# DUTEX PROPERTY UMBRELLA REGIONAL MITIGATION PLANS FOR FLORIDA DEPARTMENT OF TRANSPORTATION PROJECTS CONCEPTUAL MITIGATION PLAN ESCAMBIA COUNTY, FLORIDA

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1.0 PROJECT OVERVIEW AND GOALS

ENTRIX, Inc. (ENTRIX) has prepared the following conceptual wetland restoration plan of the Dutex Property (Dutex) for the Northwest Florida Water Management District (NWFWMD). The majority of wetlands within Dutex are degraded due to historical land management practices, primarily fire suppression. The restoration plan was developed together with NWFWMD.

Dutex is comprised of western and eastern tracts, 481.58 and 338.85 acres respectively. For the purposes of this report the western lands will be referred to as Tract A and the eastern lands as Tract B. The majority of the property exists as wetlands that have been identified by NWFWMD as suitable wetland mitigation lands. The wetland mitigation limits were established by NWFWMD following review of historic aerials. To the greatest extent possible, proposed mitigation lands are intended to approximate the sites historic (pre-impact) wetlands limits and community structure. The property's uplands and wetlands will be restored and managed in perpetuity for ecological integrity by NWFWMD.

The following wetland report provides a cursory review of current and historic site conditions as well as a conceptual mitigation plan for all lands slated for mitigation. 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 fire suppression. 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 11.0**. 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

Dutex (Section 36, Township 2S, Range 31W) is approximately 820 acres located in the Perdido watershed between Perdido Bay and Saufley Field (part of the Pensacola Naval Air Station facilities), Escambia County, Florida; see **Figure 1**. The property lies north of Perdido Bay (a Class III water body), bordered by Eleven Mile Creek to the west and Saufley Field, a naval training facility, to the north. Topographic changes within Dutex are detailed on a United States Geological Survey (USGS) Quadrangle map as **Figure 2**.

The Dutex property is entirely undeveloped. A federally constructed and maintained drainage easement associated with the naval air field runs through the middle of the property separating Tracts A and B. Maintained access roads lie along either side of the drainage easement. Tract A contains various dirt roads and ditches. Numerous areas of trash dumping were evident throughout the western portion of the property, as was evidence of previous silviculture activity.

The Department of State, Division of Historic Resources, was contacted concerning possible archaeological sites. They have no record of any archaeological sites and no evidence of any archaeological resources was found during the inspection on this property as reported by The Phoenix Environmental Group (Otto-Allender, 1995).



Date: 03/23/2010 Rev. Date: 04/09/2010 PM: JLH GIS Analyst: JPB Map Document: FIGURE1\_LOCATION.mxd Project Number: 4240-026 PDF Document: FIGURE1\_LOCATION.pdf Plot Size: 8.5 x 11





3.0 CURRENT AND RECENT HISTORICAL CONDITIONS

Historically both subject tracts were subjected to limited silvicultural practices. These included harvest of cypress, slash (*Pinus elliottii*), and longleaf pine (*P. palustris*) followed by site preparation burns and planting of slash pine. Neither tract contains evidence of mechanical soil disturbance, however, due to the absence of fire the understory community diversity and density has been greatly reduced and partially replaced by a thick duff layer in the hydric pine communities. Some signs of historic fire was observed, but limited to the older canopy trees. More recently the property has been impacted by adjacent upstream development and associated stormwater runoff, encroachment of exotic/invasive vegetative species, fire suppression, and beaver activity. These impacts have caused shifts in the overall vegetative community structures and limits of unique plant community assemblages.

The *Florida Land Use, Cover and Forms Classification System* (FLUCCS) was utilized to identify and map the site's ecological communities. The FLUCCS 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. ENTRIX conducted a reconnaissance of Tracts A and B 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 **Figures 3A** and **3B**. Specifically, ENTRIX 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 by tract are detailed in **Table 1**. A description of the vegetative assemblages found within each community is provided. A complete list of observed plant and wildlife species is provided in **Appendix A** and **B**. A series of site photos is provided as **Appendix C**.

FLUCCS Code	FLUCCS Community	Wetland	Acreage
Tract A			
411	Mesic Pine Flatwoods	No	25.88
434	Hardwood Conifer Mixed	No	9.89
510	Stream and Waterways	Yes	3.03
510D	Road/Ditch	Yes	0.89
524	Lakes <10 Acres	Yes	2.31
534	Beaver Pond	Yes	19.34
611	Bay Swamp	Yes	4.78
613	Gum Swamp	Yes	25.87
614	Titi Swamp	Yes	9.07
625	Hydric Pine Flatwoods	Yes	131.74
627	Slash Pine Swamp Forest	Yes	43.97
631	Wetland Shrub	Yes	17.67
641	Freshwater Marsh	Yes	77.99
642	Saltwater Marsh	Yes	104.56
710	Beaches	No	4.31
747	Beaver Dam	No	0.29
Tract B			
441	Pine Plantation	No	8.58
611	Bay Swamp	Yes	36.09
614	Titi Swamp	Yes	56.54
627	Slash Pine Swamp Forest	Yes	167.69
630	Wetland Forested Mixed	Yes	69.94
	ТО	TAL WETLAND ACREAGE	771.48
		COTAL UPLAND ACREAGE	48.95

Table 1. Summary of Current On-site Vegetative Communities on the Dutex Property.

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50 494 642 524 524 524 520 500 500 500 500 500 500 500 500 500	524 510 64 710 710	411 511 411 4 1 613 411 625 627 411	D 614 627 611 627 411 411 611 411
TRACT A BOUNDARY - 481.58 AC. +/-	614 - TITI SWAMPS - 9.07AC.	710	
411 - MESIC PINE FLATWOODS - 25.88AC.	625 - HYDRIC PINE FLATWOODS - 131.74AC.		
	627 - SLASH PINE SWAMP FOREST - 43.97AC		
510 - STREAMS AND WATERWAYS - 3.03AC.	631 - WE I LAND SHRUB - 17.67AC.		
	641 - FRESHWATER MARSH - 11.99AC.		
	710 - REACHES - 4 31AC		
611 - BAY SWAMPS - 4 78AC	747 - BEAVER DAM - 0 29AC		A Company and the
613 - GUM SWAMPS - 25.87AC.			V Part and a second
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# Figure 3A - Current FLUCCS Map Tract A

Dutex Escambia County, Florida



Date: 03/23/2010 Rev. Date: 06/09/2010 PM: JLH GIS Analyst: JPB Map Document: FIGURE3A\_EXISTING\_FLUCCS\_A.mxd Project Number: 4240-026 PDF Document: FIGURE3A\_EXISTING\_FLUCCS\_A.pdf Plot Size: 8.5 x 11



Escambia County, Florida

Coordinate System: NAD 83 FSTPLN FEET

Sec 041 Twp 01 S Rng 31 W Sec 036 Twp 02 S Rng 31 W

Date: 03/23/2010 Rev. Date: 06/09/2010 PM: JLH GIS Analyst: JPB Map Document: FIGURE3B\_EXISTING\_FLUCCS\_B.mxd Project Number: 4240-026 PDF Document: FIGURE3B\_EXISTING\_FLUCCS\_B.pdf Plot Size: 8.5 x 11



# Mesic Pine Flatwoods (FLUCCS 411), 34.46 Acres

This community contains an open-to-dense canopy dominated by slash pine. Understory and shrub layer are overgrown and dense. Black titi (*Cyrilla racemiflora*) was often present in large dense stands. Shrub and low growing woody species observed included dwarf live oak (*Quercus minima*), wax myrtle (*Myrica cerifera*), saw palmetto (*Serenoa repens*), coastal sweet pepperbush (*Clethra alnifolia*), horse sugar (*Symplocos tinctoria*), largeleaf gallberry (*Ilex coriacea*), wooly huckleberry (*Gaylussacia mosieri*), Elliott's blueberry (*Vaccinium elliottii*), shiny blueberry (*V. myrsinites*), Darrow's blueberry (*V. darrowii*), and hairy wicky (*Kalmia hirsuta*).

The duff layer throughout this designation was typically deep and ground cover minimal. Occasional canopy openings often contained relict flatwoods herbaceous species including wiregrass (*Aristida stricta*), downy milkpea (*Galactia volubilis*), Carolina yelloweyed grass (*Xyris caroliniana*), and pale meadowbeauty (*Rhexia mariana*).

# Hardwood Conifer Mixed (FLUCCS 434), 9.89 Acres

This designation included two narrow, linear, upland vegetative communities adjacent to Eleven Mile Creek on the westernmost edge as well as a small area at the southeasternmost corner of Tract A. Areas adjacent to Eleven Mile Creek appear to be stream terraces associated with flood events or shifts in the river channel. This community contains large, mature southern magnolia, slash pine, and red cedar. Understory and shrub species observed include overstory recruits, laurel oak (*Quercus hemisphaerica*), sand live oak (*Q. geminata*), red bay (*Persea borbonia*), yaupon (*Ilex vomitoria*), and sparkleberry (*Vaccinium arboreum*). Groundcover species included muscadine grape (*Vitis rotundifolia*), saw palmetto (*Serenoa repens*), tall elephants foot (*Elephantopus elatus*), bracken fern (*Pteridium aquilinum*), highbush blackberry (*Rubus argutus*), and laurel greenbrier (*Smilax laurifolia*). This community contains a fairly open understory, a deep layer of pine duff, and low percent coverage of ground cover.

#### Stream (FLUCCS 510), 3.03 Acres and Lakes <10 Acres (FLUCCS 523), 3.03 Acres

One small unnamed tidal stream and two small lakes occur within the freshwater marsh in the southcentral portion of Tract A. These habitat features are typical of marsh systems in northwestern Florida. Daily water level fluctuates according to lunar, as well as windblown forces. In addition to the main tributary creek, and upstream pool, a vast network of small rivulets exists most of which drain freshwater runoff from nearby uplands. Salinities within this system range from freshwater to near saline (30 ppt) dependent on local rainfall and tide cycle. The edges of the marsh creek and rivulets offer essential habitat for a variety of brackish fish species such as killifishes (*Fundulus* spp.), silversides (*Menidia* sp.), mullet (*Mugil* sp.), and pinfish (*Lagodon* sp.). The marsh system also serves as important nursery grounds for commercially important species such as blue crabs (*Callinectessapidus*), oysters (*Crassostrea* sp.), and Penaeidae. The upstream pools serve as refugia during low tide periods. This designation also includes portions of Eleven Mile Creek on the western edge of Tract A. One small patch of wild taro (*Colocasia esculenta*) was observed growing within Eleven Mile Creek.

# Ditches and Roads (FLUCCS 510D), 0.89 Acre

A system of primarily wetland cut ditches and associated roads occur across Tract A. These ditches are associated with either an existing or historic fill road. These ditches were likely created as a result of fill road construction and not for the sole purpose of wetland drainage. Commonly observed ditch vegetation includes southern umbrellasedge (*Fuirena sciroides*), manyhead rush (*Juncus polycephalus*), fringed beaksedge (*Rhynchospora ciliaris*), needlepod rush (*Juncus scirpoides*), fascicled beaksedge (*Rhynchospora fascicularis*), torpedograss (*Panicum repens*), and common water-hyacinth (*Eichhornia*)



crassipes). Roads/trails not slated for removal as proposed by this restoration plan were not located and are not depicted on any figures in this report.

