SHULER PROPERTY
UMBRELLA REGIONAL MITIGATION PLANS FOR FLORIDA DEPARTMENT OF TRANSPORTATION PROJECTS
CONCEPTUAL MITIGATION PLAN
LIBERTY COUNTY, FLORIDA

Prepared for:

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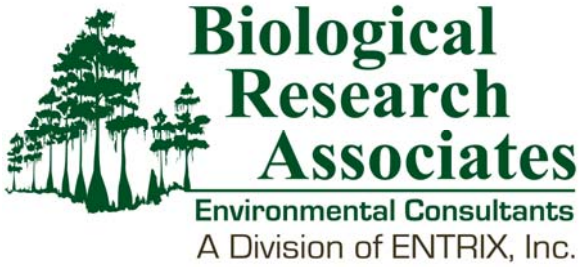

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TABLE OF CONTENTS

FIGURE

APPENDICES

1.0 PROJECT OVERVIEW AND GOALS

Biological Research Associates, LLC (BRA), a division of ENTRIX, Inc., has prepared the following conceptual wetland restoration plan of the Shuler Property (Shuler) for the Northwest Florida Water Management District (NWFWMD). The majority of wetlands within Shuler are degraded due to historic silvicultural practices. The restoration plan includes plugging existing drainage ditches, thinning planted pine, and implementing a prescribed fire program within slated wetland mitigation lands to offset wetland loss associated with Florida Department of Transportation (FDOT) projects. The subject tract is approximately 461.75 acres of which 191.12 acres have been identified by NWFWMD as wetland mitigation lands. The wetland mitigation limits were established by NWFWMD following review of historic aerials. The proposed mitigation lands are intended to approximate the sites historic (pre-impact) wetlands expanse. The restored site will be managed in perpetuity for ecological integrity by NWFWMD.

The following wetland report provides a cursory review of current and historic site conditions and provides a conceptual mitigation plan for those areas slated as mitigation lands. Although site surveys focused on lands slated for mitigation, a cursory review of all upland and wetland communities within the project tract was conducted. This review included utilizing aerial interpretation of current and historic aerials, soils mapping and associated community prescription, and ground-truthing of these interpolated features to determine the sites restoration potential. The assessment of historic conditions at the site underscores the extent to which native site conditions have been significantly altered through the conversion to a pine plantation. The prescribed restoration plan is based on the evaluation of these conditions.

Both common and scientific botanical names follow Wunderlin and Hansen (2003) and Andre Clewell (1985); see references in **Section 7.0**. The authorship of scientific names can be obtained in either of these references, and therefore, have been excluded from this report.

2.0 LOCATION AND LANDSCAPE

The 461.75-acre project site lies within the Atlantic Coastal Plain-Apalachicola Coastal Lowlands and occupies a mosaic of upland, mesic and wetland communities immediately adjacent to, and east of, County Route 67 approximately thirteen miles south of Hosford in Liberty County, Florida. A location map is provided as **Figure 1.** Lands throughout this physiogeographic region are typified by high pinelands, pine flatwoods, swampy depressions, and minor and major drainages (*i. e.*, strand swamps). Elevation changes are typically subtle with the exception of mesic slope forests and bluffs associate with creek swamps and rivers systems. Topographic changes within Shuler are detailed on a United States Geological Survey (USGS) Quadrangle map as **Figure 2**. Locally, high pinelands contain a canopy of longleaf pine (*Pinus palustris*) and a conspicuous understory of scrub oaks mainly turkey oak (*Quercus laevis*). Lower and moister sites grade from high pinelands into pine flatwoods. These areas contain a canopy dominated by longleaf pine, but slash pine (*P. elliottii*) may also be present. Wetland drains are comprised of numerous vegetative assemblages including bay, cypress, and blackgum swamps depending on the specific moisture conditions. Transitional zones between upland and wetland systems are often dominated by titi's (*Cyrilla* spp.).

Figure 1.

Figure 2.

