PANAMA CITY—BAY COUNTY INTERNATIONAL AIRPORT RELOCATION FINAL MITIGATION PLAN

October 2006




Panama City - Bay County International Airport

BECHTEL

PBS&J

Panama City – Bay County Airport and Industrial District
SAJ-2001-5264(IP-GAH)
Document A
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PANAMA CITY – BAY COUNTY
INTERNATIONAL AIRPORT RELOCATION
FINAL MITIGATION PLAN

USACE Permit Number
SAJ-2001-5264 (IP-GAH)
FDEP Ecosystem Management Agreement (EMA) & Wetland Resource Permit (WRP)
Number 03-0212186-004-DF

Applicant:

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October 2006

Panama City – Bay County International Airport Mitigation Plan
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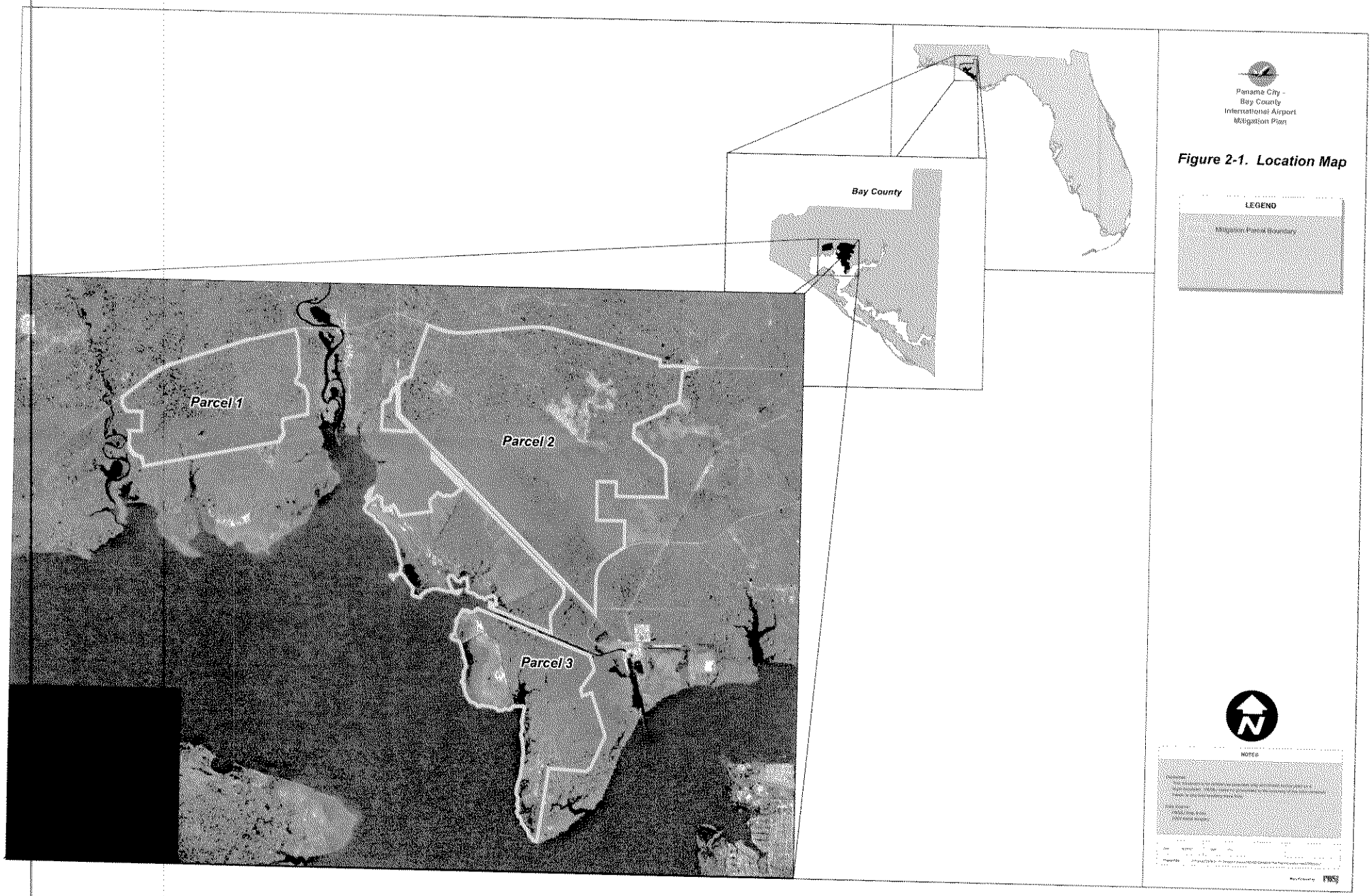
1.0 Introduction

This document serves as the mitigation plan for the relocation of the Panama City – Bay County International Airport to the West Bay site. This plan describes mitigation acreages and activities to compensate for the proposed full build-out scenario at the airport site, through 50 years. This mitigation plan will be incorporated into the Florida Department of Environmental Protection Ecosystem Management Agreement and the United States Army Corps of Engineers Section 404 dredge and fill permit.

2.0 Goals and Objectives

The objective of the airport mitigation plan is to compensate for wetland functions lost due to the construction of the Panama City – Bay County International Airport thru full build-out over 50 years. To accomplish this objective, 9,609 acres of mitigation have been proposed (see **Figure 2-1**). The main goal of the mitigation is the restoration of an ecosystem significantly altered by silvicultural land use to a native longleaf pine flatwoods/savanna ecosystem. Other goals include the preservation of large, contiguous tracts of land; protection of water quality; the enhancement of wildlife habitat; the restoration and enhancement of streams and waterways; and the protection of a substantial amount of the West Bay coastline.


Bay County
Parcel 1
Parcel 2
Parcel 3
Panama City -
Bay County
International Airport
Mitigation Plan
Figure 2-1. Location Map
LEGEND
NOTES

3.0 Mitigation Site Selection and Justification

The mitigation site for the airport was selected within the approximately 40,000-acre West Bay Preservation Area (WBPA) (**Figure 3-1**). The WBPA was identified in the Sector Overlay Plan for the West Bay area, which proposed land use within an approximately 75,000-acre area to facilitate the airport relocation. These conservation lands were selected to protect water quality and resources of West Bay and to provide wildlife corridors to large conservation units within the WBPA, Pine Log State Forest, and other conservation areas. The 9609-acre mitigation area will comprise roughly 25 % of the WBPA and contains habitat types similar to those within the airport impact area. The mitigation area is within the same watershed as the airport relocation site and contains some of the major basins present within the impact site including Burnt Mill Creek and Crooked Creek. Site selection of the airport mitigation area was coordinated with regulatory agencies including Florida Department of Environmental Protection (FDEP), United States Army Corps of Engineers (USACE), United States Fish and Wildlife Service (USFWS), and the St. Joe Company, during the Ecosystem Team Permitting process to provide large contiguous tracts with access to West Bay.

In order to quantify whether wetland functions gained from mitigation compensate for wetland functions lost due to impacts based on the potential 50-year full build-out, the Wetland Rapid Assessment Procedure (WRAP) (Miller and Gunsalus 1999) was used. FDEP and USACE agreed to use WRAP to conduct the functional assessment since WRAP is a semi-quantitative method and has been used in the region for some time. The Uniform Mitigation Assessment Method (UMAM) was also considered, but was still in the development phase at the time of permit application submittal for the airport relocation project. The WRAP analysis involved numerous components including existing and with project WRAP scores for the impact and mitigation sites, time lag, and risk factors. Five airport construction phases at ten-year intervals were incorporated into the WRAP analysis to calculate the amount of functional loss for each phase (see **Table 3-1**). Additionally, indirect impacts, such as indirect impacts to wetlands 300 feet beyond the airport relocation boundary and inclusion of non-jurisdictional adjacent non-contiguous wetlands, were included in the analysis. Impacts to wetlands included within the Wildlife Management Plan (WMP) that may never be impacted were also considered as full impacts and incorporated into the WRAP analysis.

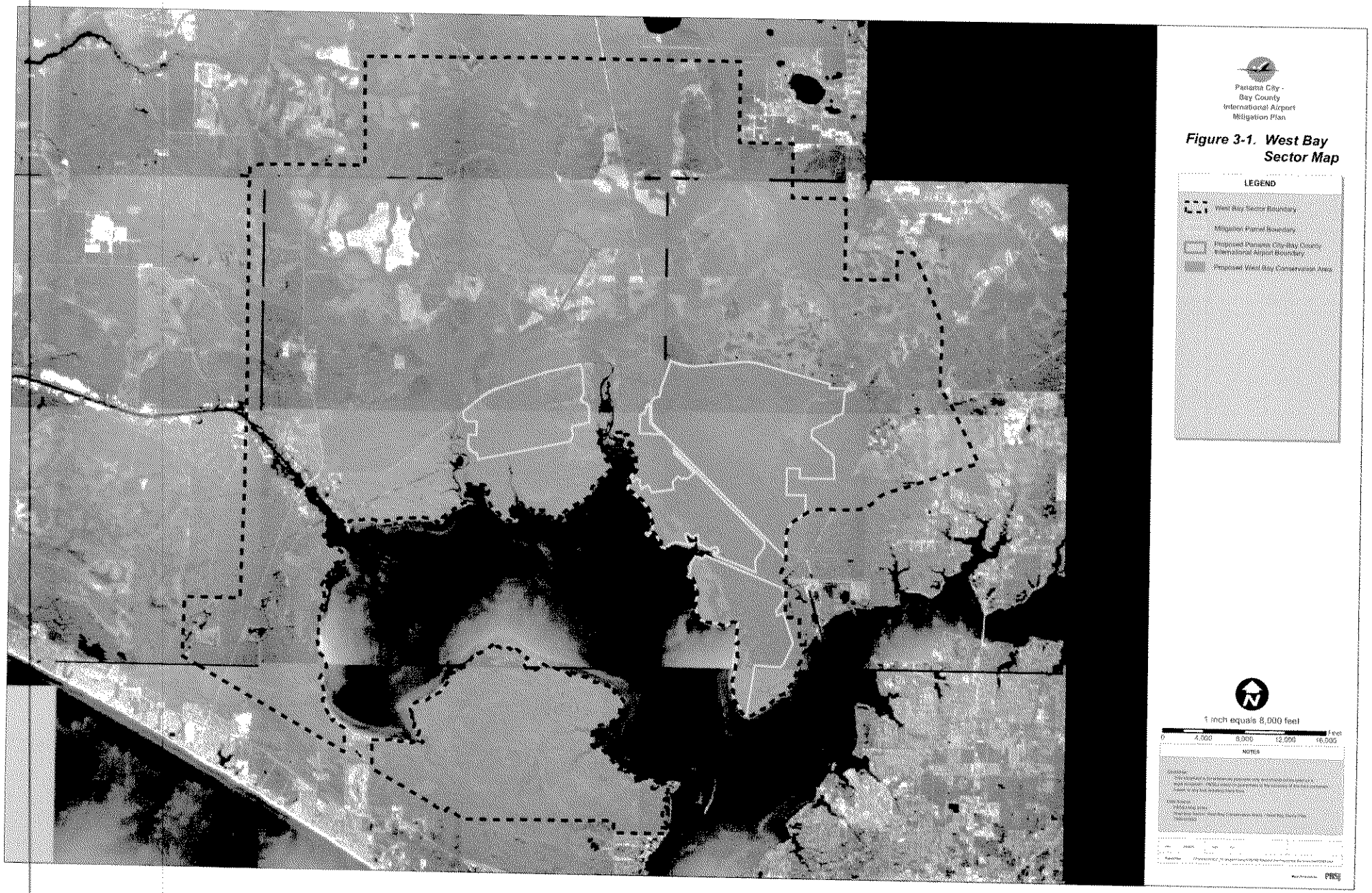


Figure 3-1. West Bay Sector Map

Table 3-1 WRAP Functional Loss Summary -- Airport Relocation Site

Project Phase[1]	Impact Type[2]	Existing FLUCFCS	Acres	Existing Conditions Score	With Project Score	Functional Loss[5]	Functional Units
0-10 Years	*Direct*	441/600	298.0	0.66	0.00	-0.66	-197
		614	56.3	0.70	0.00	-0.70	-39
		621	71.2	0.91	0.00	-0.91	-65
		630	164.7	0.82	0.00	-0.82	-135
		640,641	5.0	0.85	0.00	-0.85	-4
		Subtotal	*595.2 ac.*				*-440 fu*
0-10 Years	*Direct (Previous Indirect)*	441/600	0.0	0.48	0.00	-0.48	0
		614	0.0	0.51	0.00	-0.51	0
		621	0.0	0.67	0.00	-0.67	0
		630	0.0	0.61	0.00	-0.61	0
		640,641	0.0	0.58	0.00	-0.58	0
		Subtotal	*0.0 ac.*				*0 fu*
0-10 Years	*Indirect*	441/600	208.1	0.66	0.48	-0.18	-37
		614	29.0	0.70	0.51	-0.19	-6
		621	12.6	0.91	0.67	-0.24	-3
		630	47.0	0.82	0.61	-0.21	-10
		640,641	66.6	0.85	0.58	-0.27	-18
		Subtotal	*363.3 ac.*				*-74 fu*
11-20 Years	*Direct*	441/600	35.7	0.66	0.00	-0.66	-24
		614	21.9	0.70	0.00	-0.70	-15
		621	36.4	0.91	0.00	-0.91	-33
		630	73.0	0.82	0.00	-0.82	-60
		640,641	0.0	0.85	0.00	-0.85	0
		Subtotal	*167.0 ac.*				*-132 fu*
11-20 Years	*Direct (Previous Indirect)*	441/600	15.0	0.48	0.00	-0.48	-7
		614	1.4	0.51	0.00	-0.51	-1
		621	6.6	0.67	0.00	-0.67	-4
		630	15.0	0.61	0.00	-0.61	-9
		640,641	0.1	0.58	0.00	-0.58	0
		Subtotal	*38.1 ac.*				*-21 fu*
11-20 Years	*Indirect*	441/600	18.4	0.66	0.48	-0.18	-3
		614	13.2	0.70	0.51	-0.19	-3
		621	2.8	0.91	0.67	-0.24	-1
		630	50.4	0.82	0.61	-0.21	-11
		640,641	0.0	0.85	0.58	-0.27	0
		Subtotal	*84.8 ac.*				*-18 fu*

Table 3-1 WRAP Functional Loss Summary -- Airport Relocation Site

Project Phase[1]	Impact Type[2]	Existing FLUCFCS	Acres	Existing Conditions Score	With Project Score	Functional Loss[5]	Functional Units
21-30 Years	*Direct*	441/600	286.9	0.66	0.00	-0.66	-189
		614	22.0	0.70	0.00	-0.70	-15
		621	0.0	0.91	0.00	-0.91	0
		630	50.6	0.82	0.00	-0.82	-41
		640,641	0.5	0.85	0.00	-0.85	0
		Subtotal	*360.0 ac.*				*-245 fu*
21-30 Years	*Direct (Previous Indirect)*	441/600	88.5	0.48	0.00	-0.48	-42
		614	14.5	0.51	0.00	-0.51	-7
		621	1.6	0.67	0.00	-0.67	-1
		630	8.7	0.61	0.00	-0.61	-5
		640,641	0.0	0.58	0.00	-0.58	0
		Subtotal	*113.3 ac.*				*-55 fu*
21-30 Years	*Indirect*	441/600	110.0	0.66	0.48	-0.18	-20
		614	6.1	0.70	0.51	-0.19	-1
		621	0.0	0.91	0.67	-0.24	0
		630	15.7	0.82	0.61	-0.21	-3
		640,641	0.0	0.85	0.58	-0.27	0
		Subtotal	*131.8 ac.*				*-24 fu*
31-40 Years	*Direct*	441/600	46.8	0.66	0.00	-0.66	-31
		614	101.4	0.70	0.00	-0.70	-71
		621	0.0	0.91	0.00	-0.91	0
		630	0.0	0.82	0.00	-0.82	0
		640,641	0.0	0.85	0.00	-0.85	0
		Subtotal	*148.2 ac.*				*-102 fu*
31-40 Years	*Direct (Previous Indirect)*	441/600	32.7	0.48	0.00	-0.48	-16
		614	10.5	0.51	0.00	-0.51	-5
		621	0.1	0.67	0.00	-0.67	0
		630	0.0	0.61	0.00	-0.61	0
		640,641	0.0	0.58	0.00	-0.58	0
		Subtotal	*43.3 ac.*				*-21 fu*
31-40 Years	*Indirect*	441/600	0.5	0.66	0.48	-0.18	0
		614	22.8	0.70	0.51	-0.19	-4
		621	0.0	0.91	0.67	-0.24	0
		630	0.0	0.82	0.61	-0.21	0
		640,641	0.0	0.85	0.58	-0.27	0
		Subtotal	*23.3 ac.*				*-4 fu*

Table 3-1 WRAP Functional Loss Summary -- Airport Relocation Site

Project Phase[1]	Impact Type[2]	Existing FLUCFCS	Acres	Existing Conditions Score	With Project Score	Functional Loss[5]	Functional Units
41-50 Years	*Direct*	441/600	43.6	0.66	0.00	-0.66	-29
		614	143.2	0.70	0.00	-0.70	-100
		621	15.3	0.91	0.00	-0.91	-14
		630	51.0	0.82	0.00	-0.82	-42
		640,641	4.6	0.85	0.00	-0.85	-4
		Subtotal	*257.7 ac.*				*-189 fu*
41-50 Years	*Direct (Previous Indirect)*	441/600	22.9	0.48	0.00	-0.48	-11
		614	24.5	0.51	0.00	-0.51	-12
		621	1.9	0.67	0.00	-0.67	-1
		630	12.4	0.61	0.00	-0.61	-8
		640,641	0.0	0.58	0.00	-0.58	0
		Subtotal	*61.7 ac.*				*-32 fu*
41-50 Years	*Indirect*	441/600	10.1	0.66	0.48	-0.18	-2
		614	15.9	0.70	0.51	-0.19	-3
		621	3.0	0.91	0.67	-0.24	-1
		630	12.2	0.82	0.61	-0.21	-3
		640,641	0.0	0.85	0.58	-0.27	0
		Subtotal	*41.2 ac.*				*-9 fu*
Total Direct			***1528.1 ac.***				***-1108 fu***
Total Direct (Previous Indirect)			***256.4 ac.***				***-129 fu***
Total Indirect			***644.4 ac.***				***-129 fu***
							-1366 fu

[1]Assume impacts begin in first year of phase.

[2]Direct Impact - includes intact wetland where all function is lost (includes USACE and FDEP non-jurisdictional wetlands on project site that are technically indirect impacts); also includes wetlands within wildlife management program avoidance and minimization areas that will not be included in the USACE permit as impacts but are treated as total impact for functional assessment purposes

Direct (Previous Indirect) - includes intact wetland whose function was partially degraded by a previous phase and whose function is lost during current phase; also includes wetlands within wildlife management program avoidance and minimization areas that will not be included in the USACE permit as impacts but are treated as total impact for functional assessment purposes

Indirect - includes intact wetland whose function is degraded, but not lost, by current phase (includes off-site wetlands)

Likewise, the WRAP analysis for the mitigation involved assigning mitigation implementation start years to particular areas once associated planted pine timber stands reached 25 years of age. Functional lift was proportioned and assigned to construction phases to provide an even ratio as compared with impacts by phase (see **Table 3-2**). The

WRAP analysis shows that 1366 functional units, including direct and indirect impacts, are lost, while 1723 functional units are gained from compensatory mitigation. This shows a net gain of 357 functional units (see **Table 3-3**). Net lift values by impact phase range from a surplus of 17 to 29 % over the lift required to compensate for functional losses. Overall, across all phases, the analysis shows a surplus lift of 26 %.

Table 3-2 WRAP Functional Lift Summary – Mitigation Area

Project Phase[1]	Existing FLUCFCS	Stand Age[2]	Year of Initial Mitigation Treatment[3]	Acres[4]	Existing Conditions Score	With Mitigation Score	Cumulative Lift[5]	Functional Units
0-10 Years	441/600	32	0	261.1	0.66	0.96	0.24	63
	441/600	26	0	1108.1	0.66	0.96	0.23	255
	441/600	24	1	455.2	0.66	0.96	0.22	100
	441/600	21	4	71.3	0.66	0.96	0.20	14
	441/600	20	5	80.8	0.66	0.96	0.20	16
	441/600	0	0	264.0	0.66	0.96	0.21	55
	614	NA	0	384.7	0.70	0.97	0.23	88
	621	NA	0	4.2	0.91	0.99	0.07	0
	625	NA	0	11.2	0.88	0.99	0.10	1
	610, 613, 615, 630	NA	0	383.2	0.82	0.99	0.16	61
	640,641	NA	0	3.2	0.85	0.98	0.13	0
	Subtotal			*3027.0 ac.*				*653 fu*
11-20 Years	441/600	20	5	145.8	0.66	0.96	0.26	38
	441/600	19	6	614.6	0.66	0.96	0.25	154
	621	NA	0	3.2	0.91	0.99	0.08	0
	625	NA	0	15.2	0.88	0.99	0.11	2
	610, 613, 615, 630	NA	0	60.1	0.82	0.99	0.17	10
	640,641	NA	0	59.1	0.85	0.98	0.13	8
	Subtotal			*898.0 ac.*				*212 fu*
21-30 Years	441/600	19	7	123.5	0.66	0.96	0.28	35
	441/600	18	8	232.2	0.66	0.96	0.28	65
	441/600	17	9	105.1	0.66	0.96	0.28	29
	441/600	16	10	299.2	0.66	0.96	0.27	81
	441/600	13	13	45.5	0.66	0.96	0.27	12
	441/600	12	14	528.3	0.66	0.96	0.26	137
	441/600	0	0	2.9	0.66	0.96	0.27	1
	614	NA	0	73.5	0.70	0.97	0.25	18
	621	NA	0	7.8	0.91	0.99	0.08	1
	625	NA	0	61.7	0.88	0.99	0.11	7
	610, 613, 615, 630	NA	0	145.3	0.82	0.99	0.17	25
	640,641	NA	0	22.2	0.85	0.98	0.13	3
	Subtotal			*1647.2 ac.*				*414 fu*

Table 3-2 WRAP Functional Lift Summary – Mitigation Area

Project Phase[1]	Existing FLUCFCS	Stand Age[2]	Year of Initial Mitigation Treatment[3]	Acres[4]	Existing Conditions Score	With Mitigation Score	Cumulative Lift[5]	Functional Units
31-40 Years	441/600	12	13	213.3	0.66	0.96	0.28	60
	441/600	11	14	72.0	0.66	0.96	0.28	20
	441/600	8	17	3.3	0.66	0.96	0.28	1
	441/600	0	0	89.3	0.66	0.96	0.28	24
	614	NA	0	98.5	0.70	0.97	0.25	25
	621	NA	0	6.8	0.91	0.99	0.08	1
	625	NA	0	1.0	0.88	0.99	0.11	0
	610, 613, 615, 630	NA	0	95.0	0.82	0.99	0.17	16
	640,641	NA	0	10.6	0.85	0.98	0.13	1
	Subtotal			*589.8 ac.*				*148 fu*
41-50 Years	441/600	7	18	297.5	0.66	0.96	0.28	83
	441/600	6	19	291.0	0.66	0.96	0.28	81
	441/600	0	0	348.4	0.66	0.96	0.27	96
	614	NA	0	99.6	0.70	0.97	0.25	25
	621	NA	0	7.4	0.91	0.99	0.08	1
	625	NA	0	20.2	0.88	0.99	0.11	2
	610, 613, 615, 630	NA	0	42.3	0.82	0.99	0.17	7
	640,641	NA	0	5.1	0.85	0.98	0.13	1
	Subtotal			*1111.5 ac.*				*296 fu*
Total				***7273.5***				***1723 fu***

[1]Assume impacts occur during first year of phase (project phase refers to impacts on airport relocation – not mitigation phasing).
[2]Age (in years) of planted pine in 2005.
[3]Year during which mitigation is first implemented as referenced to year of initial impact from Phase 0 – 10 yrs. First year of impact = Year 0.
[4]Does not include tidal wetlands or uplands.
[5]Lift from polygon worksheet, taking into account risk and time lag factors.

Notes: Assumes trees are allowed to mature until 25 years of age prior to mitigation implementation.

Table 3-3 WRAP Analysis Summary - Functional Lift vs. Loss

Project Phase	Activity Type[1]	Year of Initial Activity[2]	Acres	Functional Lift/Loss	Net Lift (%)
Phase 1 (0-10 Years)	Direct Impact	0	595.2 ac.	-440 fu	
	Indirect Impact	0	363.3 ac.	-74 fu	
	Mitigation	0-5	3027.0 ac.	653 fu	
	Subtotal			139 fu	27%
Phase 2 (11-20 Years)	Direct Impact	11	205.1 ac.	-153 fu	
	Indirect Impact	11	84.8 ac.	-18 fu	
	Mitigation	0-6	898.0 ac.	212 fu	
	Subtotal			41 fu	24%
Phase 3 (21-30 Years)	Direct Impact	21	473.3 ac.	-300 fu	
	Indirect Impact	21	131.8 ac.	-24 fu	
	Mitigation	0-14	1647.2 ac.	414 fu	
	Subtotal			90 fu	28%
Phase 4 (31-40 Years)	Direct Impact	31	191.5 ac.	-123 fu	
	Indirect Impact	31	23.3 ac.	-4 fu	
	Mitigation	0-19	589.8 ac.	148 fu	
	Subtotal			21 fu	17%
Phase 5 (41-50 Years)	Direct Impact	41	319.4 ac.	-221 fu	
	Indirect Impact	41	41.2 ac.	-9 fu	
	Mitigation	0-19	1111.5 ac.	296 fu	
	Subtotal			66 fu	29%
Total Direct Impacts				**-1237 fu**	
Total Indirect Impacts				**-129 fu**	
Total Mitigation				**1723 fu**	
				357 fu	**26%**

[1]Direct Impact includes total functional loss of wetland, including wetlands within wildlife management program avoidance and minimization areas that are not included as impacts within the USACE permit but are considered total impacts for functional assessment purposes; Indirect Impact includes partial functional loss of wetland; Mitigation includes wetland restoration, enhancement, and preservation.

[2]Year(s) during which impact or mitigation activity is initiated for that phase as referenced to initial year of impact from Phase 0-10 yrs.

The airport mitigation strategy provides numerous ecological benefits including:

- Substantially more mitigation than required to compensate for impacts at full build out, based on the functional assessment;
- Mitigation for all non-jurisdictional isolated wetlands affected by the project;
- Enhanced ecological connectivity and an ecologically meaningful spatial scale of contiguous mitigation based on the parcel size and configuration;
- Mitigation for secondary wetland impacts well beyond typical state permitting requirements (based on use of the 300 ft secondary impact zone around the impact site);
- Potential avoidance of several hundred acres of wetlands on the project site, under the Wildlife Management Program (WMP), plus mitigation in advance for these areas, even though impacts are not likely;
- Inclusion of large and spatially meaningful upland restoration areas that will benefit wetland resources and overall ecosystem function;
- Enhancement and restoration of habitat for several wetland-dependent and upland threatened and endangered species;
- Indirect enhancement and protection of hundreds of acres of tidal marsh, roughly eight miles of West Bay shoreline, and other coastal habitats within and adjacent to the mitigation areas;
- Full mitigation implementation and maturity years in advance of phased project impacts (for all but the initial construction phase).

4.0 Existing Conditions

Data was collected to document existing conditions within the airport mitigation area. United States Geological Survey (USGS) quadrangle topographic maps, the Natural Resource Conservation Service soil survey, element occurrence data from the Florida Natural Areas Inventory (FNAI), and hydrologic data from the Florida Geographic Data Library (FGDL) were extensively reviewed. Flights were conducted in October 2003 to obtain false color infrared aerial photographs for the mitigation site. Vegetative communities, including wetlands, were classified using the Florida Land Use, Cover and Forms Classification System (FLUCFCS) by photo-interpretation of the aerial photographs and soil data.

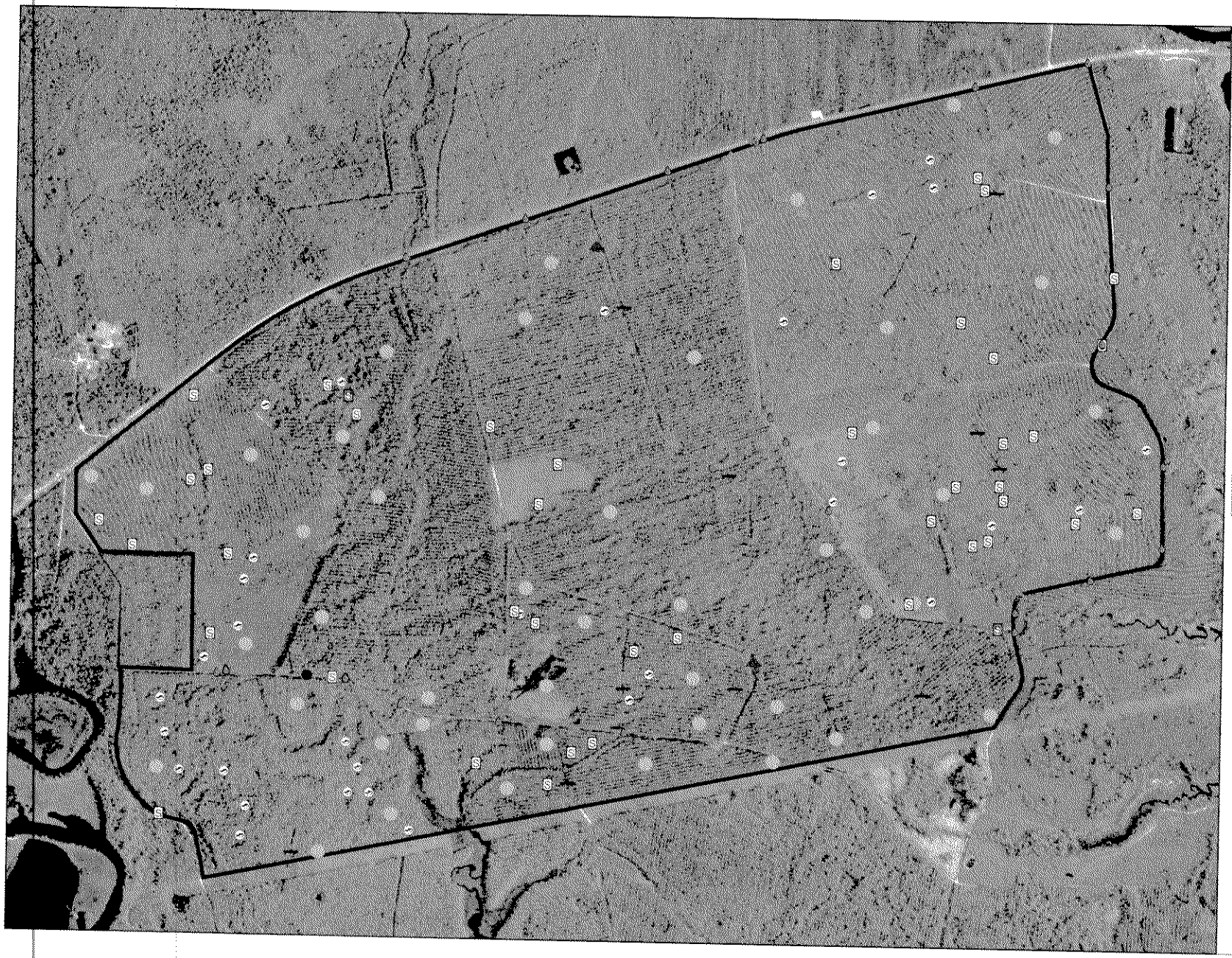
Approximately eight weeks were spent onsite collecting site-specific field characterization data to establish a qualitative baseline and verify the vegetative community delineations. Roughly 200 random field stations within planted pine stands were visited to record data such as tree diameter at breast height (DBH), canopy height, vegetative composition and density, hydric soil indicators, and wildlife observations (see **Figures 4-1**, **4-2**, **4-3**, and **4-4**). Another roughly 800 qualitative field stations associated with high quality wetlands, drainage structures, roads, ditches, streams, exotic species, listed species, dump sites, etc. have also been completed. Data obtained from the site visits were then used to adjust the initial FLUCFCS classifications of onsite ecological communities and to develop mitigation prescriptions.

4.1 Project Location and Landscape Setting

The 9,609-acre airport mitigation area is located in Bay County (see **Figure 2-1**). The mitigation area is divided into three main parcels: Parcel 1 includes 1,706 acres directly south of County Road 388 between Crooked Creek and Burnt Mill Creek and extending southward to the Gulf Power Company power line right of way. Parcel 2 includes 6,215 acres directly south of CR 388 to the east of Burnt Mill Creek and extending southward to West Bay and the power plant discharge canal. CR 2300 forms the eastern boundary of the southern portion of Parcel 2. Parcel 3 includes 1,688 acres south of the power plant discharge canal, extending southward to West Bay Point. West Bay also forms the western boundary of Parcel 3.

The airport mitigation area is located within the St. Andrew Bay watershed. The St. Andrew Bay watershed includes the interconnected St. Andrew, North, West, and East Bay; Deer Point Lake Reservoir; and St. Joseph Bay. The mitigation area is situated within four drainage basins including: direct runoff to West Bay, Burnt Mill Creek, Crooked Creek, and Alligator Bayou[2] (FGDL 2003) (see **Figure 4-5**).

[2] The major ditch along CR 2300 diverts drainage from Alligator Bayou and this basin is not as extensive within the mitigation area as it was historically or as shown in **Figure 4-5**.



Panama City - Bay County International Airport Mitigation Plan

Figure 4-1. Field Characterization and Qualitative Baseline Stations

Mitigation Parcel 1

LEGEND

Host

Data Collection Points

Supplemental Points

NOTES

Panama City - Bay County International Airport Mitigation Plan

Figure 4-2. Field Characterization and Qualitative Baseline Stations

Mitigation Parcel 2 North

LEGEND

Road

Management Unit Boundary

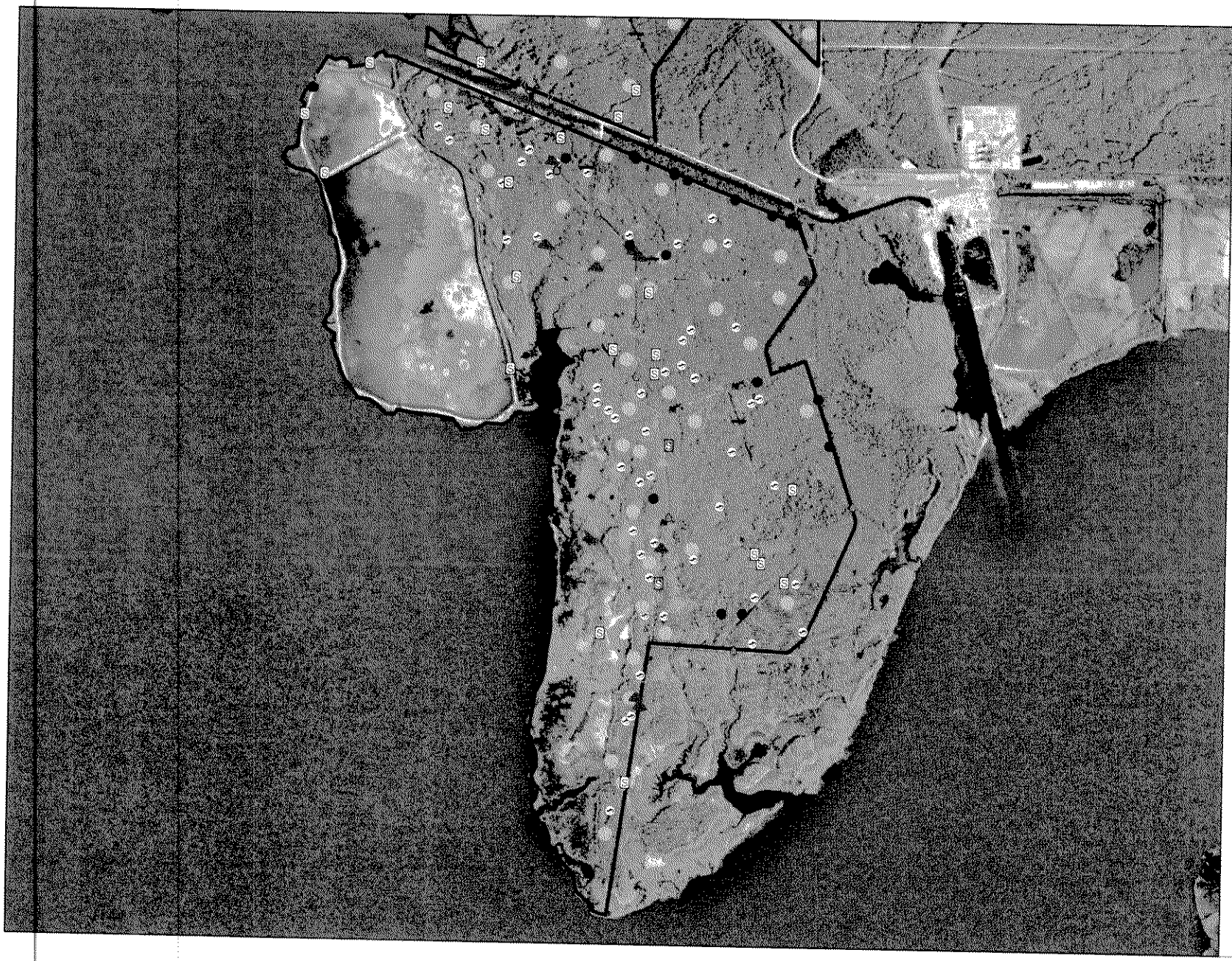
Data Collection Points

Supplemental Points

NOTES

Figure 4-3. Field Characterization and Qualitative Baseline Stations

Mitigation Parcel 2 South



Panama City - Bay County International Airport Mitigation Plan

Figure 4-4. Field Characterization and Qualitative Baseline Stations

Mitigation Parcel 3

LEGEND

Data Collection Points

Supplemental Points

N

1 inch equals 1,000 feet

0 500 1,000 2,000 3,000

METES

PBS

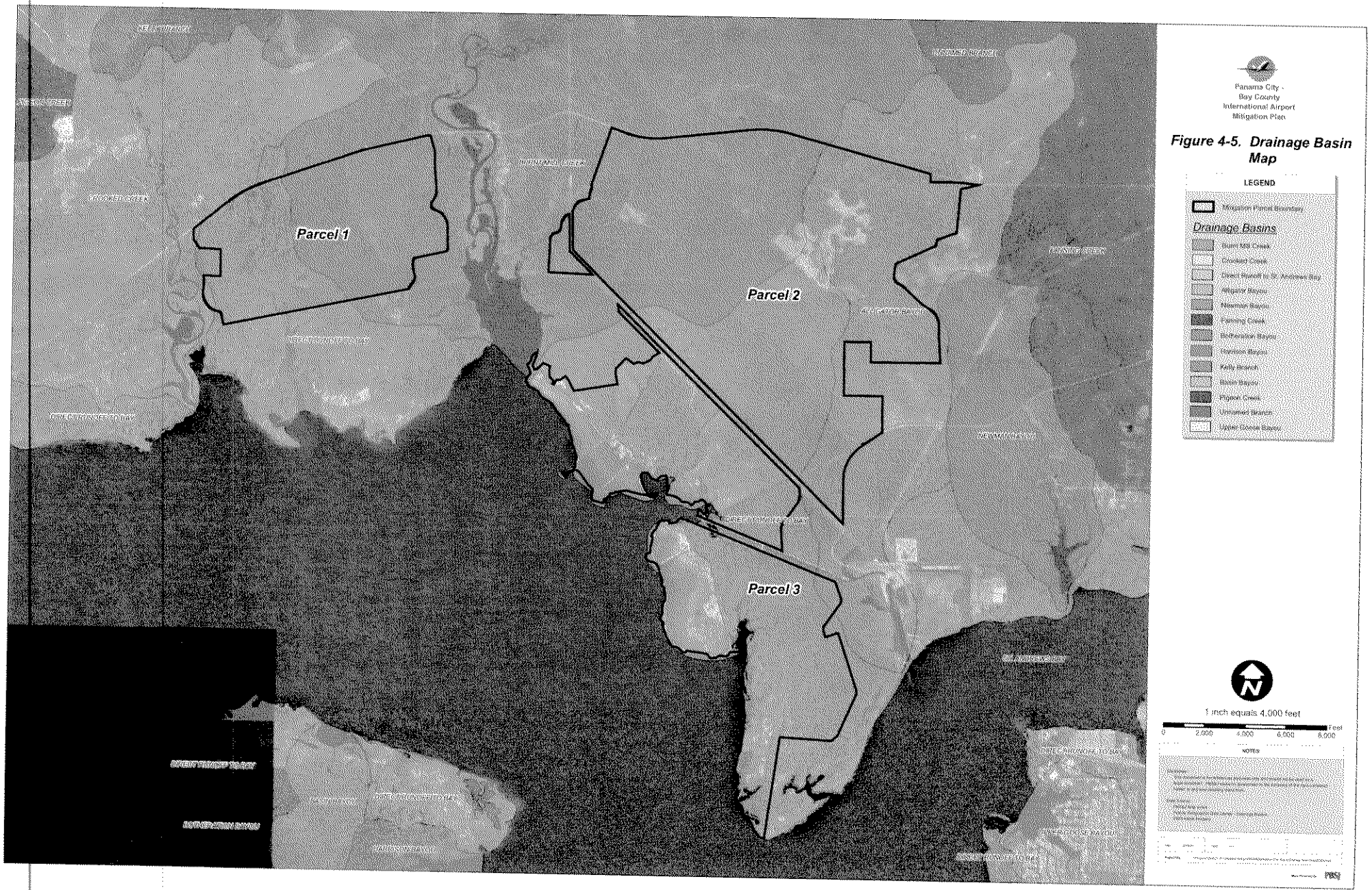


Figure 4-5. Drainage Basin Map

The St. Joe Company owns the airport mitigation area, while the Gulf Power Company owns property containing power lines that bisect and border the parcels. The mitigation area is located within the West Bay Preservation Area as outlined in the West Bay Area Sector Overlay Plan. The Sector Overlay Plan identified approximately 40,000 acres to be designated as conservation lands. The mitigation area will be part of this interconnected array of conservation lands. Silviculture predominates the current land use within the area with the exceptions being several small residential areas near Parcels 1 and 2 and the Gulf Power Company plant northeast of Parcel 3.