# Beaver Pond (FLUCCS 534), 19.34 Acres

This feature was created through the flooding of a gum swamp. Downstream wetlands appear sufficiently hydrated and vegetative structure appropriate. Remnant tree stumps and standing dead cypress trees are present throughout this community. The center of this community designation contains a large area of floating and emergent herbaceous vegetation. Herbaceous vegetation is also rooted on persisting hummocks and cypress buttresses. Deeper inundated lands are dominated by fragrant water lily (Nymphaea odorata). Vegetation observed included white-topped pitcherplant (Sarracenia leucophylla). southern umbrellasedge (Fuirena scirpoidea), saltmarsh umbrellasedge (F. breviseta), wooly witchgrass (Dichanthelium scabriusculum), acid swamp yelloweyed grass (Xyris serotina), purple love grass (Eragrostis refracta), hairy primrosewillow (Ludwigia pilosa), slender beaksedge (Rhynchospora gracilenta), bunched beaksedge (Rhynchospora cephalantha), and switch grass (Panicum virgatum).

# Bay Swamp (FLUCCS 611), 40.87 Acres

This community is limited to the northwestern corner of Tract B. This vegetative assemblage occupies both historic forested wetland and hydric pine savanna. This community likely expanded into hydric savannas and hydric pine flatwoods due to a reduction in the fire return interval. The near complete canopy closure and shading reduced the mid and understory cover. Several small creek systems were present and became more defined closer to the bay.

This community designation is dominated by sweetbay. Additional canopy species observed include tulip popular (Liriodendron tulipifera), swamp bay (Persea palustris) and red maple (Acer rubrum). Slash pines were occasionally present as canopy trees. Although no cypress species were observed within this community, several small cypress stumps were present. Herbaceous groundcover was dominated by Additional species observed included poison ivy, evergreen bayberry (Myrica sensitive fern. caroliniensis), Virginia chain fern, and littlehead nutrush (Scleria oligantha), common boneset (Eupatorium perfoliatum), water cowbane (Oxypolis filiformis), mild waterpepper (Polygonum cf. hydropiperoides), possumhaw (Viburnum nudum), fringed velloweved grass (Xyris fimbriata), hairy maiden fern (Thelypteris hispidula), lax hornpod (Mitreola petiolata), irisleaf yelloweyed grass (Xyris laxifolia var. iridifolia) and marsh fern (Thelypteris palustris). A large amount of Chinese privet (Ligustrum sinense) is present throughout the northern half of this community.

# Gum Swamp (FLUCCS 613), 25.87 Acres

This system occurs immediately south of the beaver dam and grades into the freshwater marsh. Very few large tree specimens were observed within this community, and were primarily limited to a few pond cypress and slash pine. Shrub growth was primarily limited to rooting on hummocks. Some cypress cut stumps were observed. Pond cypress recruitment was also present.

This community is typified by an open canopy comprised of swamp tupelo (*Nyssa sylvatica* var. *biflora*), sweetbay, red maple, swamp bay, as well as occasional slash pine and pond cypress (Taxodium ascendens). Understory trees and shrubs included overstory recruits, red chokeberry (Photinia pyrifolia), fetterbush, highbush blueberry (Vaccinium corymbosum), dahoon (Ilex cassine), Virginia willow (Itea virginica), and wax myrtle. Herbaceous species observed include royal fern (Osmunda regalis var. spectabilis), threeway sedge (Dulichium arundinaceum), Virginia marsh St. John's-wort (Triadenum virginicum). Virginia chain fern (Woodwardia virginica), cinnamon fern (Osmunda cinnamomea), clustered sedge (Carex glaucescens), and string-lily (Crinum americanum).



One small isolated polygon, immediately north of a fill road within the eastern-central portion of Tract A, historically appeared to be part of a larger bay swamp (FLUCCS 611). This community's current state may be attributed to lengthened hydroperiod due to pooling of water resultant from the installation of the fill road.

# Titi Swamp (FLUCCS 614), 65.61 Acres

This vegetative community occurs on the northeastern corner of Tract A. Vegetation is dominated by pure stands of very dense 15-20 foot tall black titi (*Cliftonia monophylla*). The few canopy trees present are limited to 40-60-foot tall slash pine. No slash pine recruitment was observed. Additional shrub species were a minor component of this community and included fetter bush and gallberry. No herbaceous groundcover vegetation was observed.

# Hydric Pine Flatwoods (FLUCCS 625), 131.74 Acres

This forested wetland community covers the majority of Tract A and encompasses the majority of lands historically occupied by hydric flatwoods and hydric savannas. Canopy trees within this community are dominated by slash pine. Pine height on average appeared to be 50-60 feet, and throughout slash pine recruitment was low. Few large, flat-topped slash pines were observed. The understory throughout was typically dense containing sweetbay, myrtle leafed holly (Ilex cassine var. myrtifolia), large gallberry (I. coriacea), red bay, Elliott's blueberry (Vaccinium elliottii), highbush blueberry, Virginia willow, swamp tupelo, gallberry, red maple, and black titi.

The duff layer throughout this designation was typically deep, replacing most of the ground cover vegetation. Occasional canopy openings often contained relict hydric flatwoods herbaceous species including wiregrass, Carolina yellow-eyed grass (Xyris caroliniana), hairy wicky, bracken fern, foxtail club moss (Lycopodiella alopecuroides), whitehead bogbutton (Lachnocaulon anceps), redroot (Lachnanthes caroliniana), yellow hatpins (Syngonanthus flavidulus), slender beaksedge (Rhynchospora gracilenta), narrowfruit horned beaksedge (Rhynchospora cf. inundata), Camphorweed (Pluchea sp.), woolly witchgrass (Dichanthelium scabriusculum), switchgrass (Panicum virgatum), loosehead beaksedge (Rhynchospora chalarocephala), irisleaf yelloweyed grass (Xyris laxifolia var. iridifolia), Elliott's yelloweyed grass (Xyris elliottii), manyspike flatsedge (Cyperus polystachyos), oneflower honeycombhead (Balduina uniflora), pale meadowbeauty, savanna meadowbeauty (R. alifanus), maid marian (R. nashii), blue maidencane (Amphicarpum muhlenbergianum), tapered witchgrass (Dichanthelium acuminatum), pineland yelloweyed grass (Xyris stricta), and Chapman's beaksedge (Rhvnchospora chapmanii).

# Slash Pine Swamp Forest (FLUCCS 627), 211.66 Acres

This community designation includes forested wetlands in which slash pine dominates the canopy. Historically these areas were occupied by pine flatwoods, hydric flatwoods, hydric savannas, and bay swamps. Due to fire exclusion, and possible off-site changes in hydrology, slash pine has been able to encroach into these systems. Vegetative assemblages and structure are comprised of a combination of the plant communities historically present. Numerous large "cat faced" slash and several longleaf pines are present on the southeasternmost corner of Tract B. Longleaf pine was not observed anywhere else within the Dutex property. Understory vegetation was sparse due to canopy cover, and wire grass was absent from these areas.

# Wetland Forested Mixed (FLUCCS 630), 69.94Acres

This community occurs on the southeastern corner of Tract B. This designation represents mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance of the crown canopy



Vegetative assemblages and structure are comprised of a combination of the plant composition. communities historically present.

# Wetland Shrub (FLUCCS 6312), 17.67 Acres

Canopy trees are essentially absent from this community. Several trees species, predominately slash pine, are occasionally present throughout. Shrub density typically exceeds ten feet in height. Characteristic shrubs observed included titi (Cyrilla racemiflora), black titi (Cliftonia monophylla), fetterbush (Lyonia lucida), large gallberry (Ilex coriacea), gallberry (I. glabra), wax myrtle (Myrica cerifera), and sweet pepperbush (Clethra alnifolia), and shrubs are often laced together with laurel greenbrier. Herbs are sparse, patchy, and confined to sunny openings.

# Freshwater Marsh (FLUCCS 641), 77.99 Acres

A freshwater marsh dominates the southeastern half of Tract A. Additionally, two small disjunct freshwater marshes occur within the northwestern corner of Tract A. The northernmost of these marshes is an oxbow of Eleven Mile Creek. Tree species were occasionally observed and with the exception of slash pine, typically small in stature. Herbaceous vegetation occurs as a mosaic of nearly pure stands of saw grass (Cladium jamaicense) to areas containing combinations of saw grass, wool-grass bulrush (Scirpus cyperinus), Leconte's flatsedge (Cyperus lecontei), wand loosestrife (Lythrum lineare), bighead rush (Juncus megacephalus), fragrant flatsedge (Cyperus odoratus), herb-of-grace (Bacopa monnieri), torpedograss (Panicum repens), switchgrass (Panicum virgatum), rough barnyard grass (Echinochloa muricata), conecup spikerush (Eleocharis tuberculosa), comfort root (Hibiscus aculeatus), water cowbane (Oxypolis filiformis), and dotted smartweed (Polygonum punctatum).

# Saltwater Marsh (FLUCCS 642), 104.56

A salt marsh dominates the southwestern half of Tract A. Salt marshes are intertidal areas colonized by grasses and other salt-tolerant plants (halophytes). Two vegetation zones are often observed, a low marsh that is subject to daily tidal flooding and a high marsh that is flooded less often. Due to a small beach area and extensive coastal erosion, the low marsh was limited to a patchy fringe dominated by smooth cordgrass (Spartina alterniflora). The majority of the site was dominated by a high marsh dominated by an extensive expanse of black needlerush (Juncus roemerianus) with a few associated species. Additionally observed species included marshay cordgrass (Spartina patens), rattlebox (Sesbania punicea), smallflower thoroughwort (Eupatorium semiserratum), wand loosestrife (Lythrum lineare), common reed (Phragmites australis), torpedograss (Panicum repens), coastal groundcherry (Physalis angustifolia), switchgrass (Panicum virgatum), saltmarsh morning glory (Ipomoea sagittata), seaside goldenrod (Solidago sempervirens), seashore mallow (Kosteletzkya virginica), and salt marsh aster (Aster tenuifolius).

# Beaches (FLUCCS 710), 4.31 Acres

This community occurs between Perdido Bay and the freshwater and saltwater marsh on Tract A. The shoreline exhibits evidence of being subjected to high energy wave/wind action. Shoreline erosion is evident by stumps 15-20 feet out in the bay. This shoreline is primarily bare mineral soil with occasional vegetative encroachment from the immediately adjacent freshwater and saltwater marsh. Several exotic species including Chinese tallow and rattlebox (Sesbania punicea) were occasionally present.

# Beaver Dam (FLUCCS 747), 0.29 Acre

One large earthen beaver dam occurs on the north central portion of Tract A. The dam is approximately 1,283 feet in length, upwards of 6 feet in height and potentially 15-20 feet wide at the base. Wetlands downstream of the dam appear sufficiently hydrated and vegetative structure appropriate.



#### 4.0 LISTED SPECIES

All incidental listed wildlife and botanical observations were recorded. Surveys were conducted concurrently with habitat mapping and overall site assessments. Prior to initiating site-specific surveys, ENTRIX obtained information from the Florida Natural Areas Inventory (FNAI) and Florida Fish and Wildlife Conservation Commission (FFWCC) databases of known listed and rare species occurrences within the project vicinity. Focus was given on identification of these species as well as other species known to occur locally.

Site-specific surveys were initiated to determine the presence/absence of the saltmarsh topminnow (*Fundulus jenkinsi*). Wildlife species are listed under the *Endangered Species Act* of 1973, and Chapter 39.27 *Florida Administrative Code* (FAC). On August 18, 2008, ENTRIX ecologists sampled for the species within an unnamed bayou located approximately one-half mile east of the mouth of Eleven Mile Creek.