3.0 EXISTING AND RECENT HISTORICAL CONDITIONS

The majority of the subject tract was previously clearcut and replanted with longleaf pine. Further, due to the lack of wiregrass and dominance of broomsedge it is likely that the soil was mechanically disturbed prior to planting. Furrowing is minor and restricted to the wettest of those areas planted as found on the southern two-thirds of the site. The large network of upland and wetland cut ditches were created to drain the wetlands and further facilitate pine production. Spoil excavated from these ditches was used as fill within wetlands to create adjacent access roads. The majority of observed wetland road crossings are culverted or exist as low-water crossings. For purpose of this report all roads were mapped as uplands. Although not replanted, it is assumed that trees within the majority of the deepest forested wetland sloughs and stream systems were historically harvested due to the low number of large tree specimens.

In general the Apalachicola Lowlands are defined as very gently undulating and poorly drained. Swamps of these lowlands occupy irregularly-shaped, shallow depressions that mostly do not join to form drainages. Most depressions lie no more that 6-10 feet below the level of the surrounding pineland and range from less than an acre to many sections (Clewell, 1971).

The northern quarter of the project site contains the highest elevations and driest ecological communities. Wetlands within this area are primarily seepage streams cut into the upland sandhill. Waters of this system, known as the Fox Branch, travel northeast and empty into the Ochlocknee River. Wetlands on the southern portion of the site are typified by forested and non-forested shallow sloughs/strand swamps. Water of these wetlands moves eastward converging to form the Wolf Branch of the Ochlocknee River. Hydrologic conditions as observed in the field on 28 August 2008 are depicted on **Figure 3**.

The *Florida Land Use, Cover and Forms Classification System* (FLUCFCS) was utilized to identify and map the site's ecological communities. The FLUCFCS method was designed by the Florida Department of Transportation (FDOT) as a way to develop a unified land use classification system for all land cover and plant communities found throughout Florida. BRA conducted a reconnaissance of the 461.75-acre tract in order to aerially delineate the current limits of the various wetland and upland vegetative communities and land uses. The limits of these communities are detailed on **Figure 4**. Specifically, BRA used high-resolution infrared photography, historic black and white photographs, soils maps, and ground-truthing techniques to determine the community limits. For the purposes of this report vegetative communities estimated at less than one acre in size were not mapped. A description of the vegetative assemblages found within each community is provided. A complete list of observed plant species is provided in **Appendix A**. A summary of observed vegetative communities are detailed in **Table 1.**

Table 1. Summary of Existing On-site Vegetative Communities

FLUCFCS Code	FLUCFCS Community	Wetland	Acreage
211	Improved Pasture	No	4.05
214	Row Crops-Feed Plot	No	8.65
438	Mixed Hardwood	No	2.53
4381	Mixed Hardwood Upland Valley	No	32.19
441	Coniferous Plantation	No	201.86
441H	Coniferous Plantation - Hydric	Yes	64.56
510	Stream and Valley Bottom	Yes	1.19
510D	Ditches	Yes	9.13
524	Lakes less than 10 acres	Yes	1.19
616	Slough/Strand Swamp	Yes	45.22
6261	Hydric Shrub Savanna	Yes	67.14
740	Disturbed Lands	No	4.58
814	Roads	No	19.45
	TOTAL WETLAND ACREAGE		**188.43**
	TOTAL UPLAND ACREAGE		**273.31**

Figure 3.

Figure 4.

Improved Pasture (FLUCFCS 211), 4.05 Acres
These uplands are cleared, tilled, and reseeded with pastoral grass. This community appears to be periodically maintained through mowing and is likely utilized as a hunting-based food plot.

Row Crops-Feed Plot (FLUCFCS 214), 8.65 Acres
This community contains common pastoral grass and rowed corn. Rows were relatively well defined and are likely used as a hunting-based food plot.

Mixed Hardwoods (FLUCFCS 438), 2.53 Acres
Two small areas were identified as mixed hardwoods. These upland communities contained a dense canopy dominated by Southern magnolia (*Magnolia grandiflora*), laurel oak (*Q. hemisphaerica*), and a few scattered pines. These areas are located outside of lands slated for wetland mitigation.

