 and M13. In 2010, a total of 75 species were found along transect M1, similar to 2009. The pond appears healthy and wetland vegetation appears diverse and robust. The associated uplands are in increasing in fuel and was burned early in 2010. A total of 45 species were found along M2, an increase of 10 species compared to 2009. This area was burned during the spring of 2010. Successive burns have gradually reduced oak and shrub cover while increasing the quality of the wire grass and sand hill community. A total number of 55 species were observed within M12, seven greater than the previous year. A selective herbicide was used in this area to reduce the cover of hardwoods and help release the wire grass, however shrub cover has increased and will be reduced in 2010. A total of 71 species, were observed along M13, seven species greater than in 2009. Species observed were typical of a high quality sand hill. Gulf coast lupine was again observed in this location and is thriving in M1, M2 and M13. Wire grass continues to thrive in these areas. No nuisance or exotic species were observed, except for a small patch of Bahia grass at the entrance to M1.

This polygon is represented by four transects, M1, M2, M12 and M13. In 2011, a total of 71 species were found along transect M1, similar to 2010. The pond is again greatly reduced in cover to a small pool. The associated uplands are in increasing in fuel and are in need of a burn. The population of Gulf coast lupine is greatly increasing and plants are common in this area.. A total of 41 species were found along M2, a decrease of 4 species compared to 2010. This area was burned on a 3 year interval. Successive burns have gradually reduced oak and shrub cover while increasing the quality of the wire grass and sand hill community. A total number of 48 species were observed within M12, seven less than the previous year. This area had extensive shrub reduction in the last several months to reduce hardwood cover. It is very difficult to traverse this area, but should be easier following a burn.. A total of 67 species, were observed along M13. This area also had significant hardwood eradication in late summer and it was difficult maneuvering in this area. Species observed were typical of a high quality sand hill. Gulf coast lupine was again observed in this location and is thriving in M1, M2 and M13. Wire grass continues to thrive in these areas. No nuisance or exotic species were observed, except for a small patch of Bahia grass at the entrance to M1.

Management Unit 10 is degraded sand hill that has in the absence of fire, became dominated by shrubs and hardwoods. The primary management for this area is burning at a 3-5 year interval. With regular burns this habitat has become more diverse. The District implemented hardwood control in some areas and supplemental wire grass plantings to ensure a shift back to sand hill. This management unit is represented by four transects, M1, M2, M12 and M13. In 2012, a total of 93 species were found along transect M1, The population of Gulf coast lupine is vigorous in this area. This area also is combination of several habitat types as it grades towards the pond and the species richness in this area extends beyond that of a sandhill. A total of 39 species were found along M2, a decrease of 2 species compared to 2011. This area was burned on a 5 year interval. Successive burns have gradually reduced oak and shrub cover while increasing the quality of the wire grass cover but overall, diversity is lower than sandhills with a shorter interval between fires. A total number of 56 species were observed within M12, an increase of 8 species compared to the previous year. This area had extensive shrub reduction in the last several months to reduce hardwood cover. This area was just burned in October, but species could still be identified. A total of 55 species, were observed along M13. The density and cover of the wire grass is excellent and shrub cover was greatly reduced. Burns may be needed to stimulate the seed bank here and are scheduled for 2013. Species observed were typical of a high quality sand hill. Gulf coast lupine was again observed in this location and is thriving in M1, M2 and M13. Wire grass continues to thrive in these areas.

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 and M1's entrance. Diverse is good and continued fire within these areas will ensure a diverse sand hill community. Wire grass 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 or Sand 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 sand hill community from a sand or slash pine plantation. Management activities will include the re-introduction of growing season burns, removal of planted pines, re-planting with 436 long leaf pine seedlings per acre and if needed the addition of wire grass tubelings or seeding. Initial fire was introduced to the slash pine areas in 2005, while site prep burns will take place in the winter of 2008 for the previous sand pine areas. Trees were harvested from April to November 2007. One transect (M5) was located within Management Unit 11, UMAM Polygon II. This area had already undergone a warm season burn that greatly reduced the shrub cover. The offsite sand pine was removed in April 2007. Much of the understory was in fairly good condition with good diversity typical of the sand hills.