4.2 Soils

Detailed soil map units within the airport mitigation area are shown on **Figure 4-6** (SCS 1981). A total of 17 soil types are present within the mitigation area and are presented in **Table 4-1**. Brief descriptions from the Bay County soil survey of soils that make up over 0.1 % of the mitigation area follow.

Table 4-1. USDA NRCS Detailed Soil Types within the Airport Mitigation Area

Soil mapping unit	NRCS Hydric soil criteria[1]	Total Acreage	Percent of Mitigation Area
Albany sand, 0 to 2 % slopes	Not hydric	7.5	< 0.1 %
Arents, 0 to 5 % slopes	Not hydric	125.3	1.3 %
Bayvi loamy sand	2B1, 2B3, 4	438.6	4.6 %
Blanton fine sand, 0 to 5 % slopes	Not hydric	46.5	0.5 %
Chipley sand, 0 to 5 % slopes	Not hydric	53.7	0.6 %
Chipley sand, 5 to 8 % slopes	Not hydric	7.1	< 0.1 %
Dirego muck	1, 2B1, 2B2, 4	7.6	< 0.1 %
Foxworth sand, 0 to 5 % slopes	Not hydric	30.3	0.3 %
Hurricane sand	Not hydric	333.9	3.5 %
Lakeland sand, 0 to 5 % slopes	Not hydric	4.9	< 0.1 %
Leon sand	2B1, 2B3, 3	1357.0	14.1 %
Mandarin sand	2B1	2.1	< 0.1 %
Pamlico-Dorovan complex	1, 2B1, 2B2, 3, 4	1.6	< 0.1 %
Pickney fine sand	1, 2B1, 3	7.6	< 0.1 %
Pottburg sand	2B1	4134.8	43.0 %
Rutlege sand	1, 2B1, 2B2, 3	2478.4	25.8 %
Water	--	571.9	6.0 %

1. NRCS hydric soil criteria met by the component and/or inclusion(s) (Carlisle 1995)

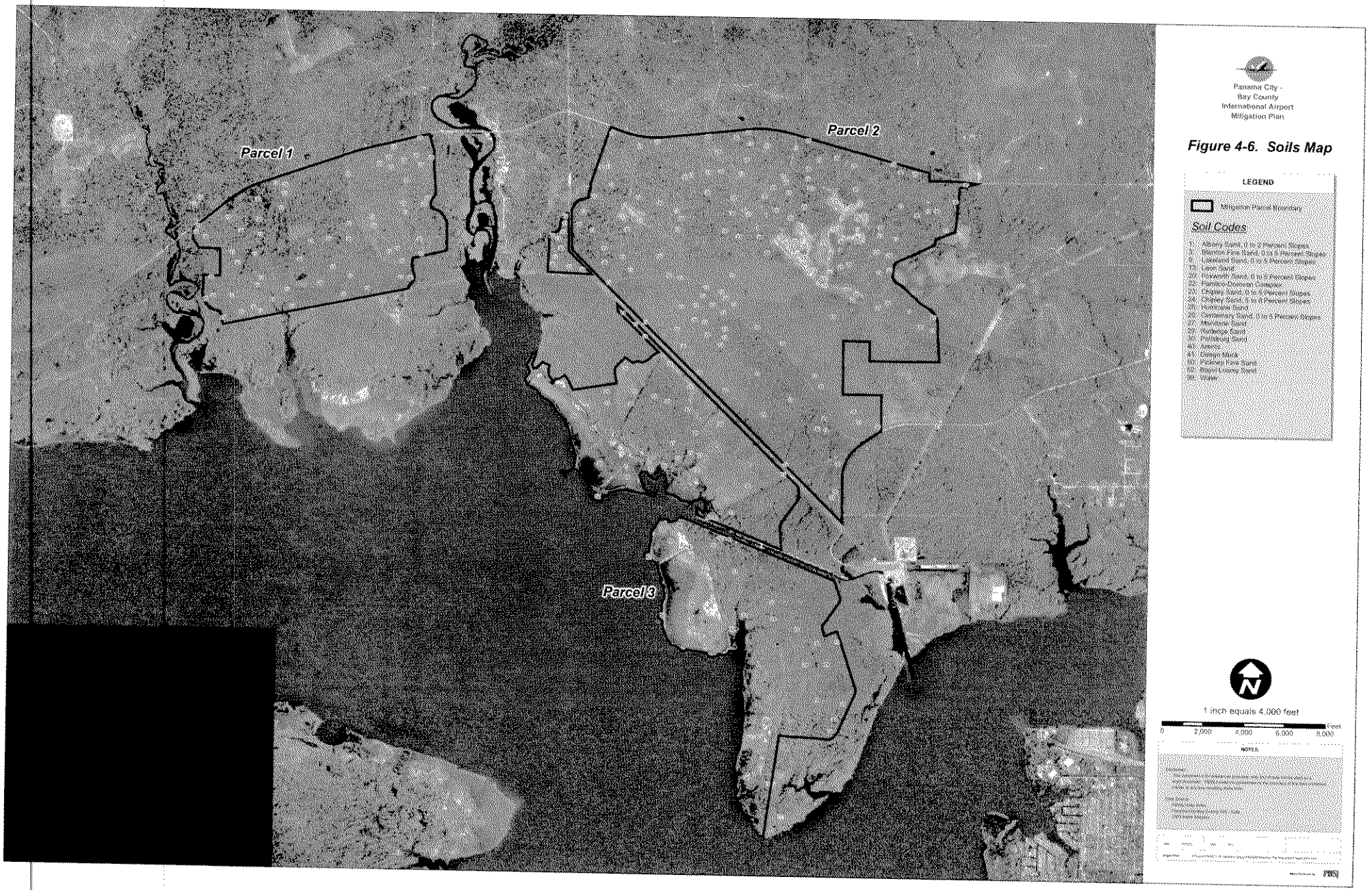


Figure 4-6. Soils Map

Arents, 0 to 5 percent slopes

Arents are anthropogenic soils, mixed by earth-moving operations, including dredging activities. Depth to the water table is variable in these soils. Vegetation in areas mapped as arents is variable as well, but is typical of disturbed environments. The berms around the marifarms in Parcels 2 and 3 are mapped as arents.

Bayvi loamy sand

This level or nearly level, very poorly drained soil is found in tidal marshes in Parcels 2 and 3 and is inundated by normal high tides. The water table is at a depth of less than 10 inches, or the soil is ponded for 6 to 12 months during most years. Vegetation found in soils mapped as Bayvi loamy sand is dominantly needle rush and cordgrass.

Blanton fine sand, 0 to 5 percent slopes

This moderately well drained, nearly level to gently sloping soil occurs on uplands in Parcel 2. This soil has a perched water table above the subsoil (80 inches) for less than one month during most years. Typical natural vegetation consists of slash and longleaf pine; live, post, and red oak; dogwood; and an understory of native shrubs, huckleberry, and wiregrass. Blanton sands have been planted in sand pine within the mitigation area.

Chipley sand, 0 to 5 percent slopes

This somewhat poorly drained, nearly level to gently sloping soil is found in uplands in Parcel 2. This soil has a water table at a depth of 30 to 40 inches for one to three months and at a depth of 40 to 60 inches for three to six months during most years. Natural vegetation consists of slash and longleaf pine; post, bluejack, and turkey oak; huckleberry; dogwood; and an understory of native shrubs, saw palmetto, bluestem, and wiregrass. Slash pine has been planted in most areas mapped as Chipley sand within the mitigation area.

Foxworth sand, 0 to 5 percent slopes

This moderately well drained, nearly level to gently sloping soils occurs in uplands in Parcel 2. This soil has a water table at a depth of 40 to 72 inches for one to three months during most years and at a depth of 30 to 40 inches for less than 30 days in some years. Natural vegetation consists of slash and longleaf pine; live, post, bluejack, and red oak; huckleberry; dogwood; and an understory of native shrubs, saw palmetto, and pineland threeawn. Areas of Foxworth sand have previously been clearcut of sand pine and are now naturally regenerating with various oak species within the mitigation area.

Hurricane sand

This somewhat poorly drained, nearly level soil occurs in the uplands in Parcels 1 and 2. Hurricane sand has a water table at a depth of 40 to 60 inches for three to six months in

most years and at a depth of 20 to 40 inches for one to three months in some years. The natural vegetation typically found in this soil consists of slash and longleaf pine; bluejack, turkey, and post oak; and an understory of native shrubs, saw palmetto, gallberry, broomsedge, bluestem, and wiregrass. Areas mapped as Hurricane sand are currently planted in slash pine within the mitigation site.

Leon sand

This poorly drained, nearly level soil is found in the flatwoods in all three Parcels. Leon sand has a water table within a depth of 10 inches for one to four months and at a depth of 10 to 40 inches for about nine months in most years. Natural vegetation consists of longleaf, pond, and slash pine; water oak; and an understory of wax myrtle, saw palmetto, runner oak, fetterbush, gallberry, and wiregrass. Areas of Leon sand are currently planted with slash pine within the mitigation area.

Pottsburg sand

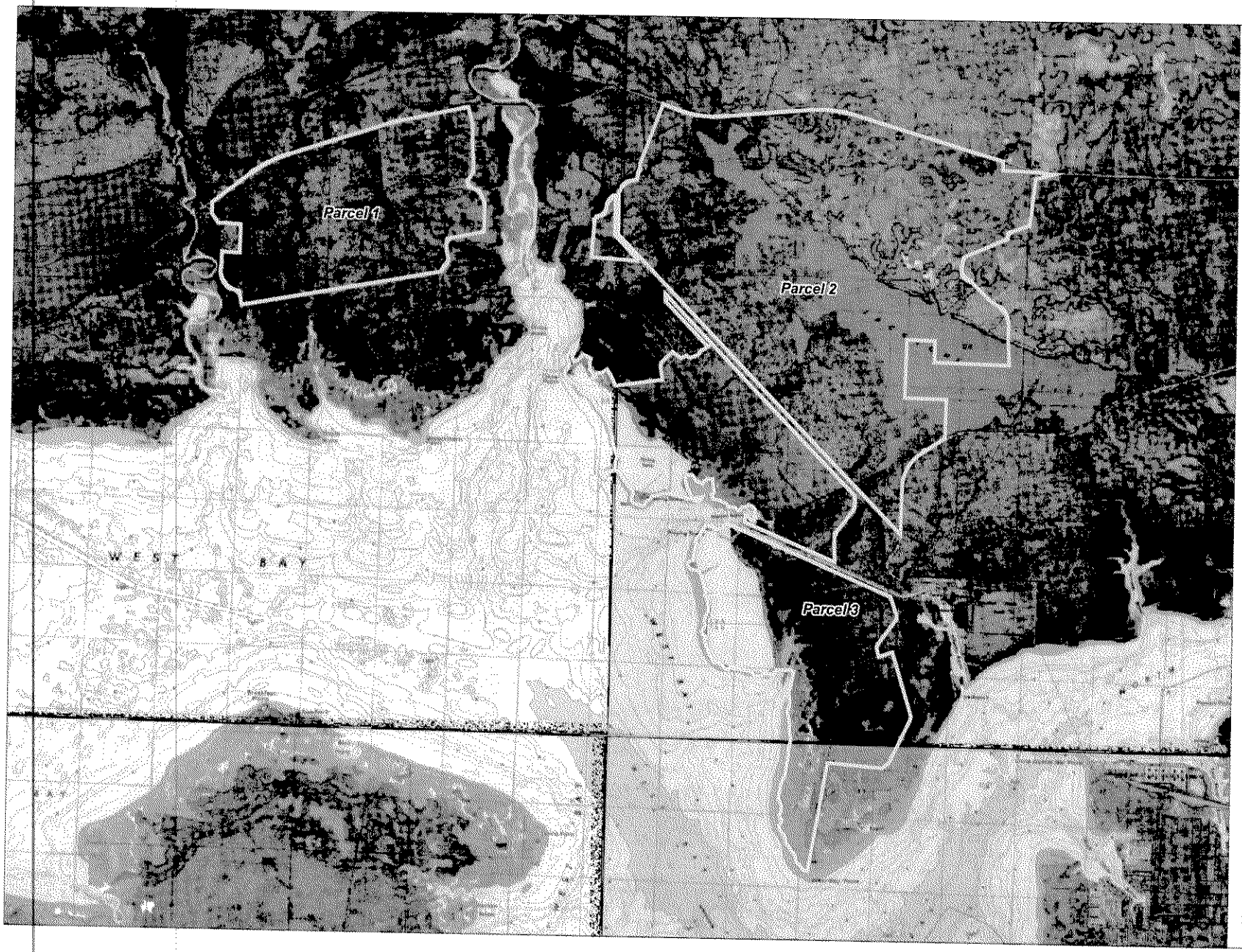
This poorly drained soil is on nearly level, low-lying areas of the flatwoods and is found in all three Parcels. The water table is within a depth of 10 inches for four to six months during most years, while some low-lying areas are ponded for two to six months annually. The natural vegetation consists of sweetbay, titi, blackgum, water oak, scattered longleaf and slash pines, gallberry, saw palmetto, wax myrtle, and pineland threeawn. Within the mitigation area, areas mapped as Pottsburg sand are planted with slash pine and may include small areas of drainages or wet depressions.

Rutlege sand

This very poorly drained soil is on nearly level or slightly depressional areas along drainage ways. Rutlege sand is found in all three parcels. This soil has a water table at or near the surface for four to six months during most years and is ponded for four to six months annually. Natural vegetation found in areas of Rutlege sand consists of titi, sweetbay, blackgum, cypress, and scattered slash pine, with an understory of gallberry, wax myrtle, pineland threeawn, and various reeds and sedges. Some areas of this soil have been planted with slash pine within the mitigation area, while other areas include natural drainages and depressions.

4.3 Topography and Hydrology

Figure 4-7 depicts topography on the mitigation area. Elevations range from about 0 feet NGVD 29 along West Bay to approximately 45 feet NGVD 29 in the north portion of Parcel 2. Parcel 2 has the greatest range in topography while Parcel 3 is nearly level.



Panama City - Bay County International Airport Mitigation Plan

Figure 4-7. USGS Quad Map

Drainage patterns vary between mitigation parcels (**Figure 4-5**). Natural drainage within Parcel 1 is generally towards West Bay to the south via Doyles Bayou or other unnamed drainages, and to the east towards Burnt Mill Creek. Flows in Parcel 2 are primarily to the south towards West Bay. Jackson Titi is a prominent feature in Parcel 2 and drains to the east and then south. Natural drainage on Parcel 3 is primarily to the west towards West Bay.

Over 8,300 acres of wetlands, including tidal marsh, and surface water occur within the airport mitigation area. Wetlands include seasonally saturated or inundated pinelands, drainage and basin forested wetlands, depressional wetlands, and estuarine tidal wetlands.

There are about 183,000 feet of linear water features within the airport mitigation area, including approximately 136,000 linear feet of streams and flowing wetlands and nearly 47,000 linear feet of man-made ditches. Man-made ditches have altered the natural hydrology of adjacent and downstream wetlands by lowering the water table and/or diverting water away from natural flows. Approximately 35,000 feet of the streams and flowing wetlands have been significantly altered through channelization, berming along the banks, and/or channel relocation. This alteration causes water to drain through the system quicker than natural conditions and reduces water access to the associated floodplains.

Nearly 200 miles of forest roads exist onsite. Roads were built either at grade through uplands or occasionally wetlands, or built up on fill, usually in wetlands. Onsite forest roads are typically 10 to 12 feet wide. Ditches approximately one to three feet wide and averaging 18 inches deep often border one or both sides of roads, particularly through wetlands. Approximately 60 stormwater structures, including corrugated pipes, box culverts, wooden bridges, and a few marginally improved low water crossings, have been placed where roads cross wetlands. Many of these structures are undersized, full of sediment, or damaged and are constricting natural flow. Undersized structures cause increases in flow velocities downstream of the structure that cause scouring and bank erosion. Ponding and flooding upstream result at some of these structures as well. In some wetland crossings where either no stormwater structure was placed or the existing structure has failed, a default low water crossing has developed, often flooding portions of the road.

4.4 Fire

Fire is largely absent from the mitigation area landscape, and is not currently a significant ecological process onsite. There is no existing prescribed fire program within the mitigation area and natural fire is typically contained and prevented from burning any significant area. About 3 % of planted pine stand field characterization points had evidence of fire. It has been several years since these fires, and dense woody shrub growth has begun to return to these areas, indicating a low frequency of fire. Additionally, slash pine in several of these burned areas have been torched, signifying that the intensity of the fire was fairly high. In summary, fire is nearly absent from the

mitigation area, with fires occurring with low frequency, high intensity, and typically burning small areas due to fire suppression.

4.5 Vegetation and Land Use

The airport mitigation area has been in intensive silviculture for approximately 50 years. Most areas are currently planted with the second or third rotation of pine. Vegetative communities within the mitigation area have been affected by intensive silvicultural practices in varying degrees, depending upon ecological community type. Impacts of silviculture on the vegetative communities include: the planting of a dense, even stand age monoculture of slash or sand pine, mechanical site preparation including bed rows, years of fire suppression, construction of drainage ditches and channelization of natural drainages, and the construction of forest roads.

Planted pine within the airport mitigation area range in age from stands planted in 1999 to stands planted in 1973. Stands are predominantly slash pine planted on bed rows averaging approximately six inches high as measured from the top of the bed to the bottom of the furrow. Pines are generally planted every five feet within a row; however, mortality and variability during machine planting often leads to irregular spacing within rows. Rows are generally ten feet apart, with older stands thinned every third, fourth, or fifth row. Several areas have also had selective thinning, while other stands have been clearcut. Clearcut areas range in age from less than a year to approximately five years since time of clearcut.

It is assumed that the natural hydrology of many planted pine areas has been altered through increased evapotranspiration from the planting of dense stands and an increase in the biomass of the shrub layer due to years of fire suppression. Additionally, thick layers of leaf litter have been allowed to accumulate since fire has been largely absent from these systems. Canopy closure occurs before the stands reach ten years old, reducing light penetration to the ground. All of these factors contribute to the planted pine areas being largely devoid of desirable groundcover species.

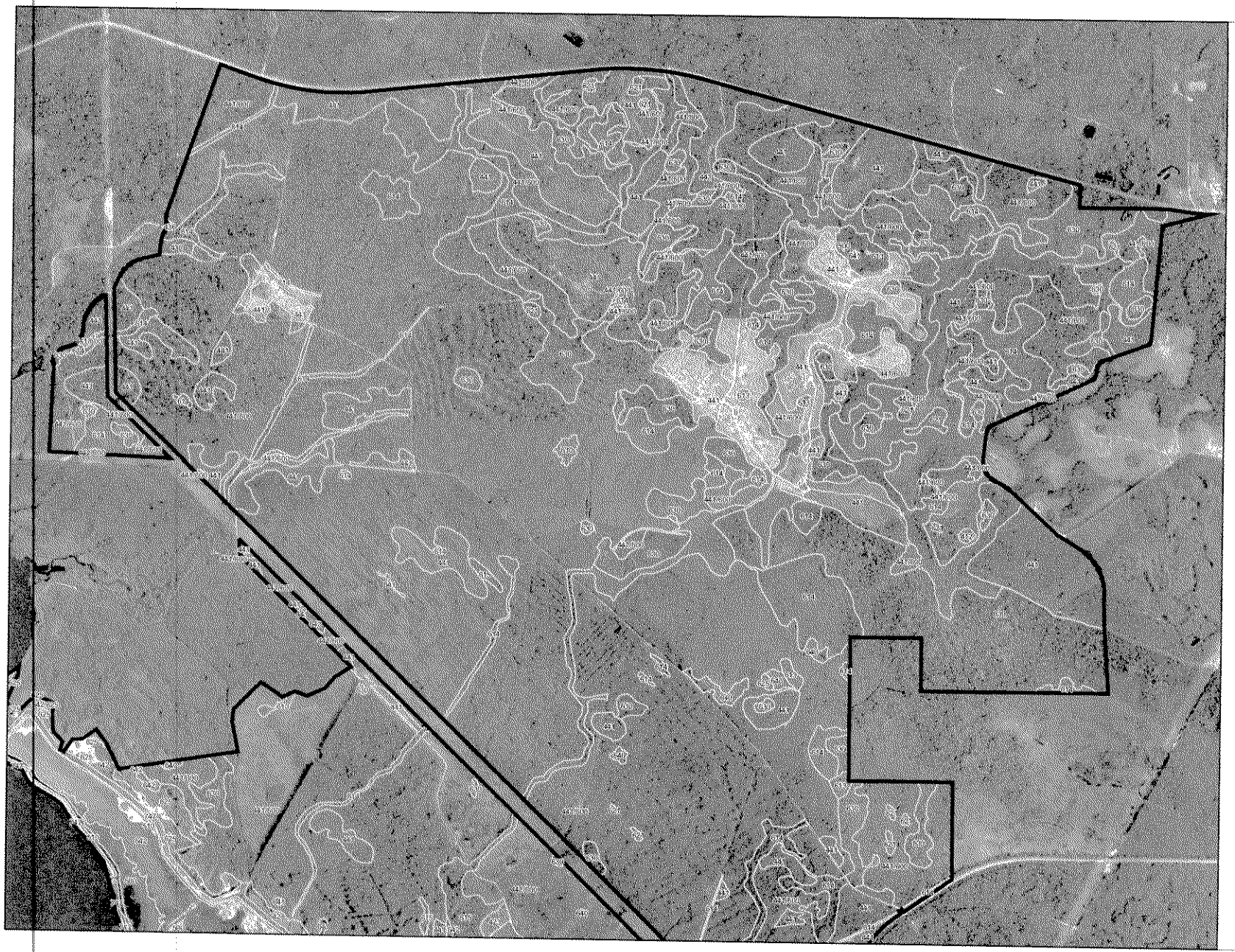
Existing vegetative communities and land use are characterized using FLUCFCS. A total of 22 vegetative communities were identified on the mitigation area (**Table 4-2** and **Figures 4-8, 4-9, 4-10,** and **4-11**). A non-comprehensive list of vegetation potentially found within the mitigation areas is provided as **Appendix A**. Several of these similar community types were treated the same during the WRAP analysis, so they will be discussed together in the following subsections that describe vegetative compositions of each community. Effects of silvicultural impacts on particular ecological communities will be discussed in detail as well.

Table 4-2. Existing Vegetative Communities and Land Use within the Panama City - Bay County International Airport Mitigation Area

FLUCFCS	Description	Existing Acreage	% of Existing Wetlands	% of Mitigation Area
411	Pine Flatwoods (upland)	0.8	--	< 0.1 %
412	Longleaf – Xeric Oak	10.3	--	0.1 %
423	Oak – Pine – Hickory	10.5	--	0.1 %
427	Live Oak	0.5	--	< 0.1 %
436	Upland Scrub	4.2	--	< 0.1 %
441	Upland Pine Plantation	1169.8	--	12.2 %
441/600	Hydric Pine Plantation	5652.4	68.0 %	58.8 %
500	Water	153.0	1.8 %	1.6 %
510	Streams and Waterways[1]	26.7	0.3 %	0.3 %
610	Wetland Hardwoods	2.1	< 0.1 %	< 0.1 %
613	Gum Swamps	55.0	0.7 %	0.6 %
614	Titi Swamps	656.3	7.9 %	6.8 %
615	Stream Swamps (bottomland)	29.8	0.4 %	0.3 %
621	Cypress	29.3	0.4 %	0.3 %
625	Hydric Pine Flatwoods	109.4	1.3 %	1.1 %
630	Mixed Forested Wetland	639.0	7.7 %	6.7 %
640	Vegetated Non-Forested Wetland	19.0	0.2 %	0.2 %
641	Freshwater Marsh	81.2	1.0 %	0.8 %
642	Saltwater Marsh	854.7	10.3 %	8.9 %
643	Wet Prairie	2.4	< 0.1 %	< 0.1 %
652	Shoreline	3.1	< 0.1 %	< 0.1 %
747	Dikes and Levees	99.3	--	1.0 %
Total	--	9608.8	100 %	100 %

[1] Includes only polygons, not linear features. A total of 183,000 linear feet of streams and man-made waterways exist onsite and have been incorporated into associated drainage FLUCFCS types.

Figure 4-8. 2004 FLUCFCS - Mitigation Parcel 1



Panama City - Bay County International Airport Mitigation Plan

Figure 4-9. 2004 FLUCFCS - Mitigation Parcel 2 North

LEGEND

Florida Land Use, Cover and Forms Classification System (FLUCFCS) Boundary - 2004

Mitigation Area Parcel Boundary

FLUCFCS Codes

411 - Pine Flatwoods
413 - Longleaf Pine-Xeric Oak
425 - Oak-Pine-Hickory
427 - Live Oak
428 - Upland Scrub, Pine and Hardwoods
441 - Upland Planted Pine
441/000 - Wet Planted Pine
500 - Open Water
510 - Streams and Waterways (Including Ditches)
610 - Wetland Hardwood Forests
611 - Bay Swamps
616 - Tidal Swamps
615 - Stream and Lake Swamps (Bottomland)
621 - Cypress
625 - Wet Pine Flatwoods
630 - Wetland Forested Mixed
640 - Vegetated, Non-Forested Wetland
641 - Freshwater Marsh
642 - Saltmarsh
643 - Wet Prairies
652 - Shrubbery
742 - Oaks and Laurels
832 - Electrical Power Transmission Lines

1 inch equals 1,600 feet

0 800 1,600 2,400 3,200 Feet

NOTES

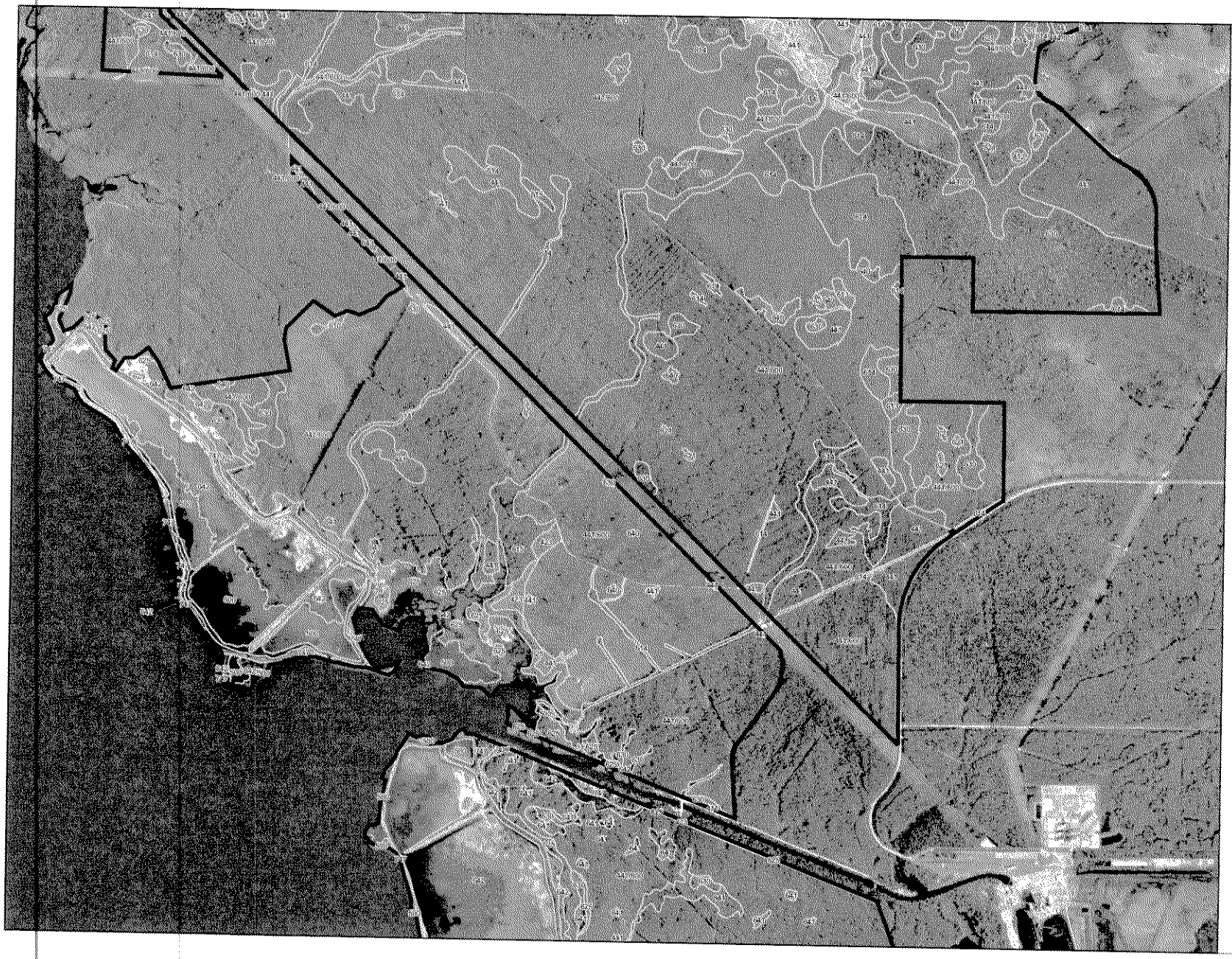


Figure 4-10. 2004 FLUCFCS - Mitigation Parcel 2 South

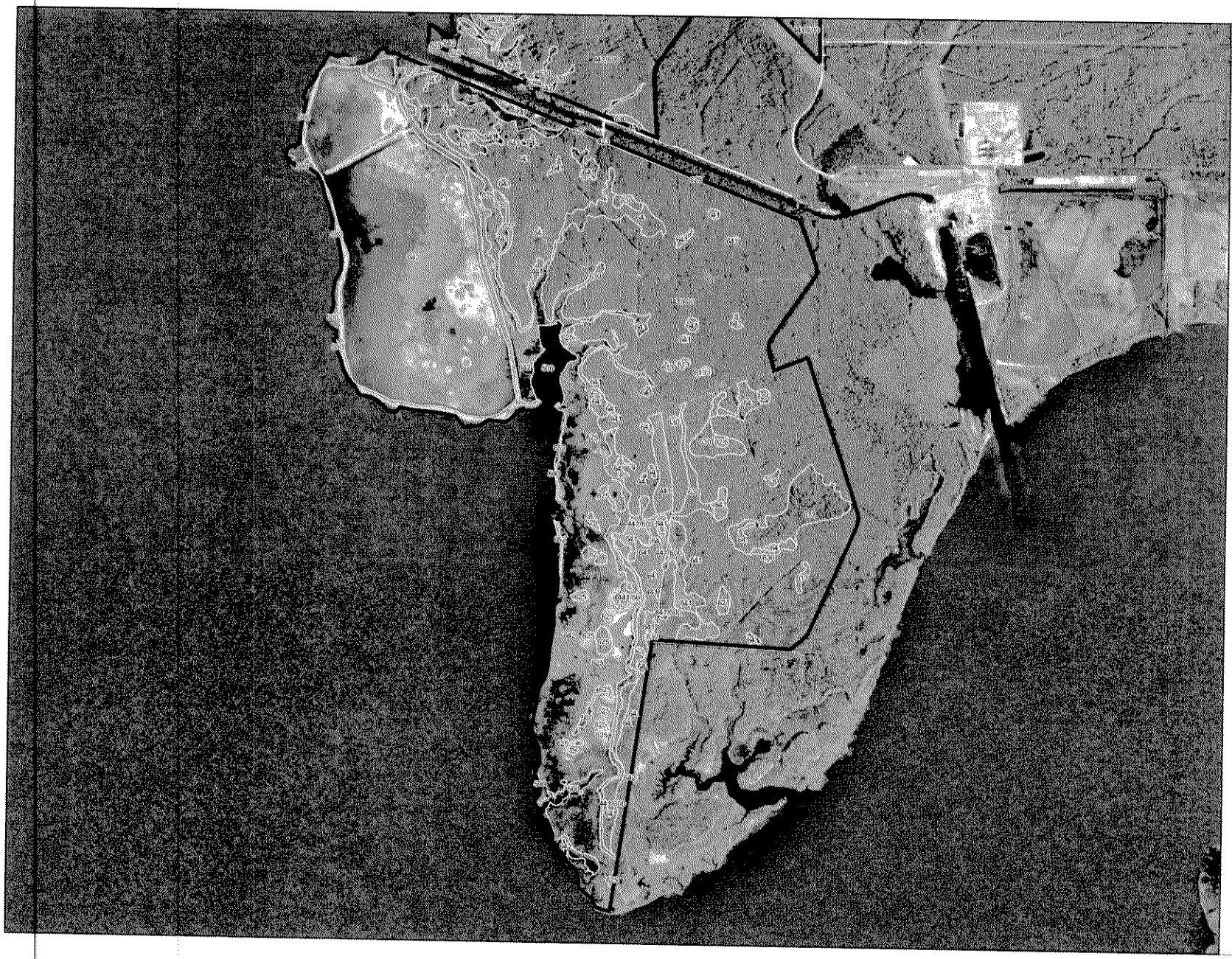


Figure 4-11. 2004 FLUCFCS - Mitigation Parcel 3

Pine and/or Oak Dominated Uplands (411, 412, 423, 427, and 436)

Uplands not planted in pine were classified as either pine flatwoods (411), longleaf pine – xeric oak (412), oak – pine – hickory (423), live oak (427), or upland scrub (436). Within the mitigation area pine flatwoods are typically mesic uplands dominated by slash pine (*Pinus elliottii*) with an understory comprised of saw palmetto (*Serenoa repens*), rusty lyonia (*Lyonia ferruginea*), running oak (*Quercus pumila*), and shiny blueberry (*Vaccinium myrsinites*).

The longleaf pine-xeric oak (412) community tends to occur on well-drained soils and has a canopy of longleaf pine (*Pinus palustris*) and occasionally slash pine. This community is also distinguished by the presence of oak species that may include: turkey oak (*Quercus laevis*), bluejack oak (*Q. incana*), laurel oak (*Q. hemisphaerica*), sand live oak (*Q. geminata*), water oak (*Q. nigra*), and/or myrtle oak (*Q. myrtifolia*). Other shrubs in the understory include wild olive (*Osmanthus americanus*), saw palmetto, and sparkleberry (*Vaccinium arboreum*). Groundcover species include wiregrass (*Aristida beyrichiana*), bracken fern (*Pteridium aquilinum*), shiny blueberry, reindeer moss (*Cladonia* spp.), and false rosemary (*Conradina canescens*).

Oak – pine – hickory (423) communities are comprised primarily of water oak, slash pine, and pignut hickory (*Carya glabra*). Shrubs and groundcover are similar to FLUCFCS types 411 and 412. FLUCFCS type 427 is comprised of mostly live oaks (*Quercus virginiana*) with some slash pine with the understory similar to FLUCFCS types 411, 412, and 423.

Upland scrub (436) is typically dominated by a variety of oaks including sand live oak, myrtle oak, Chapman oak (*Quercus chapmanii*), and turkey oak. Sand pine (*Pinus clausa*) may also be present. Groundcover species are fairly sparse but include reindeer moss and gopher apple (*Licania michauxii*). Florida rosemary (*Ceratiola ericoides*), false rosemary, saw palmetto, rusty lyonia, and woody goldenrod (*Chrysoma pauciflosculosa*) make up the shrub layer.

Upland Pine Plantation (441)

Almost all upland areas within the mitigation area have been planted in pine for timber production. These areas represent even-aged monocultures planted with either slash or sand pine. FLUCFCS type 441 can be further distinguished as three differing types: slash pine planted in mesic areas, slash pine planted in xeric areas, and sand pine planted in xeric areas.

The majority of 441 stands within the mitigation area are mesic slash pine plantation. These areas are typically in poorly or somewhat poorly drained soils. Shading from the dense canopy and years of fire suppression has resulted in a dense shrub layer and sparse herbaceous groundcover. Additionally, the practice of creating bedrows has allowed hydrophytic species to recruit within the furrows between the bedrows, since ponding may occur in these areas. Most areas of mesic 441 have a shrub layer dominated by saw

palmetto, gallberry (*Ilex glabra*), yaupon holly (*I. vomitoria*), wax myrtle (*Myrica cerifera*), rusty lyonia, fetterbush (*Lyonia lucida*), and/or titi (*Cyrilla racemiflora*). Various oak species may also be present including white oak (*Quercus alba*), turkey oak, water oak, and laurel oak. Groundcover, when present, typically has low diversity and includes shiny blueberry, running oak, reindeer moss, muscadine (*Vitis rotundifolia*), huckleberries (*Gaylussacia* spp.) and/or bracken fern. Wiregrass and other grasses, sedges, and other herbaceous species may also be found in some areas, indicating that a native herbaceous seed bank is present, but the ground cover is suppressed due to lack of light. Some areas of mesic 441 may have historically been wetlands, but have altered hydrology through adjacent drainage ditches and/or increased evapotranspiration due to dense pine stands and shrub layers. Small pockets of wet planted pine may also be found within these mesic 441 areas.

Slash pine planted in moderately well drained soils is xeric 441. In these areas slash pine may not be bedded and are often stunted in growth due to the low available water capacity. The shrub and groundcover layers are fairly similar to FLUCFCS types 412, 423, and 436.

Sand pine has been planted in the better-drained soils. Sand pine often forms a dense canopy nearly completely shading out shrub and groundcover species. Where groundcover and shrubs do exist, they are typically sparse and include: turkey oak, bluejack oak, wiregrass, bracken fern, reindeer moss, and/or saw palmetto. Many areas formerly planted with sand pine are now clearcut. These areas are naturally recruiting species typical of 412 and 436 communities with a predominance of oak species. Clearcut areas range from approximately five years old to less than a year old.

Hydric Pine Plantation (441/600)

The majority of the airport mitigation area is dominated by hydric pine plantation (441/600). FLUCFCS type 441/600 was planted with slash pine on hydric soils that are frequently ponded or saturated to the surface. Bed rows within 441/600 areas allow non-hydrophytic vegetation to encroach into the wetlands by creating elevated microtopography that avoids prolonged inundation or saturation. Occasionally, the slash pines have suffered higher mortality when planted in excessively wet areas, leaving patchy treeless areas. These treeless areas generally have better groundcover diversity than other planted pine areas. Ditches occur throughout 441/600 areas to facilitate better drainage. 441/600 areas often suffer from altered hydrology and invasions by mesic species due to increases in evapotranspiration, the presence of bed rows, and/or drainage by man-made ditches.

Hydric pine plantation stands typically suffer from an excessive shrub layer and have little groundcover, particular after canopy closure but before the first thinning. This is due both to shading from the over story and fire suppression. There is a thick layer of pine needle litter sometimes reaching over 12 inches deep in 441/600 areas. Younger stands, stands that have been thinned, and areas that have been clearcut usually have a

more developed and diverse herbaceous groundcover. Small inclusions of mesic vegetation growing at slightly higher elevation within 441/600 areas may also be present.

Vegetative composition of hydric pine plantation varies depending on hydrology, age of the stand, and proximity to the coast. Often hardwood trees are present within 441/600 areas, having been left during past clearcuts. Trees frequently present within 441/600 areas include water oak, laurel oak (*Quercus laurifolia*), southern magnolia (*Magnolia grandiflora*), sweetbay magnolia (*M. virginiana*), red maple (*Acer rubrum*), sabal palm (*Sabal palmetto*), and pond cypress (*Taxodium ascendens*).