The saltmarsh topminnow occupies tidal streams, bayous, and rivulets along the Gulf of Mexico coast ranging from Galveston, Texas to Pensacola, Florida (Boschung and Mayden 2004). This species prefers *Spartina* habitat with low to moderate salinity and has been historically recorded within the lower Eleven Mile Creek drainage (*pers. comm.* Dr. Mark Peterson). The saltmarsh topminnow is considered a 'Species of Special Concern' by the State of Florida and was listed by the Federal Register in 1997 as a candidate species for federal protection (Vol.62: 134).

Six Breder traps were deployed at strategic locations throughout the bayou; see **Table 2**. Traps were positioned along the banks using PVC-pipe harnesses so that the apertures faced into the freshwater marsh; see photo in **Appendix B**. This method, as described by Peterson *et al.* (2003), is considered the most appropriate and practical mode of capture for the species.

Station	Longitude	Latitude
1	30° 27' 33.31" N	87° 22' 03.26" W
2	30° 27' 34.27" N	87° 22' 03.80" W
3	30° 27' 35.64" N	87° 22' 01.65" W
4	30° 27' 38.33" N	87° 22' 00.42" W
5	30° 27' 38.27" N	87° 21' 58.70" W
6	30° 27' 39.78" N	87° 21' 58.11" W

Table 2. Breder Trap Locations.

Salinities at the time of deployment ranged from 10.4 ppt at Station 1 (downstream) to 7.5 ppt at Station 6 (upstream). Water temperature and dissolved oxygen at these stations measured 28.4 and 27.3, and 6.3 and 4.5, respectively. Traps were allowed an approximately four-hour soak period timed to occur during ebb tide. Tidal fluctuations during the sampling period were minimal (<0.6 inches) as is common in northern Perdido Bay. No individuals were captured during the August 2008 sampling event. However, based on available habitat and historical records we conclude that presence of *F. jenkinsi* is probable and should not be confirmed or denied without additional sampling.

Listed vegetative species observed included Water sundew (*Drosera intermedia*), white topped pitcher plant (*Sarracenia leucophylla*), and yellow fringed orchid (*Platanthera ciliaris*) were observed during site visits. Water sundew and white topped pitcher plant are common throughout the beaver pond (FLUCCS 534). A single specimen of yellow fringed orchid was observed in the bay swamp (FLUCCS 611) in the northwestern corner of Tract B. No listed wildlife species were observed.



#### 5.0 **EXOTIC SPECIES**

Invasive plants affect forest health, productivity, and limit species diversity of native forests. These plants replace native plant species and often form exotic monocultures. In many cases these stands of exotic plants are not beneficial to native wildlife which has evolved to depend on native plants for food and shelter, and who in turn distributes of native plants by seed dispersal. When exotic plants replace too much of our native plants, those wildlife dependent on native plants will move away or become extirpated. Exotic invasive plant species also reduce or eliminate resources, *i. e.*, food, cover, nesting sites, used by native wildlife and can promote populations of invasive non-native wildlife by providing them with resources otherwise unavailable in the area. Several exotic and invasive non-native plant species were observed within the project limits during site survey events. A summary of exotic species observed, location and approximate population size is provided in Table 3.

Scientific Name	Common Name	Observation Point	<b>Population/Distribution</b>
Colocasia esculenta	wild taro	Eleven Mile Creek; western edge of Tract A	small/single point
Eichhornia crassipes	common water- hyacinth	Throughout ditch adjacent to beaver dam; Tract A	medium
Ligustrum sinense	Chinese privet	Northern edge of Tract B	large/wide spread
Lygodium japonicum	Japanese climbing fern	Northern edge of Tract B	small/rare
Panicum repens	Torpedo grass	Ditch adjacent to beaver dam, beach, freshwater marsh; Tract A	medium/wide spread
Sapium sebiferum	Chinese tallow tree	Beach; Tract A: Northern edge of Tract B	small/sparse
Sesbania punicea	rattlebox	Beach; Tract A	small/sparse

 Table 3
 Summary of Invasive Botanical Species Observed within the Dutex Property.

To retain the natural biological components of the Dutex property, management of non-native invasive plants should utilize an integrated management approach, incorporating a combination of mechanical and chemical techniques. Proposed exotic species management is described Section 9.3.

#### 6.0 HISTORIC CONDITIONS

Black-and-white 1940 and 1951 historical aerial photographs were evaluated to provide the most complete illustration and highest resolution images available, and were, therefore, selected as the best representation of historic vegetative communities and distribution patterns. Historic aerials suggest that pre-impact communities within mitigation lands were comprised primarily of hydric savannas, hydric flatwoods, wetland shrub, fresh/saltwater marsh and hardwood sloughs. A historic aerial is provided as Figure 4. Due to the complete aerial coverage of the 1951 aerials, these were georeferenced and tiled to create an image depicting the historic site conditions of the Dutex property.

#### 7.0 SOILS

The Natural Resources Conservation Service (NRCS) soils manual was utilized to determine the approximate extent of the different soil units known to exist within the project site. Additionally, the Hydric Soils of Florida Handbook, Fourth Edition, was utilized to evaluate the potential presence of hydric soils. The locations and limit of individual soil units within the each tract are depicted on Figure 5. According to the NRCS soil survey for Escambia County, Florida (USDA, 1996) ten soil units are present within the subject tracts. Table 4 as well as listing the soils types also lists the type of plant community/landform that typically occupies each soil type in the undisturbed condition.



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TRACT A BOUNDARY - 481.58 A	+/- C 47 - HURRICANE AND ALBANY SOILS, 0 TO 5 PERCENT SLOPES - 3.12AC. C +/-		
4 - PIC KNEY SAND - 133.65AC.	49 - DORAVAN MUCK AND FLUVAQUENTS, FREQUENTLY FLOODED - 132.06AC.		
6 - DIREGO MUCK, TIDAL - 183.2	AC. 50 - BIGBEE-GARCON-FLUVAQUENTS COMPLEX, FLOODED - 12.02AC.	L - 219.49AC.	
9 - LEON SAND - 10.81 AC.	99 - WATER - 3.86AC. 5 TO 8 PERCENT SLOP	PES - 0.31AC.	
43 - ALBANT SAND, U IU S PER		LIVILI FLOODED - 19.00AG.	
	U 7,500 3,000 4,500 6,000 Feet		
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Soil Number	Soil Type	Acreage	Percent Hydric	Typical Landform
Tract A				
4	Pickney Sand	133.65	100	Hydric Flatwoods
6	Dirego Muck, Tidal	183.23	100	Tidal Marshes
9	Leon Sand	10.81	10	Flatwoods
43	Albany Sand, 0 to 5 Percent Slopes	3.19	5	Ridges/Rises
47	Hurricane and Albany Soils, 0 to 5 Percent Slopes,	3.12	5	Stream Terrace
47	Occasionally Flooded	5.12	5	Stream Terrace
49	Doravan Muck and Flavaquents, Frequently Flooded	132.06	100	Floodplain
50	Bigbee-Garcon-Flavaquents Complex, Flooded	12.02	35	Stream Terrace/Floodplain
99	Water	3.86	100	Water
Tract B				
4	Pickney Sand	100.26	100	Hydric Flatwoods
5	Crotan and Pickney Soils, Depressional	219.49	100	Depression
39	Bonifay Loamy Sand, 5 to 8 Percent Slopes	0.31	0	Ridges
49	Doravan Muck and Flavaquents, Frequently Flooded	19.06	100	Floodplain

 Table 4. USDA NRCS Soil Types on the Dutex Property.

# 8.0 **PROPOSED CONDITIONS**

Historic and current vegetative communities were compared to identify changes in community structure or community limits. Large shifts were observed in both the overall position of vegetative communities within the landscape and community coverage. The greatest shifts in community limits occurred with the conversions of sparsely canopied hydric pine flatwoods and hydric savannas to densely forested wetland systems containing often dense understory of black titi and titi.

The mitigation goals are to re-establish historic vegetative assemblages and community limits within each tract to the greatest extent possible. This goal will be achieved through hydrologic improvements, supplemental planting, forest thinning, and prescribed burns. The vegetative community limits and designations within the tract were identified following field investigations and review of historic and current aerial photography.

A total of fourteen community types have been identified as historically occurring throughout the Dutex property. Target communities include primarily hydric flatwoods as well as forested and herbaceous wetlands. Additional restoration activities are also proposed within upland mesic flatwoods and hardwood-conifer mixed communities. Target conditions, with appropriate continued management, will be similar to historical native structure and vegetative assemblages as shown in **Figures 6A** and **6B** and as further described. Target community types and acreages are approximated based on aerial interpretation of 1944 and 1951 historical aerials. A summary of the target vegetative community assemblages/land uses within both Tracts A and B following restoration and/or enhancement activities are detailed in **Table 5**. Descriptions typifying the historic/target communities, as described by FNAI and FLUCCS handbook are also provided.



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# Figure 6A - Proposed FLUCCS Map Tract A

Dutex Escambia County, Florida



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# Figure 6B - Proposed FLUCCS Map Tract B

Dutex Escambia County, Florida



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FLUCCS Code	FLUCCS Community	Acreage						
Tract A								
411	Mesic Pine Flatwoods	No	27.26					
434	Hardwood-Conifer Mix No							
510	Stream and Waterways Yes							
510D	Ditch	Yes	0.76					
524	Lake (less than 10 acres)	Yes	2.31					
611	Bay Swamp	Yes	38.29					
613	Gum Swamp	Yes	36.28					
614	Titi Swamp	Yes	5.24					
625	Hydric Pine Flatwoods	Yes	28.94					
626	Hydric Pine Savanna	Yes	137.56					
631	Wetland Shrub	Yes	5.16					
641	Freshwater Marsh	Yes	77.99					
642	Saltwater Marsh	Yes	104.56					
710	Beach	No	4.31					
Tract B								
411	Mesic Pine Flatwoods	No	8.58					
611	Bay Swamp	Yes	36.09					
614	Titi Swamp	Yes	56.54					
625	Hydric Pine Flatwoods	Yes	96.19					
626	Hydric Pine Savanna	Yes	52.86					
627	Hydric Pine Swamp Forest	Yes	9.46					
630	Wetland Forested Mix	Yes	79.13					
	TOTAL WETLA	AND ACREAGE	770.39					
	TOTAL UPLA	AND ACREAGE	50.04					

Table 5. Summary of Historic/Proposed Vegetative Communities on the Dutex Property.

# Mesic Pine Flatwoods (FLUCCS 411), 35.84 Acres

This upland community is typified by an overstory dominated by either slash pine, longleaf pine or both. Common flatwoods understory species include wire grass (*Aristida stricta*) and a variety of other grasses and forbs, saw palmetto (*Serenoa repens*), wax myrtle (*Myrica cerifera*), gallberry (*Ilex glabra*), and a wide variety of herbs and brush. Originally longleaf pines were common on drier sites while slash pines, which are less fire-resistant, were confined to moister sites; wildfire was the contributing factor in this distribution. However, fire control and artificial reforestation have extended the range of slash pine into former longleaf sites

Initially this upland canopy will be dominated by slash pine but adequate numbers of recruiting longleaf pine seedlings may ultimately replace the slash in dominance provided fire returns at a 2-4 year interval. Mesic flatwoods will be restored to an open landscape with a species-rich groundcover dominated by wiregrass and other fire-dependent grasses and forbs, as well as with shrubs maintained as coppice. Longleaf pine may ultimately be the principal canopy tree within this community. Following mitigation activities, lands slated for conversion to pine flatwoods are anticipated to succeed back to historic vegetative conditions.

#### Hardwood-Conifer Mixed (FLUCCS 434), 9.89 Acres

No significant changes in vegetative assemblages or structure are anticipated to occur within this community.

<u>Streams and Waterways (FLUCCS 510), 3.03 Acres</u> No significant changes are anticipated to occur within this community.