In 2006, a total of 50 species (6 trees, 7 shrubs, 2 vines, and 35 herbaceous species) were observed. Wire grass was the dominant grass species within the area. However, the emerging shrub layer was dominated by diamond oak.

In 2007, a total of 49 species were observed (7 trees, 8 shrubs, 2 vines and 32 herbaceous species) (Appendix 4). Nine new species were observed while 10 species initially present were not observed. The changes in species composition may be due to the tree harvest which greatly disturbed the understory. Species were common to the sandhill community. Wire grass was common and appeared to be the dominant species. Much of the shrub layer was reduced to sprouts and much of the diamond and live oak was destroyed during the tree harvest. A site prep burn is planned for winter 2008. Wildlife observed included: cardinal, fence lizard, titmouse, mourning dove, fish crows, red bellied wood pecker, phoebe, squirrel, two deer and lined race runner.

In 2008, a total of 59 species were observed (7 trees, 8 shrubs, 3 vines and 41 herbaceous species). Three additional species were observed. These were all typical dry sand hill species. Changes in composition are likely due to increased light from harvest of slash pine, followed by the initial burn. Wire grass continues to thrive and flowered this year. The area is returning to a sand hill from the planted pine plantation. Diversity will probably continue to increase due to increased fire rotations and response of the seed bank. No wild life was observed during sampling.

In 2009, a total of 61 species were observed (7 trees, 8 shrubs, 3 vines and 43 herbaceous species). Three additional species were observed. These were all typical dry sand hill species. Wire grass continues to increase in cover. The area has increased litter and will be burned during the winter of 2009/2010. The area is returning to a sand hill from the planted pine plantation. Diversity will probably continue to increase due to increased fire rotations and response of the seed bank.

In 2010, a total of 65 species were observed (7 trees, 9 shrubs, 3 vines and 46 herbaceous species), four more species than the previous year. These were all typical dry sand hill species. Wire grass continues to increase in cover. The area has increased litter and will be burned during the winter of 2010/2011. The area is returning to a sand hill from the planted pine plantation. Diversity will probably continue to increase due to increased fire rotations and response of the seed bank.

In 2011, a total of 61 species were observed (7 trees, 9 shrubs, 3 vines and 42 herbaceous species). These were all typical dry sand hill species. Wire grass as in previous years continues to increase in cover. The area is returning to a sand hill from the planted slash pine plantation.

In 2012, a total of 69 species were observed (7 trees, 9 shrubs, 3 vines and 50 herbaceous species). This is an increase of 8 sandhill species. These were all typical dry sand hill species. Wire grass as in previous years continues to increase in cover. The area has made a great recovery to a sand hill. Several late successional species such as the pinwheel blanket flower and blue sage occur in this area. Wire grass cover continues to increase and the area looks very similar to adjacent sandhills.

Interim Success Criteria:

The interim success criteria have been met for this area. No nuisance or exotic species were observed. Wire grass is the dominant species. The ground cover is diverse and typical of a sandhill. Diversity continues to increase as the seed bank responds and with frequent fires.

Management Unit 12, UMAM Polygon 1, Sand Hill

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 is to restore a diverse sand hill. Restoration activities include the re-introduction of growing season burns, removal of oak \leq 12 inches DBH and herbicide treatment of stumps, planting of longleaf pine (436 trees per acre), and monitoring for nuisance / exotic plant species. Oak eradication was conducted for Management Unit 12, UMAM Polygon 1 during the summer of 2005. . Fire was re-introduced in 2004 to the polygon and cover of the once dominant shrub woody goldenrod has been greatly reduced. Since the initial fire, two additional fires, the most recent in December of 2007, further reduced shrub and woody goldenrod cover. Wire grass has flowered for two consecutive years in most of this habitat. Wire grass is again the dominant herbaceous species within this polygon. The sand hill habitat within this polygon is very diverse and considered high quality with an excellent herbaceous species composition. The majority of the polygon was planted with longleaf pines in 2004; however, several areas on the north side of Green Head Branch will be re-planted with in 2008. Two transects (M3 and M4) were located within this polygon.