Shrub species that may be found in 441/600 include black gum (*Nyssa sylvatica* var. *biflora*), titi (*Cliftonia monophylla* and *Cyrilla racemiflora*), gallberry (*Ilex glabra*), tall gallberry (*I. coriacea*), myrtle-leaved holly (*I. myrtifolia*), yaupon holly, wax myrtle, evergreen bayberry (*Myrica heterophylla*), odorless wax-myrtle (*M. inodora*), swamp bay (*Persea palustris*), fetterbush, catbriar (*Smilax laurifolia*), muscadine, highbush blueberry (*Vaccinium corymbosum*), Elliott blueberry (*V. elliottii*), pop ash (*Fraxinus caroliniana*), corkwood (*Stillingia aquatica*), blackberries (*Rhubus* spp.), sweet pepperbush (*Clethra alnifolia*), swamp azalea (*Rhododendron viscosum*), St. John's wort (*Hypericum chapmanii*, *H. fasciculatum*, and *H. tetrapetalum*), and saplings of previously mentioned tree species.

Groundcover is usually sparse and comprised of early successional species. However, a variety of herbaceous species in the groundcover were found throughout the mitigation site, indicating that a diverse native seed bank is present. Species found in the groundcover layer include woolly panicum (*Panicum scabriusculum*), warty panicum (*P. verrucosum*), switchgrass (*P. virgatum*), toothache grass (*Ctenium aromaticum*), *Dicanthelium* spp., broomsedge (*Andropogon virginicus*), bushy broom grass (*A. glomeratus*), wiregrass, Florida dropseed (*Sporobolus floridamus*), beakrushes (*Rhynchosopora* spp.), saw-grass (*Cladium jamaicense*), nutsedges (*Scleria* spp.), caric sedges (*Carex* spp.), flat sedges (*Cyperus* spp.), pipe worts (*Eriocaulon* spp.), bog buttons (*Lachnocaulon* spp.), redroot (*Lachnanthes caroliniana*), golden-crest (*Lophiola americana*), irises (*Iris* spp.), soft rush (*Juncus effuses*), large-headed rush (*J. megacephalus*), creeping rush (*J. repens*), grassleaf rush (*J. marginatus*), love grasses (*Eragrostis* spp.), yellow-eyed grasses (*Xyris* spp.), sundews (*Drosera* spp.), dwarf huckleberry (*Gaylussacia dumosa*), trumpet pitcher plant (*Saracenia flava*), meadow beauties (*Rhexia* spp.), grassy arrowhead (*Sagittaria graminea*), poison ivy (*Toxicodendron radians*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*O. regalis*), netted chain fern (*Woodwardia areolata*), Virginia chain fern (*W. virginica*), fox club moss (*Lycopodium alopecuroides*), *Sphagnum* spp., and bladder worts (*Utricularia* spp.).

Water Features (500 and 510)

Water features within the mitigation area include open water features (500) such as embayments and bayous (including Johnson's Bayou) and linear waterways (510), including channels. Linear features such as streams and ditches within the mitigation site were not classified as 510, but rather the FLUCFCS type in which they are contained

(441/600, 614, 630, etc.). Streams and man-made ditches were discussed in Section 4.3. The only example of 510 within the mitigation area is the channels adjacent to the berm around the Marifarm impoundments in Parcel 2.

Hardwood and Mixed Forested Wetlands (610, 613, 615, and 630)

Swamps that are neither dominated by titi nor cypress fall into these four communities. These communities are dominated by hardwoods with the exception of 630, in which hardwoods share dominance with conifers. All four of these communities are generally high quality systems.

FLUCFCS type 610 is a mixed hardwood swamp where no particular hardwood species comprises more than 66% of the canopy and species composition does not match the description for any other FLUCFCS category.

Swamps dominated by black gum (*Nyssa sylvatica* var. *biflora*) were classified as 613. These wetlands are typically either small depressions or larger basins. These wetlands are frequently ponded for several months of the year with water depths of one to two feet. Many of these wetlands typically have few shrubs, while some of the 613 depressions have a well-developed herbaceous groundcover. Some of these 613 depressions may provide low to moderate breeding pond habitat for the federally threatened flatwoods salamander (*Ambystoma cingulatum*). Gum swamp basins generally have little groundcover. Shrubs that are found in these wetlands generally are approaching tree stature and include titi (*Cyrilla racemiflora*), sweetbay magnolia, swamp bay, myrtle-leaved holly, red maple, wax myrtle, and fetterbush. Herbaceous species within 613 systems and comprising the ecotone between these systems and wet planted pine are broomsedge, various beakrushes, switchgrass, redroot, caric sedges, woolly panicum, and even wiregrass.

FLUCFCS types 615 are stream swamps (bottomlands). These wetlands may be found around drainages and their associated floodplains. Bottomland swamps are distinguished by having a wide variety of hardwoods often with little shrub or groundcover layers. Species that make up the overstory include red maple, sweetbay magnolia, pop ash, black gum, and titi (*Cliftonia monophylla*).

Mixed forested wetlands (630) include mixed forested wetland communities in which neither hardwoods nor conifers achieve a dominance of 66% of the canopy composition. These communities include well-defined drainages, larger basins, and small depressional wetlands. FLUCFCS type 630 may transition to other wetland classifications including gum, titi, and cypress systems. 630 systems are comprised of a variety of tree species typically including pond cypress, sweetbay magnolia, titi (*Cliftonia monophylla*), slash pine, and/or black gum. Subcanopy species often include immature canopy species, titi (*Cyrilla racemiflora*), pop ash, button bush (*Cephalanthus occidentalis*), Carolina willow (*Salix caroliniana*), swamp bay, fetterbush, sweet pepperbush, tall gallberry, and myrtle-leaved holly. Groundcover is frequently absent due to shading from the canopy, but may include cinnamon fern, royal fern, fox club moss, sawgrass, and various sedges. Jackson

Titi is a large, conspicuous 630 wetland in the east section of Parcel 2. Jackson Titi is a high quality wetland containing large mature trees and several canopy species not found elsewhere on the mitigation site including tulip tree (*Liriodendron tulipifera*) and loblolly bay (*Gordonia lasianthus*).

Titi Swamps (614)

Much of the drainage and basin wetlands found on the mitigation site are comprised of titi swamps (614). These systems are overwhelmingly dominated by titi (*Cyrilla racemiflora* or *Cliftonia monophylla*) but may have an occasional sweetbay magnolia, slash pine, black gum, or pond cypress. Many of these wetlands have increased in extent due to fire suppression compared to historic conditions. Typically these wetlands have little to no ground cover due to shading, while the shrub layer is comprised primarily of titi, with some catbriar or poison ivy. Some groundcover or shrub species characteristic of 630 systems may be present in titi wetlands.

Cypress Swamps (621)

Cypress swamps are similar in structure to 630 systems except that pond cypress dominates at least 66% of the canopy composition. FLUCFCS types 621 generally are smaller depressions or depressions within larger basins. Shrub layer and groundcover species consist of those that might be found in 613 or 630 systems.

Hydric Pine Flatwoods (625)

Areas of the mitigation site characterized as hydric pine flatwoods (625) represent natural wet flatwoods that have not been converted to pine plantation. Examples of 625 are found primarily along the coast in the mitigation areas, and as small pockets of natural vegetation elsewhere. These communities are dominated by large slash pine, some with DBH of over 15 inches. FLUCFCS types 625 are typically shrubby due to lack of fire. Wax myrtle, yaupon holly, fetterbush, saw palmetto, sabal palm, gallberry, and eastern red cedar (*Juniperus virginiana*) can be found in the subcanopy and shrub layers. Species found in the groundcover include needle rush (*Juncus roemerianus*), broomsedge, and wiregrass.

Vegetated Non-Forested Wetlands and Freshwater Marsh (640 and 641)

Non-forested freshwater wetlands were either classed as vegetated non-forested (640) or freshwater marsh (641). FLUCFCS types 640 are typically shrub bogs, while 641 systems are herbaceous wetlands. Both of these wetland types often occur where planted pine experienced high mortality in excessively wet areas.

Freshwater marsh systems have less than 10% canopy closure and are dominated by an array of herbaceous species. Species commonly found in 641 systems include soft rush, needle rush, saw-grass, caric sedges, beakrushes, cordgrass (*Spartina patens*), duck potato (*Sagitaria latifolia*), lance-leaf arrowhead (*S. lancifolia*), grassy arrowhead,

lizard's tail (*Saururus cernuus*), switchgrass, woolly panicum, redroot, yellow-eyed grasses, pitcher plants (*Sarracenia* spp.), sundews, mermaid weed (*Proserpinaca pectinata*), pickerelweed (*Pontederia cordata*), annual marsh fleabane (*Pluchea odorata*), and horsetail (*Equisetum hyemale*).

FLUCFCS types 640 generally have a woody shrub component distinguishing them from 641 systems. Shrubs present in 640 systems include corkwood, St. John's wort (*Hypericum* spp.), fetterbush, myrtle-leaved holy, titi (*Cyrilla racemiflora*), black gum and/or wax myrtle. Herbaceous species found in 640 areas are similar to those found in 641 wetlands.

Saltwater Marsh and Shoreline (642 and 652)

Extensive tidal salt marsh (642) is located along the coast, within the two Marifarm impoundments, and along portions of Doyle's Bayou. Salt marsh is dominated by saltmarsh cord grass (*Spartina alterniflora*) and needlerush (*Juncus roemerianus*). Areas of the mitigation site classified as shoreline (652) generally are unvegetated except for *Sesuvium* spp and *Salicornia* spp.

Wet Prairie (643)

One small area of wet prairie exists onsite. This community is distinguished from freshwater marsh by typically having less water and has a higher dominance of graminaceous species. Wiregrass, broomsedge, and St. John's worts are generally found in 643.

Dikes and Levees (747)

Large levees (747) constructed of dredged material bound the Marifarm impoundments in Parcels 2 and 3. These berms have been breached in various locations to allow for a return to more natural hydrology within the impoundments. Vegetation growing on the berms is typical of disturbed areas and includes slash pine, saltbush (*Baccharis halmifolia*), eastern red cedar, blackberries, and broomsedge.

4.6 Wildlife and Protected Species

Wildlife

Intensive silvicultural practices have made onsite habitat less desirable for many wildlife species. The lack of fire has resulted in an increase in woody growth and a decrease in diversity of herbaceous vegetation that can provide a variety of food sources to wildlife. The even-aged pine stands on short rotations also provide little structure in the canopy for nesting bird species. Even with the degradation of the ecosystem, a variety of invertebrates, fish, amphibians, reptiles, birds, and mammals utilize habitats onsite. During the field characterization of the mitigation site, wildlife observations were recorded at each field point.

Several different species of frogs, lizards, snakes, and turtles as well as alligators were noted utilizing upland and wetland habitats within the mitigation area. Species of birds observed included seabirds, shorebirds, wading birds, doves, raptors, woodpeckers, and numerous passerines. Particularly important bird habitat exists at the Marifarm impoundments where wading birds utilize salt marsh areas and shorebirds forage and nest along the earthen berms. Many estuarine fish and shellfish that live in the St. Andrew Bay system also use open water within the impoundments, as well as tidal creeks elsewhere on the site. The mitigation area is also home to many mammals including deer, wild (feral) hog, and various species of medium and small mammals. Potential signs of the state threatened Florida black bear were also noted.

Protected Species

Existing records for plants and animals listed by the US Fish and Wildlife Service (USFWS) or the State of Florida as being endangered, threatened, or of special concern were reviewed for the mitigation area. Sources included FNAI data, the Florida Fish and Wildlife Conservation Commission (FFWCC) Waterbird Colony Database, the FFWCC Eagle Nest Database, the FFWCC Environmentally Sensitive Index (ESI) data, USFWS critical habitat, and FWC bear road kill data.

The Marifarms impoundments were proposed to be included as critical habitat Unit FL-4 for wintering federally threatened piping plovers (*Charadrius melodus*); however, this area was not designated as critical habitat in the final ruling. Additionally, the FWC ESI data indicate the presence or potential presence of piping plover within the impoundment areas. No piping plovers were noted in the mitigation area by PBS&J biologists, however fieldwork was conducted primarily outside the wintering season when these species would be present (July to late May).

During field work conducted from late April to mid-July, PBS&J biologists surveyed for plants and animals designated by USFWS or the State of Florida as being endangered, threatened, or of special concern. Surveys were conducted on foot enroute to the field characterization stations discussed previously. PBS&J biologists searched particularly for species documented in existing records to occur in the vicinity and species known or thought to occur in Bay County that utilize habitats found on the mitigation site. It is important to note that many listed plant species flower in fall, winter, or spring and may not have been conspicuous or easily identified during the surveys. Additionally, all seasonally inundated depressional wetlands that may serve as breeding pond sites for the federally threatened flatwoods salamander were evaluated using the habitat evaluation model developed by the Florida Department of Transportation for the widening of U.S. Highway 98 in Walton County.

Six listed animal species and five listed plant species were documented within the airport mitigation area. Additionally potential Florida black bear sign and an unidentified rhododendron that may be a listed species were found onsite. Habitat for the Florida black bear, flatwoods salamander, and various other listed plant species was also

documented on the site. Habitat was also documented onsite for federally listed species discussed in the draft Environmental Impact Statement for the airport relocation such as the federally endangered wood stork (*Mycteria americana*) and the federally threatened eastern indigo snake (*Drymarchon corais couperi*). Listed species and potential flatwoods salamander breeding ponds found within the mitigation area are presented in **Figures 4-12, 4-13, 4-14,** and **4-15**.

Several American alligators (*Alligator mississippiensis*) were observed within drainage ditches near CR 388. The alligator is listed as federally threatened due to similarity of appearance with the American crocodile (*Crocodylus acutus*), which is not found in Bay County. Alligators are listed as a species of special concern by the State of Florida.

Bald eagles (*Haliaeetus leucocephalus*), both mature and juvenile, were observed roosting and in flight within the mitigation area. No bald eagle nests were observed onsite, but the Florida Fish and Wildlife Conservation Commission (FFWCC) has a record of an active eagle nest within a half mile of Parcel 2 in the mouth of Burnt Mill Creek north of Marl Hammock Branch. Several other bald eagle nests are located in the region including a few within North Bay and one near Breakfast Point. Plentiful nesting habitat exists within the mitigation area, primarily within the mature natural slash pine stands along the coastal areas. Bald eagles are federally and state listed as threatened.

Two active and one inactive gopher tortoise (*Gopherus polyphemus*) burrows were observed within the mitigation site. More burrows may exist onsite as much of the potential gopher tortoise habitat was not surveyed and no specific gopher tortoise surveys were conducted. The gopher tortoise is listed as a species of special concern by the state. Gopher tortoise burrows provide refuge for several other federal and state listed species. Such commensals include the eastern indigo snake (*Drymarchon corais couperi*), Florida pine snake (*Pituophis melanoleucus mugitus*), and gopher frog (*Rana capito*). The eastern indigo snake is listed as federal and state threatened while the gopher frog and Florida pine snake are state listed as a species of special concern. Since gopher tortoises exist onsite, these species have the potential to occur onsite as well.

Several listed wading birds were observed onsite, particularly within the Marifarm impoundment areas. Species observed were the snowy egret (*Egretta thula*), little blue heron (*E. caerulea*), and tri-colored heron (*E. tricolor*). All three species have been designated by the state as species of special concern. Habitat for other listed wading birds, including the federally and state endangered wood stork also occur on site.

Potential Florida black bear (*Ursus americanus floridanus*) sign including scat and scratch markings on trees were observed in Parcel 3. Several dissected rotting logs were noted, possible evidence of typical bear behavior when searching for insects. Abundant bear habitat is available onsite and the size and connectivity to other conservation areas provides for the spatial requirements for black bears. Signs of black bears were also observed in the region during listed species surveys for the airport relocation Environmental Impact Statement (EIS) and several black bear road kills have been

Figure 4-12. Listed Species - Mitigation Parcel 1

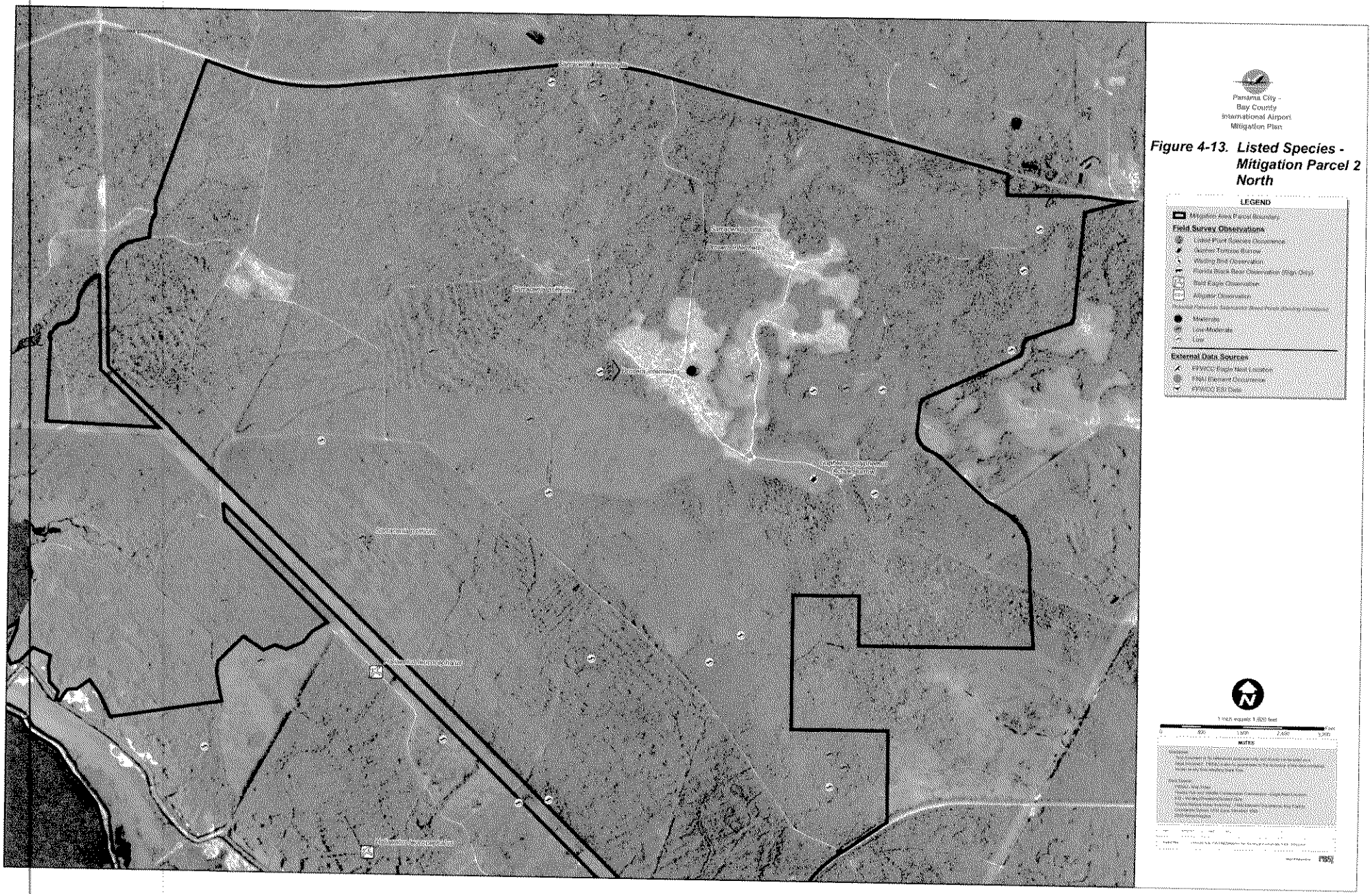


Figure 4-13. Listed Species - Mitigation Parcel 2 North

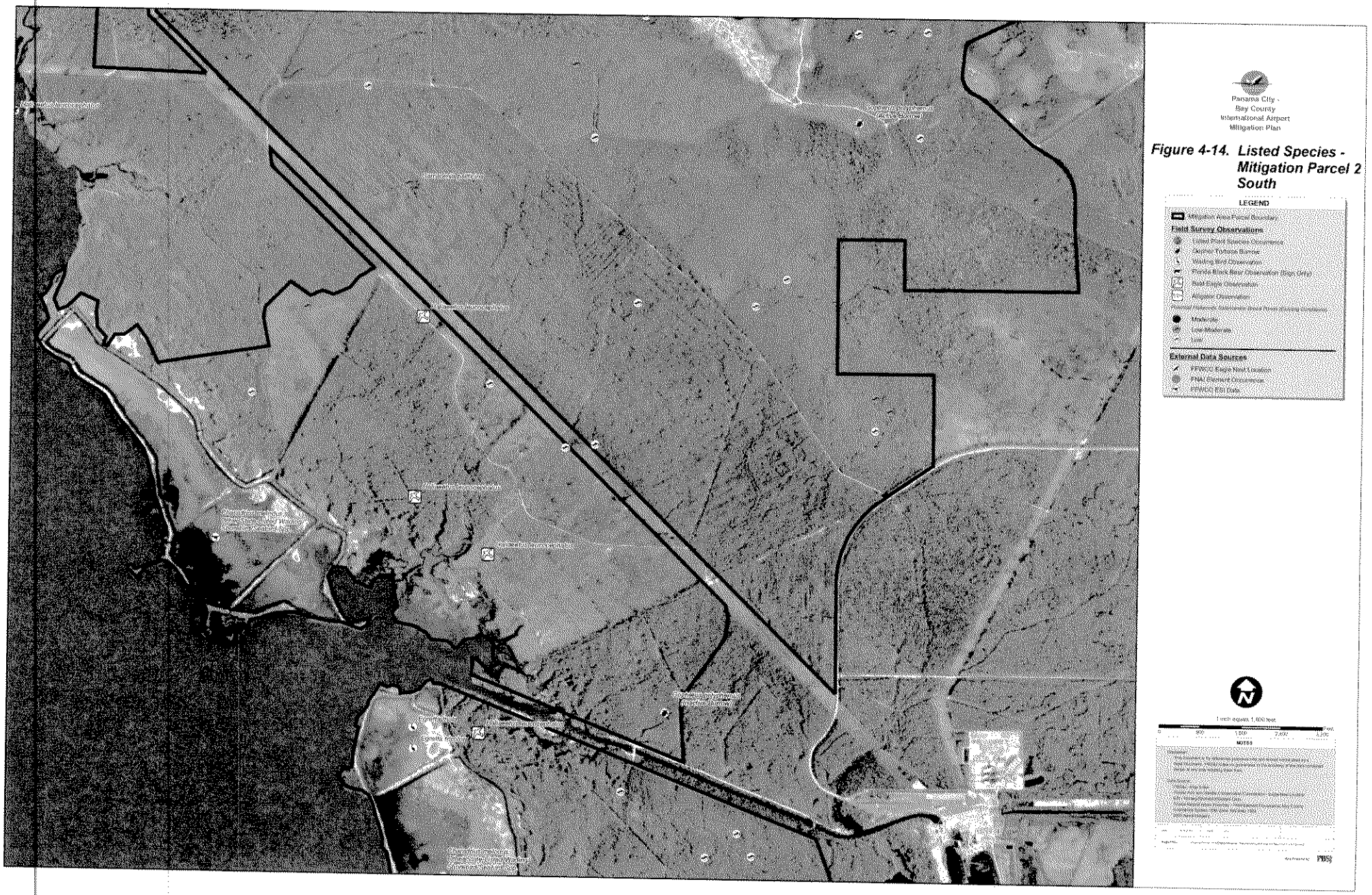


Figure 4-14. Listed Species - Mitigation Parcel 2 South

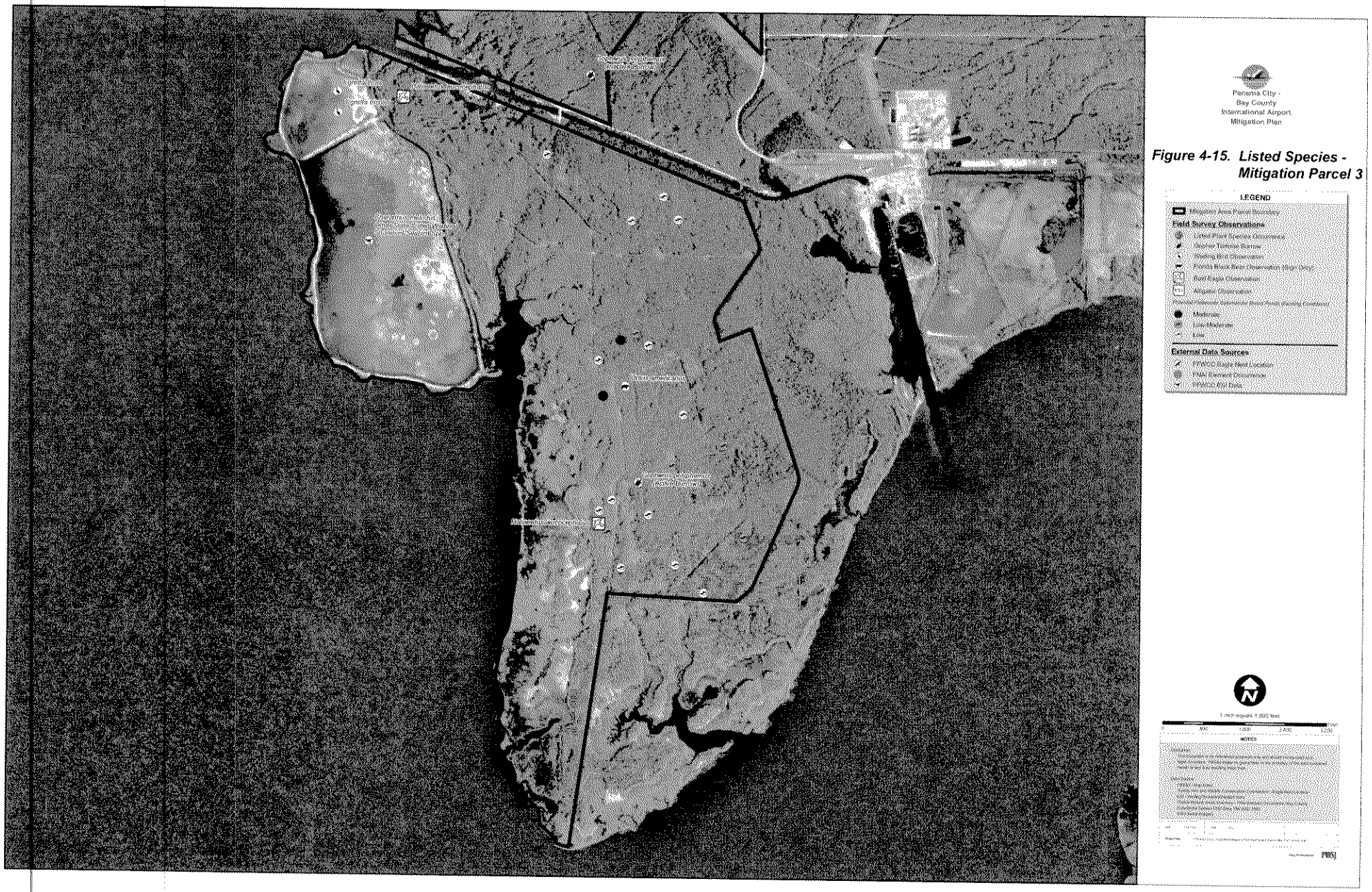


Figure 4-15. Listed Species - Mitigation Parcel 3

documented within ten miles of the mitigation parcels. Therefore, it is highly probable that black bears exist onsite.

Three listed species of pitcher plants were documented onsite. These include the state endangered white-top pitcher plant (*Sarracenia leucophylla*) and the state threatened decumbent (*S. purpurea*) and parrot (*S. psittacina*) plants. These plants may be found in hydric pine plantation, within mixed forested wetlands, or along roadside ditches. The state threatened spoon-leafed sundew (*Drosera intermedia*) is also found onsite within mixed forested wetlands and within roadside ditches. One particular area was noted within remnants of Jackson Titi that contained a population of spoon-leafed sundew that was estimated to number over one thousand individuals.

The state endangered wiregrass gentian (*Gentiana pennelliana*) was noted in flower in January 2005 after the completion of the fieldwork. This occurrence was recorded in a hydric pine plantation area of Parcel 1 that had burned within the last ten years. Wiregrass gentian typically grows in wet prairies or mesic flatwoods.

One species of rhododendron (*Rhododendron* sp.) was observed within hydric pine plantation in Parcel 1. The rhododendron was not in flower; however, and could not be identified to species. It is possible this occurrence could be of the Alabama azalea (*Rhododendron alabamense*), Florida flame azalea (*R. austrinum*), or Chapman's rhododendron (*R. chapmanii*). Although the Florida flame azalea was documented near Burnt Mill Creek during listed species surveys for the airport relocation site, no records of these species occurring in Bay County could be found for the other two species.

Potential Flatwoods Salamander Breeding Ponds

Flatwoods salamanders are a fossorial species that use seasonally inundated depressional wetlands within flatwoods as breeding ponds. Flatwoods salamanders typically utilize cypress or black gum depressional wetlands that have 30% or less canopy closure with tufted and linear growth herbaceous species as groundcover. Also important is an ecotone dominated by tufted graminaceous species, usually including wiregrass. An open canopy of longleaf or slash pine and well-developed groundcover with a wiregrass component characterizes flatwoods preferred by the flatwoods salamander.

In accordance with the method used for the recent U.S. 98 widening project in Walton County, evaluations of potential flatwoods salamander breeding ponds were conducted in two phases involving an office component that identified depressional wetlands that could serve as breeding ponds, and a field component in which the three habitat components of each pond were scored. In the first phase, a GIS analysis was conducted to identify wetlands of FLUCFCS types 613, 621, 630, 640, and 641 that were of appropriate size[3] for flatwoods salamander usage. Maps showing the location, spatial orientation, and adjacent vegetation types of these wetlands were reviewed to further evaluate these ponds. Wetlands that were part of a drainage rather than depressional,

[3] Size criteria were wetlands larger than 0.07 acres and smaller than 31.4 acres corresponding to the criteria used in the U.S. 98 widening project.

surrounded by 614 along more than 50 % of the perimeter, or part of a much larger wetland basin system were eliminated as potential ponds.

All wetlands identified as having possible potential as a breeding pond for flatwoods salamanders were evaluated during the field characterization site visits. Any other depressional wetlands observed in the field that was not identified during the first phase that would have potential for use by flatwoods salamanders were also evaluated. The three habitat components (pond, ecotone, and flatwoods) were qualitatively scored to estimate the quality of various wetlands as potential flatwoods salamander breeding pond habitat. Approximately 121 depressional wetlands were evaluated for the potential to serve as flatwoods salamander breeding bonds. A total of 27 of these ponds were designated as low-moderate habitat quality, while six ponds were designated as moderate quality. Silvicultural practices onsite have reduced the quality of habitat for flatwoods salamanders by limiting desirable groundcover species of the flatwoods, ecotones, and ponds through shading, fire suppression, and hydrologic effects.

4.7 Exotic Species

Although exotic species are not a dominant feature within the mitigation area, invasive exotic plant species have been documented at roughly 30 sites. The most prevalent exotic plant species is Chinese tallow (*Sapium sebiferum*), which is most widespread in Parcel 3. Chinese tallow is most often found in disturbed sites including along forest roads, ditches, and logging decks. Tallow may be found in both wetland and upland habitats. Outside of Parcel 3, tallow was observed occasionally near documented dump sites near CR 388.

Cogon grass (*Imperata cylindrica*) has been documented on only a few sites within the mitigation area, and was treated with herbicide by St. Joe Timberlands upon discovery. Cogon grass has also been reported ground along CR 388 on mowed roadsides; therefore, it is assumed that cogon grass has the potential to invade the mitigation area and may be a management concern in the future. Cogon grass grows in upland areas, particularly in areas of disturbance.

Camphor tree (*Cinnamomum camphora*) is also found within the mitigation site but is not very common. Camphor trees are usually found in disturbed upland sites, but occasionally may be found within wetlands. Japanese climbing fern (*Lygodium japonicum*) has not been documented on the mitigation sites, but one small occurrence (single stem that was removed) has been located in one off-site location near the mitigation areas.

Several native nuisance species have also been documented onsite including torpedo grass (*Panicum repens*) and cattails (*Typha* spp.). Torpedo grass is primarily confined to disturbed sites including forest roads and logging decks, and is not widespread. Cattails have been documented in only a few ditches within Parcel 3, and do not seem to be a management concern.

Wild (feral) pigs (*Sus scrofa*) and pig sign (rooting disturbance) have been observed throughout the mitigation area. Rooting was particularly abundant in Parcel 1 during the field characterization in 2004. Feral hogs can be destructive to groundcover vegetation, seedling and sapling recruitment and survival (including planted longleaf pine), fossorial wildlife, ground nesting birds, etc. Hogs can also compete with native species.

5.0 Historic Conditions

For the purpose of this mitigation project, historic conditions are defined as the dominant ecosystems present circa the late 1940s to early 1950s before large-scale intensive silviculture became prevalent in the region. A variety of sources were used to determine historic natural conditions in the mitigation area. Aerial photography from 1947 from St. Joe, aerial photography from 1953 from FDOT, soil survey data, and 1830s-era survey notes of vegetation descriptions were all used to delineate FLUCFCS classification for historical conditions. The 1953 aerials were relied on to a greater extent than the 1947s because thy have greater resolution and could be more accurately georeferenced.

In the last half of the 19th Century and early decades of the 20th Century, land within the airport mitigation area was used for turpentine production. Collection of turpentine involved the boxing of longleaf, and sometimes slash pine, on three or four sides with deep wedges cut into the base of the trees (Frost 1991). Turpentine could be collected for approximately four years before the tree would die. Evidence of the turpentine past may be found within the mitigation site and includes cat-faced scares on old stumps and turpentine pots.

After the turpentine industry ended, extensive logging occurred in the region during the first two decades of the 1900s. Reforestation occurred after logging resulting in ecosystems that had not changed significantly in composition from communities found in the area prior to logging. Open range livestock management was also present during this time, with ranchers annually burning the land to "green-up" forage. Open-range livestock management ended in the region in the late 1940s and early 1950s. Widespread burning for range management likely ended about this time or shortly thereafter. Clearcutting of existing forest and conversion of the area to intensive silviculture began in the mid-1950s.

5.1 Hydrology

In 1953 hydrology within the mitigation area had not been altered to the extent that it has been presently. Since pine trees were not as dense as current conditions and excessive shrub growth was controlled by fire, transpiration was probably less historically throughout the area. Additionally, with fewer canopy trees and shrubs to intercept rainfall, more precipitation would reach the soil before evaporating. It is assumed that these two factors would contribute to a higher normal water table and the water table was likely higher overall and surface water more frequent/abundant (Sun *et al.* 2001).

Although several roads within the mitigation area are apparent from the historic aerial photographs, they were not as numerous as they are today. Roads were also largely absent from the wettest areas, in contrast to some of the current roads. It is also believed that fewer roads were built upon fill or had substantial adjacent ditches. When considering these factors, roads would have had less of an effect on hydrology than they do currently.

A few ditches can be seen on the 1953 aerial photographs, but most had not been constructed at this time. Likewise, natural drainages had not been channelized and straightened at this time. Many streams and natural drainages would have been more sinuous, would have lower banks, and would typically be shallower than they are today. Natural water flow had not been altered significantly at this time since the extensive network of ditches now present, did not yet exist. Finally, the water intake and outflow canal that provides cooling water to the Gulf Power Company power plant that currently separates Parcel 2 from Parcel 3, had not been built yet.

5.2 Fire

Historically, fire was a dominant process that shaped and influenced community structure in Northwest Florida. Most ecological communities were fire maintained, requiring fire at various frequencies to recycle nutrients, stimulate plant reproduction and growth, and to control community succession and composition. Fire frequencies ranged from once every one to ten years for pine woodlands to over once every twenty years or more for cypress swamps. Fire intensity also varied based largely on frequency and subsequent fuel load since last burn. Fire intensity for communities that experienced high frequency fire generally would be low, while fire intensity would be much higher for areas that burned less frequently.

In pre-settlement times fires were generally ignited by summer lightning strikes, resulting in burns during the growing season. Summer fires would burn across the landscape, being impeded only by natural firebreaks such as wetland drainages and water. In drier years fires would burn into depressional and basin wetlands.

In the early 20th Century, the landscape in the region was burned annually to "green-up" forage as part of open range management. These fires were typically conducted either late in the dormant season or early in the growing season. Although these fires were more frequent and were conducted during different seasons than in pre-settlement times, fire remained an important process in maintaining these ecosystems.

During the latter half of the 20th Century, naturally started fires were suppressed to protect timber within pine plantations. When fires were used in pine plantation management, they were conducted during the winter, or dormant season, as opposed to the spring-summer season of natural fire. Additionally, when natural fires would start, they would burn at much higher intensity because of built up fuel such as woody shrubs and leaf litter that would naturally be consumed by periodic fire.

5.3 Vegetation

Prior to conversion to intensive silviculture, the mitigation area landscape was dominated by fire-maintained pinelands, either flatwoods or savanna, separated by forested wetland drainages and punctuated with depressional wetlands. Historic FLUCFCS types for each mitigation parcel are depicted in **Figures 5-1, 5-2, 5-3,** and **5-4**.