# Ditch (FLUCCS 510D), 0.76 Acres

No significant changes are anticipated to occur within this community.



#### Lake (less than 10 acres; FLUCCS 524), 2.31 Acres No significant changes are anticipated to occur within this community.

# Bay Swamp (FLUCCS 611), 74.38 Acres

Bay swamp is an evergreen forested wetland of bay species situated at the base of a slope or in a depression. Loblolly bay (*Gordonia lasianthus*), sweetbay (*Magnolia virginiana*), and/or swamp bay (*Persea palustris*) form an open-to-dense tree canopy and are also dominant in the understory along with fetterbush (*Lyonia lucida*), large gallberry (*Ilex coriacea*), dahoon (*I. cassine*), myrtle dahoon (*I. cassine* var. *myrtifolia*), titi (*Cyrilla racemiflora*), black titi (*Cliftonia monophylla*), wax myrtle (*Myrica cerifera*), coastal doghobble (*Leucothoe axillaris*), swamp doghobble (*L. racemosa*), red maple (*Acer rubrum*), and/or Virginia willow (*Itea virginica*). Composition of the understory varies regionally; black titi is a dominant component of baygall in the Florida Panhandle, but is uncommon in other areas. Loblolly pine (*Pinus taeda*), slash pine (*P. elliottii*), and/or pond pine (*P. serotina*) are occasionally found in the canopy, as well as sweetgum (*Liquidambar styraciflua*), and in the Panhandle, Atlantic white cedar (*Chamaecyparis thyoides*). Wetter bay swamps may also contain swamp tupelo (*Nyssa sylvatica* var. *biflora*) and/or pond cypress (*Taxodium ascendens*).

The canopy and understory do not generally form distinct strata but may appear as a dense, tall thicket (Clewell 1986). Vines, especially laurel greenbrier (*Smilax laurifolia*), coral greenbrier (*S. walteri*), and muscadine (*Vitis rotundifolia*), may be abundant and contribute to the often impenetrable nature of the understory. Herbs are absent or few, and typically consist of ferns such as cinnamon fern (*Osmunda cinnamomea*), netted chain fern (*Woodwardia areolata*), and Virginia chain fern (*W. virginica*). Sphagnum mosses (*Sphagnum* spp.) are common. Following mitigation activities, lands slated for conversion to pine flatwoods are anticipated to succeed back to historic vegetative conditions.

# Gum Swamp (FLUCCS 613). 36.28 Acres

No significant changes in vegetative assemblages or structure are anticipated to occur within existing gum swamps. Following removal of the beaver dam, currently inundated lands are anticipated to revegetate naturally and succeed back to historic vegetative conditions.

# Titi Swamp (FLUCCS 614), 61.78 Acres

Approximately 84 acres of titi swamp will be restored to the historic condition or hydric pine flatwoods or hydric pine savannah. These areas will be restored to an open landscape with a species-rich groundcover dominated by wiregrass and other fire-dependent grasses and forbs, as well as with shrubs maintained as coppice sprouts. Slash pine will be targeted as the principal canopy tree within this community with limited long leaf pine cover. In other areas the titi swamp will remain. The titi swamp was a component of the historic condition along historic drains and will be preserved. A reduction in vines and woody vegetation along shrub-flatwoods interfaces is likely following fire.

# Hydric Pine Flatwoods (FLUCCS 625), 125.13 Acres

This community will become an open pine forest with a sparse or absent midstory and a dense groundcover of wire grass (*Aristida stricta*) and other hydrophytic grasses, herbs, and low shrubs. The pine canopy typically consists of slash and longleaf pine. The subcanopy, where present, consists of scattered sweetbay (*Magnolia virginiana*), swamp bay, loblolly bay (*Gordonia lasianthus*), pond cypress (*Taxodium ascendens*), dahoon (*Ilex cassine*), titi (*Cyrilla racemiflora*), and/or wax myrtle (*Myrica cerifera*). Shrubs include large gallberry (*Ilex coriacea*), fetterbush (*Lyonia lucida*), titi, black titi (*Cliftonia monophylla*), sweet pepperbush (*Clethra alnifolia*), red chokeberry (*Photinia pyrifolia*), and azaleas (*Rhododendron canescens, R. viscosum*), Saw palmetto (*Serenoa repens*), and gallberry (*I. glabra*). Herbs include wiregrass, blue maidencane (*Amphicarpum muhlenbergianum*), and/or hydrophytic species such as toothache grass (*Ctenium aromaticum*), coastalplain



yellow-eyed grass (*Xyris ambigua*), Carolina redroot (*Lachnanthes caroliana*), beaksedges (*Rhynchospora chapmanii*, *R. latifolia*, and *R. compressa*), and pitcherplants (*Sarracenia* spp.).

These areas are typically present on wet prairie/seepage slopes and contain an herbaceous community found on continuously wet, but not inundated, soils and subjected to frequent fires. Savanna communities are usually dominated by dense wiregrass which, in the wetter portions, may occur with, or be replaced by, species in the sedge family. This nearly treeless community would have a similar diverse groundcover, dominated by beak rushes, wiregrass, as well as other grasses and forbs, that carries fire. If trees are present, the canopy will consist of cypress, longleaf pine, and slash pine. Shrubs, a minor component of this landscape, are maintained as coppice shrubs and often include titi. The restored groundcover will contain a diverse assemblage of wetland herbs as well as unusual and endemic insectivorous species. Following mitigation activities, lands slated for conversion to hydric pine flatwoods are anticipated to succeed back to historic vegetative conditions.

#### Hydric Pine Savanna (FLUCCS 626), 190.42Acres

Historically, hydric pine savanna dominated the northern and eastern portions of Tract A. This community is an open forest of slash pine with a dense herbaceous understory found on continuously wet, but not inundated, soils and subjected to frequent fires. It is usually dominated by dense wiregrass which, in the wetter portions, may occur with or be replaced by species in the sedge family: plumed beaksedge (*Rhynchospora plumosa*); featherbristle beaksedge (*R. oligantha*); Baldwin's nutrush (*Scleria baldwinii*); or slenderfruit nutrush (*S. georgiana*). In the Panhandle and northern Florida pitcherplants (*Sarracenia* spp.) are concentrated in the wetter portions. Characteristic species throughout its range include longleaved threeawn (*Aristida palustris*), pineland rayless goldenrod (*Bigelowia nudata*), toothache grass (*Ctenium aromaticum*), flattened pipewort (*Eriocaulon compressum*), water cowbane (*Oxypolis filifolia*), and coastalplain yellow-eyed grass (*Xyris ambigua*).

# Slash Pine Swamp Forest (FLUCCS 627), 9.46 Acres

This community is typically a domed swamp or strand dominated by slash pine, pond cypress, swamp black gum, loblolly bay, sweet bay, and swamp bay. These systems are typically found in systems transitioning from a pine flatwoods to hardwood forest. Due to the dense canopy, shrub and understory vegetation is sparse and may be dominated by wax myrtle, fetterbush, black titi, big gall berry, netted chain fern, Virginia chain fern and sphagnum moss.

# Wetland Forested Mixed (FLUCCS 630), 79.13 Acres

This community is vegetated with hydrophytic trees and shrubs that can withstand an extended hydroperiod. While mixed species canopies are common, the dominant trees are pond cypress (*Taxodium ascendens*) and swamp tupelo (*Nyssa sylvatica* var. *biflora*). Other typical canopy and subcanopy trees include slash pine (*Pinus elliottii*), red maple (*Acer rubrum*), dahoon (*Ilex cassine*), swamp bay (*Persea palustris*), sweetbay (*Magnolia virginiana*), loblolly bay (*Gordonia lasianthus*), swamp laurel oak (*Quercus laurifolia*), sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), and American elm (*Ulmus americana*).

Depending on hydrology and fire history, shrubs may be found throughout a basin swamp or they may be concentrated around the perimeter. Common species include Virginia willow (*Itea virginica*), swamp dogwood (*Cornus foemina*), swamp doghobble (*Leucothoe racemosa*), coastal sweetpepperbush (*Clethra alnifolia*), myrtle dahoon (*Ilex cassine var. myrtifolia*), fetterbush (*Lyonia lucida*), wax myrtle (*Myrica cerifera*), titi (*Cyrilla racemiflora*), black titi (*Cliftonia monophylla*), and common buttonbush (*Cephalanthus occidentalis*). The herbaceous layer is also variable and includes a wide array of species including maidencane (*Panicum hemitomon*), Virginia chain fern (*Woodwardia virginica*), arrowheads (*Sagittaria spp.*), lizard's tail (*Saururus*)



*cernuus*), false nettle (*Boehmeria cylindrica*), beaksedges (*Rhynchospora* spp.), bladderworts (*Utricularia* spp.), and royal fern (Osmunda regalis var. spectabilis). Following mitigation activities, lands slated for conversion to wetland forested mixed are anticipated to succeed back to historic vegetative conditions.

### Wetland Shrub (FLUCCS 631), 5.16 Acres

No significant changes in vegetative assemblages or structure are anticipated to occur within this community. A reduction in vines and woody vegetation along shrub-flatwoods interfaces is likely following fire.

#### Freshwater Marsh (FLUCCS 641), 77.99 Acres and Saltwater Marsh (FLUCCS 642), 104.56

No significant changes in vegetative assemblages or structure are anticipated to occur within this community. A reduction in woody vegetation within the marsh and along the landward limits is likely following fire.

#### Beaches (FLUCCS 710), 4.31 Acres

No significant changes in vegetative assemblages or structure are anticipated to occur within this community.

#### 9.0 **RESTORATION PLAN**

The following restoration recommendations are proposed to aid in the development of the management plans and land management activities implemented by NWFWMD. To the greatest extent possible, this plan will attempt to re-establish pre-silvicultural vegetative assemblages and distribution patterns on the Dutex property.

The mitigation restoration scenario was developed to provide a framework to facilitate a mitigation cost/ecological lift analysis. ENTRIX completed a Unified Mitigation Assessment Methodology (UMAM) analysis. The mitigation plan was developed in coordination with NWFMWD utilizing site-specific field surveys and target field conditions. The mitigation plan and associated UMAM analysis are described further in this section. This report does not provide specific mitigation cost analysis.

The conversion of specific types of current communities to their target community types, and potential acreages, is described in **Table 6**. Proposed activities include installation of culverts, low water crossings, pine thinning, supplemental planting, prescribed fire, as well as mechanical and chemical treatments to control woody vegetation. Specific details are described in Sections 9.1 and 9.2.

Proposed	Proposed Community																
FLUCCS Code	Description	411	434	510	510D	524	611	613	614	625	626	627	630	631	641	642	710
Tract A																	
411	Mesic Pine Flatwoods	Х															
434	Hardwood Conifer Mixed		Х														
510	Stream and Waterways			Х													
510D	Road/Ditch	Х			Х												
524	Lakes <10 Ac.					Х											
534	Beaver Pond	Х						Х			Х						
611	Bay Swamp						Х										
613	Gum Swamp						Х	Х									
614	Titi Swamp								Х		Х						
625	Hydric Pine Flatwoods									Х	Х						
627	Slash Pine Swamp Forest						Х				Х						
631	Wetland Shrub						Х							Х			

Table 6. Matrix of Current to Target Vegetative Communities and Land Uses with Acreages on the Dutex Property.