Mixed Hardwoods Upland Valley (FLUCFCS 4381), 32.19 Acres
This community is located on the northern third of the site, and is the upland slope forest associated with the Fox Branch of the Ochlockonee River. These sandhill-cut ravines are typified by a dense canopy of upland to mesic southern mixed hardwoods and a minimal understory component. Soil moisture is higher downslope and is reflected by the increase of hydrophytic vegetation as the slope forest grades into the seepage-stream valley bottom. Tree and shrub species observed included Southern magnolia, pignut hickory (*Carya glabra*), American olive (*Osmunda americana*), eastern redbud (*Cercis canadensis*), laurel oak, live oak (*Q. virginiana*), witch hazel (*Hamamelis virginiana*), spruce pine (*P. glabra*), loblolly pine (*P. taeda*), chinquapin (*Castanea pumila*), American holly (*Ilex opaca*) and sand holly (*I. Ambigua* var. *ambigua*). Additional vegetation present includes dwarf palmetto (*Sabal minor*), pawpaw (*Asimina triloba*), Elliott's blueberry (*Vaccinium elliottii*), and wild azalea (*Rhododendron canescens*).

Although likely historically timbered to some extent this community was not replanted with longleaf. Numerous large canopy trees exist throughout this system and probably persist due to their inaccessibility. Vegetative assemblages throughout appeared consistent with this type of system. Aerially delineated portions of the community likely contain floodplain associated with the interior creek/stream system. Supplementary site-specific vegetative and soils investigations would be required to accurately identify these limits.

Coniferous Plantation (FLUCFCS 441), 201.86 Acres
Planted longleaf is dominant throughout, but several large shortleaf pines (*P. echinata*) are also present. Plantation lands occupy lands historically occupied by high pinelands, pine flatwoods, swampy depressions, and the upper reaches of shallow-strand swamp drains. Site preparation such as ditching and furrowing facilitate the persistence of these stands. Understory vegetation ranged from species indicative of high-pine sandhills such as turkey oak (*Q. laevis*), bluejack oak (*Q. incana*), sand-live oak (*Q. geminata*), live oak, and persimmon (*Diospyros virginiana*) to wetland transitional species including gallberry (*I. glabra*), fetterbush (*I. decidua*), and black titi (*Cliftonia monophylla*). Herbaceous vegetation is low in diversity and dominated by broom sedge (*Andropogon virginicus* and *A. virginicus* var. *glaucus*). Low ground cover diversity is likely attributed to numerous stand rotations and needle-drape.

Coniferous Plantation-Hydric (FLUCFCS 441H), 64.56 Acres
These areas represent the wettest of the longleaf pine plantations. Trees plantations within historic wetlands often appear stunted or fail to persist due to the extended hydroperiod. Observed planted longleaf were small in size typically not exceeding eight feet in height. Throughout this area mature slash pines also occur at very low numbers. Wetland shrubs including Apalachicola St. John's-wort (*Hypericum chapmanii*), black titi, titi, and small-leaf titi (*C. racemiflora* var. *parvifolia*) dominate this community. Hydrology throughout these areas has been significantly altered due to ditching and increased evaporation.

It is likely that additional lands exist as hydric planted pine outside of the limits delineated within this report. These include small isolated pockets within those areas currently mapped as upland coniferous plantation, as well as historic wetland transitional zones immediately adjacent to lands currently mapped as hydric pine. Supplementary site-specific vegetative and soils investigations would be required to accurately identify these areas.

Stream and Valley Bottom (FLUCFCS 510), 1.19 Acres
This community contains creek/stream systems, associated floodplain, and adjacent hydric slope forest. Canopy trees observed included red maple (*Acer rubrum*), swamp blackgum, Ogeechee-lime (*Nyssa ogeche*), loblolly pine, water oak (*Q. nigra*), pond cypress (*Taxodium ascendens*), sweetbay (*Magnolia virginiana*), loblolly-bay (*Gordonia lasianthus*), and swamp blackgum (*N. sylvatica* var. *biflora*). Additional species observed include fetterbush, Elliot's blueberry, hornbeam (*Carpinus caroliniana*), cow-witch vine (*Decumaria barbara*), cane (*Arundinaria gigantea*), blackberry (*Rubus argutus*), cinnamon fern (*Osmunda cinnamomea*), and laurel greenbrier (*Smilax laurifolia*).