Panama City - Bay County International Airport Mitigation Plan

Figure 5-1. 1953 FLUCFCS - Mitigation Parcel 1

LEGEND

Florida Land Use, Cover and Forms Classification System (FLUCFCS) Boundary - 1953

Mitigation Area Parcel Boundary

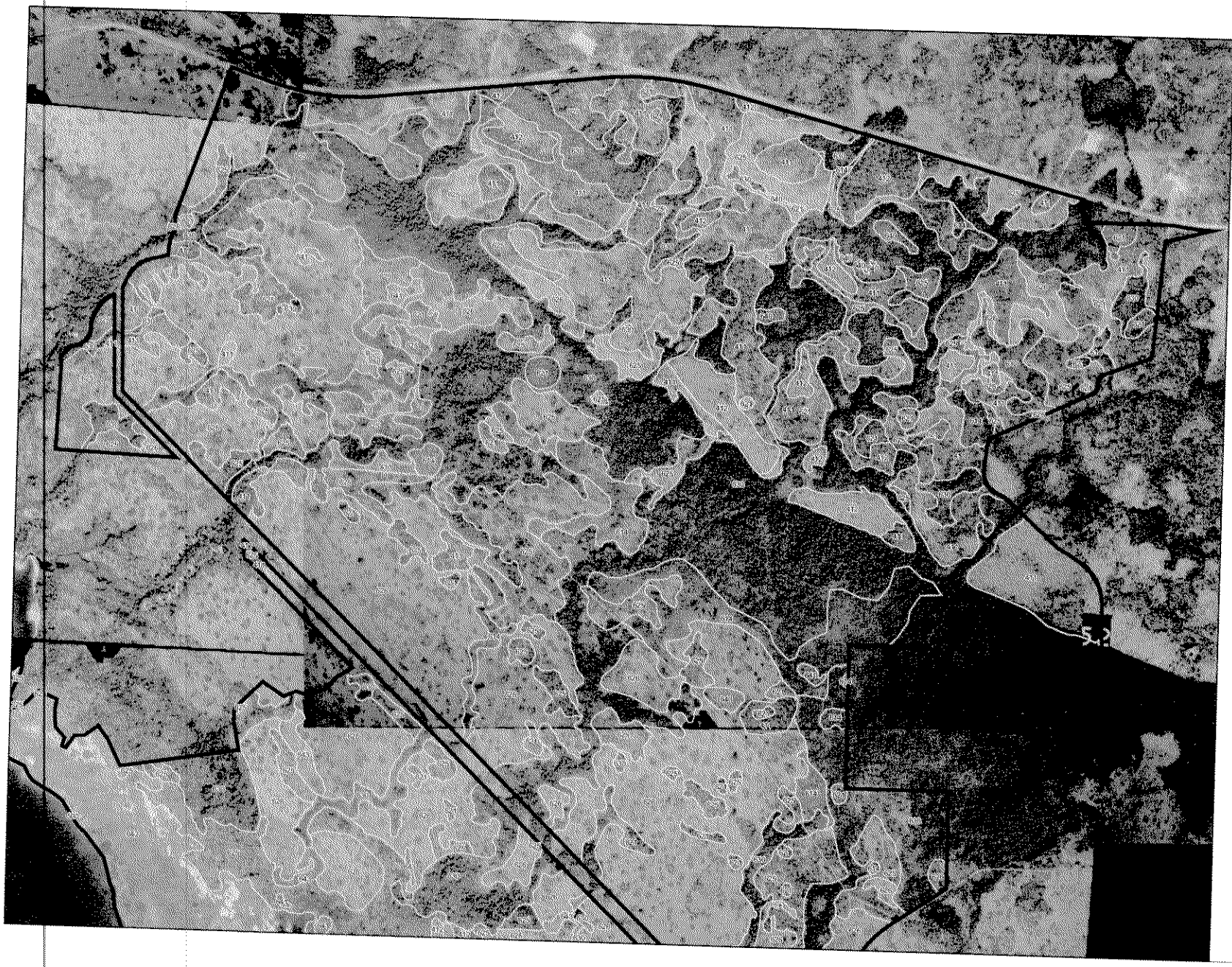
FLUCFCS Codes

411 - Pine Flatwoods
412 - Longleaf Pine-Xeric Oak
427 - Live Oak Hardwood
500 - Open Water
514 - Oil Seepage
621 - Cypress
625 - Wet Pine Flatwoods
626 - Wet Pine Savanna
630 - Wetland Forested Mixed
640 - Vegetated, Non-Forested Wetland
641 - Freshwater Marsh
642 - Saltmarsh
643 - Wet Prairies

1 inch equals 1,000 feet

0 500 1,000 1,500 2,000 Feet

NOTES



Panama City -
Bay County
International Airport
Mitigation Plan

Figure 5-2. 1953 FLUCFCS - Mitigation Parcel 2 North

LEGEND

Florida Land Use, Cover and Forms Classification System (FLUCFCS) Boundary - 1953

Mitigation Area Parcel Boundary

FLUCFCS Codes

411 - Pine Flatwoods
412 - Longleaf Pine-Xeric Oak
413 - Sand Pine Scrub
510 - Open Water
534 - Tidal Swamp
621 - Cypress
625 - Wet Pine Flatwoods
626 - Wet Pine Savanna
630 - Wetland Forested Mixed
640 - Vegetated, Non-Forested Wetland
641 - Freshwater Marsh
642 - Saltmarsh
643 - Wet Prairies

N

1 inch equals 1,600 feet

0 800 1,600 3,200 Feet

NOTES

PBS&J

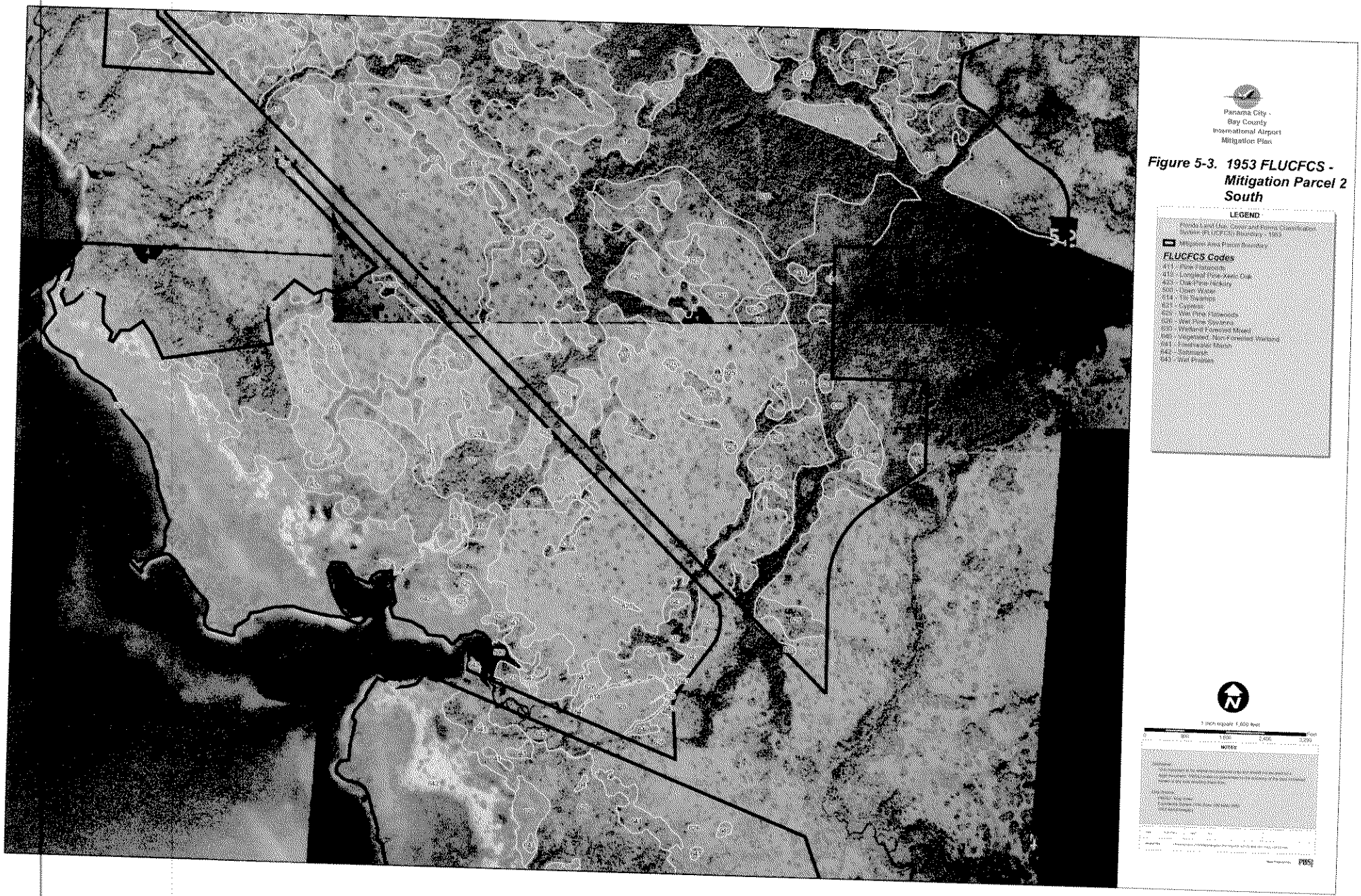
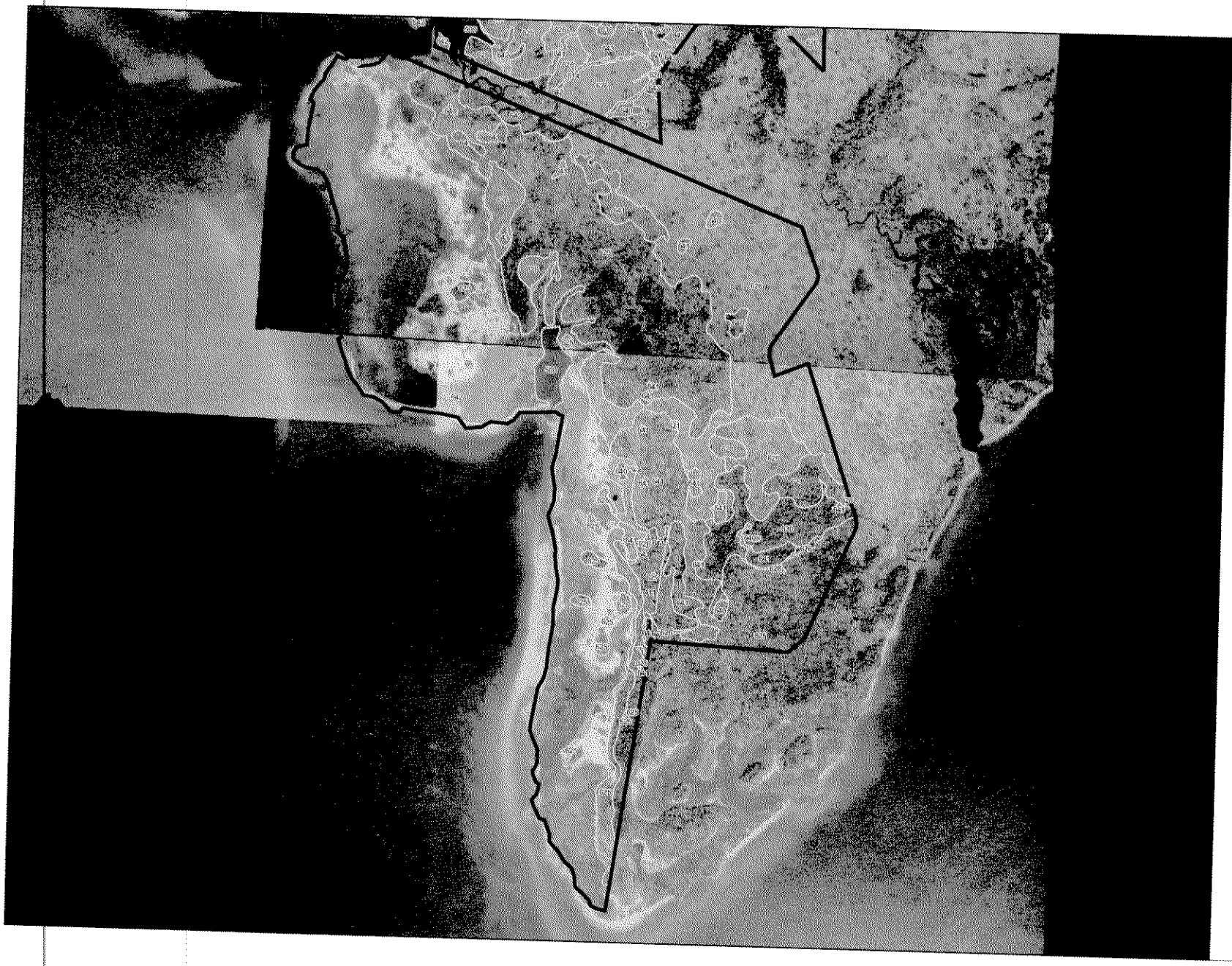


Figure 5-3. 1953 FLUCFCS - Mitigation Parcel 2 South



Panama City - Bay County International Airport Mitigation Plan

Figure 5-4. 1953 FLUCFCS - Mitigation Parcel 3

LEGEND

Florida Land Use, Cover and Forms Classification System (FLUCFCS) Boundary - 1953

Mitigation Area Parcel Boundary

FLUCFCS Codes

411 - Pine Flatwoods
413 - Longleaf Pine-Xeric Oak
423 - Oak-Pine-Hickory
500 - Open Water
614 - Tax Swamps
621 - Cypress
625 - Wet Pine Flatwoods
626 - Wet Pine Savanna
630 - Wetland Forested Mixed
640 - Vegetated, Non-Forested Wetland
641 - Freshwater Marsh
642 - Saltmarsh
643 - Wet Prairies

1 inch equals 1,800 feet

0 900 1,800 3,600 5,400 Feet

NOTES

PBS

Acreage of historic FLUCFCS is provided in **Table 5-1**. A brief description of each community type follows in the subsequent sections.

Table 5-1. Historic Vegetative Communities within the Panama City - Bay County International Airport Mitigation Area

FLUCFCS	Description	Existing Acreage	% of Historic Wetlands	% of Mitigation Area
411	Pine Flatwoods (upland)	839.0	--	8.7 %
412	Longleaf – Xeric Oak	151.3	--	1.6 %
423	Oak – Pine – Hickory	9.5	--	0.1 %
500	Water	25.9	0.3 %	0.3 %
614	Titi Swamps	555.5	6.5 %	5.8 %
621	Cypress	158.2	1.8 %	1.6 %
625	Hydric Pine Flatwoods	2006.1	23.3 %	20.9 %
626	Wet Pine Savanna	2657.8	30.9 %	27.7 %
630[1]	Mixed Forested Wetland	1892.9	22.0 %	19.7 %
640	Vegetated Non-Forested Wetland	42.1	0.5 %	0.4 %
641	Freshwater Marsh	87.1	1.0 %	0.9 %
642	Saltwater Marsh	1134.8	13.2 %	11.8 %
643	Wet Prairie	48.6	0.6 %	0.5 %
Total	--	9608.8	100 %	100 %

[1] Areas of 610, 613, and 615 may exist within polygons mapped as 630, since these particular signatures could not be differentiated from each other on the historic aerial photographs.

Upland Pine Flatwoods (411)

Upland pine flatwoods historically were found within the mitigation area on poorly and somewhat poorly drained soils. Areas of 411 were typically dominated by widely spaced, uneven aged longleaf pine stands with occasional slash pine. These communities typically had open understories with a diverse assemblage of herbaceous groundcover. Wiregrass and saw palmetto were likely a dominant component in the groundcover while woody shrubs were controlled by periodic fire. The primary differences between historical 411 and current 411 systems were the dominance of longleaf pine and diverse groundcover layer within historical flatwoods. A subtype of pine flatwoods, referred to as shrubby flatwoods, is thought to have occurred in the region as well (FNAI and FDNR 1990). Shrubby flatwoods typically had a higher abundance of shrubs due to slightly lower fire frequencies.

Longleaf Pine – Xeric Oak (412)

This community was comprised of much of the same vegetation as present-day 412 systems except that there were likely fewer oaks and a higher herbaceous percent cover

and diversity. Wiregrass was probably abundant and a distinguishing feature of this habitat.

Titi Swamps (614)

Historically, titi was a much less dominant feature of the landscape. This is partially because frequent fires restricted titi to well defined drainages. In addition, large mature hardwoods and cypress may have been logged out of some areas where they were previously dominant, leaving wetlands that are now more exclusively titi.

Cypress Swamps (621)

A higher proportion of historical wetlands were dominated by pond cypress in the area. Prior to fire suppression, many of these cypress swamps may have been less shrubby with a greater percent cover and diversity of grasses, sedges, and rushes. It is assumed that during dry years fires occasionally burned into cypress swamps and would consume biomass of the shrub layer and kill non-pyrophytic hardwoods (Ewel 1993). The absence of fire has most likely contributed to the vegetative shift towards 630 systems for many of these wetlands. Additionally, cypress were historically logged from many wetland areas, as evident from remaining cypress stumps, including those found in wetlands no longer dominated by cypress.

Hydric Pine Flatwoods (625)

Hydric pine flatwoods were much more extensive historically than at present. This community was found predominantly on poorly drained soils and would be inundated or saturated to the surface for more than two weeks during most years. Hydric pine flatwoods were dominated by widely spaced, uneven aged stands of longleaf and/or slash pine. Hydric flatwoods areas near the coast were most likely dominated exclusively by slash pine. Pond pine (*Pinus serotina*) may have also been found within the wetter portions of 625 areas. Hydric flatwoods would have been similar to 411 systems except that the ground cover was comprised of a prevalence of hydrophytic vegetation. Shrub layers were shorter and less abundant, being restricted by frequent fires. A shrubbier form of hydric pine flatwoods, which would have been similar in shrub abundance to the upland shrubby flatwoods, probably occurred in areas with lower fire frequency (Peet and Allard 1991).

Wet Pine Savannas (626)

Wet pine savannas, currently absent within the mitigation area, were previously extensive across the landscape. Wet pine savanna was similar to hydric pine flatwoods, except with much lower abundance of pine trees. Pine savannas occupied poorly and very poorly drained soils and tended to be wetter than hydric pine flatwoods. These areas were comprised primarily of a rich, diverse assemblage of hydrophytic, herbaceous species, including wiregrass. Slash and longleaf pine could be found growing along with saw palmetto on slightly elevated "islands". These saw palmetto – longleaf islands are

conspicuous on the 1953 aerial photographs. Periodic fires maintained pine savannas, preventing conversion to titi or mixed forested wetlands. Within the airport mitigation area, pine savanna was the dominant community prior to conversion to intensive slash pine silviculture.

Mixed Forested Wetlands (630)

Within this community type, areas of 610, 613, and 615 probably also existed, but were not easily delineated using the historic aerial photographs and soil survey information. Historic 630 systems were most likely similar to present 630 areas in composition, but were shaped by the effects of fire and historically wetter conditions. Mixed forested wetlands occupied some areas now dominated by titi, resulting from the logging of hardwoods and cypress. FLUCFCS type 630 historically occupied a much greater percentage of the total mitigation site area. The area of 630 has decreased due to the draining of these wetlands by drainage ditches and channelization/berm building along natural drainages and from the planting of slash pine into historic 630 areas. Jackson Titi, a mixed forested wetland, has been reduced to nearly one third of its historic size, primarily because of the planting of slash pine into the system.

Vegetated Non-forested Wetlands and Freshwater Marsh (641 and 640)

FLUCFCS types 641 and 640 were not mapped as frequently using the historic aerials as compared to current conditions. This may be because these systems blend in with pine savanna making them difficult to photo-interpret. FLUCFCS types 641 and 640 historically often occupied slightly depressional areas within 626 systems and were influenced by frequent fires. Vegetation found in these systems would have been similar to that found today, but was probably more diverse.

Saltwater Marsh (642)

Salt marsh occupied a greater area historically because of the absence of the levees, canals, and open water areas that comprise the Marifarm impoundments. Historically, fires also likely burned into salt marshes from time to time. Hydrologic influence of groundwater from adjacent flatwoods was likely also different due to planted pine and increased evapotranspiration.

6.0 Proposed Conditions

The objective of the proposed mitigation is to restore the pine plantation and associated natural communities of the airport mitigation area to historic conditions, circa the late 1940s and early 1950s, to the greatest extent possible and practicable. To accomplish this objective, the applicant proposes to re-establish the hydrology of the area by increasing the hydroperiod and restore streams and flowing wetlands. Frequent, low-intensity fire will be returned to the system through prescribed fire. The applicant intends to restore approximately 5,650 acres of 441/600 to 625, 626, and 630 community types. Additionally, roughly 1,900 acres of higher quality wetlands will be enhanced through restoration of surrounding uplands and wetlands, and by the effects of periodic fire. Over 850 acres of salt marsh (642) will be preserved and protected through the mitigation plan. Finally, some 1,200 acres of uplands will be restored and enhanced.

6.1 Hydrology

About 34,000 linear feet of man-made ditches will be blocked or backfilled. The backfilling and blocking of selected ditches will improve the hydroperiod of wetlands in some areas. The removal of certain roads and plugging of associated ditches will also improve hydrology in the area. The thinning of dense pine stands and reduction of woody shrubs will reduce evapotranspiration and canopy interception, thereby increasing the hydroperiod throughout much of the mitigation site (Sun *et al.* 2001).

Approximately 45 low water crossings will be installed to enhance or restore hydrologic condition and stream/flowing wetland function at existing forest road crossings. These measures should restore more natural hydrologic conditions to these streams and flowing wetlands. Additionally, roughly 41,000 linear feet of previously channelized streams and wetland drainages will be restored to natural stream conditions. This linear estimate does not include enhancements resulting from road and roadside ditch removal, or the upstream and downstream effects of low water crossing installation and associated hydrologic improvements. Berms will be removed from along the channels, the channel bed elevation (invert) will be restored to natural conditions, and sinuosity will be returned to these systems. In addition, another 107,000 linear feet of stream and flowing wetland surface waters will be preserved and indirectly enhanced by surrounding mitigation activities and long-term ecosystem management.

6.2 Fire

Fire will be restored as the dominant ecologic process within the mitigation area through a prescribed fire plan. After initial controlled burns during the dormant season are conducted to reduce fuel loads, low-intensity prescribed fires will be conducted during the growing season to mimic historic, natural fires. Fire frequency will be high with flatwoods and savanna ecosystems burning approximately every three to five years. Prescribed fire will be allowed to burn into non-pine dominated habitats such as cypress domes, flatwoods marshes, salt marshes, etc., when conditions allow and when it would

not result in a catastrophic situation. Regular prescribed fire will keep fuel loads low, limit shrub growth, recycle nutrients, increase plant vigor, and aid in the reproduction and regeneration of pyrophytic species such as longleaf pine and wiregrass.

6.3 Vegetation

Proposed FLUCFCS types within the airport mitigation area are shown on **Figures 6-1**, **6-2**, **6-3**, and **6-4**. Proposed FLUCFCS acreages are presented in **Table 6-1**. Actual acreage of vegetative communities may differ; however it is the objective of the mitigation to restore an entire ecosystem and provide diverse habitats, rather than reach exact acreages of specific FLUCFCS types.

Table 6-1. Proposed Vegetative Communities within the Panama City - Bay County International Airport Mitigation Area[1]

FLUCFCS	Description	Proposed Acreage	% of Proposed Wetlands	% of Mitigation Area
411	Pine Flatwoods (upland)[2]	1170.0	--	12.2 %
412	Longleaf – Xeric Oak	10.3	--	0.1 %
423	Oak – Pine – Hickory	10.5	--	0.1 %
427	Live Oak	0.5	--	< 0.1 %
436	Upland Scrub	4.2	--	< 0.1 %
500	Water	153.0	1.8 %	1.6 %
510[3]	Streams and Waterways	26.7	0.3 %	0.3 %
610	Wetland Hardwoods	2.1	< 0.1 %	< 0.1 %
613	Gum Swamps	55.0	0.7 %	0.6 %
614/630[4]	Titi Swamps or Mixed Forested Wetland	656.3	7.9 %	6.8 %
615	Stream Swamps (bottomland)	29.8	0.4 %	0.3 %
621	Cypress	29.3	0.4 %	0.3 %
625	Hydric Pine Flatwoods	1993.2	24.0 %	20.7 %
626	Wet Pine Savanna	2789.8	33.6 %	29.0 %
626/630[5]	Wet Pine Savanna or Mixed Forested Wetland	979.4	11.8 %	10.2 %
630	Mixed Forested Wetland	639.0	7.7 %	6.7 %
640	Vegetated Non-Forested Wetland	19.0	0.2 %	0.2 %
641	Freshwater Marsh	81.2	1.0 %	0.8 %
642	Saltwater Marsh	854.7	10.3 %	8.9 %
643	Wet Prairie	2.4	< 0.1 %	< 0.1%
652	Shoreline	3.1	< 0.1 %	< 0.1 %
747	Dikes and Levees	99.3	--	1.0 %

Table 6-1. Proposed Vegetative Communities within the Panama City - Bay County International Airport Mitigation Area[1]

FLUCFCS	Description	Proposed Acreage	% of Proposed Wetlands	% of Mitigation Area
Total	--	9608.8	100 %	100 %

[1] Proposed acreages of various vegetative communities are estimates based on historic conditions and current mitigation work plans.
[2] Areas within better drained soils may include oaks, depending upon fire regime, and could be classed as FLUCFCS type 412.
[3] Includes only polygons, not linear features.
[4] Areas currently classed as 614 may succeed towards 630 or may remain 614 depending upon fire regime, available seed sources, and other abiotic and biotic factors.
[5] Areas that were historically 630, but are currently 441/600. These areas will be thinned to densities similar to 626 systems, but no longleaf will be planted. These areas are expected to succeed to either 626 or 630 depending upon fire regime.

Wet pine savanna (626), hydric pine flatwoods (625), and upland flatwoods (411) are the dominant communities of the proposed landscape. These areas will be restored to historic conditions through the thinning and harvest of existing planted pine, the planting of longleaf according to community type and location, and the introduction of prescribed fire. The thinning of planted pine and return of frequent fires to these communities is expected to increase diversity and percent cover in the groundcover while reducing woody vegetation. Shrubby flatwoods may occur in some 625 and 411 areas depending upon fire frequency. Clearcutting of pines will also be eliminated from the landscape in the future, allowing uneven-aged pine stands to develop.

The FLUCFCS type designated 626/630 are areas of 441/600 that were historically 630 wetlands. Planted pine in these areas will be thinned and harvested similar to areas proposed to be 626, but no longleaf pine will be planted as these areas typically are too wet and are expected to be wetter following thinning and other hydrologic enhancements. Fire will be allowed to burn into these areas, although with greater wetness these areas may not burn as regularly as historic pine communities. These areas will either become open relatively wet 626 systems or will succeed to 630 depending on hydrology and fire frequency. A mix of communities is expected to progress through natural succession to open 626 or to 630 by the natural recruitment of hardwoods and cypress from the existing seed bank.

Titi distribution and dominance should recede in response to regular fire. In some areas existing hardwoods and cypress will mature over time and begin to dominate these systems. Likewise, non-tidal high quality wetlands (non-titi and non-planted pine wetlands) will be enhanced by fire through improved buffers, less shrub dominance, and the development of more diverse ecotones and groundcover assemblages.

Panama City - Bay County International Airport Mitigation Plan

Figure 6-1. Proposed FLUCFCS - Mitigation Parcel 1

LEGEND

Florida Land Use, Cover and Forms Classification System (FLUCFCS) Boundary - Proposed Conditions

Mitigation Area Parcel Boundary

FLUCFCS Codes

410 - Pine Flatwoods
411 - Longleaf Pine-Xeric Oak
421 - Oak-Pine-Hickory
427 - Live Oak
434 - Upland Scrub, Pine and Hardwoods
500 - Open Water
510 - Streams and Waterways (including Ditches)
610 - Wetland Hardwood Forests
612 - Gum Swamps
614 - Tidal Swamps
614/630 - Tidal Wetland Forested Mixed
615 - Stream and Lake Swamp (Bottomland)
621 - Cypress
625 - Wet Prairies
628 - Wet Pine Flatwoods
629 - Wet Pine Savanna
629/630 - Wet Pine Savanna/Wetland Forested Mixed
630 - Wetland Forested Mixed
640 - Vegetated, Non-Forested Wetland
641 - Freshwater Marsh
642 - Saltwater Marsh
643 - Wet Prairies
652 - Shrubland
747 - Dikes and Levees
832 - Electrical Power Transmission Lines

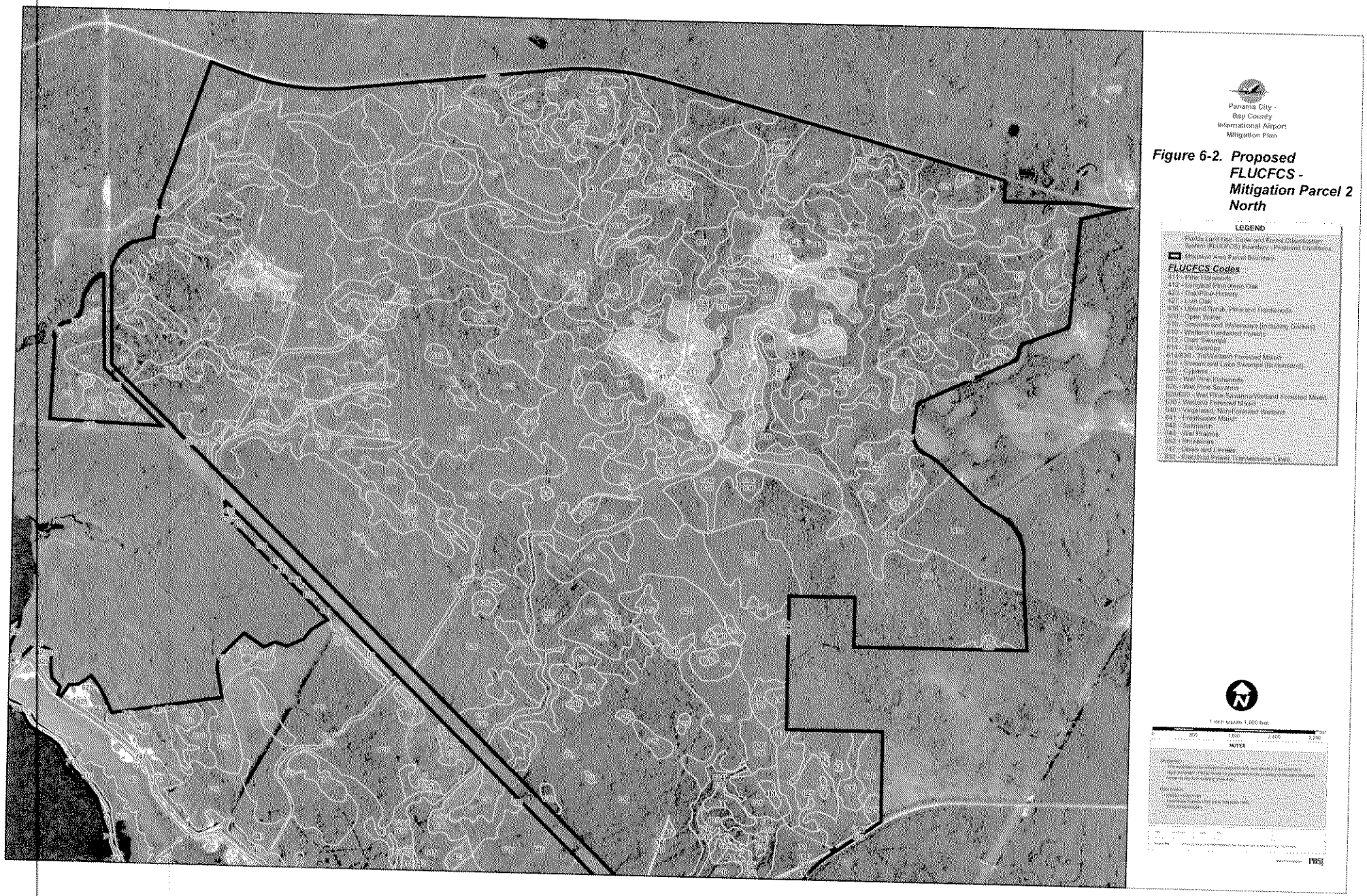


Figure 6-2. Proposed FLUCFCS - Mitigation Parcel 2 North

Figure 6-3. Proposed FLUCFCS - Mitigation Parcel 2 South

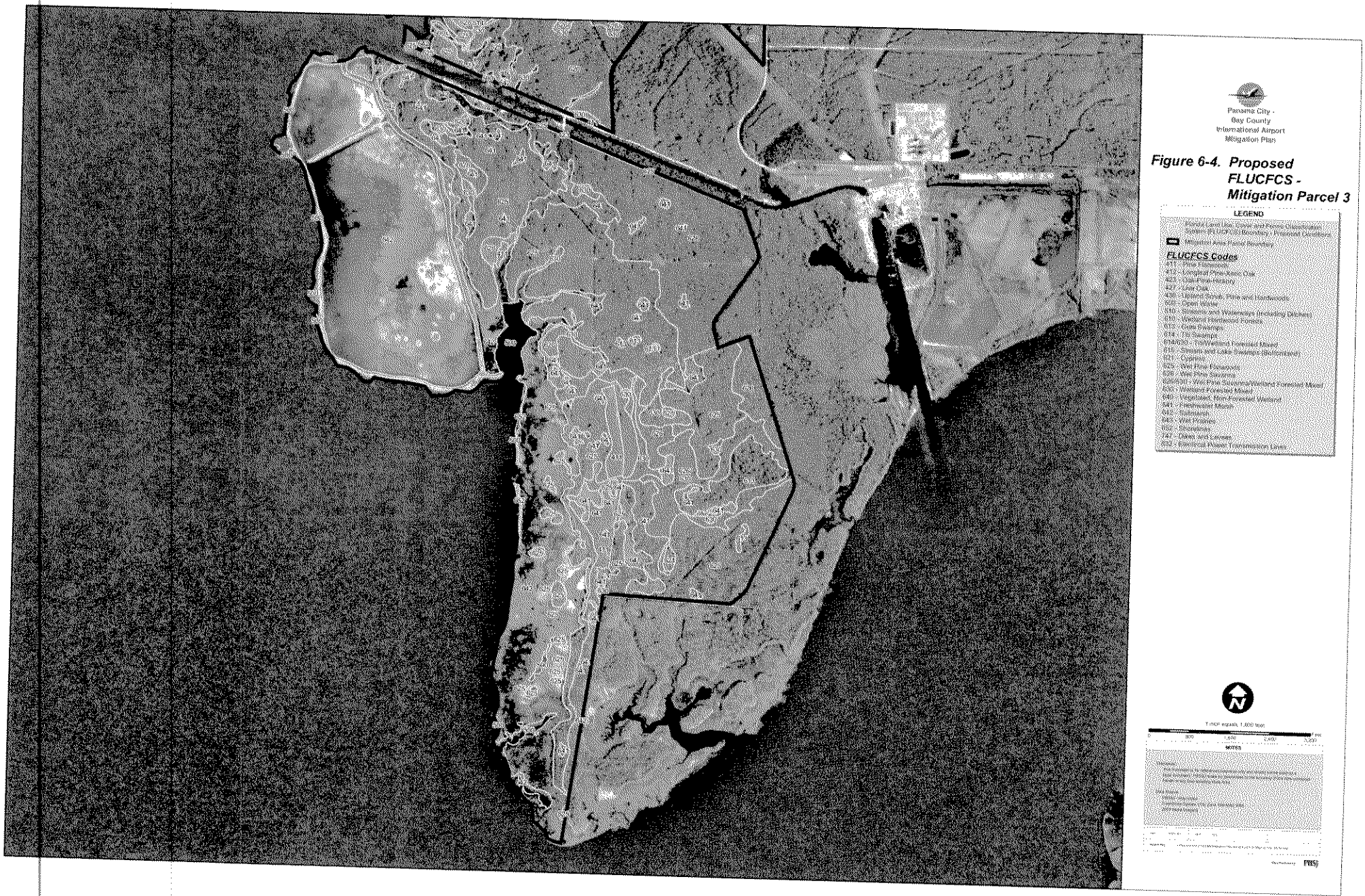


Figure 6-4. Proposed FLUCFCS - Mitigation Parcel 3

Salt marsh wetlands (642) are expected to benefit from mitigation activities including improvement of adjacent food source and habitat for wildlife and enhanced buffering effect for water quality. Thinning of adjacent planted pine may also restore more natural groundwater influence at the flatwoods/salt marsh ecotone. Fires will also be allowed to burn into salt marsh areas mimicking natural occasional fire influence on these habitats. Additionally, the potential for coastal development in and adjacent to these areas will be eliminated through protection of coastal habitats in the mitigation area.

6.4 Wildlife and Protected Species

Wildlife habitat will greatly improve in response to the proposed mitigation activities. The development of an uneven aged stand of widely spaced longleaf and slash pine will provide habitat structure and provide nesting opportunities for various bird species. The increase in the diversity of groundcover vegetation should also provide ample food sources for a variety of birds and mammals. Mitigation should improve habitat onsite for listed species such as flatwoods salamander, gopher tortoise, eastern indigo snake, various wading and shorebirds, bald eagle, and Florida black bear. Once pine trees reach appropriate age and size, habitat conditions may one day exist for the federally endangered red-cockaded woodpecker (*Picoides borealis*).

Threatened and endangered plant species, particularly wetland dependent species, will also greatly benefit from the mitigation. Mitigation activities will restore or enhance communities that provide appropriate habitat for listed plants documented in the West Bay region such as listed pitcher plants (*Sarracenia* spp.), listed sundews (*Drosera* spp.), wiregrass gentian, Chapman's crownbeard (*Verbasina chapmanii*), listed butterworts (*Pinguicula* spp.), pinewood bluestem (*Andropogon arctatus*), Curtiss' sandgrass (*Calamovilfa curtissii*), Catesby lily (*Lilium catesbaei*), yellow fringed orchid (*Platanthera cilaris*), white meadowbeauty (*Rhexia parviflora*), mock pennyroyal (*Stachydeoma graveolens*), and karst pond Xyris (*Xyris longisepala*).

7.0 Work Plan

Details of work plans for specific mitigation activities are discussed within the following sections. A detailed schedule of mitigation activities during implementation is provided as **Appendix C**.

7.1 Overview

Since impacts associated with the Panama City – Bay County International Airport relocation will occur incrementally over a period of fifty years, the mitigation plan has been designed so that mitigation implementation will be initiated sequentially to meet functional lift needs for each construction phase of the airport. Phasing of mitigation implementation is based upon the age of the planted pine stands, with mitigation implementation occurring when a particular stand reaches 25 years of age. To aid in mitigation implementation and long-term management of the mitigation area, each parcel has been further subdivided into management units based on timber stand age and existing landscape features (primarily unpaved forest roads and drainage features). There are a total of 42 management units in the mitigation area, averaging 200-300 acres in size each. Table 7-1 and Figure 7-1 illustrate which management units correspond to mitigation for each construction phase.

Table 7-1. Management Units Serving as Mitigation for each Construction Phase.

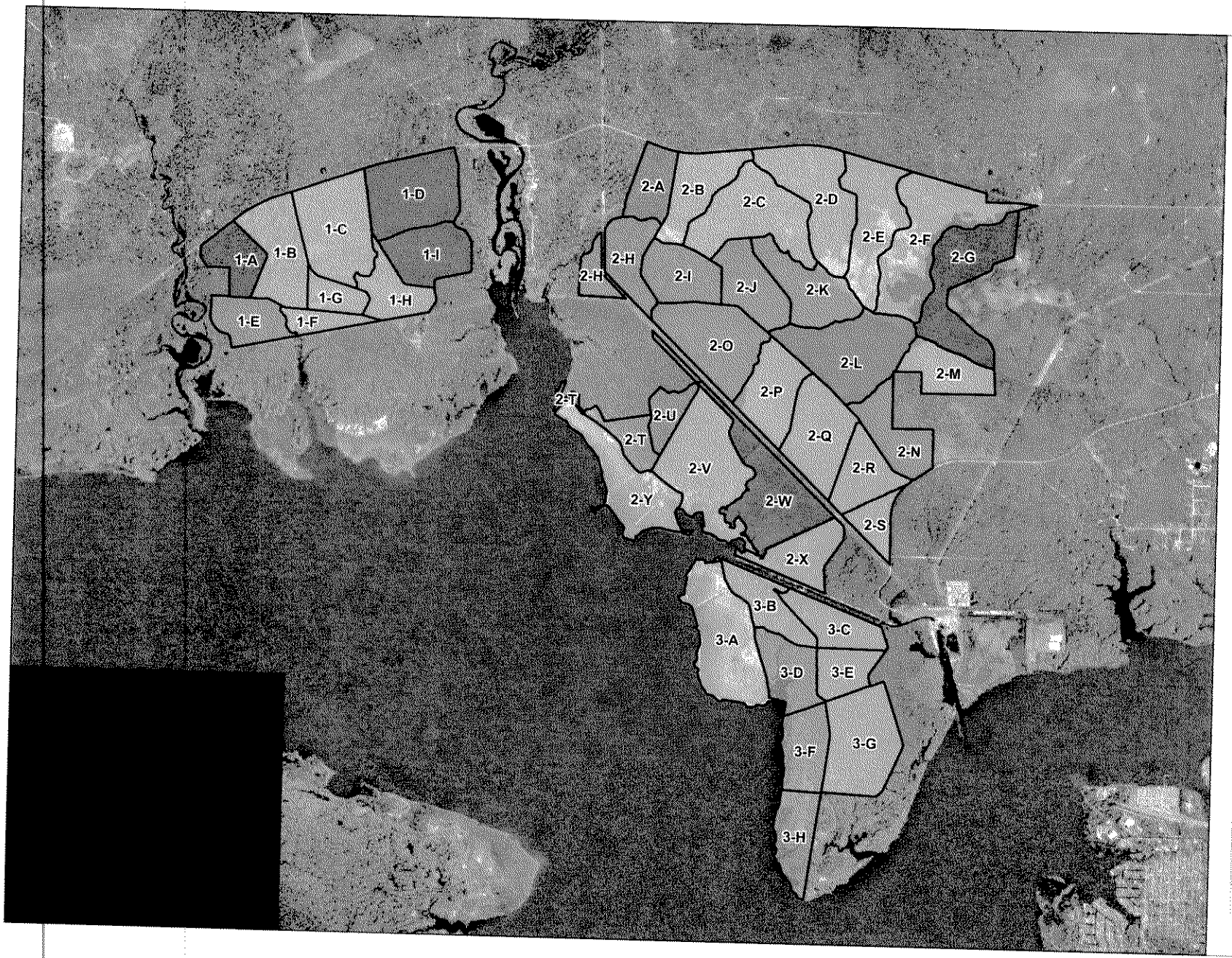
Construction Phase	Management Units	Functional Lift	Total Acreage[1]
0-10 years (I)	1B, 1C, 1F, 1G, 1H, 2B, 2C, 2D, 2E, 2F[2], 2M[3], 2P[4], 2Q, 2R, 2S, 2V, 2Y	653	4039.2
11-20 years (II)	2X, 3A, 3B, 3C, 3E, 3G	212	1334.3
21-30 years (III)	1E, 2H, 2I, 2J, 2K, 2M[3], 2N, 2O, 2P[4], 2T, 3D, 3F, 3H	414	2183.5
31-40 years (IV)	2A, 2F[2], 2L, 2U	148	712.7
41-50 years (V)	1A, 1D, 1I, 2G, 2W	296	1339.1
Total	NA	1723	9608.8

[1]Total Acreage includes uplands and wetlands with no functional lift

[2]324.4 acres of Management Unit 2F are applied to Phase I; 102.9 acres are applied to Phase IV.

[3]167.1 acres of Management Unit 2M are applied to Phase I; 3.9 acres are applied to Phase III.

[4]211.9 acres of Management Unit 2P are applied to Phase I; 8.2 acres are applied to Phase III.