In 2006, a total of 35 species (7 trees, 2 shrubs, 2 vines, and 24 herbs) were observed along pedestrian transect M3, while 68 species (8 trees, 9 shrubs, 2 vines and 49 herbs) were observed within M4. The species were typical of the sand hill though in wetter areas of M4 adjacent to Little Deep Edge Pond, more pine flatwood vegetation occurred. Small patches of centipede grass were observed along the pedestrian transect M3.

In 2007, a total of 42 species (8 trees, 7 shrubs, 2 vines and 25 herbs) were observed along M3 (Appendix 4). The additional, shrub species observed may be due to expanding the path further to the west and up an old ridgeline. Shrubs were typical of the sandhill and high in wildlife value. Twelve new species were observed within this transect and may again be due to expanding the pedestrian survey. Five species, Southern magnolia, golden aster, bracken fern, Carolina milkweed and pinewoods milkweed were not observed in this year's sampling. This may be due to the later sampling when some of these species are less noticeable following flowering and fruiting. Along the pedestrian transect M4 a total of 69 species (8 trees, 11 shrubs, 2 vines and 48 herbaceous) species were observed. A total of 17 new species were seen this year and 13 species previously observed were not seen this year. The area surrounding this pedestrian meander was burned during the winter of 2007 and the fire was particularly hot killing some turkey and live oaks and also may have removed some of the less fire tolerant species. Centipede grass which was observed as a minor component in the polygon was completely absent following the fire. Another species apparently removed by the fire was the slender crab grass. Other new species may have emerged from the seed bank once the fire exposed bare ground. Wildlife observed within this polygon included rabbit and raccoon tracks, and an active gopher tortoise burrow. In addition several threatened and endangered species were observed including southern crab apple, smooth barked St. John's wort and Gulf Coast lupine.

In 2008, a total of 53 species were observed along M3, an increase of 11 species from the previous year. The additional species were common to sand hills and species number may be increasing as a result of the shrub layer reduction due to successive fires. M4 is the most diverse of the areas of the bank. A total of 87 species were observed within this area. This is an increase of 18 species and may be due to a recent prescribed fire. Oak and shrub densities are low in this area and there are pockets of wet flatwoods within the sand hill vegetation. As shrub levels are reduced and continued fires will help in keeping the observed diversity. No nuisance or exotic species were observed though small patches of centipede grass were observed by staff. Some expansion of turkey and live oaks were observed within these areas and will be reduced if cover continues to expand. Wildlife observed within this area included turkey and raccoon tracks, active gopher tortoise burrow, down wood pecker, chickadee. Threatened and endangered species include gulf coast lupine, crab apple and smooth barked St. Johns wort adjacent to cat pond.

In 2009, a total of 55 species were observed along M3, an increase of 2 species from the previous year. This area is quite diverse and additional species were common to sand hills and species number may be increasing as a result of the shrub layer reduction due to successive fires. In order to reduce oak sprouts from felled trees, the area was treated with Velpar (ULW), an herbicide selective for hardwood species. The area will be burned in the winter of 2009/2010. It is expected that Velpar will reduce the hardwood cover to below 150 trees per acre and keep the sand hill open and park like. M4 is the most diverse of the areas of the bank. This area historically had a low density of pines and oaks and continued fires should keep this area in excellent condition. A total of 91 species were observed within this area, and increase of 4 species. This area has an abundance of late successional sand hill species and quality of habitat in this area is very high. Oak and shrub densities are low and there are pockets of wet flatwoods within the sand hill vegetation. As shrub levels are reduced and continued fires will help in keeping the observed diversity. No nuisance or exotic species were observed though small patches of centipede grass were observed by staff. Some expansion of turkey and live oaks were observed within these areas and will be reduced if cover continues to expand. Threatened and endangered species include gulf coast lupine, crab apple and smooth barked St. John's wort adjacent to cat pond.