As with the adjacent upland slope forest, this community was not converted to pine plantation.

Ditches (FLUCFCS 510D), 9.13 Acres
Numerous steep-walled upland and wetland-cut ditches occur throughout the study area. Titi, black titi, and small-leaf titi dominated the upper reaches of these features. Ditches appeared to be all interconnected via historic wetland systems, culverts, and low-water crossings.

Lakes less than 10 acres (FLUCFCS 524), 1.19 Acres
Several small borrow areas exist on the northern half of the site. These areas exist both within and outside of lands slated for wetland mitigation.

Slough/Strand Swamp (FLUCFCS 616), 45.22 Acres
Though once interconnected many of the features current exist as isolated islands. These areas are generally topographically shallow and forested wetland drains, dominated by a canopy of pond cypress, sweetbay, loblolly-bay, and swamp black gum, encompassed by a dense stands of titi and myrtle-leaf holly (*I. myrtifolia*). Pond cypress dome swamps are present in the deepest depressional areas. Soil oxidation was observed throughout the site due to wetlands draining.

Hydric Shrub Savannah (FLUCFCS 6261). 67.14 Acres
These lands include areas pines failed to take or persist severely stunted following planting due to the long hydroperiod. Historic ditching attempts, draglines, or rutting from silvicultural practices occur throughout these

lands and is apparent on recent aerial photography. The majority of land identified as savannahs occurs on the southern half of the site and was inundated with upwards of one foot of water at the time of site visits. These areas are typified as shrub dominated communities comprised of Apalachicola St. John's-wort, black titi, titi and small-leaf titi. Carolina willow (*Salix caroliniana*), slash pine, longleaf pine, swamp blackgum, and silverling (*Baccharis glomerufolia*) are occasional throughout. Herbaceous vegetation includes redroot (*Lachnanthes caroliniana*), Mohr's thoroughwort (*Eupatorium mohrii*), sedges (*Cyperus* spp.), roundpod St. John's-wort (*Hypericum cistifolium*), pineland rayless goldenrod (*Bigelowia nudata*), dense gayfeather (*Liatris spicata*), Carolina yellow-eyed grass (*Xyris caroliniana*), pale meadowbeauty (*Rhexia mariana*), handsome Harry (*R. virginica*), shortleaf rosegentian (*Sabatia brevifolia*), bluestem, and bottlebrush threeawn (*Aristida spiciformis*).

Disturbed Lands (FLUCFCS 740), 4.58 Acres
Several areas were identified as disturbed lands and appear to be associated with recent earthwork and/or erosion due to lack of vegetation. These areas exist both within and outside of lands slated for wetland mitigation

Roadways (FLUCFCS 814), 19.45 Acres
Roadways exist throughout the site both in uplands and wetlands. Wetland roadways were created from spoil excavated from an adjacent wetland cut ditch. Several roads were observed as inaccessible to due culvert blowout.

4.0 HISTORIC CONDITIONS

Historic aerials suggest that pre-impact communities within mitigation lands were comprised of pine flatwoods, hardwood sloughs, and scattered hydric savannas. Based on a review of historic aerial photographs, soils maps, and knowledge of ecosystems within the region we're predicted the likely extents of native communities that would be restored at the site.

4.1 SOILS

The Natural Resources Conservation Service (NRCS) soils manual (2007) was utilized to determine the approximate extent of the different soils units known to exist within the project boundaries. Eleven soils units were determined to occur within the project limits. **Table 2** provides a summary of on-site soils. The specific limits of mapped soil units are detailed on **Figure 5**.

Table 2. Summary of On-site Soil Units

Soil Unit	Soil Series	Wetland	Acreage
2	Albany sand, 0 to 5 percent slopes	No	2.22
6	Blanton sand, 0 to 5 percent slopes	No	8.56
9	Centenary sand, 0 to 5 percent slopes	No	17.42
12	Rutledge and Plummer, depressional	Yes	9.33
31	Hurricane and Chipley soils, 0 to 3 percent slopes	No	28.21
46	Hurricane, Leon, and Albany	No	65.02
56	Pottsburg sand	Partial	59.35
58	Rutledge, Bibb, and Surrency frequently flooded	Yes	117.80
60	Sapelo sand	Partial	4.52
62	Scranton loamy sand, slough	Yes	3.21
83	Plummer, Sapelo, and Pottsburg	Partial	145.89

Figure 5.