Panama City - Bay County International Airport Mitigation Plan

Figure 7-1. Management Units by Phase

LEGEND

Mitigation Area Management Unit Boundaries

Applicable Impact Phase

Phase I (Impacts for years 0-10)

Phase II (Impacts for years 11-20)

Phase III (Impacts for years 21-30)

Phase IV (Impacts for years 31-40)

Phase V (Impacts for years 41-50)

1 inch equals 4,000 feet

0 2,000 4,000 8,000 Feet

NOTES

In order to reach the goals and objectives of the mitigation plan, several work plans for various mitigation activities have been created. These plans include strategies, designs, and schedules for activities such as harvest and thinning of planted pine, planting of longleaf pine, hydrologic restoration, prescribed fire, dump site removal, and exotic and invasive species control.

7.2 Harvest and Thinning Plan

As discussed previously planted pine stands in the mitigation areas were planted between 1973 and 1999 (ranging in stand ages from 6 to 32 years old in 2005). Some areas have previously been clearcut, while some stands have been thinned every 3rd, 4th, or 5th row. A few stands have been selectively thinned. Younger stands have not been thinned. Several additional rounds of row thinning by St. Joe Timberland may be possible under the existing timber management plan, prior to mitigation implementation, although thinning methods will adhere to practices outlined in this harvest and thinning plan.

The final round of thinning prior to transfer to mitigation will be a selective, evenly spaced thin to a prescribed basal area, detailed below. The final round of thinning will occur the year of initial wetland impact from the airport construction and the following year for all stands currently 25 years or older and then be staggered as existing pine stands reach 25 years of age. Planted pine stand ages are illustrated in **Figure 7-2**. The proposed target community and location of the stands will determine the basal area of the final thin in a particular area.

Areas of planted slash pine proposed for target communities of upland pine flatwoods (411) or hydric pine flatwoods (625) are further subdivided into coastal and non-coastal flatwoods areas. Coastal areas are defined as management units south of the power line in Parcel 2 and all of Parcel 3. Longleaf pine will be planted in non-coastal 411 and 625 and coastal 411, but will not be planted in coastal 625. Thinning target density is affected by whether longleaf pine will be planted in the area, since thinning the canopy will help promote the growth of longleaf pine. Slash pine within areas targeted for non-coastal 411 and 625 and coastal 411 will be thinned to a basal area of 20 to 30 square feet per acre. Planted pine within areas slated to be coastal 625 will be thinned to a basal area of 40 to 50 square feet per acre. Planted pine target basal areas after thinning are shown on **Figures 7-3**, **7-4**, **7-5**, and **7-6**.

Areas planted in sand pine are proposed to be restored to 411 communities. Sand pine is not considered to be a natural part of this community type. Therefore, these areas will be clearcut of all sand pine during final thinning.

Slash pine plantation that is targeted for 626 restoration will be thinned to basal areas of 20 to 30 square feet per acre. Areas that are expected to become either 626 or 630 (proposed FLUCFCS 626/630) will also be thinned to 20 to 30 square feet per acre.

Panama City – Bay County International Airport Mitigation Plan

Figure 7-2. Planted Pine Harvest and Thinning Schedule

Panama City - Bay County International Airport Mitigation Plan

Figure 7-3. Planted Pine Harvest and Thinning Plan

Target Densities and Voluntary SMZ's

Mitigation Parcel 1

LEGEND

Road

Management Unit Boundary

Planted Pine Target Density

0 sq. Ft/ac (Sand Pine)

20 to 30 sq. ft/ac

40 to 60 sq. ft/ac

Previously Cleared or Under Current Contract

No Thinning (Natural Stands)

Buffers*

50-Foot Voluntary SMZ

90-Foot Voluntary SMZ

*Voluntary streams SMZ's as defined by the Florida Division of Forestry Forest Best Management Practices are not shown, but are to be observed.

N

1 inch equals 1,200 feet

0 600 1,200 2,400

NOTES

PBS

Panama City - Bay County International Airport Mitigation Plan

Figure 7-4. Planted Pine Harvest and Thinning Plan

Target Densities and Voluntary SMZ's

Mitigation Parcel 2 - North

LEGEND

Road

Management Unit Boundary

Planted Pine Target Density

0 sq. ft/ac (Sand Pine)

30 to 35 sq. ft/ac

40 to 45 sq. ft/ac

Previously Cleared or Under Current Contract

No Thinning (Natural Stands)

Buffers*

75-Foot Voluntary SMZ

50-Foot Voluntary SMZ

*Voluntary SMZs are as defined by the Florida Division of Forestry's 2008 Best Management Practices and not shown, but are to be observed.

1 inch equals 1,600 feet

0 800 1,600 2,400 3,200 Feet

NOTES

Figure 7-5. Planted Pine Harvest and Thinning Plan

Target Densities and Voluntary SMZ's

Mitigation Parcel 2 - South


2-V
2-W
2-X
2-S
3-A
3-B
3-C
3-D
3-E
3-F
3-G
3-H
LEGEND
Road
Management Unit Boundary
Planted Pine Target Density
Buffers*
Panama City - Bay County International Airport Mitigation Plan
Figure 7-6. Planted Pine Harvest and Thinning Plan
Target Densities and Voluntary SMZ's
Mitigation Parcel 3
NOTES

A few management units or portions of management units will be thinned to 10 to 20 square feet per acre for comparison/adaptive management purposes. Additional thinning may take place following mitigation implementation under the long-term management plan for the site. Target basal area and/or number of mature trees per acre may be adjusted as necessary closer to the final thinning operation, based on actual DBH values at the time of harvest or thinning, and ecological considerations at that time.

All harvest and thinning operations, including thinning prior to or during mitigation implementation, will, at a minimum, adhere to current Silvicultural Best Management Practices (BMPs), including observation of Special Management Zones (SMZs) as defined by the Florida Division of Forestry (FDOF 2003). In particular, thinning operations will be planned so the use of heavy equipment and the occurrence of excessive soil rutting are minimized during wet conditions. Excessive rutting should be avoided by managing thinning operations in hydric planted pine areas outside the wet season and around periods when onsite soil moisture conditions are inappropriate. This will include onsite reconnaissance and direction of forestry crews and equipment by supervising foresters and mitigation ecologists. If excessive rutting does unexpectedly occur, thinning operations will be halted and relocated to drier areas until conditions improve, and excessively rutted areas will be rehabilitated.

In addition, in order to maintain consistency with the airport relocation and other projects on West Bay that are designed to meet Outstanding Florida Waters (OFW) stormwater standards, a 50-foot Primary SMZ will be voluntarily observed along the shoreline of West Bay and all tidal creeks, bayous, and tidal marsh (642) in or adjacent to the mitigation areas. Where 613, 615, 621, 630, 640, and 641 communities occur within or border planted pine stands, harvesting or thinning of cypress, hardwoods, or pine will not take place within these areas. Heavy equipment will not be allowed within these areas, and logging slash and debris will not be placed or pushed into these wetlands. A minimum 35-foot Primary SMZ will be voluntarily observed around many of these smaller higher quality wetlands (HQWs). Several other areas within planted pine noted for particularly diverse groundcover are buffered by voluntary Primary SMZs. Voluntary Primary SMZ buffers are shown along with target thinning basal area in **Figures 7-3**, **7-4**, **7-5**, and **7-6**. Wetlands dominated by dense titi stands (614), including linear titi strands and drainages, are not considered HQWs under this harvest and thinning plan, and will not be protected by the 35-foot Primary SMZ described in this paragraph; however, where streams are present, standard SMZs still apply as specified by FDOF (2003).

Additionally, incidental harvest of individual cypress, hardwood, and cabbage palm trees greater than six inches DBH growing in planted pine stands will be minimized during pine thinning operations. Desirable tree species include cypress, sweetbay magnolia, red bay, swamp bay, loblolly bay, black gum, Ogeechee tupelo (*Nyssa ogeche*), red maple, dahoon holly, pop ash, yellow poplar, southern magnolia, all oaks, and cabbage palm. Large specimens of titi, wax myrtle, yaupon holly, and tall gallberry occurring in the sub-canopy of planted pine stands do not need to be avoided during thinning operations. Large snags and dead trees, which provide valuable habitat to wildlife, will also be retained whenever possible. Also, natural stands of mixed longleaf and slash pine, and

natural stands of coastal slash pine flatwoods will not be thinned under the initial thinning plan.

Where possible, previously existing loading decks and landing areas should be used for logging staging areas, rather than establishing new sites. These logging decks will be removed after completion of harvesting and thinning within a particular area whenever possible. Additionally, slash and logging debris will be broadcast over the management unit rather than left in large piles.

7.3 Longleaf Pine Planting Plan

Since an adequate seed bank for longleaf pine does not exist within the airport mitigation area, longleaf pine restoration will require artificial regeneration. Areas selected for longleaf planting are based on target ecological community types, soils, and elevation. As indicated in the harvest and thinning section, longleaf will be planted in areas proposed for 411, non-coastal 625, and 626 communities. Nearly 160,000 longleaf pine seedlings will be planted over approximately 5,200 acres of former planted pine.

Planting densities for areas targeted for 411 and 625 restoration will depend on whether the site has been clearcut or whether existing slash pine will be retained. Approximately 625 acres of previously clearcut pine plantation will be planted with longleaf pine at densities of 100 seedlings per acre. Roughly 1,800 acres of planted pine with slash pine retained will be planted at densities of 50 seedlings per acre. Planting densities differ between clearcut and thinned areas to allow for similar tree densities and basal area for these areas once the planted longleaf mature. **Figures 7-7**, **7-8**, **7-9**, and **7-10** depict longleaf planting densities in each of the three mitigation parcels.

Future wet savannas will have longleaf planted in scattered clusters on small slightly elevated "palmetto islands" identified using historic aerials. These "islands" will be planted with one to five longleaf seedlings depending on the size of the island. Roughly 2,300 of these "islands" will be planted in savanna areas spanning roughly 2,800 acres.

Site preparation will be very important when planting longleaf pine, since longleaf pine seedlings are intolerant of shade and need access to bare mineral soil free of competing vegetation. After existing pine stands are thinned, prescribed fire will be conducted during the following fall/winter/early spring. Longleaf seedlings will be planted in the months of October through February the year following the timber thinning (and fire). A second burn may be completed the fall prior to longleaf planting, where possible or necessary. In existing clearcut areas, longleaf will be planted between October and February immediately following the first burn.

Planting methods will involve hand planting of container grown longleaf pine seedlings obtained locally within Northwest Florida, lower Alabama, and/or South Georgia. All longleaf pine planting will be completed by work crews experienced with hand planting longleaf. Longleaf will be planted in an irregular spaced manner at appropriate densities depending on whether the site has been formerly clearcut or thinned. Longleaf pine will

be planted in clusters on slightly elevated topographic features in future pine savanna areas.

7.4 Hydrologic Restoration Plan

It is expected that a major improvement to hydrology within the airport mitigation area will occur when the planted pine is thinned and the shrub layer is reduced through fire. This reduction in biomass should decrease evapotranspiration rates throughout the area and create a more natural hydroperiod for the flatwoods/savanna and other associated wetland areas.

Additionally, several methods will be employed to restore streams, natural flowing wetlands, and wet planted pine that have had hydrology impacted by construction of roads, ditches, and channelization. A discussion of general methods to be used for hydrological restoration follows, while details on restoration of specific sites, typical cross sections, and maps showing the locations of these areas may be found in **Appendix D**. Each specific hydrologic restoration and road removal area will include survey work (profiles and cross-sections), engineering calculations and design, and the development of construction plans and specifications. Plans for specific hydrologic restoration activities will be submitted to USACE and FDEP as part of the yearly progress reports (see Section 10.0).

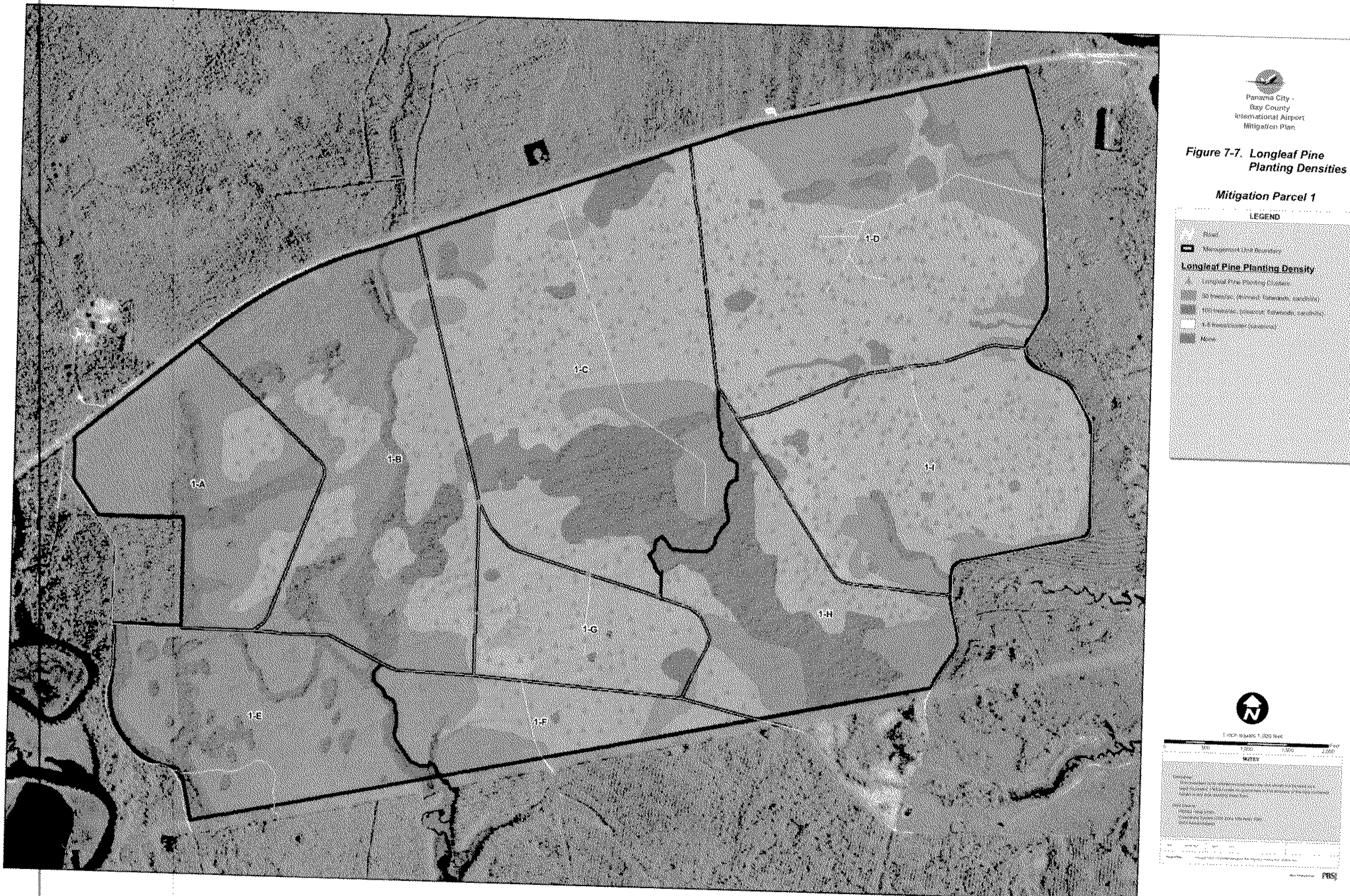
Many of the hydrologic improvements focus on roads constructed through wetlands and at stream and flowing wetland-road crossings. Where roads unnecessary for long-term management (access, fire management) have been constructed at grade without fill and have no associated roadside ditches, the road will be retired simply by discontinuing vehicular use and allowing recruitment of native vegetation. Non-essential roads that are elevated by fill and have roadside ditches, typically have a higher impact on surrounding hydrology and will need to be removed. Fill used to construct these roads will be removed to natural soil and then regraded to the natural grade. Roadside ditches will be filled to the natural grade. All road retirement and removal will occur after the roads are no longer necessary for final thinning of that particular management unit. A total of 42,000 linear feet of roads will be retired or removed. Additional retirement and removal of roads not described in **Appendix D** may be considered under long-term management if it is determined that the road is not necessary for access and fire management.

Several measures will be used to improve flowing wetland/stream crossings along forest roads. The primary activity will be to install a hard bottom low water crossing where a pipe currently exists. The pipe and fill from the road will be removed from the flowing wetland/stream and the associated floodplain, and a hard bottom consisting of gravel, geotextile fabric, or other suitable material will be placed at the elevation of the natural invert of the channel. This will reduce the backing of water and sedimentation upstream of the road and the downstream scouring and erosion that is often caused by the damaged or undersized pipes. Installation of low-water crossings and removal of fill in these systems will also re-connect upstream and downstream floodplain areas and improve the exchange of water between the channel and floodplain. Also, the use of low-water

Panama City - Bay County International Airport Mitigation Plan

Figure 7-7. Longleaf Pine Planting Densities

Mitigation Parcel 1



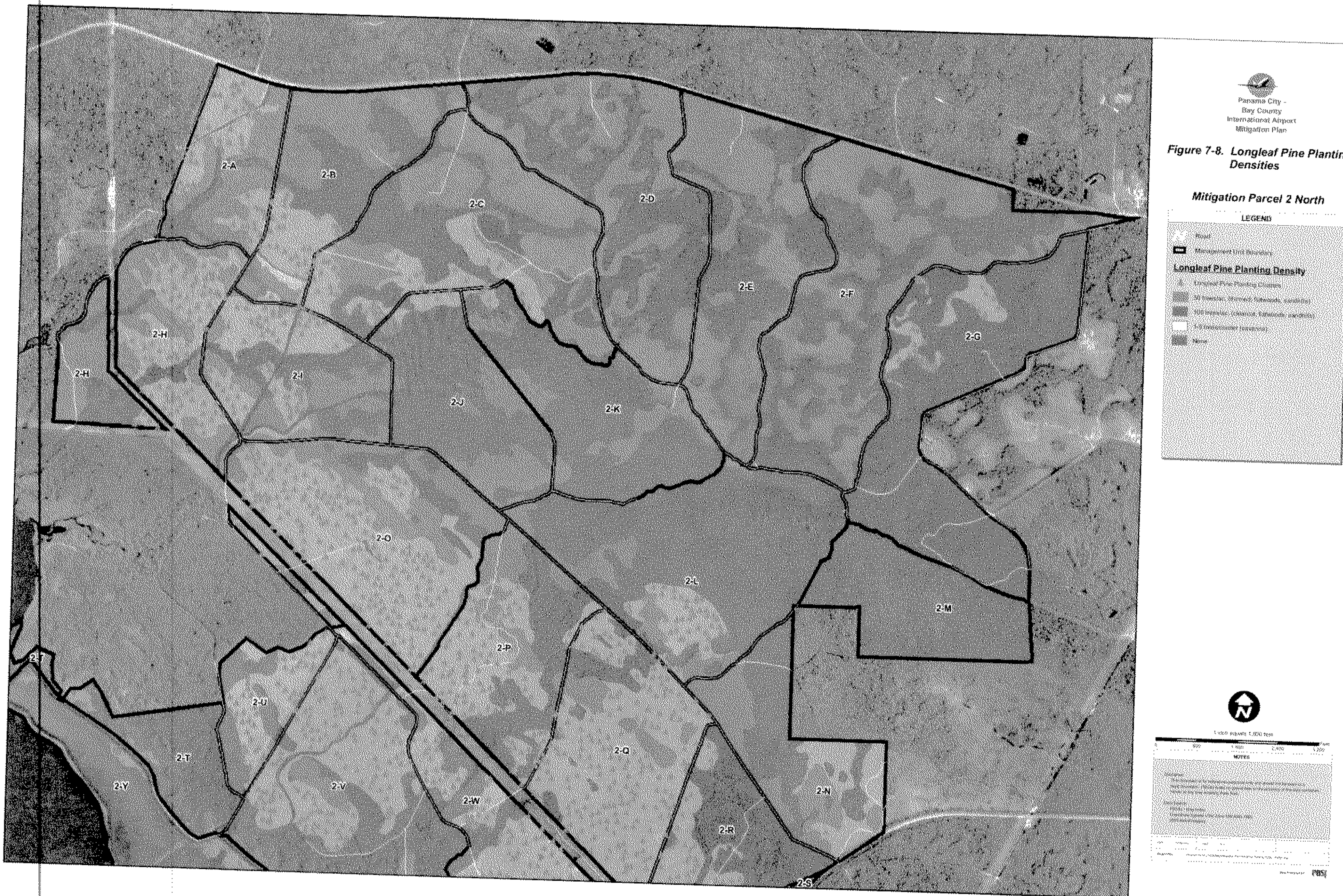


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Figure 7-8. Longleaf Pine Planting Densities

Mitigation Parcel 2 North

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Figure 7-9. Longleaf Pine Planting Densities

Mitigation Parcel 2 South

LEGEND

Longleaf Pine Planting Density

None

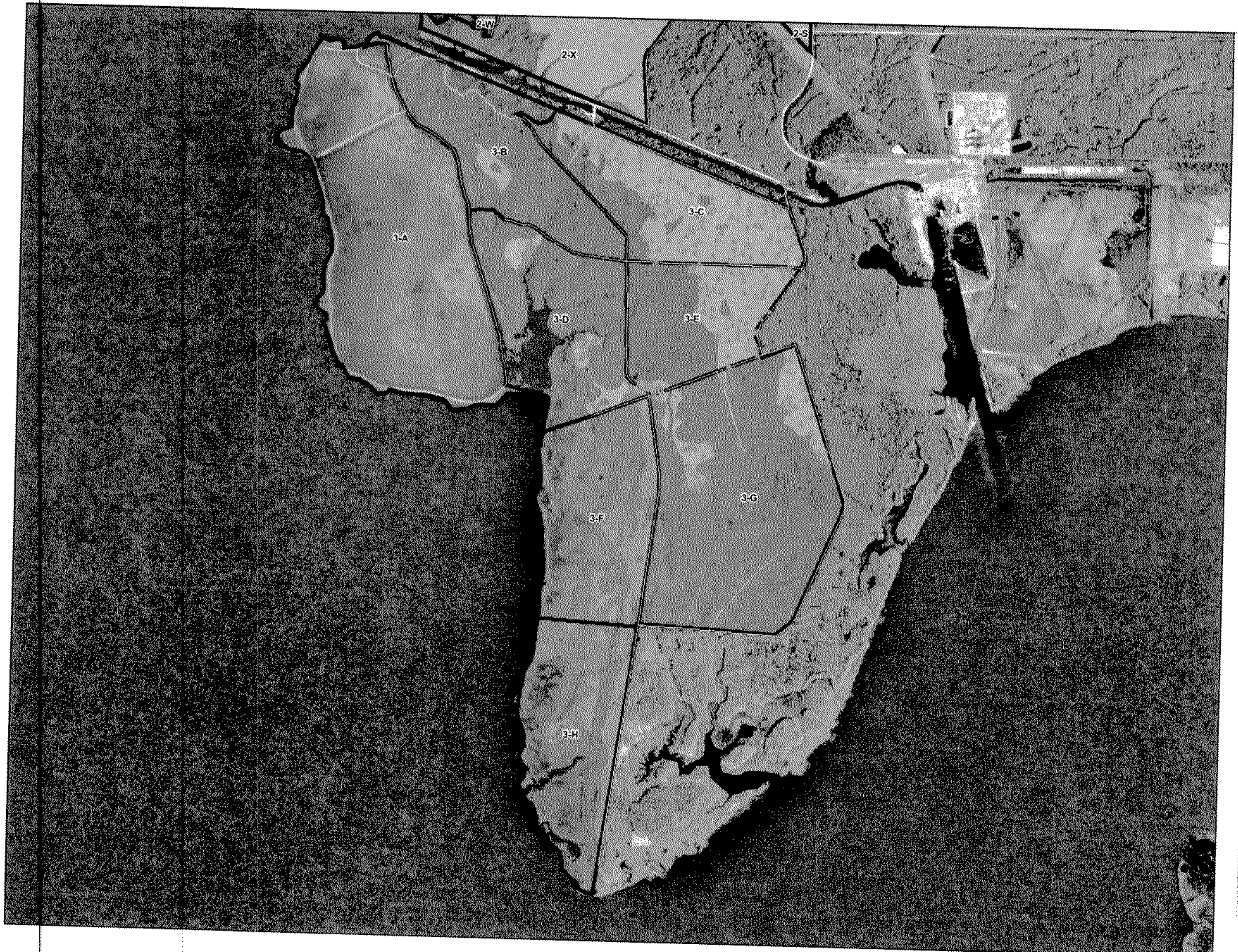

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Figure 7-10. Longleaf Pine Planting Densities

Mitigation Parcel 3

LEGEND

Road

Management Unit Boundary

Longleaf Pine Planting Density

Longleaf Pine Planting Clusters

None

1 inch equals 1,550 feet

NOTES

crossings will remove fish and wildlife barriers created by fill, drainage structures, scouring, and high flow velocities.

Several wooden bridges have been constructed over streams/flowing wetlands. Road fill will be removed from the waterway floodplain and a low water crossing or new bridge will be installed. Additionally, existing low water crossings (either constructed or defacto) will be improved by installing hard bottoms, removing additional road fill to ensure proper invert elevation and floodplain connectivity, and/or appropriately relocating the crossing. A total of 45 low water crossings will be installed or improved. Where man-made ditches cross underneath roads; damaged, inappropriate sized, or incorrectly placed corrugated pipes will be replaced by a new pipe or culvert, appropriately sized and positioned. The same activity applies for pipes that serve to convey water from one roadside ditch to the other. Corrugated pipes at these two types of crossings that have become clogged with sediment and are no longer functioning correctly, will be serviced or replaced with a new pipe. Additional pipe replacement and maintenance will continue as needed during long-term management. Work on stream/wetland crossings will begin after access for thinning is no longer required.

Several man-made ditches occurring throughout the mitigation area will be either backfilled or blocked to prevent drainage of adjacent wetlands. Small ditches may be backfilled entirely, while appropriately positioned ditch blocks placed at regular intervals will be used for larger ditches. Spreaders will be used to disperse flow from intact ditches where downstream portions have been plugged. Approximately 34,000 linear feet of man-made ditches will be backfilled or plugged.

The following techniques will be used to restore streams and flowing wetlands that have been altered through channelization. Certain natural streams and flowing wetlands have had their channels straightened and deepened along the approximate historic location. In these cases, ditch blocks will be installed at specific locations to retard the flow of water through the system, raise the water level to provide better access to or exchange with the floodplain, and restore sinuousity in the channel. Berms created from spoils of previous channel alteration will be removed from the floodplain and may be used to construct the ditch plugs. Alternatively, fill may be placed in the deepened channel to raise the invert to natural elevations or the banks may be regraded. Often channels from historic streams and drainage ways have been relocated to facilitate better drainage. To restore these systems, a ditch block will be installed at the junction of the relocated channel and historic channel. Additional ditch blocks may be installed at regular intervals within the relocated channel. The historic channel may then be re-graded and have bed rows removed as needed so that flow is not blocked or diverted. Roughly 41,000 linear feet of streams and flowing wetlands will be restored through these methods.

7.5 Burn Plan

The prescribed fire plan addresses the use of fire as a restoration and management tool, primarily in pine flatwoods and savanna habitats. Following the thinning of planted pine stands, the prescribed fire plan calls for up to three initial dormant season burns per

management unit on a one to two year rotation, followed by the implementation of growing season burns on a three to five year rotation in perpetuity. The goals of the dormant season burns are to modify and promote fuel characteristics favorable for growing season fire prescriptions while protecting large mature pines and encouraging the expansion of herbaceous ground cover. In addition, the dormant season burns will be aimed at reducing the height and volume of mid-story fuels. The goals of the growing season burns will be to reduce and control woody shrub cover, to promote and maintain natural herbaceous groundcover, and to keep fuel loads low enough to safely burn during the growing season in subsequent years.

The roughly 200 to 300-acre management units described previously will comprise the major burn units. In some cases, additional fire lines may be needed to augment the management unit boundaries, but use of such lines will be minimized, especially in wetland areas. Initial growing season burns may be possible on some management units, and will be used preferentially in place of initial dormant season burns when appropriate. Occasional dormant season burns will also be mixed into the growing season burn rotation. Some variation on the timing of growing season burns will also occur within management units (e.g., an early growing season burn one year followed by a mid or late growing season burn during the next burn rotation, or vice versa, for a particular management unit). The mixing of occasional dormant season fires into a growing season fire regime, and the variation of timing on growing season burns will mimic a more natural fire regime and promote more natural plant communities and wildlife habitat. Some use of dormant season fires may also be needed to protect planted longleaf pines once they leave the grass stage and before they reach heights where fire mortality is less of a concern. Occasional dormant season burns will also promote natural longleaf recruitment and regeneration in the more distant future. Fire will be allowed to burn into non-pine dominated habitats such as cypress domes, flatwoods marshes, salt marshes, etc., when conditions allow and when it would not result in a catastrophic situation. Safety is a requirement of any and all prescribed fire events and no compromises to safety will be allowed. The detailed prescribed fire plan and examples of specific prescriptions are provided as **Appendix E**.

7.6 Dump Site Removal

Approximately 40 small dumpsites have been documented in the mitigation area, particularly along the forest roads and at forest road junctions. Dump materials consist mainly of "white goods" such as washers, dryers, refrigerators, as well as automobile scraps, old tires, construction debris, etc. These dump sites will be removed and properly disposed of at the onset of mitigation activities. Locked gates and other measures described in the section on site protection and maintenance should help prevent future dumping on the mitigation site.

7.7 Exotic and Invasive Species Control

As described previously, exotic and invasive species distribution and abundance are generally low and a serious problem may not occur since preventative action and control

measures will be employed at the time of mitigation implementation. Exotic removal and control will be independent of other mitigation activities and may begin prior to a management unit officially transferring from silviculture to mitigation. Exotic and invasive species control plans focus on Chinese tallow, cogon grass, and feral pigs, all species documented on the mitigation area that have potential to disrupt restoration objectives.

Chinese tallow (*Sapium sebiferum*)

As stated before, Chinese tallow is the most prevalent exotic species present onsite, particularly within Parcel 3. To prevent the spread of tallow, control measures will begin immediately after mitigation implementation. This will be done to reduce the amount of time the tallow has to mature and spread, as well as prevent further spread of this species. If not controlled prior to logging operations, it is believed that tallow reproduction and recruitment will be facilitated by two things: 1) the movement of thinning equipment; 2) open space for recruitment following thinning.

Tallow treatment will be localized to areas of major tallow occurrence, typically where large tallow are present. When possible, tallow control should take place in the spring when seeds are not present and the trees are actively growing, making them more susceptible to herbicides. The method of tallow control will be dependent on the size of the plant. Any tallow small enough and not in seed will be pulled up by hand and removed from the site. If small tallow are found in large quantities over large areas, terrestrial herbicides containing the active ingredient 2-4 D may be applied directly to the foliage, instead of manually removing the plants. Any areas of tallow growing in standing water will be treated with an herbicide labeled for use in aquatic systems. All herbicides will be used in a manner consistent with their labeling. It is also expected that regular prescribed fire will also completely kill or top kill tallow up to three meters in height.

All tallow that are too large to pull out of the ground by hand will be treated with an herbicide in the spring. Trees growing in a terrestrial environment will be girdled at least 15 cm wide around the lowest 30 to 60 cm of the trunk. The girdled area will then be sprayed with triclopyr (eg. Garlon 3A, Garlon 4, Pathfinder II, etc.). The selected herbicide may be diluted and applied with a surfactant in accordance with the labeling. For example, Garlon 4 would be diluted to 20% with oil prior to application. Tallow growing in standing water will be cut as close to the water as possible. An herbicide recommended for use in wetlands, such as Rodeo, will then be applied directly to the freshly cut stump. Treatment in this manner will occur during the spring when no seeds are present on the tree. The cut tree will not be removed to reduce the risk of introducing tallow to additional areas.

The above control methods for Chinese tallow will be used on areas of tallow identified prior to and during initial mitigation implementation. Any additional areas of tallow identified during pine thinning or harvesting, mitigation monitoring, or long-term resource management will be treated using the same methods on an as needed basis. It is

expected that if these preventative control measures are implemented the risk of tallow becoming a serious problem will be small.

Cogon Grass (*Imperata cylindrica*)

Another exotic species present within the mitigation area is cogon grass (*Imperata cylindrica*). Although this highly invasive species was observed in only one location within the boundaries of the mitigation area and has been treated with herbicide by St. Joe Timberland, it has been noted along the County Road 388 right-of-way. St. Joe Timberland regularly treats cogon grass infestations along the right-of-way with herbicides to control and prevent the spread into St. Joe timberlands. Treatment of cogon grass within the right-of-way will need to continue once these lands pass from St. Joe management to mitigation use, and coordination with Bay County Public Works will be required.

The prescription for treating cogon grass along the C.R. 388 right-of-way will be to treat the affected areas with herbicides. Currently, St. Joe Timberland applies a hybrid mix of 27.6 % imazapyr (e.g. chopper) and glyphosate (e.g. Roundup) using a five-gallon backpack sprayer in late summer. Treatment of cogon grass should continue in this manner after mitigation implementation begins. Control of cogon grass using this method will continue until cogon grass is no longer observed at these locations.

Wherever cogon grass is observed within the mitigation, a prescribed burn will precede herbicide application. Application of glyphosate will follow several weeks after the controlled burn. It is sometimes recommended that the cogon grass site be disced prior to herbicide application to break up rhizomes. Although this method may increase the effectiveness of the herbicide, it also increases the chance of spreading cogon grass to other areas and therefore will not be used. There is only one known location of cogon grass within the mitigation area, so preventative action in adjacent areas where cogon grass is known to occur should greatly reduce the likelihood that it will become a problem within the mitigation area.

Feral Pigs (*Sus scrofa*)

In addition to the several species of invasive and exotic plant species present within the mitigation area, a substantial population of non-native wild hogs (*Sus scrofa*) may also pose a risk to ecological restoration of the area. Individuals of this non-native species are either descendants of escaped domestic hogs or hybrids of European boar deliberately released for hunting purposes. Feral hogs are disruptive and may cause damage to soil and native vegetation, particularly planted longleaf pine seedlings. Hogs can also impact ground-nesting birds, small herptofauna, and compete with native wildlife. Additionally, the presence of hogs may present a risk to humans, through disease and their sometimes aggressive disposition, should the mitigation area become available for public use. For these reasons a feral hog control and management plan will be implemented.

A professional shooting and trapping program will be employed as needed to control hog populations, in coordination with all appropriate agencies and in accordance with pertinent regulations. Regular coordination with recreational hunters will also take place, to encourage hunters to take wild pigs whenever possible (within existing state hunting regulations) and to discourage activities that augment pig populations. Protective fencing could be used in certain areas to protect resources at high risk from hog disturbance, such as areas of planted longleaf pine seedlings, if needed. Fences may be of similar construction to those designed to contain domestic hogs, but should be 32 to 39 inches in height to prevent hog access but allowing passage of white-tailed deer. The decision if and where to use protective fencing will be based on the potential for impact on the resource, success of other hog control measures, and cost of the fence.

Other Exotic and Invasive Species

Although documented onsite, camphor tree does not seem to exhibit invasive characteristics and is not expected to be a major management concern. Areas of camphor infestation will be treated during the Chinese tallow control effort. Japanese climbing fern is also not expected to become a management concern, since it has not been documented onsite. If Japanese climbing fern is documented onsite, the area will be recorded and treated with appropriate herbicides as soon as possible, consistent with current BMP's.

8.0 Performance Standards

This section describes performance standards for various aspects or components of the mitigation plan. These standards provide characteristics and measures to be used to judge whether or not the goals of the mitigation plan have been achieved or are trending toward success. In some cases, alternative acceptable conditions, and remedial or contingency measures are included as well, and are typically prefaced with phrases such as "as appropriate" and "if needed". Major categories of performance standards described below include landscape level standards, ecological community standards, and hydrologic standards. Ecological community standards are further separated by groups of related community types, and integrate mitigation activities such as thinning, planting, and prescribed fire.

8.1 Landscape Level

Performance standards at the landscape level will focus on achieving or trending towards the approximate location, spatial distribution, and acreage of ecological community types indicated in the proposed FLUCFCS maps and acreage tables, based on periodic photo-interpretation and limited ground-truthing. Replication of the exact boundaries and acreages indicated in the mitigation plan are not required, however, the composition and relative distribution of community types should be similar to the proposed conditions.

8.2 Wet Pine Savanna (626), Hydric Pine Flatwoods (625), Upland Pine Flatwoods (411)

Vegetation Canopy/Dominant Trees

Performance standards for this component shall be focused on achieving a shift from the dominance of even-aged slash pine and sand pine planted in rows at very high densities and basal areas to conditions trending toward more open canopies with widely spaced trees, mixed stand age, and a mix of slash and longleaf pine where appropriate. Some areas will be dominated primarily by either slash pine or longleaf pine, as described in the mitigation plan. Presence of other desirable tree species including pond cypress, swamp black gum, sweet bay, various oaks, etc. will be acceptable; however, large expanses of dense titi in the canopy or subcanopy will not be acceptable. Areas largely lacking trees, or with widely spaced tree clusters consisting of a few trees will be acceptable, particularly for wet savanna areas in former clear cuts (for which some areas may approximate wet prairie, FLUCFCS 643). Initially, performance standards include achieving the basal areas prescribed in the thinning plan (e.g., 20-30 or 40-50 square feet/ac depending on location; clear cuts for sand pine areas). Initial slash pine basal areas can be somewhat lower than the prescribed values, but should not be higher. With time, as mature trees increase in size, longleaf seedlings grow and mature, and natural recruitment occurs, basal area may increase above the prescribed values. This will be re-evaluated regularly via the monitoring program. Additional low-intensity thinning can be performed on a 10-year or longer rotation, to re-establish appropriate basal area or tree

densities, if needed. With large mature trees in the future, basal area can exceed the initial prescription as long as an open canopy and widely spaced tree distribution are maintained. Note that use of prescribed fire is also expected to provide natural thinning and control of excessive slash pine and hardwood recruitment. Control of exotic tree species, particularly Chinese tallow, will be undertaken so that exotics comprise <1% of the canopy and subcanopy.

Woody Shrubs

Performance standards for this component shall be focused on achieving a shift from the widespread abundance and dominance of woody shrubs such as titi, gallberry, fetterbush, and wax myrtle, to conditions trending toward more open areas without widespread continuous expanses of uninterrupted woody shrubs. This does not mean that woody shrubs should not be present or should be uniformly sparse, but that a trend towards a mosaic that includes substantial expanses of areas that are not dominated by woody shrubs should develop. Under this performance scenario, some shrubby areas, particularly in flatwoods ("shrubby flatwoods"), on elevated "palmetto islands" within wet savannas, and in xeric habitats would still be acceptable, but a dense shrub layer should not be the dominant vegetation feature at ground level across most pinelands in the mitigation area. In such areas, woody shrub height should be generally less than shrub height under pre-mitigation conditions on the site, and should be reduced by pine thinning operations and prescribed fire (supplemented with mechanical treatment if necessary), and maintained by prescribed fire over the long-term. Upland pinelands in well-drained areas, particularly those formerly planted in sand pine, may appropriately trend towards longleaf pine – xeric oak habitat (FLUCFCS 412), rather than upland flatwoods, and may normally include a significant woody shrub component.

Groundcover Vegetation

Performance standards for this component shall be focused on achieving a shift from the widespread abundance and dominance of woody shrubs to conditions trending toward a mosaic that includes substantial open areas dominated by herbaceous groundcover. Percent cover in wet savannas should trend toward 80% or higher cover of native herbaceous species (see **Appendix A**). Percent cover in wet flatwoods should trend toward 50% or higher cover by native herbaceous species. Initially, in wetland areas, herbaceous cover dominated by early succession species associated with physical disturbance, but capable of carrying prescribed fire, will be acceptable. However, with time, herbaceous species composition should trend towards species more typically associated with periodic fire. A trend toward a general increase in diversity (richness) of native groundcover species should also occur. Control of exotic groundcover species, such as cogon grass in upland flatwoods, will be undertaken so that exotics comprise <1% of the groundcover vegetation.

8.3 Cypress (621), Mixed Forested Wetlands (630, 615, 613, 610), Titi (614)

Vegetation Canopy/Dominant Trees

Performance standards for this component shall primarily be focused on maintaining and enhancing the existing canopy condition in terms of species composition, allowing for natural recruitment and growth of desirable species. If natural tree recruitment is not occurring or appears limited, supplemental planting of pond cypress and mixed hardwoods can be conducted as needed. For titi wetlands (614), dominance of tree-sized titi species or a trend in this direction will be an acceptable condition. However, the overall extent of some titi stands may be reduced or constricted and the affected areas replaced by wet pinelands, an herbaceous ecotone, or other mixed wetlands, all with a likely titi component. A shift or trend of this type would be considered a desirable or acceptable outcome depending on site characteristics. Control of exotic tree species, particularly Chinese tallow, will be undertaken so that exotics comprise <1% of the canopy and subcanopy.