Proposed	Community		Proposed Community														
FLUCCS Code	Description	411	434	510	510D	524	611	613	614	625	626	627	630	631	641	642	710
641	Freshwater Marsh														Х		
642	Saltwater Marsh															Х	
710	Beaches																Х
747	Beaver Dam	Х						Х			Х						
Tract B																	
411	Mesic Pine Flatwoods	Х															
611	Bay Swamp						Х										
614	Titi Swamp								Х								
627	Slash Pine Swamp Forest									Х	Х	Х	Х				
630	Wetland Forested Mixed												Х				

# 9.1 MITIGATION EFFORT

**Figures 7A** and **7B** depict the proposed mitigation plan for Tract A and B respectively. The proposed planting schedule is provided in **Section 9.3**. **Table 7** provides a summary of the proposed mitigation activities for Tracts A and B.

Current	Target	IIMAM				Restorati	on Tech	nique		
Community	Community	Polygon	Thinning	Gyrotrac	Herbicide	Planting	Fire	Preserve/Fire Intrusion	Removal/ Fill	Exotic Removal
Tract A										
411	411	2-2					Х			
411	411	3-3	Х		Х		Х			
434	434	1-6						Х		
510	510	4-6						Х		
510D	411	5-5							Х	
510D	510D	6-6						Х		
524	524	8-6						Х		
534	411	9-6						Х		
534	613	10-6						Х		
534	626	11-6						Х		
611	611	12-4		Х	Х		Х			
613	611	13-4		Х	Х		Х			
613	613	14-6						Х		
614	614	15-6						Х		
614	626	3-3	Х		Х		Х			
625	625	16-2					Х			
625	625	18-4		Х	Х		Х			
625	625	17-3	Х		Х		Х			
625	626	19-2					Х			
625	626	20-3	Х		Х		Х			
625	626	21-4		Х	Х		Х			
627	626	23-3	Х		Х		Х			
627	611	22-4		Х	Х		Х			
627	626	20-3	Х		Х		Х			
631	611	24-6						Х		
631	631	25-6						Х		
641	641	27-6						Х		
710	710	28-2					Х			
747	411	29-1				Х			X	
747	613	30-1				Х			X	
747	626	31-1				Х			X	
Tract B										
411	411	3B	Х		Х	Х	Х			

 Table 7. Proposed Restoration Technique per Community Conversion Type within the Dutex Property.



C t	Transat	TINANA	Restoration Technique							
Community	Community	Polygon	Thinning	Gyrotrac	Herbicide	Planting	Fire	Preserve/Fire Intrusion	Removal/ Fill	Exotic Removal
411	411	4C		Х	Х	Х	Х			
411	411	4ERC		Х	Х	Х	Х			Х
611	611	4ERB		Х	Х	Х	Х			Х
611	611	4B		Х	Х		Х			
611	611	6						Х		
611	611	6ER						Х		Х
614	614	4B		Х	Х		Х			
614	614	6						Х		
627	625	3A	Х		Х	Х	Х			
627	626	3A	Х		Х	Х	Х			
627	625	4ERA		Х	Х	Х	Х			Х
627	626	4ERA		Х	Х	Х	Х			Х
627	625	4A		Х	Х	Х	Х			
627	626	4A		Х	Х	Х	Х			
627	630	4B		Х	Х		Х			
627	627	6						Х		
627	627	6ER						Х		Х
630	630	6						X		
630	630	6ER						X		Х

# 9.2 **RESTORATION TECHNIQUES**

Low impact machinery should be utilized where possible. Vehicles should be equipped with tracks to avoid rutting in both uplands and wetlands. Tracked vehicles are in contact with a larger surface area than would generally be the case with a wheeled vehicle, and as a result exert a much lower force per unit area on the ground being traversed than a conventional wheeled vehicle of the same weight. This makes them suitable for use on soft, low friction, and uneven ground. Existing access roads, where available, should be utilized to enter and exit mitigation. Further, restoration activities should not occur following periods of extended rainfall.

# Prescribed Fire, Fire Intrusion

Frequent fire is necessary to re-establish and maintain the historic limits and plant assemblages of grasslands and herbaceous pinelands. A great deal of the existing dense woody vegetation is likely attributable to fire suppression, especially within the mesic and hydric flatwoods and savanna lands. The longer the period of time since the last fire, the more developed the understory shrubs will be. If the understory is allowed to grow for too long, the accumulation of needle drape and the height of flammable understory shrubs will increase the probability of a catastrophic canopy fire. Due to the long absence of fire throughout many of communities within the Dutex Property, cool season or dormant season burns may be required to reduce the fuel load prior to warm season burns.

Falling dense titi stands should also be implemented to reduce the vertical fuel load to reduce the likelihood of a canopy fire. Fires should be allowed to burn into deeper wetland systems. Existing firebreaks should be used where present. No firelines will be used to prevent fire from intruding into forested or shrub dominated wetlands unless experiencing drought conditions or there is concern with smoke management. When a fireline is necessary, heavy equipment can be used only to mow or "lay down" vegetation by driving equipment over the area of concern with attention to avoiding wet, mucky areas. If the previous two methods are unsatisfactory, and the situation is considered a serious threat, careful planning and consideration for a lightly harrowed line as determined by agency staff is acceptable.

Growing season burning will be used whenever possible to mimic natural fires. Firelines will avoid ecotones and prescribed fires will be encouraged to burn into wetland ecotones when sufficient hydration exists. The protocol for fire in wetlands is to allow fires to reduce woody plants on the wetland edges and within the ecotone.



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# Figure 7A - Mitigation Activity Tract A

Dutex Escambia County, Florida



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# Figure 7B - Mitigation Activity Tract B

Dutex Escambia County, Florida



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The reduction of shrub density through repeated prescribed burns will allow relict graminoid and herbaceous groundcover species, currently present at reduced numbers, the opportunity to colonize areas previously occupied by woody vegetation. The woody species will persist, but will remain as part of the ground cover stratum as the herbaceous component recovers. Plants currently identified as absent within unburned lands should emerge, as many herbaceous species are known to become dormant with increasing competition from shrubs, surviving as rootstocks until released by fire and increased exposure to light and air. A summary of the target fire return interval for each target community is provided as **Table 9**.

FLUCCS Code	FLUCCS Community	Fire Return Interval
Tract A		
411	Mesic Pine Flatwoods	2-4 yrs.
434	Hardwood-Conifer Mix	variable, 2-20 yrs
510	Stream and Waterways	NA
524	Lake (less than 10 acres)	NA
611	Bay Swamp	occasional, rare
613	Gum Swamp	occasional, rare
614	Titi Swamp	variable, periodic
625	Hydric Pine Flatwoods	2-4 yrs.
626	Hydric Pine Savanna	2-4 yrs.
631	Wetland Shrub	2-3 yrs
641	Freshwater Marsh	5-10 yrs.
642	Saltwater Marsh	5-10 yrs.
710	Beach	3-10 yrs.
Tract B		
411	Mesic Pine Flatwoods	2-4 yrs.
611	Bay Swamp	occasional, rare
614	Titi Swamp	variable, periodic
625	Hydric Pine Flatwoods	2-4 yrs
626	Hydric Pine Savanna	2-4 yrs
630	Wetland Forested Mix	occasional, rare

Table 9. Summary of Fire Return Interval within the Dutex Property.

#### Silvicultural Activities (Gyrotrac, Thinning, Drop/Fall)

Where possible, pine within flatwoods should be thinned and converted to uneven-aged management. Preferably, thinning will result in a random spatial pattern of trees. In all cases enough canopy trees should be left to provide sufficient needle cast to carry fires. When groundcover fuels have recovered enough to carry fire on their own, canopy trees should be further harvested, felled, or girdled to restore historic densities. If harvested, specialized equipment, including chainsaws, may be required to prevent rutting in some areas.

A Gyro-Track, set off-grade, should be used in areas containing dense, mature brush and small trees. Gyro-Tracking should be conducted in manner that does not disturb the soil. A summary of the longterm target tree density per proposed vegetative community is provided in **Table 10**. Actual tree densities during implementation phase of mitigation activities are likely to be higher than the longterm target densities.

FLUCCS Code	FLUCCS Community	Target Trees/Acre	Forest Age Structure
411	Pine Flatwoods	25-40	Uneven
434	Hardwood-Conifer Mix	150-250	Uneven
510	Stream and Waterways	NA	NA
524	Lake (less than 10 acres)	NA	NA
611	Bay Swamp	200-400	Uneven
613	Gum Swamp	200-400	Uneven

 Table 10.
 Summary of Target Trees per Acre.



FLUCCS Code	FLUCCS Community	Target Trees/Acre	Forest Age Structure
614	Titi Swamp	NA	NA
625	Hydric Pine Flatwoods	15-30	Uneven
626	Hydric Pine Savanna	0-15	Uneven
630	Wetland Forested Mix	200-400	Uneven
631	Wetland Shrub	NA	NA
641	Freshwater Marsh	NA	NA
642	Saltwater Marsh	NA	NA
710	Beach	NA	NA

The initial thin for each system, would be 100-200 trees per acre, for mesic pine flatwoods, hydric pine flatwoods, and pine encroachment areas until the understory has developed. This initial target density should provide sufficient needle cast to sufficiently carry fire across the landscape as the understory is developing. After the understory can carry a fire, tree densities can be further reduced toward the target levels.

### Road/Beaver Dam Removal/Low Water Crossings

The beaver dam and all wetland roads should be removed were feasible. Fill generated should be placed in adjacent ditches and graded back into the drained pond. Beavers should be trapped and removed from the property. Roads and beaver dam should be graded to the same elevation as the adjacent vegetative community. Ditch filling should re-establish hydroperiods within drained and immediately adjacent lands. Ditch plugs should be installed where fill generated from road removals is insufficient to fully fill ditches. Where roads are not slated for removal, five low-water crossings have been sited where wetland drains or water conveyances were historically present. Consideration should be given to the utilization of granite in lieu of lime rock as a low-water crossing base so as not to affect natural water and soil chemistry. Further hydrologic evaluation of the study site and adjacent lands is needed to fully understand how existing culverts, and the respective siting of, affect re-establishment of historic flow paths.

Following beaver dam removal and subsequent draining of inundated lands, historically forested wetlands will be allowed to revegetate naturally. Supplemental plantings are not proposed as native soil and adjacent lands should provide an ample seed source and root stock for proper re-establishment of the native vegetative community. Annual monitoring will be required to ensure new dams are not constructed. Dam removal is also anticipated to decrease the flooding frequency on immediately adjacent developed lands to the north.

# Herbicide Treatment

Chemical treatment will be utilized to remove and retard growth both of native, woody vegetation, and nuisance/exotic species. Herbicide applications will be applied by a Florida-licensed Restricted Use Pesticide (RUP) applicator that is familiar with the indigenous plant populations.

Herbicides are often the most effective and efficient means of controlling woody plants or plants with running rhizomes. There are several application techniques that can be used to control trees and other woody plants, and not all woody plant species are equally susceptible to herbicides. Therefore, relative to size and species, results may vary for any of these application methods.

Hand-applied foliar spray will be utilized where risk to non-target species is minimal. Treatments using this method will be conducted such that over-application, spray run-off, and spray drift are minimized. Additionally, a tracer dye will be used with the spray solution to avoid over-application or omitting some plants entirely. This treatment technique is most effective during the growing season. All treatments will be conducted during appropriate vegetative growing stage, weather conditions, and season to increase effectiveness.



# Supplemental Planting

Supplemental planting within Tract A is slated to occur only within areas of beaver dam removal. Supplemental plantings within Tract B will occur throughout most areas currently containing dense pine stands (e.g. 411 and 627). Throughout both Tracts A and B supplemental wiregrass plantings and seventeen additional regional herbaceous groundcover flatwoods species will occur if herbaceous groundcover within mesic flatwoods, hydric flatwoods, or hydric savannas is deemed insufficient following the initial clearing/thinning effort. Supplemental plantings will consist of bareroot trees and wiregrass plugs installed at varying densities dependent upon existing/regenerating plant densities. Planting densities within bay swamps will depend on vegetative structure/density following mitigation activities. The proposed and potential mitigation effort planting schedule is provided in **Table 11**.