4.1.1 Ecological Community Types based on Soils Types

As shown within the "Detailed Soil Map Units" section of the soils survey **Table 3** indicates the ecological community types native to the soils found on site; see **Figure 6**.

Table 3. Summary of soils-based assessment of natural community and landforms present on site.

Soil Unit	Detailed soil series	Ecological Community	Landforms
2	Albany sand, 0 to 5 percent slopes	Mixed Hardwood and Pine	Knolls and rises
6	Blanton sand, 0 to 5 percent slopes	Mixed Hardwood and Pine	Knolls and hills
9	Centenary sand, 0 to 5 percent slopes	Longleaf Pine-Turkey Oak Hills	Knolls and rises
12	Rutledge and Plummer soils, depressional	Swamp Hardwoods	Depressions
31	Hurricane and Chipley soils, 0 to 3 percent slopes	Mixed Hardwood and Pine	Knolls and rises
46	Hurricane, Leon, and Albany soils	Hurricane and Albany—Mixed Hardwood and Pine; Leon—North Florida Flatwoods	Knolls and flatwoods
56	Pottsburg sand	North Florida Flatwoods	Flatwoods
58	Rutledge, Bibb, and Surrency soils, frequently flooded	Swamp Hardwoods	Flood plains and depressions
60	Sapelo sand	North Florida Flatwoods	Flatwoods
62	Scranton loamy sand, slough	Slough	Sloughs and drainageways
83	Plummer, Sapelo, and Pottsburg soils	North Florida Flatwoods	Flatwoods and flats

4.1.2 Landform Position based on Soils Types

As shown within the "Detailed Soil Map Units" section of the soils survey **Table 3** indicates the landform positions characteristic of the various soils found on site; see **Figure 7**.

4.2 PROTECTED SPECIES

Prior to initiating site-specific surveys BRA obtained information from the Florida Natural Areas Inventory (FNAI) databases of known listed and rare species occurrences within the project vicinity. The listed species element occurrences are depicted on **Figure 8**. Although the results of the database search were limited to one listed species, the Florida black bear (*Ursus americanus floridanus*), Liberty County Florida, is known for its numerous listed plant and animal species including vegetative species endemic to the region. Species found within the region include the gopher frog (*Rana capito*), Southern American kestrel (*Falco sparverius*), eastern indigo snake (*Drymarchon couperi*), red cockaded woodpecker (RCW; *Picoides borealis*), Sherman's fox squirrel (*Sciurus niger shermani*), gopher tortoise (*Gopherus polyphemus*), Harpers beauty (*Harperocallis flava*), Florida skullcap (*Scutellaria floridana*), butterwort (*Pinguicula ionantha*), and pennyroyal (*Hedeoma graveolens*). A cursory survey effort focused on locating these and other listed species potentially occurring on-site based on the current site conditions. Wildlife and botanical surveys were conducted concurrently with habitat mapping and overall site assessments.

Figure 6.

Figure 7.

Figure 8.

Several active and inactive gopher tortoise burrows were observed within many of the upland planted pinelands on the northern third of the property. All observed burrows were outside the wetland mitigation area limits. The gopher tortoise is currently listed as a Florida threatened species. No additional listed species were observed.

Due to the ephemeral nature of many of the regulated plant species known to occur within the region it is possible that populations exist on-site; though are unidentifiable during surveys associated with this report. It is also likely that additional wildlife species would use the parcel during species-specific migratory, breeding, and foraging seasons.

5.0 PROPOSED CONDITIONS

Strand swamps and hydric savannas should be restored from existing pine plantations through thinning of longleaf pine and installation of ditch plugs, where applicable, in conjunction with appropriate prescribed fire. Existing shrub savanna lands may succeed to an open forested savanna absent of silviculture and dependent upon the allowed fire exposure. For the purpose of this report it's assumed that existing shrub savannas will persist in the near future. Although the historic limits of communities and vegetative assemblages will not be immediately realized the proposed restoration plan should re-establish the hydrology necessary to facilitate succession towards this end. No restoration is proposed for upland and wetland areas associated with the Fox Branch of the Ochlocknee River (FLUCFCS 4381 and 510) or the existing waterbodies (FLUCFCS 524). Removal of wetland cut roads (FLUCFCS 814) would lead to significant habitat improvements. The proposed post-restoration site conditions are detailed below in **Table 4 and on Figure 8**.