Woody Shrubs

Performance standards for this component shall be focused on achieving a shift from the abundance and density of woody shrubs (titi and fetterbush especially), particularly within the ecotone shared by these communities and the adjacent pinelands, but also, to a lesser extent, within the interior of these communities. This does not mean that woody shrubs should not be present or should be uniformly sparse, but that they should be less abundant and dense, particularly within the ecotone. Woody shrub height should be generally less than shrub height under pre-mitigation conditions on the site (especially within the ecotone), and should be reduced by prescribed fire (supplemented with manual or mechanical treatment if necessary), and maintained by long-term prescribed fire management, understanding that fire in the interior of these communities will typically be less frequent than for the surrounding pinelands.

Groundcover

Performance standards for this component shall be focused on achieving a shift toward the dominance of herbaceous groundcover within the ecotone, and a greater abundance of herbaceous cover with the interior of these communities as well, where appropriate. Within the ecotone, percent cover should trend toward 80% or higher cover of native herbaceous species. Initially, herbaceous cover dominated by early succession species associated with physical disturbance, but capable of adequately carrying prescribed fire, will be acceptable in the ecotone. However, with time, herbaceous species composition in the ecotone should trend towards species more typically associated with periodic fire. A trend toward a general increase in diversity (richness) of native groundcover species in the ecotone should also occur. In the interior of these forested wetlands, if a relatively open canopy is present, percent cover should trend toward 20% or higher cover of native herbaceous species (not including natural open water areas). Where these communities contain closed or nearly closed canopies due to large mature trees or other factors related

to relatively natural community structure, shading may limit herbaceous groundcover to occasional patches such as light gaps, which would be an acceptable outcome. Control of exotic groundcover species, will be undertaken so that exotics comprise <1% of the groundcover vegetation in these communities.

8.4 Freshwater Marsh (641) and Shrub Bogs (640)

Vegetation Canopy/Dominant Trees

Performance standards for this component shall primarily be focused on maintaining open marsh and shrub communities generally lacking trees. This condition will be maintained by existing hydrologic conditions and periodic prescribed fire. Occasional seedlings, saplings, and mature shrub-sized specimens of species such as pond cypress, and swamp black gum would be acceptable under appropriate circumstances, especially in shrub bogs. In addition, if a particular marsh or shrub wetland appears to be naturally succeeding toward a woodland or forested system, an increasing abundance of trees (and shrubs) would be acceptable, and the site would be treated as a different wetland type for future considerations. Control of exotic tree species, particularly Chinese tallow, will be undertaken in these wetland types if needed.

Woody Shrubs

Performance standards for this component shall primarily focus on maintaining a lack of woody shrubs in marsh areas through the use of fire. Occurrence of certain shrub species, such as *Stillingia* spp. and *Hypericum* spp., in marshes would be acceptable. For shrub bogs, performance criteria shall focus on maintaining the existing community structure and species composition, primarily dominated by shrubs such as *Hypericum* spp., *Ilex myrtifolia*, *Stillingia* spp., etc. Performance standards for marsh and shrub communities also include achieving a shift from the abundance and density of woody shrubs within the ecotone shared by these communities and the adjacent pinelands (where applicable). This does not mean that woody shrubs should not be present or should be uniformly sparse within the ecotone, but that they should generally be less abundant and dense. In some cases, application of fire in shrub bogs could result in a trend toward less shrub abundance and the development of marsh or wet prairie communities, which would be an acceptable outcome as well.

Groundcover

Performance standards for this component shall be focused on maintaining and enhancing herbaceous cover and species composition within these communities through the use of prescribed fire. Percent cover in marshes should trend toward 80% or higher cover of native herbaceous species. Percent cover in shrub bogs should trend toward 50% or higher cover by native herbaceous species. Some examples of these communities should trend toward a general increase in diversity (richness) of native groundcover species, however, some examples are already relatively diverse, while others may normally be less diverse due to dominance by a characteristic species (flatwoods marshes near the

coast which are dominated by sawgrass, for instance). Based on existing and future hydrologic conditions, the use of prescribed fire, and other factors, some marsh and shrub wetlands may also begin to approximate wet prairie in the future, or may begin to blend in with surrounding wet savanna as the surrounding pine canopy is opened up. Both of these cases would be considered acceptable outcomes. Control of exotic groundcover species in marsh and wetland shrub communities will be undertaken so that exotics comprise <1% of the groundcover vegetation.

8.5 Hydrologic Restoration and Enhancement

Performance standards for hydrologic restoration and enhancement activities shall be based on the appropriate installation/completion and functioning of planned structures and activities.

For low water crossings (LWCs), an improvement of overall channel and floodplain connectivity and continuity will be achieved, and stream and wetland flows across the crossing will approximate or trend towards adjacent hydrologic and geomorphic conditions outside the area previously influenced by the road, culvert, or other existing structure. In addition, there should not be damming, pooling, or excessive sedimentation upstream of the LWC, erosion under or around the structure, excessive sedimentation within the crossing, scouring or erosion on the downstream side, channel straightening or incision, floodplain restriction, or blocking of normal passage for channel and floodplain associated organisms and waterborne materials (all of which currently occur to various degrees in different locations).

For culvert installation, these will either primarily focus on improving hydrologic connectivity between adjacent wetlands separated by essential forest roads, or will function to maintain adequate drainage in association with essential roads. Culvert installation and maintenance should not result in damming, pooling, erosion, or scouring that would run counter to ecological community and hydrologic goals. In most cases, culvert work is primarily planned to replace existing structures that are not functioning properly, resulting in the reduction or elimination of the problems previously mentioned.

Filling and blocking of major ditches and removal of spoil mounds, berms, or bedding rows for purposes of stream and flowing wetland restoration will function so that flow is re-directed from the ditch system to natural stream channels or flowing wetland systems or to former systems that are being re-established. Former stream channels or wetland flow-ways may not always be precisely re-established in terms of location, however, a trend toward the development of natural channel or flowing wetland geomorphology and hydrology should develop over time.

Where filling and blocking of major or minor ditches are planned within flatwoods, savannas, and depressional wetlands, performance standards involve eliminating or slowing channelized drainage of these wetlands, and in some cases, converting the ditch and associated spoil mounds or berms to more natural landforms and ecological communities.

For road removal and roadside ditch filling, performance criteria will be based on re-establishing natural grades and removing restrictions to natural surface water movement, and the establishment of appropriate native species, with the understanding that at least some of these areas may primarily be maintained in a herbaceous condition to serve as low intensity fire lines where needed.

9.0 Site Protection and Maintenance

9.1 Long-term Legal Protection

Conservation easements will provide long-term legal protection of the mitigation area. Easements will be created with FDEP as grantee and will allow for continued long-term maintenance and ecological enhancement of the mitigation area. The conservation easement will be submitted to FDEP and the Corps for review prior to recordation.

9.2 Parties Involved

Site Protection and Maintenance will be the responsibility of the permittee.

9.3 Maintenance Plan and Schedule

Once the final pine thinning and harvest has been completed, longleaf pine has been planted, and the initial dormant season growing burns have been conducted for an individual management unit, that unit will enter into long-term management. The mitigation area will be managed to maintain the longleaf pine flatwoods and savanna communities and to promote wildlife habitat. Long-term management will continue in perpetuity for the mitigation area.

Long-term management of the site will include regular reconnaissance and site security. Site security will include maintenance of locked access gates, signage, and possible use of fencing in some areas, if needed.

Forest roads and stormwater structures such as low water crossings, corrugated pipes, box culverts, and bridges will be maintained as part of long-term management. Activities such as grading and fixing any developing erosion problems will be done under road management. Additionally, if any roads are identified as being no longer necessary for resource management, these roads may be retired or removed as described in Section 7.4. Servicing, repair, and replacement may be conducted on drainage structures as needed.

The major long-term resource management activity will be continued use of prescribed fire. This will include burning on a three to five year rotation, dominated by growing season burns, but allowing for a mix of timing on growing season burns and occasional dormant season burns (see burn plan). As longleaf pine plantings mature over time, some additional selective thinning of slash pine may also be performed periodically, on roughly a 10-year rotation within any particular management unit. Any thinning under long-term management would use passive or low impact methods and not result in severe rutting. Supplemental plantings of longleaf pine and cypress/mixed hardwoods to augment natural recruitment may also occur in selected areas as needed.

Continued monitoring and reconnaissance of the site will also be performed to detect any exotic species problems that may arise over time. It is expected that periodic localized

treatment of exotics such as Chinese tallow, cogon grass, and Japanese climbing fern will be performed under long-term management of the site. Sustained management of wild hogs will also continue. Maintenance of hydrologic structures such as low water crossings will take place periodically, as will forest road management activities (including additional potential road retirement and removal sites).

Passive and active wildlife enhancement will continue under long-term management. Continued use of prescribed fire will benefit the habitat of many wildlife species. Active management techniques that could be utilized would include installation of wood duck boxes in larger cypress, gum, and mixed forested wetland areas; installation of osprey/bald eagle nesting platforms near the coast; placing bluebird and American kestrel nesting boxes within pine savannas; and the relocation of offsite gopher tortoises to restored/enhanced upland habitats. In addition, opportunities will likely exist for enhancement/restoration of wild turkey and quail populations on the site once habitat restoration and enhancement activities are in effect. In the long term, the mitigation area could also potentially contribute to the restoration and management of red-cockaded woodpecker, in coordination with other existing and planned natural resource management areas in the region. Active red-cockaded woodpecker restoration activities could include woodpecker relocations and artificial nest cavity installations. Additionally, coordination will take place with Gulf Power Company to determine if vegetation plantings or other passive means can be used near the access roads/bridges that cross the power plant discharge canal to enhance wildlife crossings between Mitigation Parcels 2 and 3. Finally, management of passive recreation activities, such as hiking, will be incorporated into long-term management of the mitigation areas.

10.0 Monitoring Plan

Field characterization and qualitative baseline monitoring were conducted at roughly 200 randomly located field stations in planted pine areas in 2004 (**Figure 4-1** to **Figure 4-4**). This corresponded to an average of five (5) stations per management unit. Another roughly 800 qualitative field stations were also evaluated, including targeted planted pine and pine flatwoods site characterizations, evaluation of nearly all potential high quality wetlands in the mitigation area (existing and historic 621, 630, 640, and 641 occurrences), and habitat assessments at all potential flatwoods salamander breeding ponds. This also included inventory of all drainage structures on the site, potential road removal areas, potential ditch work sites, existing and historic stream assessments, exotic species observations, listed species occurrences, documentation and characterization of dump sites, etc. These data are archived as field data forms and maps, an interactive MS Access database, and digital photographs from each station. The field characterization and baseline monitoring were used to ground-truth and update existing and historic ecological community maps for the site, and also contributed greatly to the development of the mitigation plan and specific mitigation prescriptions. In addition, these data, particularly the 200 random planted pine stations and the high quality wetland evaluations, document qualitative baseline conditions prior to mitigation implementation across a large number of sites spanning the entire mitigation area, including all parcels, management units, and variations in stand age, prior silviculture treatments, and ecological community types. In terms of qualitative monitoring, these sites can be returned to periodically to rapidly characterize conditions following mitigation implementation, mitigation maturity, and throughout long-term management of the site. Furthermore, baseline and periodic quantitative monitoring is proposed for a subset of these stations, as detailed below.

Thirty-five (35) quantitative baseline and post-mitigation monitoring stations are proposed (**Figure 10-1**). Each quantitative station corresponds to a qualitative baseline station sampled in 2004 (described above). Twenty-eight stations are located in current planted pine areas that are proposed to become: wet pine savanna (9 stations), hydric pine flatwoods (9 stations), wet savanna/mixed forested wetlands (5 stations), or upland pine flatwoods (5 stations). These include a mix of stand ages, test sites for thinning prescriptions, and previously clearcut areas. One station was chosen randomly from each of the management units in Parcels 1 and 2 that are scheduled for the first few phases of mitigation implementation. One station was also chosen randomly from each management unit in Parcel 3 and from planted management units within the historic extent of "Jackson's Titi" in Parcel 2, to achieve equal geographic coverage, to address two of the larger stand age classes, and to account for unique vegetation, soils, and hydrologic characteristics found within these two areas. Seven (7) additional stations correspond to potential high quality wetlands that were also assessed as potential flatwoods salamander breeding ponds during the qualitative baseline monitoring. These stations were chosen randomly from among the same management units selected for monitoring of pine-dominated communities. These 7 stations are located in the following ecological community types: mixed forested wetlands (4 stations), cypress dome/pond

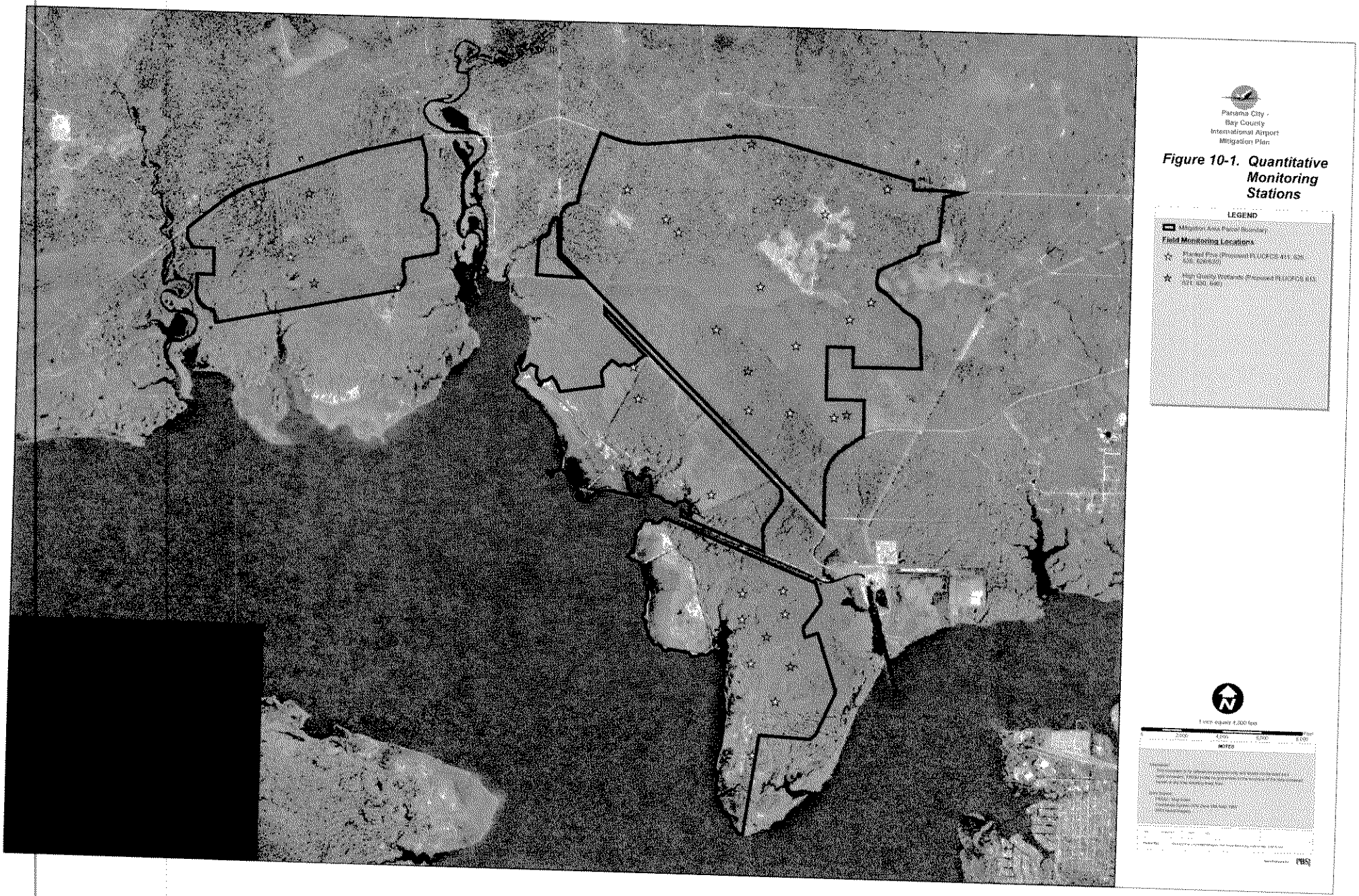

Figure 10-1. Quantitative Monitoring Stations

(1 station), gum pond (1 station), and shrub bog (1 station). These stations are geographically distributed as follows: 2 stations in Parcel 1, 3 stations in Parcel 2, and 2 stations in Parcel 3. These stations also correspond to potential flatwoods salamander breeding ponds with habitat assessment ratings ranging from low to moderate quality.

Quantitative monitoring field protocols will be adapted from the standard methodology for ecological community classification, description, and mapping developed and employed by The Nature Conservancy, NatureServe, the Network of Natural Heritage Programs, and the U.S. Department of the Interior (Grossman et al. 1998, Peet and Allard 1993, http://biology.usgs.gov/npsveg/nvcs.html). This approach is desirable because: 1) it will allow for community level multivariate classification and comparison of monitoring stations before and after mitigation implementation and long-term management, 2) is closely tied to characteristics identified in the performance standards, 3) a substantial body of data exists for comparable natural systems that was collected using the same methodology, 4) data collected using this method can be readily organized for comparison with existing community classifications under the National Vegetation Classification Standard, 5) this field protocol and resultant community classification data integrates well with ecological community mapping using photo-interpretation and GIS.

Quantitative monitoring will entail the use of a large fixed field plot (50 m x 20 m) at each sampling station, divided into 10 fixed 10 m x 10 m subplots. Plots will be oriented along a random heading at each station, with the limitation that the plots will be located entirely within the existing and proposed ecological community type for the site (plots will not overlap with existing or proposed community boundaries). Environmental characteristics and canopy layer/tree data will be collected for the entire plot, except for planted pine stations prior to thinning. For planted pine stands that have not been thinned, one of the 10 m x 10 m subplots (randomly selected) will be used for canopy layer/tree data collection. Shrub and groundcover data will be recorded within four of the 10 m x 10 m subplots (randomly selected). Species-level groundcover layer data will be collected from 10 randomly selected 1 m^2 quadrats occurring within the selected subplots. All species occurring within the 50 m x 20 m plot will also be recorded, even if not included in the quantitative data collected for the subplots and quadrats.

Data collection will include repeated quantitative measures of: (1) canopy and subcanopy tree density, basal area (for planted pine stations), species composition, diameter at breast height (DBH; measured at 1.5 m), and tree height; (2) woody shrub percent cover, height, and species composition; and (3) groundcover percent cover, species composition, and species richness/diversity.

The tree canopy and subcanopy layers will be defined by woody species typically with a single stem or main trunk, diameter at breast height (DBH; measured at 1.5 m) >2.5 cm, and total height >1.5 m. The canopy layer will comprise the typical level of the majority of mature or taller trees. The subcanopy layer will include generally smaller trees growing at less than canopy height. The shrub layer will be defined as woody plants, generally (but not always) of low height, typically with several stems arising from the base of the plant and lacking a main trunk. Small trees, including seedlings and saplings,

≤1.5 m in height or with DBH ≤2.5 cm, will be counted in the shrub layer. The groundcover layer will be defined as all herbaceous species, and weakly woody plants ≤1.5 m tall and with DBH ≤2.5 cm. Vines will be treated as a separate vegetation layer.

Percent cover values will be based on visual estimation using Braun-Blanquet cover classes (**Table 10-1**). Tree and Shrub height will be based on visual estimation ranges (**Table 10-2**).

Table 10-1. Braun-Blanquet (B-B) Cover Class Definitions.

B-B Cover Class	Value
0	Absent
1	0-1% Cover
2	1-5% Cover
3	5-25% Cover
4	25-50% Cover
5	50-75% Cover
6	75-100% Cover

Table 10-2. Tree and Shrub Height Class Definitions.

Height Class	Value
1	<0.5 m (shrub layer only)
2	0.5-2 m
3	2-5 m
4	5-10 m
5	10-15 m
6	15-20 m
7	20-35 m
8	>35 m

Permanent photo-point stations will be established for each quantitative field plot. Photographs will be recorded using a digital camera (5 megapixels or greater). Photographs at each photo-point will be repeated during each monitoring event.

Baseline quantitative vegetation monitoring will take place during fall (September-Nov) prior to the onset of mitigation activities across most of the site. Following mitigation implementation, quantitative monitoring will take place annually for five years. Assuming that the monitoring stations are trending toward the performance standards by the end of 5 years, annual monitoring will cease. Quantitative monitoring will continue thereafter once every five years through 20 years to track the monitoring stations as they reach maturity and to guide long-term management. Beyond 20 years, monitoring will take place every 10 years as needed to support long-term management of the site.

Peizometers and/or staff gauges, as appropriate, will also be placed at strategic locations to record water table and surface water levels before and after mitigation implementation. Qualitative reconnaissance and inspection of larger mitigation areas, characterization and ground-truth stations, and specific work areas (hydrologic restoration sites, road removal areas, thinning units, burn units, etc.) will be conducted in association with the quantitative monitoring, based on set travel routes that will be repeated over time. In addition, specific work sites will be reviewed prior to mitigation activities, and inspected during the work and afterwards to ensure operations are conducted and completed according to plan. Work sites will also be reviewed periodically as appropriate to check the proper function or status of these areas.

In addition to ground-based monitoring, vertical aerial photography will be acquired and photo-interpreted 5, 10, and 20 years after the onset of mitigation (in fall). Afterwards, aerial photography will be acquired every 10 years as needed to support long-term management of the mitigation area. Photo-interpretation of ecological community types will be based on the Florida Land Use, Cover, and Forms Classification System (FLUCFCS).

Statistical analysis of the quantitative monitoring data will be based primarily on before and after comparison of overall community classification. Individual vegetation layer components from the quantitative data will also be evaluated. Comparisons with similar natural communities can be tentatively used as supporting documentation; however, this will not be the main basis for analysis or judging performance.

The mitigation area will be considered to have met the performance standards if a change in ecological communities (in the appropriate direction) is demonstrated for former planted pine areas, or if a trend toward such a change is reasonably shown, based on quantitative monitoring, qualitative reconnaissance and inspection, and photo-interpretation results.

Mitigation Progress Reports that address the implementation of scheduled mitigation activities such as pine thinning/harvest, prescribed burns, longleaf pine planting, etc., as referenced in **Appendix C**, will be submitted to FDEP and USACE annually throughout the implementation phase of the mitigation. These reports will also include the plans for specific hydrologic restoration activities as referenced in Section 7.4. The initial progress report will be a baseline documentation of recent forest management activities on the site. The initial progress report will be due within 60 days after USACE permit issuance. Subsequent progress reports shall be due annually in the same month that the baseline progress report was submitted.

Mitigation Monitoring Reports that address the findings of the mitigation monitoring events shall be submitted to FDEP and USACE according to the monitoring schedule described previously in this document. The initial report shall address baseline monitoring to be conducted within 60 days of USACE permit issuance or earlier. Monitoring reports will be submitted to FDEP and USACE within 90 days of completion of field monitoring activities for that year/period.

Table 10-3 provides a reporting schedule for the Mitigation Progress Reports and the Mitigation Monitoring Reports.

Table 10-3. Schedule of Monitoring Reports.

Year[1]	Required Reports	Frequency
Baseline[2]	Mitigation Progress Report	Project Outset
	Mitigation Monitoring Report	Project Outset
1 - 5	Mitigation Progress Report	Annually
	Mitigation Monitoring Report	Annually
6 - 25	Mitigation Progress Report	Annually
	Mitigation Monitoring Report	Every 5 years
25 +	Mitigation Monitoring Report	Every 10 years

[1]Year as referenced to years since initial impact from airport construction.
[2]Established the year of permit issuance.

11.0 Adaptive Management Plan

To ensure that the mitigation meets the objective and goals outlined in this mitigation plan, many measures will be in place to identify whether success is being achieved and to modify mitigation activities to ensure success of the mitigation. Adaptive management is closely related to the monitoring plan and linked directly to the performance standards. Long-term monitoring will identify the progression of the mitigation area toward the performance criteria, and will identify any areas not trending in the desired direction. For any areas not progressing towards the desired conditions, measures outlined in Section 11.2 will be implemented.

11.1 Responsible Parties

Adaptive management will be the responsibility of the permittee.

11.2 Potential Challenges and Remedial Measures

Although most of the proposed mitigation activities involve low risk, several potential challenges to achieving success have been identified. These challenges will be discussed as they relate to each individual mitigation activity plan: thinning, planting, hydrologic, burn, and exotic control.

Harvest and Thinning of Existing Planted Pine

Since the goals of the harvest and thinning plan include thinning the existing planted slash pine to a basal area that will facilitate the propagation of longleaf pine and the development of more natural groundcover, reductions or increases in the thinning target basal area may take place to achieve these goals. As stated in the harvest and thinning plan, some areas will be experimentally thinned to a lower basal area of 10 to 20 square feet per acre for comparative purposes. If this lower basal area produces more desirable results, target basal areas may be reduced for future thinning operations in younger stands. In addition, supplemental thinning in flatwoods and savanna areas could be conducted for older stands. If excessive rutting unexpectedly occurs during thinning operations, thinning operations will be halted and relocated to drier areas until conditions improve, and excessively rutted areas will be rehabilitated.

Longleaf Pine Planting and Survival

Longleaf pine is proposed to be planted on a wide-spread scale in uplands and wetlands with shorter hydroperiods. This planting scheme was developed with the knowledge that longleaf pine may not survive or do well in all locations, due to hydroperiod, fire, etc. By conducting widespread planting at low densities, it is anticipated that longleaf pine will become established in the locations where it would most likely occur naturally. Mortality due to wetness and fire is expected and accepted, and no specific percent survival has been specified as long as longleaf pine becomes established in a variety of locations and

habitats. Higher survival is expected in some upland areas, and if survival there is poor, replanting will take place. In other areas, replanting will be based upon best professional judgment concerning the cause of low survival in relation to habitat conditions.

Several potential challenges to the success of longleaf have been identified. These challenges relate to available sunlight, competition from other vegetation, target planting densities, predation by feral hogs, mortality and delayed growth due to brown-spot, mortality from excessively wet soils, and mortality from fire. Remedial measures concerning available sunlight were addressed previously under harvest and thinning of planted pine. The prescribed fire conducted prior to planting is expected to reduce competition with herbaceous and woody vegetation while the longleaf pine are in the grass stage. Subsequent prescribed fire should continue to control herbaceous and woody vegetation and allow the longleaf to enter the subcanopy strata. The potential downfall with this strategy is that any fires conducted before the longleaf reach 1.5 meters tall but after the longleaf leave the grass stage could lead to high mortality due to fire. This can be reduced by conducting cool season burns while the longleaf are vulnerable. Supplemental plantings would be planned for any area that experiences widespread longleaf mortality due to fire.

Brown-spot needle blight, caused by *Scirrhia acicola*, is most damaging while longleaf pine are in the grass stage and can lead to increased time in the grass stage and mortality. The risk from brown-spot will be reduced by limiting the amount of time the longleaf will remain in the grass stage through the use of container grown seedlings, which leave the grass stage quicker than bareroot seedlings, and use of prescribed fire to stimulate longleaf pine to reach the height growth stage. Additional controlled burns may also be used to control brown-spot if infections develop within a stand.

If proposed planting densities are found to be producing pine stands that are either too sparse or too dense, future planting densities would be either increased or reduced. Additionally, if longleaf survival was decreased due to poor stock, incorrect planting methods, drought, or disease, supplemental planting could occur. Although excessively wet areas are not targeted for longleaf planting, some mortality may be due to wet conditions. If this occurs, no supplemental plantings of longleaf will be conducted in these areas, since longleaf may not be appropriate due to hydroperiod.

Predation of longleaf pine seedlings by feral hogs could become an issue in some locations. Measures outlined in Section 7.7 should help prevent large-scale predation of seedlings by hogs. Particular hog control measures to protect longleaf seedlings include increased monitoring for hog activity in areas scheduled to be planted, targeted hog eradication in planting areas, and temporary fencing of planted areas. Longleaf planting areas that are significantly affected by hog predation over a wide area will be replanted.

Hydrologic Restoration

Hydrologic structures, such as ditch blocks, low water crossings, and culverts, installed as part of the hydrologic restoration plan will be inspected periodically in accordance with

the monitoring and long-term management plan. If any structure is determined to be functioning incorrectly, it will be serviced or redesigned and replaced depending upon the nature of the problem. Likewise, if unanticipated, undesirable effects, such as excessive flooding or ponding, occur due to specific hydrologic restoration activities, the design will be reevaluated and redesigned, as necessary to correct the situation.

Prescribed Fire

Adaptive management measures in place to ensure that prescribed fire meets ecological objectives and goals are contained within the fire management plan (see **Appendix E**). First and foremost, measures stressing fire safety are described within the plan. Individual prescriptions will be written for each burn to meet safety concerns, smoke management issues, and ecological restoration goals. In order to meet safety concerns and restoration goals, excessive woody vegetation (particularly titi and oaks) may be mechanically thinned in some areas prior to the initial dormant season burns to reduce fuel loads and facilitate the spread of fire. In addition, in areas where several rotations of burning alone has not adequately controlled woody shrubs and vines, mechanical or manual thinning may be combined with burning to achieve shrub control, followed by burning for long-term management[4]. Additionally, the burn plan allows for the variation of the timing of burns to achieve specific restoration goals. This includes accelerating or delaying some burns to promote longleaf pine regeneration during the early stages of the mitigation project.

Exotic Species

As stated previously, exotic species infestation is not currently a problem within the mitigation area, nor is it expected that a significant exotic species problem will develop. A preventative approach is expected to keep the risk of exotic species establishment low. Site reconnaissance conducted under the monitoring and long-term management plans should identify exotic species occurrences within the mitigation plan. Areas of cogon grass or Japanese climbing fern will be immediately treated with appropriate herbicides to control these species. Significant occurrences of Chinese tallow or camphor tree will also be treated with appropriate herbicides to control the spread of these species. It is desired that coordination with Bay County Public Works will lead to a management plan for controlling cogon grass along the CR 388 right-of-way. Controlling cogon grass along the right-of-way should help prevent the establishment of this species within the mitigation area.

[4] Mechanical thinning would be conducted in planted pine areas using appropriate equipment when thinning in wetter areas, while manual thinning would be done in smaller, more sensitive high quality wetlands.

12.0 Allowable Activities

Except for such specific activities as authorized pursuant to the permits, the proposed activities detailed in this mitigation plan, and the conservation easement, the following activities are prohibited on the Property:

a. Construction or placing of structures on or above the ground, including but not limited to buildings, roads, signs, docks, piers or other water dependent structures, billboards or other advertising and utilities;

b. Dumping or placing of soil or other substances or material as landfill, or dumping or placing of trash, waste or unsightly or offensive materials;

c. Removal or destruction of trees, shrubs, or other vegetation, with the exception of nuisance and exotic plants and management activities as described in the mitigation plan;

d. Excavating, dredging, or removing loam, peat, gravel, soil, rock or other material substance in such manner as to affect or disturb the surface of the ground;

e. Surface use except for purposes that permit the land or water area to remain predominantly in its natural condition;

f. Activities detrimental to drainage, flood control, water conservation, erosion control, soil conservation, or fish and wildlife habitat preservation;

g. Acts or uses detrimental to such aforementioned retention and maintenance of land or water areas;

h. Acts or uses detrimental to the preservation of any features or aspects of the Property having historical or archaeological significance; and

i. The recreational use of vehicles, including but not limited to All-Terrain Vehicles.

The following activities are specifically authorized on the Property:

a. Fire fighting or fire suppression activities;

b. Machine clearing of fire lines/fire breaks as part of controlled burn activities, fire fighting, or fire suppression;

c. Installation of fences for land management or habitat protection purposes;

d. Removal or extermination of nuisance or exotic animal species;

e. Hunting of deer, quail and other indigenous animal species pursuant to properly issued hunting permits;

f. Installation of signs for land management, facilitating passive recreation or habitat protection purposes;

g. Maintenance of unpaved nature trails; and

h. Installation of interpretive signs for nature trails.

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Appendix A

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Acer rubrum	Red maple			
Achillea millefolia	Milk pea			
Agalinis spp.	False foxglove			
Aletris aurea	Yellow colic-root			
Aletris lutea	Yellow colic-root			
Ambrosia spp.	Ragweed			
Amphicarpum muhlenbergianum	Little blue maidencane			
Andropogon arctatus	**Pine-woods bluestem**	**N**	**LT**	
Andropogon capillipes	Chalky bluestem			
Andropogon glomeratus	Bushy beardstem			
Andropogon spp.	Bluestem			
Andropogon virginicus	Broomsedge bluestem			
Aristida beyrichiana	Wiregrass			
Aristida palustris	Longleaf threeawn			
Aristida purpurescens	Arrowfeather			
Aristida rhizophora	Florida threeawn			
Aristida simpliciflora	Southern three-awned grass			
Aristida spiciformis	Bottlebrush threeawn			
Aristolochia tomentosa	**Pipevine**	**N**	**LE**	
Arnoglossum album	**White-flowered plantain**	**N**	**LE**	
Arnoglossum diversifolium	**Variable-leaved Indian-plantain**	**N**	**LT**	
Aronia arbutifolia	Red chokeberry			
Arundinaria gigantea	Cane			
Asclepias humistrata	Sandhill milkweed			
Asclepias lanceolata	Fen-flower milkweed			
Asclepias michauxii	Michaux's milkweed			
Asclepias spp.	Milkweeds			
Asclepias viridula	**Southern milkweed**	**N**	**LT**	
Aster eryngiifolius	Thistleleaf aster			
Aster spinulosus	**Pine-woods aster**	**N**	**LE**	
Aster spp.	Asters			
Baccharis angustifolia	False -willow			
Baccharis halimifolia	Saltbush			
Bacopa spp.	water hyssop			
Balduina spp.	Honeycomb heads			
Balduina uniflora	Oneflower honeycombhead			
Baptisia lanceolata	Wild indigo			
Baptisia megacarpa	**Apalachicola wild indigo**	**N**	**LE**	
Batis maritima	Saltwort			
Berlandiera pumila	Greeneyes			
Bidens mitis	Small-fruit beggarticks			
Bigelowia nudata	Rayless goldenrod			
Borrichia frutescens	Sea oxeye			

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Calamintha dentata	**Florida calamint**	**N**	**LT**	
Calamovilfa curtissii	**Curtiss' sandgrass**	**N**	**LT**	
Canna flaccida	Golden canna			
Carex balzellii	**Baltzell's sedge**	**N**	**LT**	
Carex debilis	Caric sedge			
Carex spp.	Caric sedges			
Carex verrucosa	Caric sedge			
Carphephorus odoratissimus	Deer tongue			
Carphephorus spp.	Deer tongue			
Carya glabra	Pignut hickory			
Cassia fasciculata	Partridge pea			
Cassia nictitans	Sensitive briar			
Centella asiatica	Coinwort			
Cephalanthus occidentalis	Common buttonbrush			
Ceratiola ericoides	Rosemary			
Chaptalia tomentosa	Sun-bonnets			
Chasmanthium spp.	Spikegrasses			
Chrysoma pauciflosculosa	Woody goldenrod			
Chrysopsis spp.	Golden-asters			
Cinnamomum camphora	**Camphor tree**			**Yes**
Cladina spp.	Deer mosses			
Cladium jamaicense	Sawgrass			
Cladonia spp.	Deer mosses			
Cleistes divaricata	**Spreading Pogonia**	**N**	**LT**	
Clethra alnifolia	Sweet pepperbush			
Cliftonia monophylla	Black titi			
Clitoria mariana	Butterfly pea			
Conradina canescens	False rosemary			
Coreopsis nudata	Georgia tickseed			
Coreopsis spp.	Tickseed			
Cornus alterniflora	**Alternate-leaf dogwood**	**N**	**LE**	
Crotalaria rotundifolia	Rabbit bells			
Crotalaria spectabilis	Showy Crotalaria			
Croton argyranthemus	Silver croton			
Ctenium aromaticum	toothache grass			
Cyperus pseudovegetus	Marsh flat-sedge			
Cyperus spp.	Flat sedges			
Cyrilla racemiflora	Titi			
Desmodium incanum	Creeping beggarweed			
Desmodium strictum	Pineland beggarweed			
Dicanthelium spp.	Panic grasses			
Dichromena spp.	White-topped sedges			
Diodia teres	Poor Joe			

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Diodia virginiana	Virginia buttonweed			
Diospyros virginiana	Persimmon			
Distichilis spicata	Saltgrass			
Drosera brevifolia	Sundew			
Drosera capillaris	Sundew			
Drosera filiformis	**Thread-dew**	**N**	**LT**	
Drosera intermedia	**Spoon-leaved Sundew**	**N**	**LT**	
Drosera tracyi	Sundew			
Eleocharis spp.	Spikerushes			
Elephantopus spp.	Elephant's feet			
Eragrostis spp.	Lovegrasses			
Eraianthus strictus	Narrow plume grass			
Erianthus giganteus	Sugarcane plumegrass			
Erigeron vernus	Early whitetop fleabane			
Eriocaulon compressum	Flattened pipewort			
Eriocaulon decangulare	Ten-angled pipewort			
Eriocaulon nigrobracteatum	**Dark-headed hatpins**	**N**	**LE**	
Eriocaulon ravenelii	Southern pipewort			
Eriocaulon spp.	Hatpins			
Eriogonum tomentosa	Wild buckwheat			
Eryngium baldwinii	Baldwin's coyote thistle			
Eryngium integrifolium	Blueflower eryngo			
Eupatorium capillifolium	Dog fennel			
Eupatorium leucolepis	Justice weed			
Eupatorium spp.	Dog fennel			
Euphorbia inundata	Spurge			
Euphorbia telephioides	**Telephus spurge**	**LT**	**LE**	
Euthamia graminifolia	Flat -topped goldenrod			
Euthamia minor	Slender flat-topped goldenrod			
Fimbristylis spp.	Fringe-rushes			
Fraxinus caroliniana	Carolina ash			
Fuirena scirpoidea	Southern umbrella sedge			
Fuirena squarrosa	Hairy umbrella sedge			
Gaylussacia dumosa	Dwarf huckleberry			
Gaylussacia frondosa	Dangleberry			
Gaylussacia mosieri	Mosier's huckleberry			
Gelsemium sempervirens	Yellow jessamine			
Gelsemium spp.	Yellow jessamine			
Gentiana pennelliana	**Wiregrass gentian**	**N**	**LE**	
Gordonia lasianthus	Loblolly bay			
Helenium spp.	Sneezeweed			
Helianthus spp.	Sunflowers			
Heterotheca graminifolia	Grassleaf goldenaster			

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Heterotheca subaxillaris	Camphor weed			
Hydrocotyle verticillata	Water pennywort			
Hymenocallis henryae	**Panhandle spiderlily**	**N**	**LE**	
Hymenocallis rotata	Spider lily			
Hypericum brachyphyllum	St. John's wort			
Hypericum chapmanii	Sponge bark hypericum			
Hypericum cistifolium	St. John's wort			
Hypericum crux-andreae	St. Peter's-wort			
Hypericum exile	St. John's wort			
Hypericum fasciculatum	Sandweed			
Hypericum galioides	St. John's wort			
Hypericum gentianoides	Pineweed			
Hypericum hypericoides	St. Andrew's cross			
Hypericum lissophloeus	**Smooth-barked St. John's wort**	**N**	**LE**	
Hypericum microsepala	St. John's wort			
Hypericum spp.	St. John's worts			
Hypericum teterapetalum	St. John's wort			
Hypoxis juncea	Common stargrass			
Ilex cassine	Dahoon holly			
Ilex coriacea	Sweet gallberry			
Ilex glabra	Gallberry			
Ilex myrtifolia	Myrtle-leaved holly			
Ilex opaca	American holly			
Ilex verticillata	Black holly			
Ilex vomitoria	Yaupon			
Illicium floridanum	Florida anise			
Imperata cylindrica	**Cogon grass**			**Yes**
Ipomoea sagittata	Morning glory			
Iris tridentata	Savannah iris			
Iris virginica	Southern blue flag			
Itea virginica	Virginia willow			
Iva frutescens	Marsh elder			
Iva microcephala	Little marsh elder			
Juncus effusus	Soft rush			
Juncus marginatus	Needlerush			
Juncus megacephalus	Large-headed rush			
Juncus polycephalos	Manyhead rush			
Juncus repens	Rushes			
Juncus roemerianus	Black needlerush			
Juniperus virginiana	Red cedar			
Justicia ovata	Water-willow			
Kalmia hirsuta	Hairy wicky			
Lachnanthes caroliniana	Redroot			