	Common	Spacing (ft	FLUCO	CS Code	Mitigation	Sizo	
Scientific Name	Name	on-center)	Current	Target	Activity Code	(Acre)	Quantity
Tract A							
Pinus palustris	longleaf pine	10	747	411	2	0.05	22
Aristida stricta	wire grass	3	/4/	411	2	0.05	242
Nyssa sylvatica var. biflora	swamp tupelo	6	747	612	1	0.10	115
Taxodium ascendens	pond cypress	6	/4/	015	1	0.19	115
Pinus elliottii	slash pine	10					22
Aristida stricta	wire grass	4	747	626	2	0.05	136
NA	17 herb. spp.	4					136
Tract B							
Aristida stricta	wire grass	4	627	625 626	20	120.85	351,267
NA	17 herb. spp.	4	027	025, 020	Ja	129.63	351,267
Pinus elliottii	slash pine	10	411	411	35	2 55	12 337
Aristida stricta	wire grass	3	411	411	30	2.33	12,337
Aristida stricta	wire grass	4	627	625 626	4ED a	3 20	8,964
NA	17 herb. spp.	4	027	025, 020	4EKa	3.29	8,964
Pinus palustris	longleaf pine	10	441	411		2.16	939
Aristida stricta	wire grass	3	441	411	4EKC	2.16	10,430
Aristida stricta	wire grass	4	627	625, 626	4a	15.90	43,253
Pinus palustris	longleaf pine	10	441	411	4c	3.881	1,691

Table 11. Mitigation Effort Planting Summary for Dutex Property.

The successful restoration of historic vegetative distribution patterns should be measured against the best available pre-silvicultural aerial photography. While near-total hydrologic restoration within the study areas is potentially possible, complete re-establishment of historic hydropatterns and historic vegetative limits may not be realized due to permanent hydrologic alterations within the study sites and on adjacent lands. Hydrological restoration of off-site lands is outside the scope of this report. Though comparison of restored target vegetative communities with those historically present is not possible due to the lack of pre-silvicultural vegetative data within the study areas, similar relatively unaltered plant assemblages present locally and should be used as reference sites. References site for this project have not yet been identified.

# 10.0 UMAM ANALYSIS

UMAM analysis was conducted for the mitigation plan. The results of UMAM analysis identify a potential overall functional lift of 107.16 credits following implementation of the proposed mitigation activities. A UMAM assessment area polygon map is provided as **Figure 8A** for Tract A and **Figure 8B** for Tract B. UMAM polygons were delineated based on both current and historic/target vegetative community structure and function as well as the proposed mitigation schedule. A summary of the mitigation effort UMAM scoring is provided in **Appendix D** for Tract A and **Appendix E** for Tract B.

		16		92 3141	11-6 3-3 3-4 3-9-9 10-9 10-9 3-3 3-4 3-3 3-4 3-5 3-5 3-5 3-5 3-5 3-5 3-5 3-5		214 15-6 18-4 18-4 18-4 18-3 3-4 21-4 3-3		
TRACT A BOUNDARY - 481.58 AC. +/-		$\square$	9-6 - 534(C) / 411(T) - (PRESERVATION, FIRE INTRUSION) - 1.21AC.	3	18-4 - 625(C) / 625(T) - (GYROTRAC, FIRE, HERBICIDE) - 21.06AC.	3	26-2 - 641(C) / 641(T) - (FIRE) - 180.67AC.		
1-6 - 434(C) / 434(T) - (PRESER VATION,	FIRE INTRUSION) - 9.89AC.		10-6 - 534(C) / 613(T) - (PRESERVATION, FIRE INTRUSION) - 11.28AC	ි දුර	19-2 - 625(C) / 626(T) - (FIRE) - 38.53AC.		26-2 - 642(C) / 642(T) - (FIRE) - 180.67AC.		
2-2 - 411(C) / 411(T) - (FIRE) - 6.82AC.			11-6 - 534(C) / 626(T) - (PRESERVATION, FIRE INTRUSION) - 6.85AC.		20-3 - 625(C) / 626(T) - (THIN, FIRE, HERBICIDE) - 77.59AC.		27-6 - 641(C) / 641(T) - (PRESERVATION, F	IRE INTRUSION) - 1.88AC.	
3-3 - 411(C) / 411(T) - (THIN, FIRE, HERE	SIGIDE) - 22.89AC.	$\sim$	12-4 - 611(U) / 611(T) - (GYROTRAC, FIRE, HERBICIDE) - 4.78AC.		20-3 - 527(C) / 525(T) - (THIN, FIRE, HERBICIDE) - 77.59AC.		28-2 - /10(C) / 710(T) - (FIRE) - 4.31AC.		1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
4-6 - 510(C) / 510(T) - (PRESERVATION	FIRE INTRUSION) - 3.034C	$\frac{2}{2}$	14-6 - 613(C) / 613(T) - (PRESERVATION FIRE INTRUSION) - 24 840	$\sim$	21-4 - 022(U) / 020(1) - (UTRUTRAC, FIRE, MERBICIDE) - 5.78AC.	$\sim$	23-1 - 747(C) / 411(1) - (BEAVER DAM REN 30-1 - 747(C) / 613(T) - (REAVER DAM DEN	10 VAL, PLANTING) - 0.05AC.	
5-5 - 510D(C)/ 411(T) - (ROAD REMOVA	L / DITCH FILL) - 0.13AC.	3	15-6 - 614(C) / 614(T) - (PRESERVATION, FIRE INTRUSION) - 5.24AC.	$\sim$	23-3 - 627(C) / 626(T) - (THIN, FIRE. HERBICIDE) - 4.93AC	$\sim$	31-1 - 747(C) / 626(T) - (BEAVER DAM REM	IOVAL, PLANTING) - 0.05AC.	
6-6 - 510D(C) / 510D(T) - (PRESERVATIO	N, FIRE INTRUSION) - 0.76AC.	$\tilde{\Xi}$	16-2 - 625(C) / 625(T) - (FIRE) - 5.41AC.	$\widetilde{\sim}$	24-6 - 631(C) / 611(T) - (PRESERVATION, FIRE INTRUSION) - 12.51AC	$\sim$		,	
8-6 - 524(C) / 524(T) - (PRESERVATION,	FIRE INTRUSION) - 2.31AC.	ä	17-3 - 625(C) / 625(T) - (THIN, FIRE, HERBICIDE) - 2.47 AC.	ŝ	25-6 - 631(C) / 631(T) - (PRESERVATION, FIRE INTRUSION) - 5.16AC.				
		0	1,000 2,000	3,000	4,000 Feet			88.041.1498611990.086629780	1.588552.415.205
·		0	300 600	900	1,200 Meters				
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		G GER GER GER GER GER GER GER GER GER GE	RB -AERA GER G		
TRACT B BOUNDARY - 338.85 AC. +/-		4ERC - 411(C) / 411(T) - (GYRO-TRACK, HERBICIDE, FIRE, EXOTICS REMOVAL, PLANTING)	- 2.16AC. 6 - 611(C) / 611(T) - (PRE	ESERVATION) - 126.77 AC.	
3A - 627(C) / 625(T) - (TIMBER, FIRE, H	ERBICIDE, PLANTING) - 129.86AC.	4A - 627(C) / 625(T) - (GYRO-TRACK, HERBICIDE, FIRE, PLANTING) - 15.9AC.	6 - 614(C) / 614(T) - (PRE	ESERVATION) - 126.77AC.	
3A - 627(C) / 626(T) - (TIMBER, FIRE, H	ERBICIDE, PLANTING) - 129.86AC.		6 - 627(C) / 627(T) - (PRE	ESERVATION) - 126.77AC	
4ERA - 627(C) / 625(T) - (GYRO-TRACK	, HERBICIDE, FIRE, EXOTICS REMOVAL, PLANTING) - 3.294	<ul> <li>4B - 614(C) / 614(T) - (GYRO-TRACK, HERBICIDE, FIRE) - 44.37AC.</li> </ul>	6ER - 611(C) / 611(T) - (F	PRESERVATION, EXOTICS REMOVAL)	- 9.42AC.
4ERA - 627(C) / 626(T) - (GYRO-TRACK	, HERBICIDE, FIRE, EXOTICS REMOVAL, PLANTING) - 3.294	4B - 627(C) / 630(T) - (GYRO-TRACK, HERBICIDE, FIRE) - 44.37AC.	6ER - 627(C) / 627(T) - (F	PRESERVATION, EXOTICS REMOVAL)	- 9.42AC.
4ERB - 611(C) / 611(T) - (GYRO-TRACK	, HERBICIDE, FIRE, EXOTICS REMOVAL) - 0.65AC.	4C - 411(C)/411(T) - (GYRO-TRACK, HERBICIDE, FIRE, PLANTING) - 3.88AC.	6ER - 630(C) / 630(T) - (F	PRESERVATION, EXOTICS REMOVAL)	- 9.42AC.
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#### **10.1** IMPLEMENTATION ISSUES

- Use of prescribed fire would need to be coordinated with Saufley Field and adjacent landowners.
- Initial dormant-season fuel reduction fires should be followed by implementation of growingseason burns, subject to on-the-ground conditions, on 2-to-5-year cycles.

### **10.2 PERFORMANCE CRITERIA**

The plant community structure targeted in the post-enhancement condition will be that which existed prior to the fire exclusion, subsequent increase in woody vegetation and beaver dam construction, as listed in **Table 5** and illustrated on **Figures 6A** and **6B**.

#### **10.3 LONG-TERM MANAGEMENT**

NWFWMD will be responsible for ensuring the perpetual management of mitigation lands. NWFWMD will manage 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.