Table 4. Summary of Post-Restoration Vegetative Communities within the conservation easement.

FLUCFCS Code	FLUCFCS Community	Wetland	Acreage
4381	Mixed Hardwood Upland Valley	No	20.03
510	Stream and Valley Bottom	Yes	1.08
524	Lakes less than 10 acres	Yes	0.98
616	Slough/Strand Swamp	Yes	109.66
6261	Hydric Shrub Savanna	Yes	57.61
814	Roads	No	6.75
		TOTAL WETLAND ACREAGE	**169.33**
		TOTAL UPLAND ACREAGE	**26.78**

6.0 RESTORATION PLAN

These activities are prescribed for those areas identified by NWFWMD as mitigation lands. Restoration activities will be conducted in accordance with the conditions detailed in the site's conservation easement. Removal of wetland cut roads would result in significant habitat improvements. If that is not possible, all wetland cut ditches should have a series of equalizer culverts installed to re-establish hydrologic connectivity between adjacent wetland systems. Mitigation actions and anticipated changes occurring within each post-mitigation community following restoration activities are herein detailed.

Mixed Hardwoods Upland Valley (FLUCFCS 4381), 20.03 Acres
No work is proposed. An increased hydroperiod may result following ditch plug and culvert installation.

Stream and Valley Bottom (FLUCFCS 510), 1.08 Acres
No work is proposed. An increased hydroperiod may result following ditch plug and culvert installation.

Lakes less than 10 acres (FLUCFCS 524), 0.98 Acre
No work is proposed. These areas exist at various elevations providing a diverse habitat for wildlife utilization: feeding areas for wading birds during dry-down periods and breeding areas for amphibians. Water levels may increase following ditch plug and culvert installation.

Slough/Strand Swamp (FLUCFCS 616), 109.66 Acres
Strand swamps will be restored from existing pine plantations through thinning of longleaf pine and installation of ditch plugs and culvert installation, where applicable, to re-establish the hydrologic connectivity and enhance the vegetative community structure. These actions should result in re-establishment of the communities that historically existed. Planted longleaf stands should be thinned to a density appropriate for the stands existing age-class within this type of system. A reduction in pine density will reduce evapotranspiration and allow for an increase in soil moisture. Ground cover diversity should also increase following pine thinning due to increased light penetration and reduction in needle cast. Prescribed fire will serve to further stimulate native ground cover vegetation. Tree species present within existing adjacent strand swamps are anticipated to naturally succeed into these areas. Inclusions of hydric savanna may occur as fingers, or isolated islands within these lands, depending upon the re-established hydroperiod and frequency of fire.

Hydric Shrub Savannah (FLUCFCS 6261). 57.61 Acres
Mitigation efforts include ditch plugging to re-establish the hydrologic connectivity and result in a re-establishment of the vegetative community that historically existed. Due to the strong hydrology it is likely that furrows won't persist. Tree species present throughout this system, and within existing adjacent strand swamps, are anticipated to naturally succeed into these areas. Inclusions of hardwood strand swamps may occur as fingers, or isolated islands within these lands, depending upon the re-established hydroperiod and frequency of fire.

Ditching and rutting within these lands appears old, absent of associated spoil piles, and have a minimal effect site hydrologic-connectivity. Attempts at restoring these impacts will likely result in additional impacts, and therefore, it is recommended that restoration efforts concentrate on areas of more recent impact.

Roadways (FLUCFCS 814), 6.75 Acres
Ideally, built-up roads constructed in wetlands should be removed and spoil pushed back into adjacent ditches. This would require a revision to the conservation easement terms.