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Lachnocaulon digynum	**Pineland bogbutton**	**N**	**LT**	
Lachnocaulon spp.	Bogbottoms			
Lanchnocaulon anceps	Gob button			
Leersia hexandra	Cutgrass			
Lespedeza capitata	Bush clover			
Leucothoe spp.	Dog-hobble			
Liaeopsis spp.	False-Lilly			
Liatris spp.	Blazing stars			
Licania michauxii	Gopher apple			
Lilium catesbaei	**Catesby lily**	**N**	**LT**	
Linum floridanum	Florida yellow flax			
Linum medium	Flax			
Liriodendron tulipifera	Yellow Poplar			
Lobelia brevifolia	Lobelia			
Lobelia glandulosa	Lobelia			
Lophiola americana	Goldcrest			
Ludwigia maritima	Seaside plain seedbox			
Ludwigia pilosa	Hairy primrosewillow			
Ludwigia spp.	Primrose			
Lupinus diffusus	Oak ridge lupine			
Lupinus villosus	Lady lupine			
Lupinus westianus	**Gulf Coast lupine**	**N**	**LT**	
Lycopodium alopecuroides	Foxtail clubmoss			
Lycopodium spp.	Clubmosses			
Lycopus spp.	Bugle weed			
Lygodium japonicum	**Japanese climbing fern**			**Yes**
Lyonia ferruginea	Rusty staggerbush			
Lyonia lucida	Fetterbush			
Macbridea alba	**White birds-in-a-nest**	**LT**	**LE**	
Macranthera flammea	**Hummingbird flower**	**N**	**LE**	
Magnolia grandiflora	Southern magnolia			
Magnolia virginiana	Sweet bay			
Mikania scandens	Climbing hempweed			
Mimosa quadrivalvius	**Silk tree**			**Yes**
Mitchella repens	Partridge berry			
Muhlenbergia capillaris	Gulf muhly			
Muhlenbergia spp.	Muhly grass			
Myrica cerifera	Wax myrtle			
Myrica heterophylla	Bayberry			
Myrica inodora	Odorless wax myrtle			
Nymphaea spp.	Water lilies			
Nymphioides spp.	Floating heart			
Nyssa aquatica	Water tupelo			

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Nyssa ogeche	Ogeechee tupelo			
Nyssa sylvatica var. biflora	Swamp tupelo			
Opuntia humifusa	Prickly pear cactus			
Orontium aquaticum	Golden club			
Osmunda cinnamomea	Cinnamon fern			
Osmunda regalis	Royal fern			
Oxypolis filiformis	Dropwort			
Oxypolis greenmanii	**Giant water dropwort**	**N**	**LE**	
Panicum anceps rhizomatum	Hairy panicum			
Panicum ciliatum	Fringed panicum			
Panicum dichotomum	Forked panicum			
Panicum hemitomum	Maidencane			
Panicum nudicaule	**Naked-stemmed panic grass**	**N**	**LT**	
Panicum repens	Torpedo grass			
Panicum rigidulum	Red-topped panic grass			
Panicum scabriusculum	Wooly panicum			
Panicum verrucosum	Warty panicum			
Panicum virgatum	Switchgrass			
Paspalum distichum	Knotgrass			
Paspalum plicatum	Brownseed paspalum			
Peltandra spp.	Arum			
Persea borbonia	Red bay			
Persea palustris	Swamp bay			
Physostegia godfreyi	**Apalachicola dragonhead**	**N**	**LT**	
Physostegia virginiana	False dragonheads			
Pieris phillyreifolius	Vine wicky			
Pinckneya bracteata	**Fever tree**	**N**	**LT**	
Pinguicula ionantha	**Violet-flowered butterwort**	**LT**	**LE**	
Pinguicula lutea	**Yellow butterwort**	**N**	**LT**	
Pinguicula planifolia	**Chapman's butterwort**	**N**	**LT**	
Pinguicula primuliflora	**Primrose-flowered butterwort**	**N**	**LE**	
Pinus clausa	Sand pine			
Pinus elliottii	Slash pine			
Pinus palustris	Longleaf pine			
Pinus serotina	Pond pine			
Pityopsis graminifolia	Narrowleaf silkgrass			
Pityopsis spp.	Golden aster			
Platanthera ciliaris	**Yellowfringed orchid**	**N**	**LT**	
Platanthera cristata	**Crested yellow orchid**	**N**	**LT**	
Platanthera integra	**Yellow fringeless orchid**	**N**	**LE**	
Platanthera nivea	**Snowy orchid**	**N**	**LT**	
Pleea tenuifolia	Rush-featherling			
Pluchea odorata	Salt marsh fleabane			

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Pluchea rosea	Perennial marsh fleabane			
Pogonia ophioglossioides	**Rose Pogonia**	**N**	**LT**	
Polygala cruciata	Drumhead			
Polygala cymosa	Tall milkwort			
Polygala lutea	Red-hot-poker			
Polygala nana	Candy root			
Polygala spp.	Milkworts			
Polygonella macrophylla	**Large-leaf jointweed**	**N**	**LT**	
Polygonum hydropiperoides	Wildwater-pepper			
Polypremum procumbens	Juniper-leaf			
Pontederia cordata	Pickerelweed			
Pontederia spp.	Pickerelweed			
Proserpinaca palustris	Marsh mermaid weed			
Proserpinaca pectinata	Combleaf mermaid weed			
Proserpinaca spp.	Mermaid Weed			
Pteridium aquilinum	Bracken fern			
Pterocaulon pycnostachyum	Blackroot			
Quercus alba	White oak			
Quercus chapmanii	Chapman's oak			
Quercus geminata	Sand live oak			
Quercus hemisphaerica	Laurel oak			
Quercus incana	Bluejack oak			
Quercus laevis	Turkey oak			
Quercus laurifolia	Swamp laurel oak			
Quercus margaretta	Sand post oak			
Quercus minima	Dwarf live oak			
Quercus myrtifolia	Myrtle-leaved oak			
Quercus nigra	Water oak			
Quercus pumila	Running oak			
Quercus stellata	Post oak			
Quercus virginiana	Live oak			
Rhexia alifanus	Meadowbeauty			
Rhexia lutea	Meadowbeauty			
Rhexia mariana	Pale meadowbeauty			
Rhexia parviflora	**Small-flowered meadowbeauty**	**N**	**LE**	
Rhexia salicifolia	**Panhandle meadowbeauty**	**N**	**LT**	
Rhexia spp.	Meadowbeauties			
Rhododendron austrinum	**Flame azalea**	**N**	**LE**	
Rhododendron chapmanii	**Chapman's azalea**	**N**	**LE**	
Rhododendron viscosum	Swamp azalea			
Rhus copallina	Winged sumac			
Rhus glabra	Sumac			
Rhynchospora chapmanii	Chapman's beakrush			

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Rhynchospora corniculata	Short-bristle beakrush			
Rhynchospora crinipes	**Hairy peduncled beakrush**	**N**	**LE**	
Rhynchospora fascicularis	Fascicled beakrush			
Rhynchospora filifolia	Threadleaf beakrush			
Rhynchospora spp.	Beakrushes			
Rhynchospora stenophylla	**Narrow-leaved beakrush**	**N**	**LT**	
Rubus argutus	Blackberry			
Rubus spp.	Blackberries			
Rubus trivialis	Dewberry			
Rudbeckia nitida	**St. John's Susan**	**N**	**LE**	
Rudbeckia spp.	Black-eyed susan			
Rumex spp.	Docks			
Sabal palmetto	Cabbage palm			
Sabatia spp.	Marsh pinks			
Sabel minor	Bluestem palmetto			
Sagitarria spp.	Arrowheads			
Sagittaria graminea	Grass-leaf Arrowhead			
Sagittaria isoetiformis	Arrowhead			
Sagittaria lancifolia	Lance-leaf arrowhead			
Salicornia perennis	Saltwort			
Salicornia virginica	Perennial glasswort			
Salix caroliniana	Carolina willow			
Sambucus canadensis	Elderberry			
Sapium sebiferum	**Chinese tallow**			**Yes**
Sarracenia flava	Yellow trumpets			
Sarracenia leucophylla	**White-topped pitcher plant**	**N**	**LE**	
Sarracenia minor	**Hooded pitcher plant**	**N**	**LT**	
Sarracenia psitticina	**Parrot pitcher plant**	**N**	**LT**	
Sarracenia purpurea	**Purple pitcher plant**	**N**	**LT**	
Sarracenia rubra	**Sweet pitcher plant**	**N**	**LT**	
Saururus cernuus	Lizard's tail			
Schizachyrium scoparium	Little bluestem			
Schizachyrium stoloniferum	Bluestems			
Schrankia microphylla	Sensitive brier			
Scirpus cyperinus	Wooly bulrush			
Scirpus spp.	Bulrushes			
Scleria ciliata	Nutrush			
Scleria reticularis	Nutrush			
Scleria spp.	Nutrushes			
Serenoa repens	Saw palmetto			
Sesbania herbacea	Rattle-rush			
Sesbania punicea	**Purple sesban**			**Yes**
Sesuvium spp.	Sea purslanes			

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Silene virginica	**Fire pink**	**N**	**LE**	
Smilax laurifolia	Catbriar			
Smilax spp.	Green briars			
Solidago spp.	Goldenrod			
Sorghastrum macundus	Lopsided indiangrass			
Sorghastrum nutans	Indiangrass			
Spartina alterniflora	Saltmarsh cord grass			
Spartina bakeri	Sand cord grass			
Spartina cynosuroides	Big cord grass			
Spartina patens	Marsh-hay cord grass			
Spartina spartinae	Gulf cord grass			
Sphagnum spp.	Sphagnum mosses			
Spiranthes laciniata	**Lace-lip ladies' tresses**	**N**	**LT**	
Spiranthes longilabris	**Long-lip Ladies'-tresses**	**N**	**LT**	
Spiranthes vernalis	Ladies tresses			
Sporobolus curtissii	Curtis dropseed			
Sporobolus floridana	Florida dropseed			
Sporobolus junceus	Pinewoods dropseed			
Stachydeoma graveolens	**Mock pennyroyal**	**N**	**LE**	
Stewartia malacodendron	**Silky camellia**	**N**	**LE**	
Stillingia aquatica	Corkwood			
Stillingia sylvatica	Queen's delight			
Taxodium ascendens	Pond cypress			
Tillandsia usneoides	Spanish moss			
Tolfieldia racemosa	Asphodel			
Toxicodendron radicans	Poison ivy			
Triadenum spp.	Marsh St. John's wort			
Typha domingensis	Southern cattail			
Typha latifolia	Common cattail			
Utricularia spp.	Bladderworts			
Vaccinium arboreum	Sparkleberry			
Vaccinium corymbosum	Highbush blueberry			
Vaccinium darrowi	Glaucous blueberry			
Vaccinium elliottii	Elliot's blueberry			
Vaccinium myrsinites	Shiny blueberry			
Vaccinium stamineum	Deerberry			
Verbesina chapmanii	**Chapman's crownbeard**	**N**	**LT**	
Viburnum nudum	Possumhaw			
Viola spp.	Violets			
Vitis rotundifolia	Muscadine grape			
Woodwardia areolata	Netted chain fern			
Woodwardia virginica	Chain fern			
Xyris isoetifolia	**Quillwort Yellow-eyed grass**	**N**	**LE**	

List of Potential Vegetation that Could Occur in the Panama City - Bay County International Airport Mitigation Area

Scientific Name	Common Name	Federal Status	State Status	Exotic
Xyris longisepala	**Karst pond xyris**	**N**	**LE**	
Xyris scabrifolia	**Harper's yellow-eyed grass**	**N**	**LT**	
Xyris spp.	Yellow-eyed grasses			
Yucca aloifolia	Yucca			
Yucca filamentosa	Yucca			
Yucca flaccida	Weak-leaf yucca			
Zephranthes atamasco	**Atamasco-lily**	**N**	**LT**	
Zigadenus spp.	Crow poison			
Zizania aquatica	Wildrice			

Appendix B

Listed Animal Species That Could Potentially Be Found Within The Panama City – Bay County International Airport Mitigation Area.

Scientific Name	Common Name	Listing Status		Confirmed Onsite
		FWC	FWS	
Fish				
Acipenser oxyrhynchus desotoi	Gulf Sturgeon	SSC	T	
Amphibians				
Ambystoma cingulatum	Flatwoods Salamander	SSC	T	
Rana capito	Gopher frog	SSC	NL	
Reptiles				
Alligator mississippiensis	American alligator	SSC	T(S/A)	Yes
Caretta caretta	Loggerhead sea turtle	T	T	
Chelonia mydas	Green sea turtle	E	E[1] & T[2]	
Drymarchon corais couperi	Eastern indigo snake	T	T	
Eretmochelys imbricata	Hawksbill sea turtle	E	E	
Gopherus polyphemus	Gopher tortoise	SSC	NL	Yes
Lepidocheyls kempi	Kemp's ridley sea turtle	E	E	
Macroclemys temminckii	Alligator snapping turtle	SSC	NL	
Pituophis melanoleucus mugitus	Florida pine snake	SSC	NL	
Birds				
Charadrius alexandrinus	Snowy plover	T	NL	
Charadrius melodus	Piping plover	T	T	
Egretta caerulea	Little blue heron	SSC	NL	Yes
Egretta thula	Snowy egret	SSC	NL	Yes
Egretta tricolor	Tricolored heron	SSC	NL	Yes
Eudocimus albus	White ibis	SSC	NL	
Falco peregrinus	Peregrine Falcon	E	NL	
Falco sparverius paulus	Southeastern American kestrel	T	NL	
Haematopus palliatus	American oystercatcher	SSC	NL	
Haliaeetus leucocephalus	Bald eagle	T	T	Yes
Mycteria americana	Wood stork	E	E	
Pelecanus occidentalis	Brown pelican	SSC	NL	
Picoides borealis	Red-cockaded woodpecker	SSC	E	
Rynchops niger	Black skimmer	SSC	NL	
Sterna antillarum	Least tern	T	NL	
Mammals				
Ursus americanus floridanus	Florida black bear	SSC	NL	Probable

[1] Breeding colony populations in FL and on Pacific coast of Mexico.
[2] Wherever found except where listed as endangered.

Appendix C

Panama City-Bay County International Airport Mitigation Implementation Schedule

Management Unit	Year(s) Stand(s) Planted	Planted Pine Thinning	Initial Burn	Longleaf Planting	Hydrologic Work[5]	Exotic Species Control	Dump Site Removal	Recordation of Conservation Easement	Corresponding Airport Construction Phase(s)
1A	1999	Year 19	Fall/winter Year 19	Fall/winter Year 20	Year 20 (1)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 41-50 Years
1B	1979	Year 0-1	Fall/winter Year 0, Fall/winter Year 1	Fall/winter Year 1, Fall/winter Year 2	Year 9 (2, 12)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
1C	1979, Clearcut	Year 0-1, N/A	Fall/winter Year 0, Fall/winter Year 1	Fall/winter Year 1, Fall/winter Year 2	Year 1-2 (3, 4, 6), Year 20 (5, 6)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
1D	1998	Year 18	Fall/winter Year 18	Fall/winter Year 19	Year 1-2 (5), Year 19 (7), Year 20 (6, 8, 9, 10)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 41-50 Years
1E	1988	Year 8	Fall/winter Year 8	Fall/winter Year 9	Year 9 (2, 11), Year 20 (1)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years
1F	1984	Year 4	Fall/winter Year 4	Fall/winter Year 5	Year 5 (12, 13, 14), Year 9 (12)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
1G	Clearcut	N/A	Fall/winter Year 0	Fall/winter Year 1	Year 5 (13)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
1H	1979	Year 0-1	Fall/winter Year 0, Fall/winter Year 1	Fall/winter Year 1, Fall/winter Year 2	Year 1-2 (6), Year 20 (6)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years

[5] Numbers within parentheses are hydrologic work comments for that parcel as referenced in Appendix D.

Panama City-Bay County International Airport Mitigation Implementation Schedule

Management Unit	Year(s) Stand(s) Planted	Planted Pine Thinning	Initial Burn	Longleaf Planting	Hydrologic Work[5]	Exotic Species Control	Dump Site Removal	Recordation of Conservation Easement	Corresponding Airport Construction Phase(s)
1I	1998, 1999	Year 18, Year 19	Fall/winter Year 18, Fall/winter Year 19	Fall/winter Year 19, Fall/winter Year 20	Year 20 (10, 15, 16, 17)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
2A	1993, 1994	Year 13-14, Year15	Fall/winter Year 13, Fall/winter Year 14, Fall/winter Year 15	Fall/winter Year 14, Fall/winter Year 15, Fall/winter Year 16	Year 15 (1, 2, 3)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 31-40 Years
2B	1979, Clearcut	Year 0-1, N/A	Fall/winter Year 0, Fall/winter Year 1	Fall/winter Year 1, Fall/winter Year 2	Year 1-2 (4, 5, 6), Year 8 (28), Year 15 (3)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
2C	1979	Year 0-1	Fall/winter Year 0, Fall/winter Year 1	Fall/winter Year 1, Fall/winter Year 2	Year 1-2 (5, 7, 8, 9), Year 8 (28), Year 14-15 (10, 11)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
2D	1979, Clearcut	Year 0-1, N/A	Fall/winter Year 0, Fall/winter Year 1	Fall/winter Year 1, Fall/winter Year 2	Year 1-2 (6, 9, 12, 13), Year 14-15 (11)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
2E	1979 Clearcut	Year 0-1, N/A	Fall/winter Year 0, Fall/winter Year 1	Fall/winter Year 1, Fall/winter Year 2	Year 1-2 (15, 16), Year 14-15 (14)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years

Panama City-Bay County International Airport Mitigation Implementation Schedule

Management Unit	Year(s) Stand(s) Planted	Planted Pine Thinning	Initial Burn	Longleaf Planting	Hydrologic Work[5]	Exotic Species Control	Dump Site Removal	Recordation of Conservation Easement	Corresponding Airport Construction Phase(s)
2F	1979, 1997, Clearcut	Year 0-1 Year 17, N/A	Fall/winter Year 0, Fall/winter Year 1, Fall/winter Year 17	Fall/winter Year 1, Fall/winter Year 2, Fall/winter Year 18	Year 1-2 (16), Year 14-15 (17)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years, Phase 31-40 Years
2G	Clearcut	N/A	Fall/winter Year 0	Fall/winter Year 1	Year 1 (18, 19, 20, 21, 22, 23, 24), Year 14-15 (17)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 41-50 Years
2H	1987, 1993	Year 7, Year 13-14	Fall/winter Year 7, Fall/winter Year13-14	Fall/winter Year 8, Fall/winter Year 14-15	Year 8 (26, 27, 28), Year 14-15 (25)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years
2I	1987	Year 7	Fall/winter Year 7	Fall/winter Year 8	Year 8 (28), Year 14-15 (28)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years
2J	1993	Year 13-14	Fall/winter Year 13, Fall/winter Year 14	Fall/winter Year 14, Fall/winter Year 15	Year 14-15 (28, 29)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years
2K	1993, Clearcut	Year 13-14, N/A	Fall/winter Year 0, Fall/winter Year 13, Fall/winter Year 14	Fall/winter Year 1, Fall/winter Year 14, Fall/winter Year 15	Year 14-15 (10, 14)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years

Panama City-Bay County International Airport Mitigation Implementation Schedule

Management Unit	Year(s) Stand(s) Planted	Planted Pine Thinning	Initial Burn	Longleaf Planting	Hydrologic Work[5]	Exotic Species Control	Dump Site Removal	Recordation of Conservation Easement	Corresponding Airport Construction Phase(s)
2L	1993, Clearcut	Year 13-14, N/A	Fall/winter Year 0, Fall/winter Year 13, Fall/winter Year 14	Fall/winter Year 1, Fall/winter Year 14, Fall/winter Year 15	Year 14-15 (30, 31)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 31-40 Years
2M	1993, Clearcut	Year 13-14, N/A	Fall/winter Year 0, Fall/winter Year 13, Fall/winter Year 14	Fall/winter Year 1, Fall/winter Year 14, Fall/winter Year 15	N/A	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years, Phase 21-30 Years
2N	1993	Year 13-14	Fall/winter Year 13, Fall/winter Year 14	Fall/winter Year 14, Fall/winter Year 15	Year 14-15 (32, 33, 38, 40)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years
2O	1989	Year 9	Fall/winter Year 9	Fall/winter Year 10	Year 10 (34, 35, 36), Year 14-15 (29)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years
2P	1981, 1989	Year 1, Year 9	Fall/winter Year 9, Fall/winter Year 1	Fall/winter Year 2, Fall/winter Year 10	Year 2 (37), Year 10 (36), Year 14-15 (30, 31)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years, Phase 21-30 Years
2Q	1981	Year 1	Fall/winter Year 1	Fall/winter Year 2	Year 2 (37, 38)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
2R	Clearcut	N/A	Fall/winter Year 0	Fall/winter Year 1	Year 1 (38, 39), Year 2 (38), Year 14-15 (38, 40)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years

Panama City-Bay County International Airport Mitigation Implementation Schedule

Management Unit	Year(s) Stand(s) Planted	Planted Pine Thinning	Initial Burn	Longleaf Planting	Hydrologic Work[5]	Exotic Species Control	Dump Site Removal	Recordation of Conservation Easement	Corresponding Airport Construction Phase(s)
2S	1985	Year 5	Fall/winter Year 5	Fall/winter Year 6	N/A	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
2T	1992	Year 12	Fall/winter Year 12	N/A	N/A	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years
2U	Clearcut	N/A	Fall/winter Year 0	Fall/winter Year 1	N/A	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 31-40 Years
2V	1973	Year 0-1	Fall/winter Year 0, Fall/winter Year 1	Fall/winter Year 1, Fall/winter Year 2	Year 1-2 (41), Year 10 (36), Year 13 (37)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
2W	Clearcut	N/A	Fall/winter Year 0	Fall/winter Year 1	Year 1 (42, 43), Year 2 (37) Year 10 (36), Year 13 (37)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 41-50 Years
2X	1985	Year 5	Fall/winter Year 5	Fall/winter Year 6	Year 6 (44)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 11-20 Years
2Y	N/A	N/A	N/A	N/A	N/A	Year -1 ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 0-10 Years
3A	N/A	N/A	N/A	N/A	N/A	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 11-20 Years
3B	1986	Year 6-7	Fall/winter Year 6, Fall/winter Year 7	Fall/winter Year 7, Fall/winter Year 8	Year 7-8 (1, 3)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 11-20 Years

Panama City-Bay County International Airport Mitigation Implementation Schedule

Management Unit	Year(s) Stand(s) Planted	Planted Pine Thinning	Initial Burn	Longleaf Planting	Hydrologic Work[2]	Exotic Species Control	Dump Site Removal	Recordation of Conservation Easement	Corresponding Airport Construction Phase(s)
3C	1986	Year 6-7	Fall/winter Year 6, Fall/winter Year 7	Fall/winter Year 7, Fall/winter Year 8	Year 7-8 (2, 3)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 11-20 Years
3D	1986	Year 6-7	Fall/winter Year 6, Fall/winter Year 7	Fall/winter Year 7, Fall/winter Year 8	Year 7-8 (1, 4, 5, 6)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years
3E	1986	Year 6-7	Fall/winter Year 6, Fall/winter Year 7	Fall/winter Year 7, Fall/winter Year 8	Year 7-8 (4, 5, 6)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 11-20 Years
3F	1986	Year 6-7	Fall/winter Year 6, Fall/winter Year 7	Fall/winter Year 7, Fall/winter Year 8	Year 7-8 (7, 11)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years
3G	1986	Year 6-7	Fall/winter Year 6, Fall/winter Year 7	Fall/winter Year 7, Fall/winter Year 8	Year 7-8 (7, 8, 9, 10, 11)	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 11-20 Years
3H	1986	Year 6-7	Fall/winter Year 6, Fall/winter Year 7	Fall/winter Year 7, Fall/winter Year 8	N/A	Year 0-1/ ongoing	Year 0-1	As required by FDEP and USACE Permits for this project	Phase 21-30 Years

Appendix D

Hydrologic Restoration Sites – Conceptual Descriptions

In the following section, specific hydrologic restoration sites are described. Subject management units and scheduled years of work are provided for each conceptual description. **Figures D-1** through **Figure D-4** show the locations of these restoration areas. **Figures D-5** through **Figure D-8** illustrate typical cross sections.

Parcel 1

Site No.

1) Remove road fill and improve existing (defacto) low water crossing (1A/1E, Year 20).

2) Construct low water crossing (or bridge), remove fill for road that is in floodplain of the stream (1B/1E, Year 9).

3) Restore historic stream/flowing wetland channel, via re-grading and removing bedding rows that block/divert natural flow (1C, Year 1-2).

4) Remove road and fill roadside ditches, return to natural grade (1C, Year 1-2).

5) Install new culvert/pipe, sized appropriately (1C/1D, Year 1-2).

6) Restore natural channel/drainage way leading toward large basin swamp to south. Install ditch block near juncture of historic flow-way and current ditch system. Install additional ditch blocks at regular intervals along larger ditch that runs parallel to road, roughly 30 ft from road (not the roadside ditch), if necessary. Re-grade historic channel location and remove bedding rows as needed so flow is not blocked/diverted (1C/1H, Year 1-2). Also, install LWCs in two locations near road and flow-way junctures to enhance connectivity (1C/1D/1H, Year 20).

7) Remove road and fill roadside ditches, return to natural grade (1D, Year 19).

8) Remove pipe and road fill through stream/floodplain, install low water crossing (1D, Year 20).

9) Remove pipe and road fill through stream/floodplain, install low water crossing. Move crossing to north to natural flow-way location (1D, Year 20).

10) Remove fill for road and improve existing (defacto) low water crossing (1D/1I, Year 20).

11) Remove road, associated ditch, and low water crossing from wetland and stream, including various drainage/construction debris at crossing (1E, Year 9).

12) Backfill ditch (1F, Year 5), install pipe at road juncture (if needed) (Year 9, 1B/1F), install turn-outs for roadside ditches to north at regular intervals as needed to divert ditch flow back to wetlands.

13) Backfill/plug interior ditch, install new pipe with spreader at road on north end to maintain access (1F/1G, Year 5).

14) Remove road, culvert, and fill roadside ditches, return to natural grade (1F, Year 5).

15) Remove road and fill roadside ditches, return to natural grade (1I, Year 20).

16) Install new culvert/pipe, sized appropriately (1I, Year 20).

17) Remove road fill and improve existing low water crossing (1I, Year 20).

Parcel 2

Site No.

1) Retire road; install new pipe/culvert, sized appropriately (2A, Year 15).

2) Remove road fill and improve existing low water crossing. Improve road to reduce erosion potential (2A, Year 15).

3) Remove pipe and road fill through stream/floodplain, install low water crossing (2A/2B, Year 15).

4) Backfill/plug interior ditch (2B, Year 1-2).

5) Plug large ditch running parallel to road (not roadside ditch). Install culverts and/or low water crossings as appropriate to restore natural connection within large historic basin/drainage drainage swamp. Retire road to the north and remove existing pipe (2B/2C, Year 1-2).

6) Remove pipe and road fill through stream/floodplain, install box culvert or low water crossing (2B/2D, Year 1-2).

7) Remove road and fill roadside ditches, return to natural grade (2C, Year 1-2).

8) Remove road and fill roadside ditches, return to natural grade (2C, Year 1-2).

9) Remove road fill and improve existing low water crossing (2C/2D, Year 1-2).

10) Plug large ditch running parallel to road (not roadside ditch). Install low water crossing at east end to restore natural connection of historic drainage system (2C/2K, Year 14-15).

11) Remove pipe and road fill through stream/floodplain, install low water crossing (2C/2D, Year 14-15).

12) Backfill/plug small interior ditch (2D, Year 1-2).

13) Retire road north of bend. Remove road south of bend and fill roadside swale, return to natural grade (2D, Year 1-2).

14) Remove pipe and road fill through stream/floodplain, install low water crossing (2E/2K, Year 14-15).

15) Remove road and fill roadside ditches, return to natural grade (2E, Year 1-2).

16) Remove road fill and improve existing low water crossing (2E/2F, Year 1-2).

17) Remove pipe and road fill through stream/floodplain, install low water crossing (2F/2G, Year 14-15).

18) Remove road and fill roadside ditches, return to natural grade (2G, Year 1).

19) Construct low water crossing (or bridge), remove bridge and road fill that is in floodplain of the stream (2G, Year 1).

20) Remove road fill and improve existing low water crossing. Move low water crossing 100 feet to southwest (2G, Year 1).

21) Remove fill for road and improve existing low water crossing (2G, Year 1).

22) Remove pipe and road fill through stream/floodplain, install low water crossing (2G, Year 1).

23) Remove road and fill roadside ditches, return to natural grade (2G, Year 1).

24) Remove fill for road and improve existing low water crossing (2G, Year 1).

25) Remove pipe and road fill through stream/floodplain, install low water crossing (2H, Year 14-15).

26) Propose to remove pipe and road fill through stream/floodplain, install low water crossing. Structure within powerline property and may create issues with access. Subject to Gulf Power coordination (2H, Year 8).

27) Propose to remove fill for road and improve existing low water crossing. Structure within powerline property. Subject to Gulf Power coordination (2H, Year 8).

28) Restore natural channels/drainage ways leading toward Marl Hammock Branch to the southwest. Install ditch block near juncture of historic flow-ways and current ditch system. Install additional ditch blocks at regular intervals along northern ditch, northwestern portion of ditch, and southeastern portion of ditch, if necessary. Re-grade historic channel location, remove berms along existing channel, and remove bedding rows as needed so flow is not blocked/diverted. Install ditch blocks along ditch within historic stream channel/drainage way location to retard drainage of water from the system and provide access to associated floodplain (2I, Year 8). Install low water crossing on road between 2H and 2I to help reconnect historic drainage (2H/2I, Year 8).

Also, install new pipe with spreader where ditch running north/south crosses road to maintain access (2B/2I, Year 8). Remove road fill and improve existing (defacto) low water crossing where current ditch and historic drainage flowed into 2I from 2C (2C/2I, Year 8). Remove fill for road and install low water crossing in south east of 2I where Marl Hammock Branch historically entered 2J (2I/2J, Year 14-15). Remove pipe and road fill through stream/floodplain where Marl Hammock Branch crosses into 2I from 2H, install low water crossing (2H/2I, Year 8).

29) Remove fill for road and improve existing low water crossing to restore connectivity of historic drainage (2J/2O, Year 14-15).

30) Remove pipe and road fill through stream/floodplain and install low water crossing (2L/2P, Year 14-15).

31) Remove pipe and road fill in historic drainage and install low water crossing to restore/improve connectivity of historic drainage system. Potential for regrading/removal of bedding rows in historic drainage (2L/2P, Year 14-15).

32) Remove road and fill roadside ditches. Restore to natural grade. Some work subject to Gulf Power coordination (2N, Year 14-15).

33) Serious erosion currently occurring along road and down road. Build road higher and improve roadside ditches to prevent road erosion. Install pipes to convey water from east side of road to larger roadside ditch on west side of road. Further to west, remove road fill within stream/drainage way channels and improve two existing low water crossings (2N, Year 14-15).

34) Backfill/plug small interior ditch (2O, Year 10).

35) Remove road and fill roadside ditches. Restore to natural grade. Remove berms along road at northeast terminus (2O, Year 10).

36) Restore natural channel/drainage way. Install ditch blocks where ditch junctions with historical channel. Re-grade historic drainage location and remove bedding rows as needed so flow is not blocked/diverted. Re-grade and install ditch plugs as necessary to restore historic sinuousity, retard flow, and provide access to floodplain where ditch is

located in historic stream channel/drainage way location. May need to relocate road in 2P or install low water crossings as needed to allow drainage to return to historic location. Remove berms along ditch channel (2O/2P/2V/2W, Year 10). Remove pipe and road fill in stream/floodplain and install low water crossing (2V/2W, Year 10). Some work subject to coordination with Gulf Power for areas in and adjacent to Gulf Power property.

37) Restore natural channel/drainage way. Install ditch blocks where ditch junctions with historical channel/drainage way. Re-grade historic drainage location and remove bedding rows as needed so flow is not blocked/diverted, particularly in section where historic drainage split. Re-grade and install ditch plugs as necessary to restore historic sinuousity, retard flow, and provide access to floodplain where ditch is located in historic stream channel/drainage way location. Remove berms along flow way (2P/2W, Year 2). Remove two pipes and road fill along the western boundary road of 2W and install low water crossings (2V/2W, Year 13). Remove road fill and install low water crossing south of corner of 2P and 2Q to facilitate restoration of historic drainage (2W, Year 13). Some work subject to coordination with Gulf Power for areas in and adjacent to Gulf Power property.

Install ditch blocks in eastern ditch draining small 614 system in 2Q to retard the movement of water to help rehabilitate this historic drainage system. Remove pipe and road fill where ditch crosses road and install low water crossing (2P/2Q, Year 2).

38) Regrade ditched drainage way to allow access to associated floodplain (2R, Year 1). Remove bridge and road fill from drainage way and install low water crossing or new bridge as appropriate (2N/2R, Year 14-15). Install ditch block where southwestern east-west ditch junctions with historic drainage. Install additional ditch blocks along ditch at regular intervals to prevent drainage of surrounding wetlands (2R, Year 1). Clean sediment from pipe or install new pipe where small northern ditch crosses road (2Q/2R, Year 2).

39) Retire road (2R, Year 1).

40) Remove pipe and road fill from drainage way and install low water crossing (2N/2R, Year 14-15).

41) Remove road and fill roadside ditches. Restore to natural grade (2V, Year 1-2).

42) Remove road and fill roadside ditches. Restore to natural grade (2W, Year 1).

43) Install ditch blocks at regular intervals within series of ditches flowing to main ditch to prevent drainage of adjacent wetlands. Install new pipes where ditches cross road bisecting 2W (2W, Year 1).

44) Replace damaged pipe with appropriately sized pipe (2X, Year 6).

Parcel 3

Site No.

1) Remove road fill and install low water crossing (3B/3D, Year 7-8).

2) Remove road fill and fill roadside ditches. Restore to natural grade. Removal of road will restore hydrologic connection of 641 system (3C, Year 7-8).

3) Remove road fill and improve existing (defacto) low water crossing (3B/3C, Year 7-8).

4) Remove road fill and improve existing (defacto) low water crossing (3D/3E, Year 7-8).

5) Remove road fill and improve existing (defacto) low water crossing (3D/3E, Year 7-8).

6) Install ditch blocks at regular intervals within east-west ditch to prevent drainage of adjacent wetlands. Keep small roadside ditch to facilitate drainage away from road (3D/3E, Year 7-8).

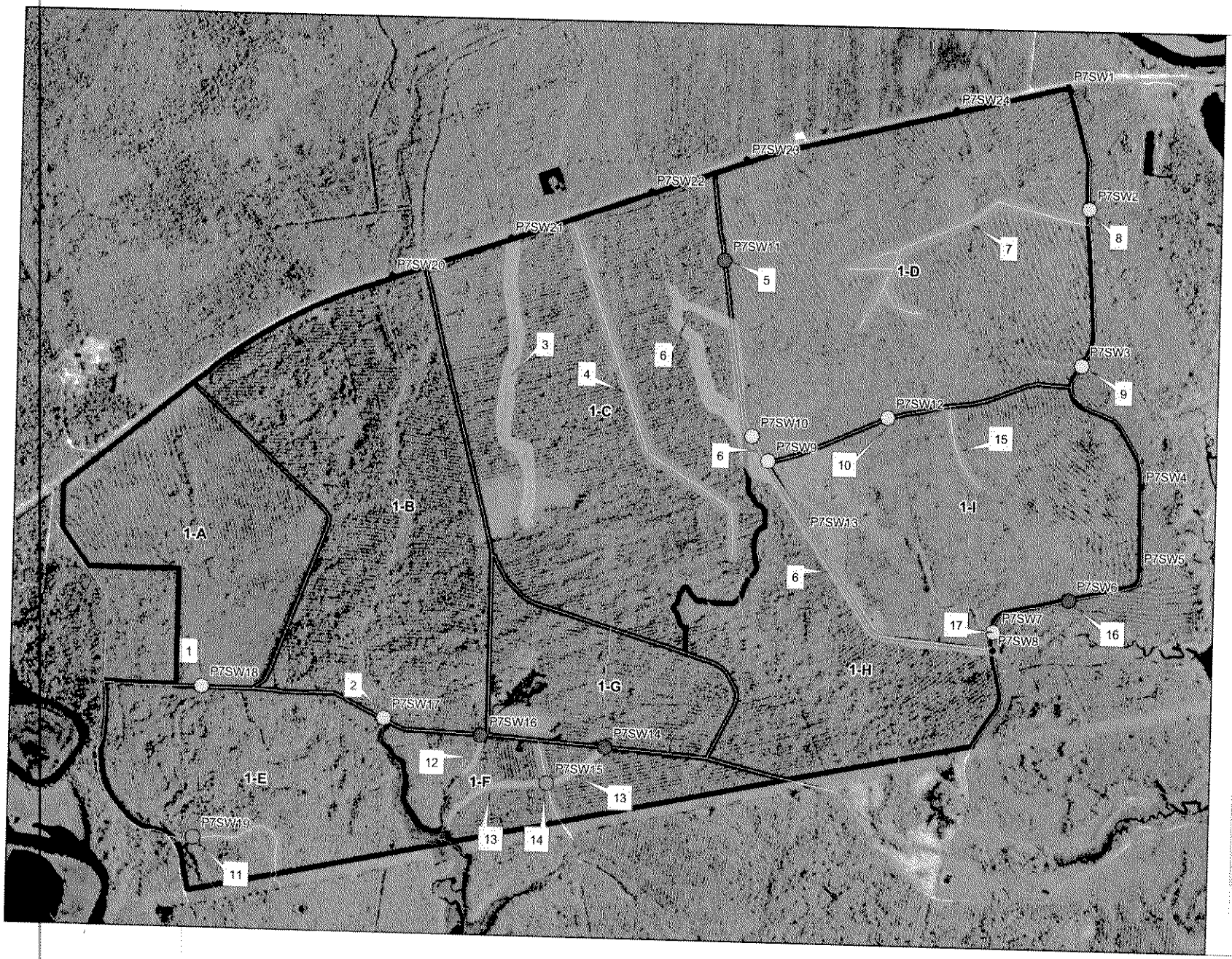
7) Install ditch blocks at regular intervals within northern small east-west ditch to prevent drainage from depressional wetland. Install ditch blocks at regular intervals in small southern east-west ditch to prevent draining of adjacent wetlands. Install ditch blocks at regular intervals within large north-south ditch to prevent drainage of adjacent wetlands and surrounding area (3G, Year 7-8). Remove pipe and road fill where ditch/natural drainage way crosses from 3G to 3F and install low water crossing (3F/3G, Year 7-8).

8) Remove road and fill roadside ditches. Restore to natural grade (3G, Year 7-8).

9) Install ditch blocks at regular intervals within ditch draining large gum swamp. Install new appropriately sized pipe where ditch crosses road (3G, Year 7-8).

10) Remove road and fill roadside ditches. Restore to natural grade (3G, Year 7-8).

11) Install pipes or culverts as needed to re-establish hydrologic connectivity of 641 system (3F/3G, Year 7-8).