In 2010, a total of 65 species were observed (7 trees, 9 shrubs, 3 vines and 46 herbaceous species), four more species than the previous year. These were all typical dry sand hill species. Wire grass continues to increase in cover. The area has increased litter and will be burned during the winter of 2010/2011. The area is returning to a sand hill from the planted pine plantation. Diversity will probably continue to increase due to increased fire rotations and response of the seed bank

In 2012, a total of 88 species were observed along M3, an increase of 33 species from the previous year and 89 species were observed along M4 similar to last year. Both of these areas significantly increased since the first monitoring report. M3 started with 35 species to currently 88 species while M4 initially had 68 species to a current 89 species an increase of 21 species. These areas are quite diverse and species number may be increasing as a result of the shrub layer reduction due to successive fires. M4 is the most diverse of the areas of the bank. This area has an abundance of late successional sand hill species and quality of habitat in this area is very high. Oak and shrub densities are low and there are pockets of wet flatwoods within the sand hill vegetation. As shrub levels are reduced and continued fires will help in keeping the observed diversity

Interim Success Criteria:

This polygon has met the restoration goals set forth in the interim success criteria. Four controlled burns within this polygon have greatly reduced the cover of woody golden rod and stimulated the cover of wire grass and other grasses and forbs. Oaks have been reduced to less than 150 trees per acre and the herbaceous vegetation is dominated by wire grass. Long leaf pine seedling numbers were reduced during the fall burn of 2011 to appropriate levels.

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 along the backside of Dykes Mill Pond. The water levels at Garret pond were very low due to the summer drought of 2005.

In 2006, a total of 36 species (5 trees, 7 shrubs, 1 vine and 23 herbs) were observed. Vegetation was typical of a diverse pond within the region. A small patch of torpedo grass was observed at the boat ramp to the pond. A zone of Smooth barked St. John's wort and seedlings was observed just below the shrub layer surrounding the pond. Some species such as pickerel weed appear to have been set back by the drought and most of the leaves and stem have browned.

In 2007, a total of 24 species were observed (5 trees, 7 shrubs, 1 vine and 11 herbs) (Appendix 4). Due to the extended drought, this pond has been dry for approximately a year. The reduction in herbaceous species is due to the lack of water. Most of the absent species were aquatic or required wet conditions to thrive. The small patch of torpedo grass at the old boat launch had been sprayed during the summer and none was observed during the fall sampling. Dog fennel has continued to invade the site and many of the aquatic species were absent.

In 2008, a total of 20 species were observed (5 trees, 7 shrubs, 1 vine and 8 herbs) (Appendix 4). Due to the extended drought, this pond has been dry for approximately 2 years. The reduction in herbaceous species is due to the lack of water. Most of the absent species were aquatic or required wet conditions to thrive. Dog fennel has continued to invade the site and several wet flatwood species have been observed. No torpedo grass was observed during the fall monitoring.

In 2009, a total of 35 species were observed (5 trees, 7 shrubs, 1 vine and 23 herbs). The drought has ended and Garret Pond is again filling with water. Many of the wetland dependant species are once again flourishing within the pond and shoreline. The dog fennel and invading upland species have been drown and are being replaced by wetland vegetation. No torpedo grass was observed during the fall monitoring.

In 2010, a total of 43 species were observed along M6, (5 trees, 7 shrubs, 2 vine and 29 herbs), and increase of 8 species. A total of 40 species were observed along M7 an increase of two species. The diversity of the wetlands continues to increase since the prolonged drought. The wetland dependent species are diverse and flourishing within the pond and shoreline. No torpedo grass was observed during the fall monitoring.

In 2011, a total of 39 species were observed along M6, while 36 species were observed along M7. This represents a reduction in species numbers for each area and maybe the result of the continued drought and lack of water and aquatic habitat at Garret Pond. The diversity of the wetlands continues to increase since the prolonged drought. The wetland dependent species are diverse and flourishing within the pond and shoreline. No torpedo grass was observed during the fall monitoring.

In 2012, a total of 51 species were observed along M6, while 42 species were observed along M7. This represents an increase in species numbers for each transect and are due in part to the planted species found in this area and due in part to a seed bank response due to prolonged drought. Small ponds of water remain at Garret Pond. The wetland dependent species are surviving in the wettest areas.

Interim Success Criteria:

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
Restoration Ecologist
Environmental Scientist
Qualified Mitigation Supervisor