6.1 IMPLEMENTATION ISSUES

- The current conservation easement language prohibits restricting access to existing uplands. Removal of wetland fill roads to restore the hydrology to pre-impact conditions would exclude access to numerous uplands. Conservation easement language would need to be revised to allow for wetland road removal. Roads/spoil berms should be culverted if removal is not possible.

- Historic seasonal high water determinations may be required to address the potential flooding following ditch plugging and/or ditch filling. Alternatively, temporary stop-log weirs could be constructed and manipulated to ascertain optimal fill elevations across the site.

- Use of prescribed fire would need to be coordinated with the landowner in relation to management of the pine plantation that will remain. Burn zones will need to be defined and timing would likely need to be coordinated with pine needle harvest. Ideally no fire lines should be necessary, but that may not be entirely possible at this site. Perhaps some compromise can be reached to allow the use of prescribed fire in the mitigation area with little to no fire line installation. This may require modification of the conservation easement boundaries and/or language.

- Initial dormant-season fuel reduction fires should be followed by implementation of growing-season burns, subject to on-the-ground conditions, on 2-to-5-year cycles.

6.2 PERFORMANCE CRITERIA

The plant community structure targeted in the post-enhancement condition will be that which existed prior to the bedding and planting, as listed in **Table 4** and illustrated on **Figure 9**.

6.3 LONG-TERM MANAGEMENT

NWFWMD will be responsible for ensuring the perpetual management of mitigation lands. NWFWMD will manage a portion of the property for restoration and mitigation purposes, as necessary, and in accordance with the conservation easement. Long-term management is described in *Umbrella, Watershed-Based, Regional Mitigation Plan* (UWRMP) Section 11.7.

Figure 9.

7.0 REFERENCES

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APPENDIX

A

Appendix A—Observed Plant Species on the Shuler Property

Scientific Name	**Common Name**
Acer rubrum	red maple
Aletris lutea	yellow colicroot
Andropogon virginicus	broomsedge bluestem
Andropogon virginicus var. *glaucus*	chalky bluestem
Aralia spinosa	devil's walking stick
Aristida spiciciformes	bottlebrush threeawn
Aronia arbutifolia	red chokeberry
Arundinaria gigantea	cane
Asimina angustifolia	slimleaf paw-paw
Asimina triloba	common paw-paw
Baccharis glomeruliflora	silverling
Balduina uniflora	costal plain honeycombhead
Bigelowia nudata	pineland rayless goldenrod
Bignonia capreolata	crossvine
Buchnera americana	bluehearts
Calliacarpa americana	American beautyberry
Carex glaucescens	clustered sedge
Carex spp.	sedges
Carphephorus pseudoliatris	bristleleaf chaffhead
Carpinus caroliniana	American hornbeam
Carya glabra	pignut hickory
Castanea pumila	chinquapin
Cercis canadensis	red buckeye
Chrysopsis sp.	golden aster
Clethera alnifolia	sweet pepperbush
Cliftonia monophylla	black titi
Coreopsis lanceolata	lanceleaf ticksead
Cyperus sp.	flat sedge
Cyrilla racemiflora v. parvifolia	small-leaf titi
Cyrilla racemiflora	titi
Decumaria barbara	cow-witch vine
Dichanthelium commutatum	variable witchgrass
Diodia virginiana	Virginia buttonweed
Diospyros virginiana	persimmon
Drosera capillaris	pink sundew
Eriocaulon decangulare	tenangle pipewort
Eupatorium mohrii	Mohr's thoroughwort
Eupatorium rotundifolium	roundleaf thoroughwort
Fimbristlis sp.	fimbry
Gaylussacia mosieri	wooly huckleberry
Gaylussacia frondosa var. *nana*	blue huckleberry
Gelsemium sempervirens	yellow jessamine
Gordonia lasianthus	loblolly bay
Hamamelis virginiana	witch hazel
Hedeoma hispidum	rough falsepennyroyal
Helianthus angustifolius	narrowleaf sunflower
Hypericum brachyphyllum	coastal plain St. John's-wort
Hypericum chapmanii	Apalachicola St. John's-wort
Hypericum cistifolium	roundpod St. John's-wort