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# APPENDIX

A



A	ppendix	A—Obse	rved Plant	Species.
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Scientific Name	Common Name
Acalypha gracilens	three seeded mercury
Acer rubrum	red maple
Alternanathera philoxeroides	alligatorweed
Ambrosia artemisiifolia	common ragweed
Ammannia sp.	redstem
Amphicarpum muhlenbergianum	blue maidencane
Andropogon virginicus var. virginicus	broomsedge bluestem
Andropogon virginicus var. glaucus	chalky bluestem
Aristida stricta	wiregrass
Aronia arbutifolia	red chokeberry
Arundinaria gigantea	switchcane
Aster tenuifolius	salt marsh aster
Baccharis halimifolia	sea myrtle
Bacopa monnieri	herb-of-grace
Balduina uniflora	oneflower honeycombhead
Bidens mitis	smallfruit beggarticks
Bignonia capreolata	crossvine
Bolboschoenus robustus	sturdy bulrush
Callicarpa americana	beautyberry
Carex glausescens	clustered sedge
Carex stipate	owlfruit sedge
Carya glabra	pignut hickory
Centella asiatica	spadeleaf
Chamaecyparis thyoides	atlantic white cedar
Chasmanthium sp.	woodoats
Chrysopsis subulata	golden aster
Cladium jamaicense	jamaica swamp sawgrass
Clethra alinfolia	sweet pepper bush
Cliftonia monoplylla	black titi
Colocasia esculenta	wild taro
Commelina diffusa	dayflower
Conradina canescens	false rosemary
Crinum americana	southern swamp lily
Cyperus lecontei	Leconte's flatsedge
Cyperus odoratus	fragrant flatsedge
Cyperus polystachyos	manyspike flatsedge
Cyrilla racemiflora	red titi
Dicanthelium sp.	panic grass
Dichanthelium aciculare	needleleaf witchgrass
Dichanthelium acuminatum	tapered witchgrass
Dichanthelium commutatum	variable witchgrass
Dichanthelium scabriusculum	woolly witchgrass
Diodia virginiana	Virginia buttonweed
Drosera brevifolia	dward sundew
Drosera intermedia	water sundew; spoonleaf sundew
Drosera capillaris	pink sundew
Dulichium arundinaceum	threeway sedge; sheathed galingale
Echinochloa muricata	rough barnyardgrass
Eichhornia crassipes	common water-hyacinth
Eleocharis tuberculosa	conecup spikerush
Elephantopus elatus	florida elephant's-foot
Eragrostis refracta	coastal lovegrass
Eriocaulon decangulare	pipewort
Eupatorium compositifolium	dog fennel
Eupatorium mikanioides	semaphore thoroughwort
Eupatorium morhii	Mohr's thoroughwort



Scientific Name	Common Name
Eupatorium perfoliatum	common boneset
Eupatorium rotundifolium	false hoarhound
Eupatorium semiserratum	smallflower thoroughwort
Eupatorium serotinum	boneset
Euthamia graminifolia	grass-leaved goldenrod
Euthamia minor	slender flattop goldenrod
Fuirena brevisetaa	saltmarsh umbrellasedge
Fuirena sciroides	southern umbrellasedge
Fuirena scirpoidea	southern umbrellasedge
Fuirena sp.	umbrellasedge
Galactia volubilis	downy milkpea
Gaylussacia mosieri	woolly huckleberry
Gelsemium sempervirens	Florida jessamine
Habenaria repens	water-spider orchid
Hamamelis virginiana	American witchhazel
Helenium amarum	Spanish daisy; bitterweed
Hibiscus aculeatus	comfortroot
Hibiscus grandiflorus	swamp rosemallow
Hydrocotyle sp.	marshpennywort
Hypericum brachyphyllum	coastalplain St. John's-wort
Hypericum cistifolium	roundpod St. John's-wort
Hypericum denticulatum	coppery St. John's-wort
Hypericum gentianoides	Pineweeds; Orangegrass
Hypericum hypericoides	St. Andrew's-cross
Hypericum mutilum	dwarf St. John's-wort
Hypericum tetrapetalum	fourpetal St. John's-wort
Ilex cassine	dahoon
<i>Ilex coriacea</i>	large gallberry
Ilex glabra	gallberry
<i>Ilex myrtifolia</i>	myrtle leaf holly
<i>Ilex vomitoria</i>	yaupon
Ipomoea sagittata	salt marsh morning glory
Itea virginica	Virginia willow; Virginia sweetspire
Iva jrutescens	bigiear sumpweed
Juncus cf. scirpoides	heedlepod rush
	bog rush; elliott s rush
Juncus megacephalus	bighead rush
Juncus polycephalus	naadlanad rish
Juncus scirpoides	hleek poodle rush
Junitas Toemerianas	rad coder
Juniperus Virginiana	weterwillow
Justicia sp. Kalmia hirsuta	hairy wicky
Kaimu nii suu Kostolotalwa wirainiga	saeshara mallow
Kosteletzkyu virginicu	redroot
Lachnanines curoliana	whitehead bogbutton
Liatris sp	shooting star
Liaustrum sinansa	chinese privet
Ligusitum sinense Liriodendron tulinifera	tulintrae: vellow poplar
Linouenaron impgera	hairy primrosevillow
Ludwigia sp	rattlebox
Luuwigiu sp.	fortail clubmoss
Lycopus sp	waterborehound
Lycopus sp.	Japanese climbing fern
Lygouum juponicum	fetterbush
Lybrum lineare	wand loosestrife
Magnolia grandiflora	southern magnolia
Magnolia virginiana	sweethav
Malanthium virginicum	Virginia hunchflower
meannain virginicam	v nginia buncimowei



Scientific Name	Common Name
Mikania scandens	milk vine
Mitreola petiolata	lax hornpod
Myrica cerifera	wax myrtle
Myrica heterophylla	evergreen bayberry; northern bayberry
Nymphaea odorata	fragrant water lily
Nyssa sylvatica var. biflora	tupelo
Onoclea sensibilis	sensitive fern
Osmunda regalis	royal fern
Osmunda cinnamomea	cinnamon fern
Oxypolis filiformis	water cowbane
Panicum commutatum	variable witchgrass
Panicum repens	torpedograss
Panicum virgatum	switchgrass
Paspalum sp.	crowngrass
Peltandra sagittifolia	spoon flower
Persea borbonia	red bay
Persea palustris	silk bay
Phragmites australis	common reed
Phyla nodiflora	frogs- fruit
Physalis angustifolia	coastal groundcherry
Pinus elliottii	slash pine
Platanthera ciliaris	yellow fringed orchid
Platanus occidentalis	American sycamore; American planetree
Pluchea odorata	cure-for-all
Pluchea purpurescens	annual salt marsh fleabane
Pluchea rosea	rosy camphorweed
Pluchea sp.	camphorweed
Polygala cruciata	drumheads
Polygala cymosa	tall pinebarren milkwort
Polygala hookeri	hooker's milkwort
Polygala lutea	orange milkwort
Polygala nana	candyroot
Polygala ramosa	low pinebarren milkwort
Polygonum cf. hydropiperoides	mild waterpepper; swamp smartweed
Polygonum hydropiperoides	mild waterpepper; swamp smartweed
Polygonum punctatum	dotted smartweed
Proserpinaca pectinata	combleaf mermaidweed
Pteridium aquilinum var. pseudocaudatum	tailed bracken
Pterocaulon pycnostachyum	blackroot
Quercus geminata	sand live oak
Quercus hemispherica	laurel oak; diamond oak
Quercus laurifolia	laurel oak; diamond oak
Quercus minima	dwarf live oak
Duercus pumila	running oak
Quercus virginiana	live oak
Z Rhexia alifanus	savannah meadow beauty
Rhexia mariana	pale meadowbeauty: Maryland meadowbeauty
Rhexia nashii	maid marian
Rhus copalinum	winged sumac
Rhynchospora cephalantha	bunched beaksedge
Rhynchospora cf. inundata	narrowfruit horned beaksedge
Rhynchospora chalarocephala	loosehead beaksedge
Rhynchospora chapmanii	Chapman's beaksedge
Rhynchospora ciliaris	fringed beaksedge
Rhynchospora fascicularis	fascicled beaksedge
Rhynchospora gracilanta	slender beaksedge
Rhynchospora sp	heakrush
Rubus aroutus	sawtooth blackberry
Rubus cunaifolius	sand blackberry
Ruous culleijouus	Sand Diackbelly



Scientific Name	Common Name
Rubus trivialis	southern dewberry
Rhynchospora corniculata	shortbristle horned beaksedge
Sabal minor	dwarf palmetto; bluestem palm
Sabal palmetto	sabal palm
Sabatia brevifolia	narrow-leaved sabatia
Sabatia macrophylla	largeleaf rosegentian
Sagittaria latifolia	broadleaf arrowhead; common arrowhead; duck potato
Sagittaria lancifolia	bulltongue arrowhead
Salix caroliniana	Carolina willow; coastalplain willow
Sambucus canadensis	American elder; elderberry
Sapium sebiferum	popcorn tree
Sarracenia leucophylla	white top pitcher plant
Scleria oligantha	littlehead nutrush
Scirpus cyperinus	wool-grass bulrush
Serenoa repens	saw-palmetto
Sesbania punicea	rattlebox
Smilax bona-nox	saw greenbrier
Smilax laurifolia	laurel greenbrier; bamboo vine
Smilax pumila	sarsaparilla vine
Smilax sp.	greenbrierr
Solidago sempervirens	seaside goldenrod
Spartina patens	marshhay cordgrass; saltmeadow cordgrass
Sphagnum sp.	peat moss
Stillingia aquatica	water toothleaf; corkwood
Symplocos tinctoria	common sweetleaf; horse sugar
Syngonanthus flavidulus	yellow hatpins
Taxodium ascendens	pond cypress
Thelypteris hispidula	hairy maiden fern
Thelypteris palustris	marsh fern
Toxicodendron radicans	poison ivy
Triadenum virginicum	Virginia marsh St. John's-wort
Typha latifolia	cattail
Utricularia sp.	bladderwort
Vaccinium arboreum	sparkleberry; farkleberry
Vaccinium corymbosum	highbush blueberry
Vaccinium elliottii	highbush blueberry
Vaccinium myrsinites	shiny blueberry
Viburnum nudum	possumhaw
Vitis rotundifolia	muscadine grape
Woodwardia areolata	netted chain fern
Woodwardia virginica	Virginia chain fern
Xyris sp.	yelloweyed grass
Xyris caroliniana	Carolina yelloweyed grass
Xyris elliottii	Elliott's yelloweyed grass
Xyris fimbriata	fringed yelloweyed grass
Xyris laxifolia var. iridifolia	irisleaf yelloweyed grass
Xyris platylepis	tall yelloweyed grass
Xyris serotina	acidswamp yelloweyed grass
Xvris stricta	pineland velloweved grass



# APPENDIX

В



# Appendix B—Observed and Target Wildlife Species on the Dutex Property

#### AMPHIBIANS

Scientific Name	Common Name							
Acris gryllus	cricket frog							
Acris gryllus	southern cricket frog							
Agkistrodon piscivorus	cottonmouth							
Alligator mississippiensis	alligator							
Ambystoma cingulatum	flatwoods salamander							
Ambystoma talpoideum	mole salamander							
Ambystoma tigrinum	tiger salamander							
Amphiuma means	two-toed amphiuma							
Anolis carolinensis	green anole							
Bufo quercicus	oak toad							
Chelydra serpentina	snapping turtle							
Cnemidophorus sexlineatus	six-lined racerunner							
Coluber constrictor	black racer							
Crotalus adamanteus	eastern diamondback rattlesnake							
Crotalus spp.	diamondback rattlesnake							
Deirochelys reticularia	chicken turtle							
Desmognathus auriculatus	southern dusky salamander							
Diadophis punctatus	ringneck snake							
Elaphe guttata	red rat snake							
Elaphe obsoleta quadrivittata	yellow rat snake							
Elaphe obsoleta spiloides	gray rat snake							
Eumeces laticeps	broadhead skink							
Eurycea quadradigitata	dwarf salamander							
Farancia abacura	eastern mud snake							
Gastrophryne carolinensis	narrowmouth toad							
Gopherus polyphemus	gopher tortoise							
Heterodon simus	southern hognose snake							
Hyla chrysoscelis	Cope's gray treefrog							
Hyla cinerea	green treefrog							
Hyla femoralis	pinewoods treefrog							
Hyla gratiosa	barking treefrog							
Hyla squirella	squirrel treefrog							
Kinosternon baurii	striped mud turtle							
Kinosternon subrubrum steindachneri	mud turtle							
Lampropeltis elapsoides	scarlet kingsnake							
Masticophis flagellum	coachwhip snake							
Micrurus fulvius	coral snake							
Nerodia fasciata	banded water snake							
Nerodia floridana	green water snake							
Notophthalmus perstriatus	striped newt							
Opheodrys aestivus	rough green snake							
Ophisaurus ventralis	eastern glass lizard							
Plethodon glutinosus	slimy salamander							
Pseudacris nigrita	southern chorus frog							
Pseudacris ocularis	little grass frog							
Pseudacris ornata	ornate chorus frog							
Pseudacris spp.	chorus frog							
Rana capito	gopher frog							
Rana catesbeiana	bull trog							
Rana clamitans clamitans	bronze irog							
Rana grylio	pig irog							
Rana sphenocephala	reopard frog							
Regina aneni	surped swamp snake							
Kegina rigida	crayiisii shake							
Scalenorus undulatus	castern fance lizerd							
Sceloporus unaulatus	eastern rence nzard							
Seminateix magaa	ground skink							
Siran intermedia	lacer siran							
Siran lacarting	reaster siren							
Siten accentita	pycmy rattleenake							
Storeria occipitomaculata	red-bellied snake							
Terranene carolina	how turtle							
i crupene curounu	oox turte							