Scientific Name	**Common Name**
Hypericum gentianoides	pineweeds
Hypericum hypericoides	St. Andrew's-cross
Hypericum myrtifolium	myrtleleaf St. John's-wort
Hypoxis juncea	fringed yellow stargrass
Ilex ambigua	Carolina holly
Ilex cassine var. *myrtifolia*	myrtle dahoon
Ilex glabra	inkberry
Ilex opaca	American holly
Itea virginica	Carolina willow
Kalmia hirsuta	wicky
Lachnanthes caroliniana	Carolina redroot
Lachnocaulon minus	Small's bogbutton
Lachnocaulon sp.	bogbutton
Leucothoe axillaris	coastal doghobble
Liatris spicata	dense gayfeather
Linum sp.	flax
Liquidambar styraciflua	sweetgum
Ludwigia pilosa	hairy primrosewillow
Ludwigia virgata	savanna primrosewillow
Lycopodiella alopecuroides	foxtail club-moss
Lyonia fruticosa	coastal plain staggerbush
Lyonia lucida	fetterbush
Magnolia grandiflora	Southern magnolia
Magnolia virginiana	sweetbay
Mitchella repens	partridgeberry
Myrica Caroliniensis	evergreen bayberry
Myrica cerifera	wax myrtle
Nyssa ogeche	Ogeechee-lime
Nyssa sylvatica	blackgum
Nyssa sylvatica var. *biflora*	swamp blackgum
Osmanthus americanus	American olive
Osmunda cinnamomea	cinnamon fern
Osmunda regalis var. *spectabilis*	royal ferm
Persea palustris	redbay
Pieris phyllyreifolia	fetterbush
Pinus echinata	shortleaf pine
Pinus glabra	spruce pine
Pinus paulustris	longleaf pine
Pinusa elliottii	slash pine
Pityopsis graminafolia	narrowleaf silkgrass
Pluchea rosea	rosy camphorweed
Polygala lutea	orange milkwork
Polygala nana	candyroot
Polypremum procumbens	rustweed
Proserpinaca pectinata	combleaf mermaidweed
Pteridium capillaceum	bracken fern
Pterocaulon pycnostachyum	blackroot
Quercus geminata	sand live oak
Quercus hemisphaerica	diamond oak
Quercus incana	bluejack oak
Quercus laevis	turkey oak

Scientific Name	**Common Name**
Quercus laurifolia	laurel oak
Quercus nigra	water oak
Quercus virginiana	live oak
Rhexia mariana	pale meadowbeauty
Rhexia virginica	handsome Harry
Rhododendron canescens	sweet pinxter azalea
Rhynchospora inundata	narrowfruit horned beaksedge
Rubus argutus	sawtooth blackberry
Rubus cuneifolius	sand blackberry
Rudbeckia graminifolia	grassleaf coneflower
Rudbeckia mohrii	Mohr's coneflower
Sabal minor	dwarf palmetto
Sabatia breviflolia	shortleaf rosegentian
Salix caroliniana	Carolina willow
Scelaria sp.	nutrush
Scirpus cyperinus	woolgrass
Scoparia dulcis	sweetbroom
Serenoa repens	saw palmetto
Seymaria cassioides	yaupon blacksenna
Seymaria petinata	piedmont blacksenna
Sida sp.	fanpettles
Smilax bona nox	saw greenbrier
Smilax glauca	cat greenbrier
Smilax laurifolia	laurel greenbrier
Smilax pumila	sasparilla vine
Smilax taminoides	bristly greenbrier
Solidago canadensis var. *scabra*	Canada goldenrod
Solidago latissimifolia	Elliott's goldenrod
Symplocos tinctoria	horsesugar
Syngonanthus flavidulus	yellow hatpins
Taxodium ascendens	pond-cypress
Tephrosia sp.	hoarypea
Vaccinium arboreum	sparkleberry
Vaccinium corymbosum	highbush blueberry
Vaccinium elliottii	Elliott's blueberry
Vaccinium stamineum	deerberry
Vernonia angustifolia	tall ironweed
Vitis rotundifloia	muscadine
Woodwardia virginica	Virginia chain fern
Xyris caroliniana	Carolina yelloweyed grass
Xyris spp.	yelloweyed grass
Zigadenus glaberrimus	sandbog deathcamas