#### BIRDS

Scientific Name	Common Name						
Accipitriformes spp.	hawks						
Aix sponsa	wood duck						
Ardea alba	great egret						
Ardea herodias	great blue heron						
Baeolophus bicolor	tufted titmouse						
Bubo virginianus	great horned owl						
Buteo lineatus	red-shouldered hawk						
Circus cyaneus	northern harrier						
Coccyzus americanus	yellowbellied cuckoo						
Colinus virginianus	bobwhite						
Compsothlypis americana	parula warbler						
Corvus brachyrhynchos	common crow						
Cyanocitta cristata	blue jay						
Dendroica pinus	pine warbler						
Dryocopus pileatus	pileated woodpecker						
Dumetella carolinensis	catbird						
Egretta caerulea	little blue heron						
Egretta thula	snowy egret						
Egretta tricolor	tricolored heron						
Elanoides forficatus	swallow-tailed kite						
Eudocimus albus	white ibis						
Euphagus carolinus	rusty blackbird						
Falco sparverius	southeastern kestrel						
Grus canadensis	sandhill crane						
Haliaeetus leucocephalus	bald eagle						
Melanerpes carolinus	red-bellied woodpecker						
Meleagris spp.	turkey						
Mimus polyglottos	mocking brid						
Mycteria americana	woodstork						
Myiarchus crinitus	great-crested flycatcher						
Pandion haliaetus	osprey						
Passeriformes spp.	songbirds						
Polioptila caerulea	blue gray gnatcatcher						
Protonotaria citrea	prothonotory warbler						
Scolopax minor	woodcock						
Sitta pusilla	brown-headed nuthatch						
Strix varia	barred owl						
Thryothorus ludovicianus	Carolina wren						
Vireo griseus	white-eyed vireo						
Vireo olivaceus	red-eyed vireo						
Zenaida macroura	mourning dove						

#### MAMMALS

Scientific Name	Common Name								
Didelphis virginiana	opossum								
Felis rufus	bobcat								
Lontra canadensis	river otter								
Mephitis mephitis	striped skunk								
Neotoma floridana	woodrat								
Neovison vison	mink								
Odocoileus virginianus	white-tailed deer								
Peromyscus gossypinus	cotton mouse								
Peromyscus polionotus	beach mouse								
Procyon lotor	raccoon								
Scalopus aquaticus	eastern mole								
Sciurus carolinensis	gray squirrel								
Sciurus niger	fox squirrel								
Sigmodon hispidus	cotton rat								
Soricidae spp.	shrews								
Sylvilagus floridanus	cottontail rabbit								
Urocyon cinereoargenteus	gray fox								
Ursus americanus	black bear								

# INVERTEBRATES

Scientific Name	Common Name							
Neritina spp.	olive nerites							
Uca spp.	fiddler crabs							



# APPENDIX

С





Wetland Forested Mixed (FLUCCS 630)



South of beaver pond (Gum Swamp; FLUCCS 613)



Wetland Forested Mixed (FLUCCS 630)



Ditch (FLUCCS 510)





Canopy opening in Pine Flatwoods (FLUCCS 411)



Titi Swamp (FLUCCS 614)



Pine Flatwoods (FLUCCS 411)



Titi Swamp (FLUCCS 614)





Bay Swamp with Privet (FLUCCS 611)



Beaver Dam (FLUCCS 747)



Beaver Pond (FLUCCS 534)



Titi Swamp (FLUCCS 614)







Slash Pine Swamp Forest (FLUCCS 627)



Lakes <10 Acres (FLUCCS 524)



Hardwood Conifer Mixed (FLUCCS 434)





Stream and Waterways (FLUCCS 510)



Hardwood Conifer Mixed/Stream and Waterways (Eleven Mile Creek; FLUCCS 434/510)



Ditch (FLUCCS 510)



Hydric Pine Flatwoods (FLUCCS 625)





Stream and Waterways (FLUCCS 510) with Wild Taro (Colocasia esculenta)



Freshwater Marsh (FLUCCS 641)



Beaches/Freshwater Marsh (FLUCCS 710/641)



Breder Trap Deployment





Common water hyacinth (*Eichhornia crassipes*)



# APPENDIX

D



June 24, 2010

							SCO											
FLUCCS Code		MIT ACT	UMAM Polygon	Ac	LOCATION AND LANDSCAPE		WATER ENVIRONMENT		COMM STRUC	COMMUNITY STRUCTURE		UMAM WITH	DELTA	TIME	P FACT	RISK	RFG	LIFT
CURRENT	TARGET	CODE			W/OUT or CUR.	WITH MIT.	W/OUT or CUR.	WITH MIT.	W/OUT or CUR.	WITH MIT.	MIT.	MIT.		2.110				
434	434	6	1	9.89	0	0	0	0	0	0	0.00	0.00	0.00	NA	1	1.00	NA	NA
441	411	2	2	6.82	0	0	0	0	0	0	0.00	0.00	0.00	1.68	1	1.75	0.00	0.00
441	411	3	3	22.89	0	0	0	0	0	0	0.00	0.00	0.00	1.46	1	1.50	0.00	0.00
510	510	6	4	3.03	0	0	0	0	0	0	0.00	0.00	0.00	NA	1	1.00	NA	NA
510D	411	5	5	0.13	0	0	0	0	0	0	0.00	0.00	0.00	1.68	1	2.00	0.00	0.00
510D	510D	6	6	0.76	0	0	0	0	0	0	0.00	0.00	0.00	NA	1	1.00	NA	NA
510D	626	5	7	0.17	2	9	2	9	2	10	0.20	0.93	0.73	1.68	1	2.00	0.22	0.04
524	524	6	8	2.31	0	0	0	0	0	0	0.00	0.00	0.00	NA	1	1.00	NA	NA
534	411	6	9	1.21	0	0	0	0	0	0	0.00	0.00	0.00	NA	1	1.00	NA	NA
534	613	6	10	11.28	7	9	4	9	3	9	0.47	0.90	0.43	1.16	1	1.00	0.37	4.21
534	626	6	11	6.85	7	9	2	9	1	9	0.33	0.90	0.57	1.07	1	1.00	0.53	3.63
611	611	4	12	4.78	7	9	8	9	7	10	0.73	0.93	0.20	1.03	1	1.25	0.16	0.74
613	611	4	13	1.07	7	9	6	9	7	10	0.67	0.93	0.27	1.03	1	1.25	0.21	0.22
613	613	6	14	24.80	7	9	8	9	9	10	0.80	0.93	0.13	1.00	1	1.00	0.13	3.31
614	614	6	15	5.24	7	9	9	9	9	10	0.83	0.93	0.10	1.00	1	1.00	0.10	0.52
625	625	2	16	5.41	7	9	8	9	6	9	0.70	0.90	0.20	1.03	1	1.00	0.19	1.05
625	625	3	17	2.47	7	9	8	9	6	10	0.70	0.93	0.23	1.07	1	1.25	0.17	0.43
625	625	4	18	21.06	7	9	8	9	6	10	0.70	0.93	0.23	1.07	1	1.25	0.17	3.67
625	626	2	19	38.53	7	9	8	9	6	9	0.70	0.90	0.20	1.03	1	1.25	0.16	5.99
625	626	3	20	77.59	7	9	8	9	6	10	0.70	0.93	0.23	1.07	1	1.25	0.17	13.54
625	626	4	21	5.78	7	9	8	9	6	10	0.70	0.93	0.23	1.07	1	1.25	0.17	1.01
627	611	4	22	19.93	7	9	8	9	8	10	0.77	0.93	0.17	1.07	1	1.25	0.12	2.48
627	626	3	23	4.93	7	9	8	9	5	9	0.67	0.90	0.23	1.07	1	1.25	0.17	0.86
631	611	2	24	12.51	7	9	8	9	9	9	0.80	0.90	0.10	1.16	1	1.00	0.09	1.08
631	631	2	25	5.16	7	9	8	9	9	9	0.80	0.90	0.10	1.00	1	1.00	0.10	0.52
641	641	2	26	180.67	7	9	8	9	9	9	0.80	0.90	0.10	1.03	1	1.00	0.10	17.54
641	641	6	27	1.88	7	9	10	10	9	10	0.87	0.97	0.10	1.00	1	1.00	0.10	0.19
710	710	2	28	4.31	0	0	0	0	0	0	0.00	0.00	0.00	1.07	1	1.00	0.00	0.00
747	411	1	29	0.05	0	0	0	0	0	0	0.00	0.00	0.00	1.68	1	2.00	0.00	0.00
747	613	1	30	0.19	7	9	0	9	0	10	0.23	0.93	0.70	1.16	1	1.00	0.60	0.11
747	626	1	31	0.05	7	9	0	9	0	9	0.23	0.90	0.67	1.07	1	1.00	0.62	0.03
West Totals:		481.75														61.17		



# APPENDIX

Е



June 24, 2010

					SCORE													
FLUCCS Code		MIT ACT	UMAM	Ac	LOCATION AND LANDSCAPE		WATER ENVIRONMENT		COMMUNITY STRUCTURE		UMAM W/OUT	UMAM WITH	DELTA	TIME	Р	RISK	RFG	LIFT
CURRENT	TARGET	CODE	Polygon		W/OUT or CUR.	WITH MIT.	W/OUT or CUR.	WITH MIT.	W/OUT or CUR.	WITH MIT.	MIT.	MIT.		LAG	FACT			
627	625, 626	3a	3a	129.86	7	9	8	8	6	9	0.70	0.87	0.17	1.03	1	1.25	0.13	16.81
441	411	3b	3b	2.55	7	9	8	8	6	9	0.70	0.87	0.17	1.07	1	1.25	0.12	0.32
627	625, 626	4ERa	4ERa	3.29	7	9	8	8	4	9	0.63	0.87	0.23	1.07	1	1.25	0.17	0.57
611	611	4ERb	4ERb	0.65	7	9	8	8	4	9	0.63	0.87	0.23	1.07	1	1.25	0.17	0.11
441	411	4ERc	4ERc	2.16	7	9	8	8	4	9	0.63	0.87	0.23	1.07	1	1.25	0.17	0.38
627	625, 626	4a	4a	15.90	7	9	8	8	6	9	0.70	0.87	0.17	1.03	1	1.25	0.13	2.06
611, 614, 627, 630	611, 614, 627, 630	4b	4b	44.38	7	9	8	8	6	9	0.70	0.87	0.17	1.03	1	1.00	0.16	7.18
441	411	4c	4c	3.88	7	9	8	8	6	9	0.70	0.87	0.17	1.03	1	1.25	0.13	0.50
614, 627, 630	614, 627, 630	6	6	126.78	7	9	8	8	7	9	0.73	0.87	0.13	1.03	1	1.00	0.13	16.41
611, 627, 630	611, 627, 630	6ER	6ER	9.42	7	9	8	8	4	9	0.63	0.87	0.23	1.07	1	1.25	0.17	1.64
East Totals:			ast Totals:	338.85														45.99
West and East Combined Total:		820.60														107.16		

# ADDENDUM - 4/9/12