Panama City - Bay County International Airport Mitigation Plan

Figure D-1. Hydrologic Restoration

Mitigation Parcel 1

LEGEND

River

Management Unit Boundary

Hydrologic Restoration Areas

FLUCFCS Type 510 - Streams and Waterways

Ditched Historic Water Courses

Road Removal/Improved Areas

Hydrologic Restoration Activity Area

Existing & Proposed Structures

Existing Structure - No Work Proposed

Existing Structure Removal

Low Water Crossing (LWC) Installation

New Pipe Installation

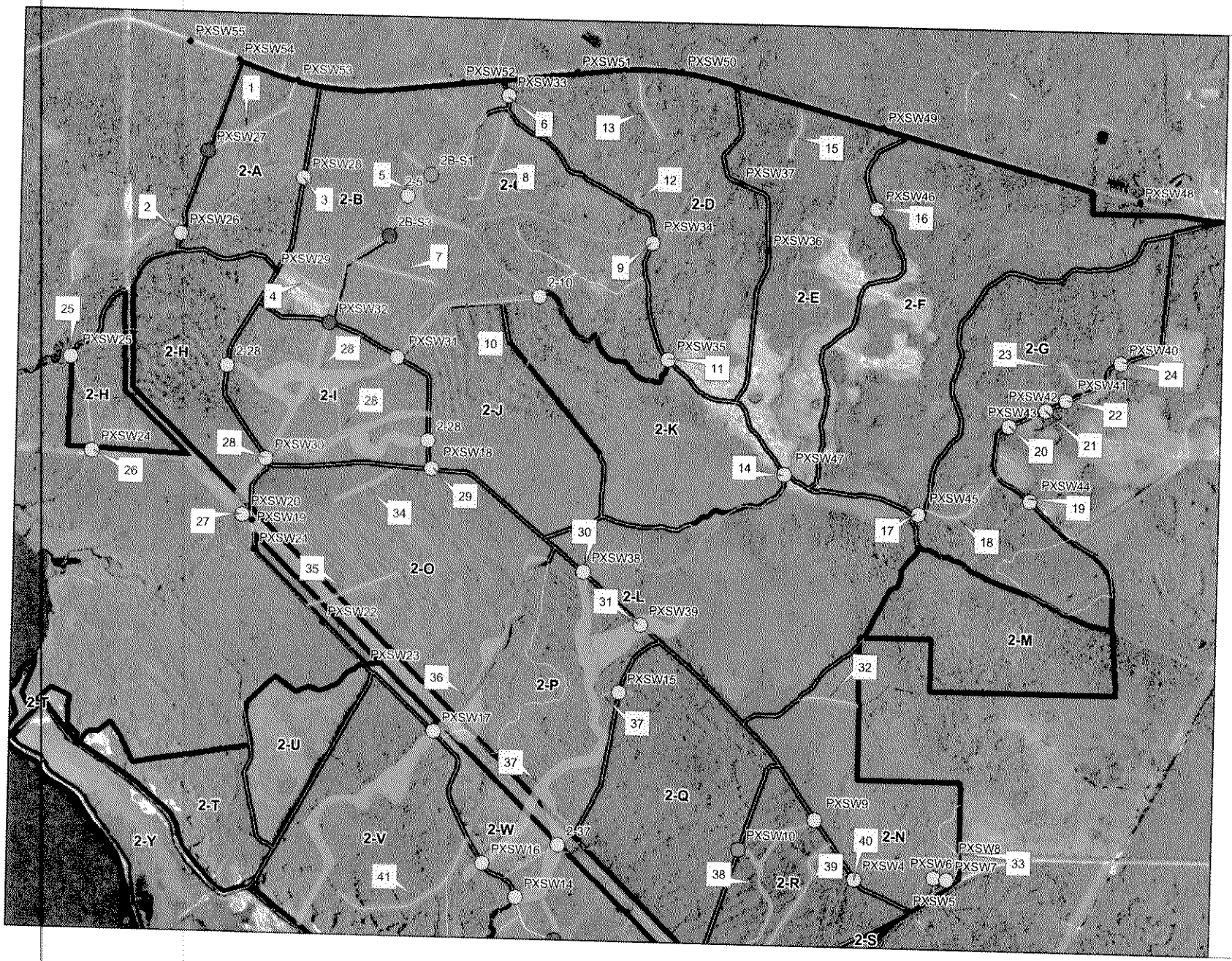
Clean Out

Side Determination Letter

1 inch equals 1,000 feet

0 500 1,000 1,500 2,000 Feet

NOTES



Panama City - Bay County International Airport Mitigation Plan

Figure D-2. Hydrologic Restoration

Mitigation Parcel 2 - North

LEGEND

Road

Management Unit Boundary

Hydrologic Restoration Areas

FLUCCS Type 510 - Streams and Waterways

Selected Historic Water Courses

Road Removal/Retirement Areas

Hydrologic Restoration Activity Area

Existing & Proposed Structures

Existing Structure - No Work Proposed

Existing Structure Removal

Low Water Crossing (LWC) Installation

New Pipe Installation

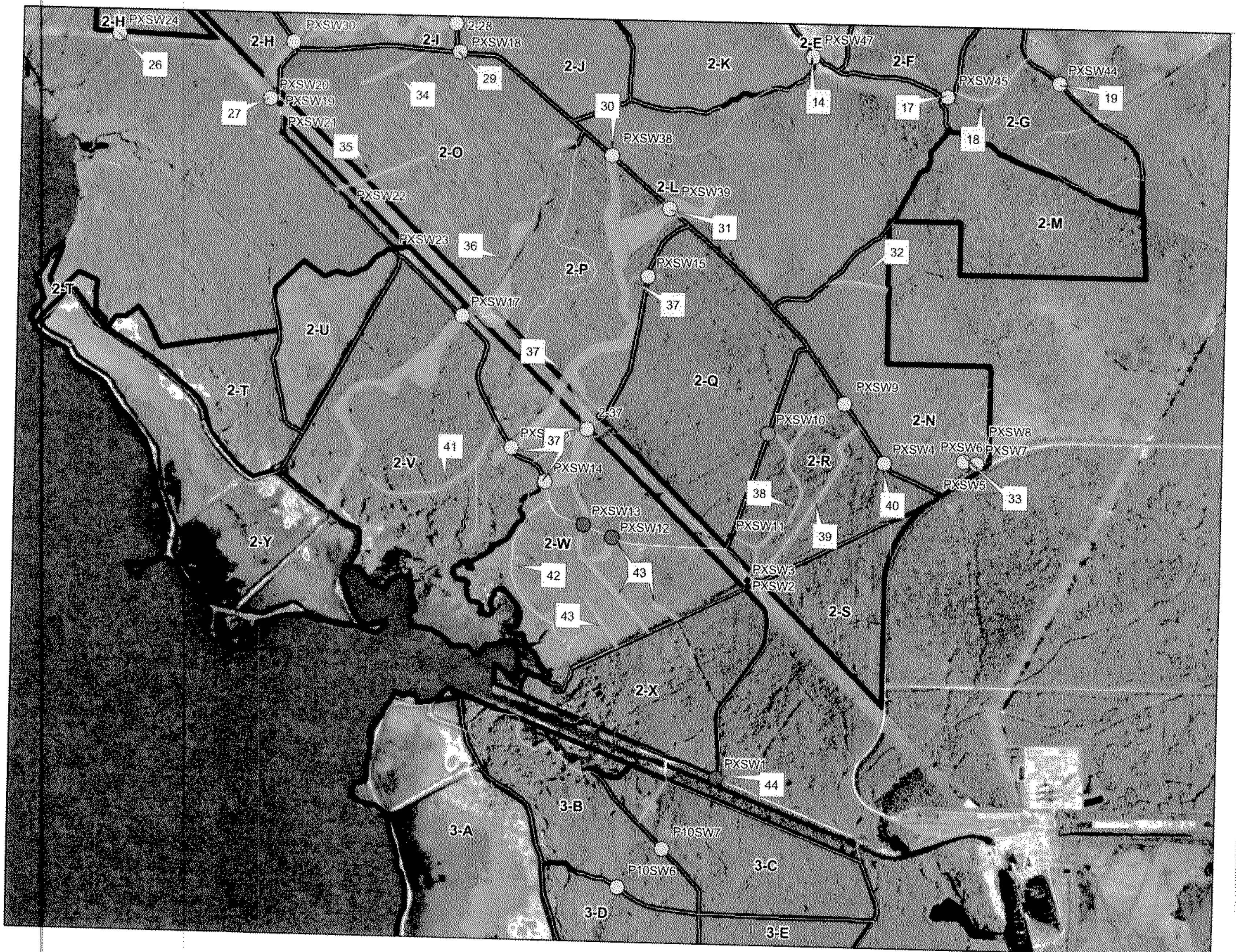
Culvert Inlet

Site Description Label

1 inch equals 1,600 feet

0 800 1,600 2,400 3,200 Feet

NOTES:



Panama City - Bay County International Airport Mitigation Plan

Figure D-3. Hydrologic Restoration

Mitigation Parcel 2 - South

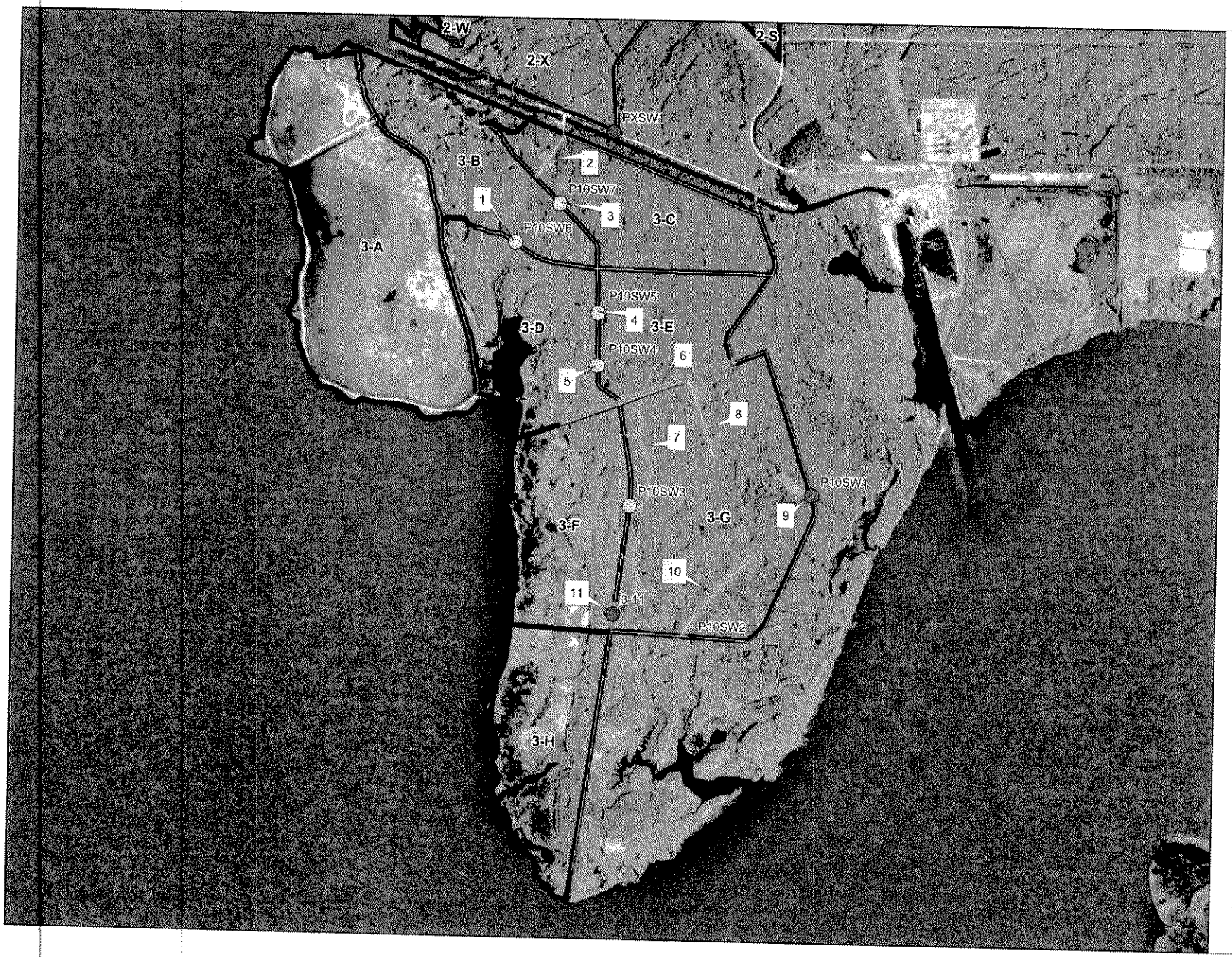
LEGEND

Road

Hydrologic Restoration Areas

Existing & Proposed Structures

N



Panama City - Bay County International Airport Mitigation Plan

Figure D-4. Hydrologic Restoration

Mitigation Parcel 3

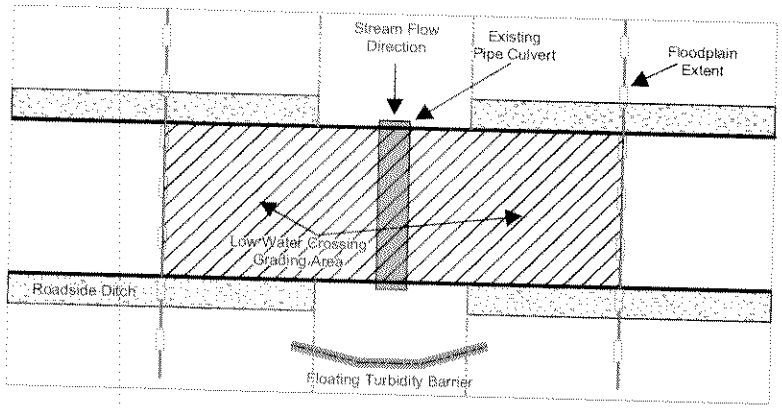
LEGEND

Hydrologic Restoration Areas

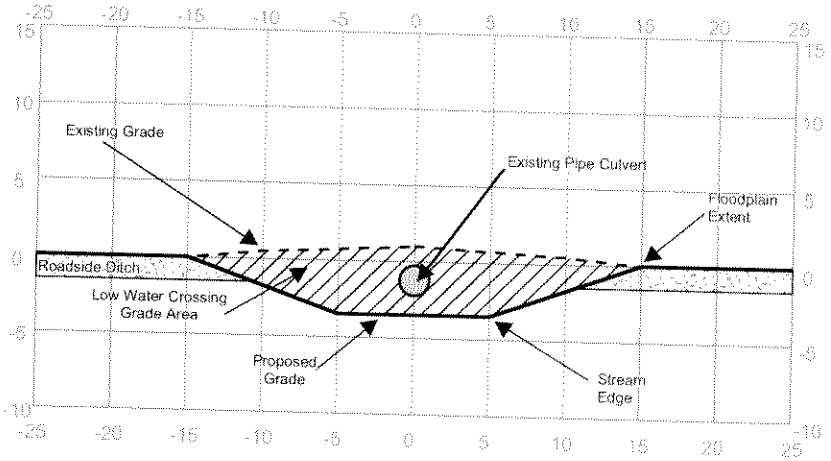
Existing & Proposed Structures

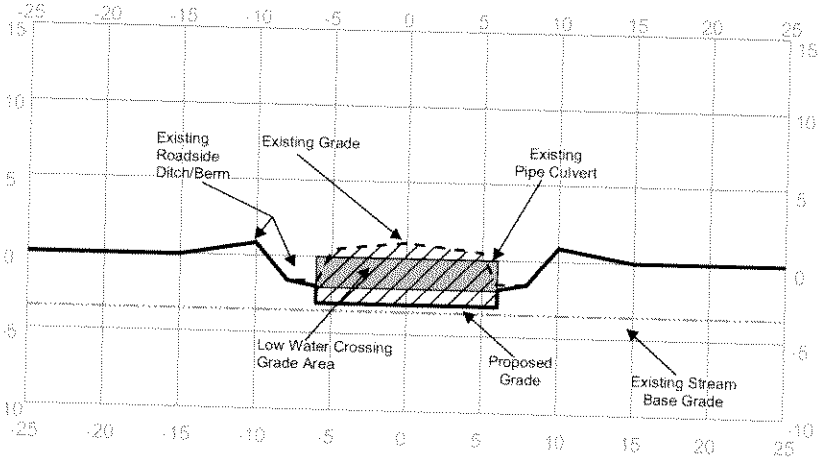
NOTES

Plan View



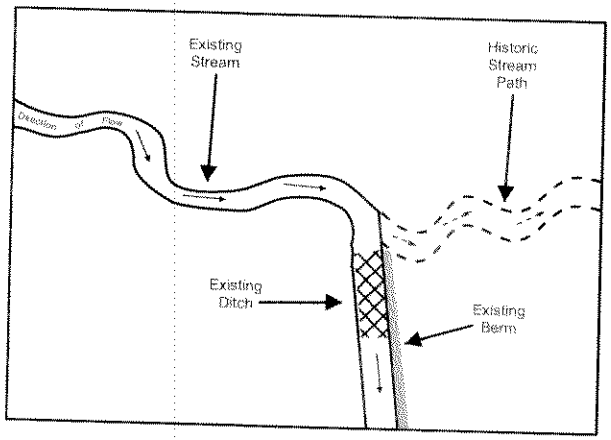
Cross Sectional View



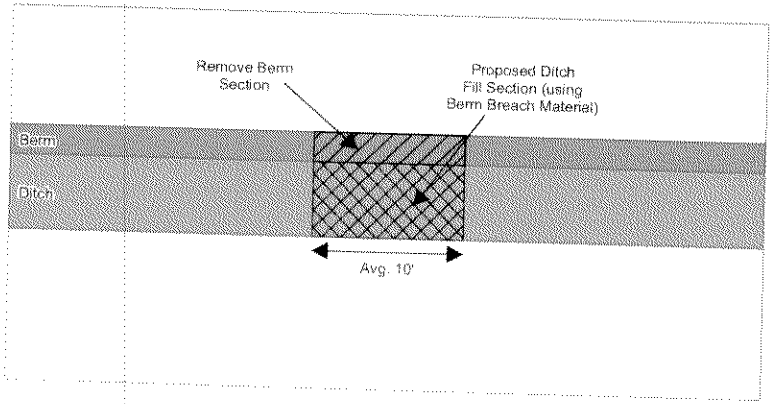


Longitudinal View

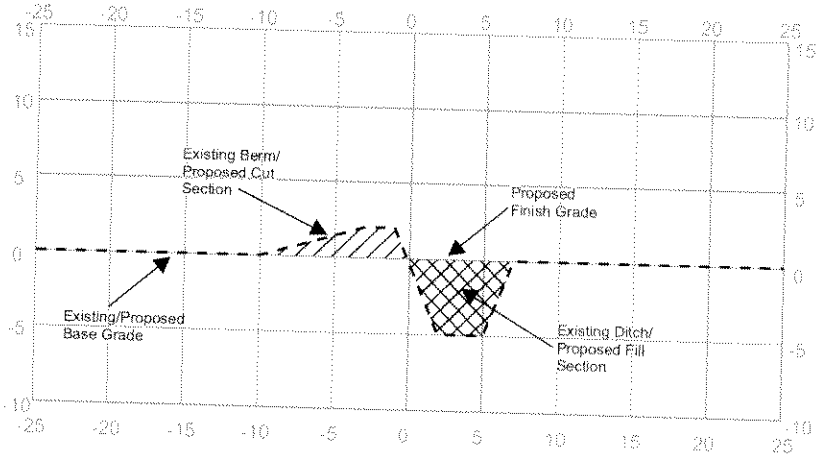
Panama City - Bay County International Airport PBS&J	PROJECT: Panama City-Bay County International Airport (Proposed) DATE: 3/23/05 DRAWN BY: RTC FILE NAME: I:\Projects\070554.21_PC Mitigation Design\GIS\MXD\Mitigation Plan Report\LWC_Typical.mxd	***MITIGATION***	FIGURE D-5. LOW WATER CROSSING (TYPICAL SECTION)	Scale: N.T.S



Plan View



Cross Sectional View



Panama City - Bay County International Airport

PBSJ

PROJECT: Panama City-Bay County International Airport (Proposed)

DATE: 3/23/05

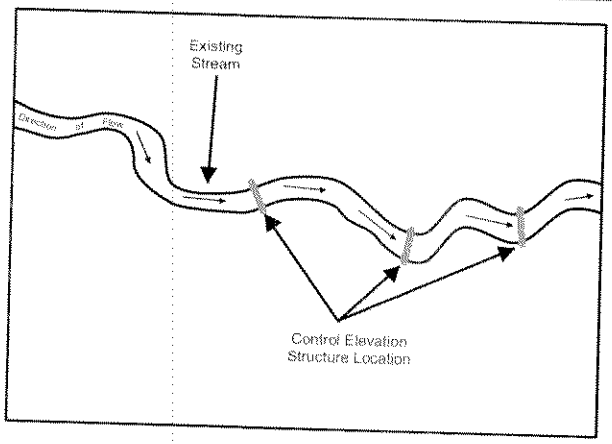
DRAWN BY: RTC

MITIGATION

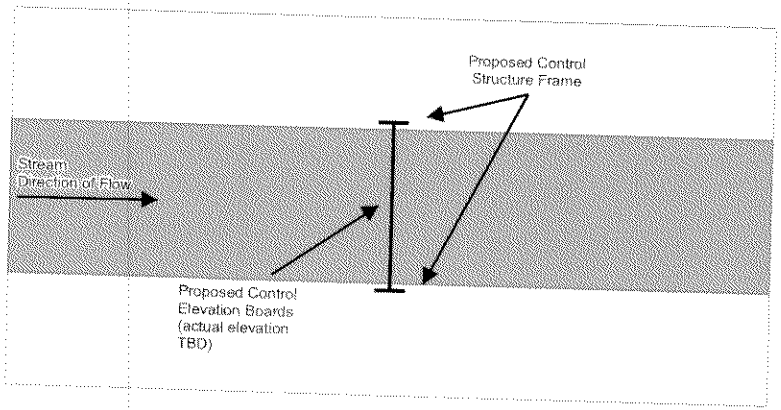
FILE NAME: I:\Projects\070554.21_PC Mitigation Design\GIS\MXD\ Mitigation Plan Report\DitchBlock_Typical.mxd

FIGURE D-6. DITCH BLOCK (TYPICAL SECTION)

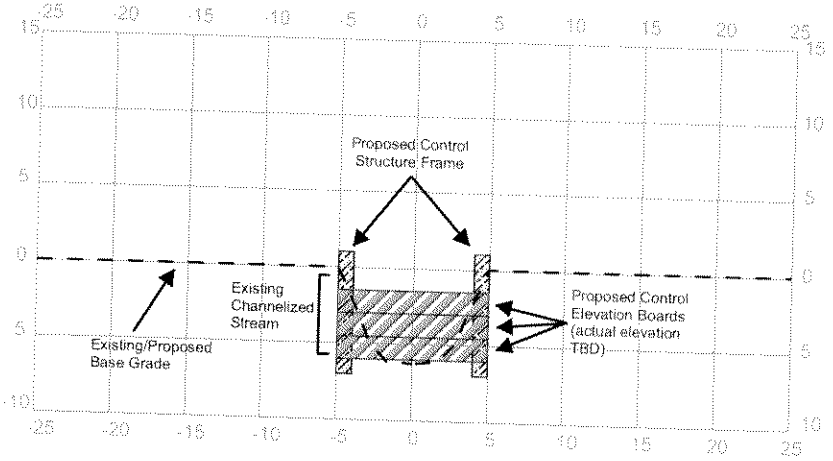
Scale: N.T.S



Plan View

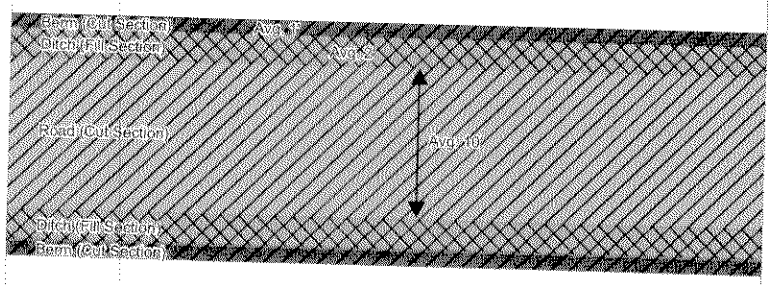


Cross Sectional View

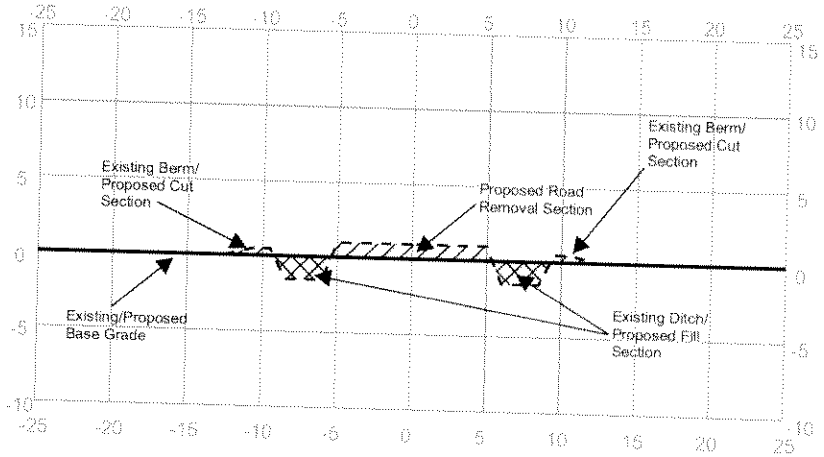


Panama City - Bay County International Airport PBSJ	PROJECT: Panama City-Bay County International Airport (Proposed) DATE: 3/23/05 DRAWN BY: RTC **MITIGATION** FILE NAME: I:\Projects\070554.21_PC Mitigation Design\GIS\MXD\Mitigation Plan Report\DitchBlock_ContElev_Typical.mxd	FIGURE D-7. DITCH BLOCK WITH CONTROL ELEVATION (TYPICAL SECTION)	Scale: N.T.S

Plan View



Cross Sectional View



Panama City - Bay County International Airport PBSJ	PROJECT: Panama City-Bay County International Airport (Proposed) DATE: 3/23/05 DRAWN BY: RTC **MITIGATION** FILENAME: I:\Projects\070554.21_PC Mitigation Design\GIS\MXD\Mitigation Plan Report\RoadRem_Typical.mxd	FIGURE D-8. ROAD REMOVAL (TYPICAL SECTION)

Scale: N.T.S

Appendix E

Initial Fire Management Plan for the Panama City – Bay County International Airport Mitigation Area

Introduction

As mitigation for potential impacts to wetlands due to the construction of the Panama City – Bay County International Airport, the Panama City – Bay County Airport Authority propose restoring and enhancing approximately 10,000 acres of wetlands and uplands currently in silvicultural production and owned by the St. Joe Company. This project is located adjacent to West Bay, south of County Road 388 and northwest of Panama City in Bay County, Florida.

The initial fire management plan contained herein presents the general prescription and techniques that would be used to implement dormant-season prescribed burns within the mitigation area. An example of a dormant-season prescription, as well as, goals and objectives for implementing subsequent growing-season prescribed burns are provided in this plan. Site specific techniques for implementing growing season burns will be developed later based on field conditions at the time. Specific operation plans meeting state requirements and providing more details on work responsibilities, personnel and communication will be prepared and approved prior to each prescribed burn.

Description of Mitigation Area

This mitigation area encompasses approximately 10,000 acres, subdivided into three separate mitigation parcels. Within the three parcels, existing 10- to 12-foot wide timber roads and other landscape features further subdivide the parcels into 42 smaller management units. These management units are of a size that allows for a more practical application of prescribed fire than that of a large, single burn unit. Units are typically separated by existing barriers (e.g., roads, streams and property boundaries). Each burn unit requires unique corresponding objectives including:

- Ideal weather conditions
- Seasonality (e.g., dormant season versus growing season burns)
- Ignition techniques
- Equipment and staffing

Each burn unit has been given unique identifiers that, in view of the entire project, will denote them as individual units. Individual units can and will be monitored over the life of the project and data from each subsequent monitoring event recorded and logged for comparison and reevaluation. Ultimately the unique identifiers will tag data for incorporation into an appropriate logical access database.

The dominant plant communities within the mitigation area are primarily hydric and mesic planted slash pine stands. The majority of these areas will be restored to the

natural communities of mesic and hydric flatwoods and wet pine savanna. Historical records from the St. Joe Company and several state agencies indicate that the site has been used primarily for silviculture for over 50 years. Due to current silvicultural activities, the planted pine stands within the site vary in age, with some management units established in 1973 and others as recent as 1999. In addition to the planted pine stands, the site consists of a mosaic of vegetative communities, including: upland and wetland pine flatwoods, wet pine savannas, cypress domes, shrub bogs, flatwoods marshes, mixed forested wetlands, and salt marsh. As a result of historic and current silviculture, both natural and man-induced fire events have been aggressively controlled and/or avoided in the area.

Primary Objective and Goal

The primary objective of this phase of restoration is the re-introduction of fire management, in addition to the mechanical removal of pines from the site. The goals of this objective are to facilitate the replacement of the planted pine stands and help restore the site to a pre-silviculture condition. In forested community types, prescribed fire applications are often critical to the restoration of natural systems, and further serves as an important management tool in the maintenance of post restoration conditions. As a maintenance tool, prescribed fire is intended to mimic natural fire regimes and results in the attainment of ecological restoration goals.

Along with ecological considerations, all prescriptions will be specifically written in compliance with Florida's open burning laws. Preservation of life and protection of property by the safe application of prescribed fire implementation and management, is the primary responsibility of the Prescribed Burn Manager (PBM), but is exercised by all members of the prescribed fire team. Safety is however, not a goal but a requirement of any and all prescribed fire events. No compromises to safety will be allowed.

Dormant-Season Prescribed Fire Objectives

The objective of the initial dormant-season burns is the reduction of hazardous fuel loads, so that a growing season fire regime can effectively be implemented. A series of dormant-season burns will significantly reduce the amount of fuel, while minimizing scorch and mortality of mature pines. A secondary objective of the dormant-season prescribe fire is to facilitate the survival of mature pines. Once fuel loads have been deemed sufficiently reduced, the management plan can safely shift to growing-season burns.

Dormant-Season Prescribed Fire Goals

These goals collectively define the desired outcome resulting from a series of up to three dormant-season burns, per burn unit, applied over a three-to-six year period.

1. Modify and promote fuel characteristics favorable for growing-season fire prescriptions while protecting mature pines and encouraging the expansion of herbaceous ground cover.

2. Reduce the height of mid-story fuels to an average of less than 3 feet over 80% of the site. This goal shall be met prior to shifting to growing-season burns.

3. Harvest and thin slash pine to meet the basal area goals prescribed within the harvest and thinning plan.

Growing-Season Prescribed Fire Objectives

The objective of growing-season burns is to reduce the overall density and coverage of shrubs and canopy species while favoring a variety of herbaceous plant species typical of pine flatwoods and/or wet pine savanna community types. The duration and frequency of growing-season burns will be dependent on the response of vegetation to previous burns. Finally, depending on fuel loads, some units may not require the use of initial dormant-season burns, and may be appropriate candidates for immediate growing-season burns.

Once herbaceous cover, typical to pine flatwoods has been re-established, the prescribed burn regime may be shifted to longer frequencies between burns. Longer fire intervals, as well as the use of occasional dormant-season burns, may provide for pine regeneration and improved vigor in plant species not specifically adapted to frequent fires.

Growing-Season Prescribed Fire Goals

1. Reduce the average percentage and density of shrub cover by 75%.

2. Keep fuel loads low enough to safely burn during the growing season without damaging mature pines during subsequent burns.

Wetlands

Fire will only be allowed to burn into wetland systems when wetlands are sufficiently hydrated such that muck fires are not likely and, conditions exist such that the application of prescribed fire in the wetlands will not result in unsafe or harmful situations. Further, wetlands will only be burned when control lines within wetlands are not necessary to maintain the burn within the property lines or a specific burn block identified and included in the prescription under implementation.

Site Preparation

Before conducting a prescribed burn within the individual units, numerous site preparation concerns need to be addressed to allow for the successful implementation of prescribed fire. These concerns include: slash pine thinning and harvesting, the presence

of listed species, the presence and density of nuisance species (especially pyrogenic species) and firebreak construction and maintenance.

1. Slash Pine Thinning and Harvesting

Pre-burn thinning and harvesting of slash pine stands to the specifications outlined in the harvest and thinning plan are imperative. The implementation of this plan will help to reduce the unit's canopy coverage to the prescribed basal area goal. Standard practices associated with thinning and harvesting pines are likely to increase the horizontal fuel loads with the addition of timber litter and slash. The additional fuel loads from litter and slash may require pile burning of the accumulated fuels prior to the introduction of prescribed fire within those units. The number of individual piles required for pile burns is dependent on the amount of timber litter and slash accumulated from the harvesting activities. At no time should pile burns be allowed to escape into burn units or should the intensity of the pile burn be allowed to scorch adjacent trees or vegetation.

2. Listed Species

The existence and location of listed species and their habitats within a burn unit, presents additional challenges and concerns. Each unit identified with this concern must have prescriptions written that reduce potential risks of harm to the listed species and their habitat. Examples of risk reduction due to listed species existence within a burn unit may include:

- Creation of a raked or mowed radius around the listed species' location
- Timing the burn to a period outside of the nesting season.
- Consultation with the respective regulatory agency with jurisdiction over the species of concern, prior to the scheduled prescribed fire event. In certain instances, this consultation may require permits for the taking of the species and as a result may require a lengthy negotiation process.

3. Nuisance Species

Nuisance species, including titi (*Cyrilla racemiflora* and *Cliftonia monophylla*), blackberry (*Rubus* spp.), and Chinese tallow (*Sapium sebiferum*) are found intermittently throughout the site. The amount of titi (a somewhat pyrogenic species in particular), may alter the behavior of the prescribed burn, and may require removal by either mechanical or herbicidal treatments before the introduction of fire. Failure to consider the pyrogenic nature of titi and like species may result in fire escape and/or other control problems. Additional safety measures must be considered and included in prescriptions for units where this species is present in the community.

4. Firebreak Construction and Maintenance

Roads and natural features will be utilized to delineate individual units. Existing roads and firebreaks can be maintained with mowing, bush hogging, or disking. Some fire line maintenance and/or construction activities may be required prior to burning individual units. This can be accomplished using the previously mentioned methods. Fire lines through wetlands should be avoided in all cases. Installation of a mowed line may be considered only when extreme control conditions exist and

vehicles with low pressure-high flotation tires or tracks can be utilized to install the mowed line.

Prescription

For each burn unit, a prescribed fire prescription must be prepared. A pre-planned and well-written prescription provides explicit directions and helps guide decision making before, during and after the burn.

Every prescription must begin with the identification of site specific data including: the site specific identifier or site/unit number; the land owners name; the specific location of the unit (generally identified in Section, Township and Range, but should also include latitude and longitude delineators); and the specific size of the burn unit (in acres or hectares). A preferred implementation period (month or season) may also be included.

Following site specific identifiers, a description of the site must be provided next. The description should begin with any site history available, especially as it relates to previous land uses, fire information (when was it last burned and fuel model) and/or natural features information. Generally the description should include information on the vegetation or community type; overstory, understory and herbaceous species; topography; natural or manmade fire barriers; and an identification of smoke sensitive areas.

Next a statement of the specific objectives of the prescribed fire should be noted, followed by a narrative which details and summarizes the site conditions in view of the overall objectives of the prescription. The narrative ties everything together relating to the site description and the objectives of the prescribed fire event. Generally, the narrative is the background from which the prescription is implemented.

One basic necessity of any prescription is the identification of the number and qualifications of individuals necessary to carry out the operation of the prescribed fire event. This team must also be trained, experienced and skilled in wildland firefighting such that they can respond to and fight any fire behaviors arising out of the prescribed fire they are involved with, until appropriate backup forces are on site and engaged. As prescribed by law, the prescription will be prepared by a certified burn manager responsible for the prescribed fire event. All personnel assigned to the burn will be required to have some sort of formal fire training offered through one of the various Federal and/or State agencies.

The minimum requirement should be successful completion of the following: Basic Wildland Firefighting including I-110; Standards of Survival as a supplement to S-130; and, Introduction to Wildland Fire Behavior (S-190). It is highly recommended for crew bosses to have accomplished at least: Portable Pumps and Water Use (S-211) and/or Southern Engine Operations (S-214). In addition to certification as a prescribed fire manager, the following training is recommended for the PBM: Basic Interagency Prescribed Fire; Florida Fire Behavior; Initial Attack/Incident Commander (S-200); Fire

Operations in the Urban Interface (S-205); Intermediate Fire Behavior (S-290); and, Fire Behavior Calculations (S-390). Lastly, provision for immediate onsite medical response is also recommended. This first responder should have an intermediate level of training such that emergency medical care is available until more highly qualified EMT or paramedical assistance is on the scene. Training for the first responder should include at a minimum: Cardiopulmonary Resuscitation (CPR), Basic First Aid and Emergency Medical Response training such as that provided by the American Red Cross in the American Red Cross Emergency Response course.

The size of the fire team or crew will depend on several factors. Generally, smaller units away from urban areas will require a smaller crew, while larger units may need to be staffed with additional members, depending on the firing methods and escape risk. However, unit size may not be the only limiting or increasing factor in crew size. Other conditions requiring larger crews could include considerations for units with high/heavy fuel loads, units adjacent to urban or rural developments, smoke screening considerations for smoke sensitive areas, and units with potential problem spots such as listed species concerns and/or nuisance species concentrations that could result in increased fire behavior.

The prescription will also identify the burn window(s) necessary to achieve the desired goals and objectives. A burn window will be determined based primarily on seasonality, fuel loads and weather conditions necessary for the safe implementation of the prescription in the burn unit. Burn window(s) exists any time that optimal conditions for meeting the prescribed burn objectives are available within the pre-planned burn rotation.

The primary objective of the site-specific prescription is the safe, efficient restoration of the subject parcel. Hence, each prescription should also include measurable or quantifiable goals for the specific burn unit. Analysis of the prescribed fire event in an "after action" report may be the means to document goal achievement.

Note: Once a burn unit's associated burn window is forecasted as imminent and resources are made available, the prescribed fire team will mobilize to implement the prescribed fire event on the subject unit. Implementation consists of at least an entire day's activities, from mobilization and the acquisition of a burn permit from the Florida Division of Forestry (FDOF), through the course of the day's prescribed fire, and must always include final mop-up operations and demobilization.

The parameters and information provided below are included as an example of variables desired in general prescribed fire behavior. However, to insure compliance with Florida's open burn laws, site and event-specific prescriptions will be drafted and filed prior to each burn. Furthermore, a crew briefing will be held prior to implementation of a prescribed fire event during which the prescription and event specific conditions will be discussed and appropriate crew assignments and responsibilities made.

- *Flame lengths*: Flame length is defined as the distance between the flame tip and the midpoint of the flame depth at the base of the flame, which is generally the

ground's surface. Flame lengths of backing fires should not exceed 6 feet, while those of strip-head and flanking fires should not yield flame lengths greater than 10-12 feet.

- *Rate of spread*: Rate of spread is defined as the speed at which the fire moves across the area being burned. The desired rate of fire spread for backing fires, augmented with conservatively set flank and strip-head fires, is 1 to 3 chains per hour. One chain is equivalent to 66 feet.
- *Surface wind speed and direction*: The surface wind, or 20-foot wind, is the standard forecast wind defined as either 20-feet above open ground or a vegetative surface. Depending on the burn unit location, the ideal wind direction for prescribed fire events within the mitigation area will be from the direction which minimizes impacts of smoke on smoke sensitive areas. The operation winds will be specified in the prescription; however a number of sites may favor winds from the west, south, southwest and east, with others favoring a north to northwest wind. Prescribed burning should not occur under "Red Flag" conditions, nor commence when 20-foot wind speeds are greater than 15 mph. Special consideration and attention must be given to afternoon sea breezes that may arise from the Gulf of Mexico.
- *Transport wind speed and direction*: Transport wind is the average wind within the mixing layer that determines the rate of smoke movement. Transport winds are generally of the same direction as surface winds. For prescribed fire planning purposes, prescribed fire events should not commence when transport wind speed is expected to exceed 20mph.
- *Mixing height*: The mixing layer is the atmospheric layer from the surface upward in which relative turbulent mixing of air and smoke occurs. The ideal level for mixing heights is no lower than 1800 feet.
- *Minimum relative humidity*: Relative humidity is the ratio of the amount of moisture in the air to a potential saturated quantity at a given temperature and pressure. The safe and successful execution of a prescribed fire event is dependent on fire behavior and humidity is an important variable. Ideally, during a prescribed fire event, daytime humidity should not fall below 35% to 40%. Humidity levels predicted or recorded below 35% should be avoided (a "Red Flag" condition). Most prescriptions for flatwoods and savanna community types will not support humidity recordings below 40%.
- *Fine fuel moisture*: Fine fuel moisture is defined as the water content of a fuel expressed as a percentage of the ovendry weight of the fuel. The ideal range for fine fuel moisture should range between 7% and 20% during winter months and between 11% to 20% during the summer.

Smoke Management

Smoke management and screening involves a plan of action allowing for the implementation of prescribed burning, such that the smoke produced will disperse without impacting health or the creation of smoke-induced safety hazards. The objectives of smoke management are to reduce the emissions produced, identify and

avoid smoke sensitive areas and burn only when atmospheric conditions allow for good smoke transport and dispersion.

Standard smoke screening techniques will be included in prescribed fire prescriptions and applied prior to initiating any prescribed fire within the mitigation area. The basic considerations for smoke management must be determined for each burn unit and reviewed prior to commencement of the prescribed fire event. Site considerations include: wind direction during the event and through the following evening hours, ignition methods and success of fuel ignition, notification of law enforcement, emergency response agencies, Department of Transportation, as well as appropriate general public, mop-up, individual unit size, and problem fuels (e.g., snags and logs, duff, and muck/peat).

Wind direction is a primary concern to any smoke management plan. It is imperative to choose wind directions that will direct smoke away from sensitive areas (e.g., airports, roads, schools, hospitals, housing projects, large commercial areas etc.).

The proper ignition method is another concern with smoke management. The safest firing technique is through the use of backing fires. This technique produces the least amount of particulate due to slower burning and more complete combustion of the fuels. Backing fires used on highly sensitive units can help minimize smoke production during a prescribed burn; however, they are more time consuming and may not be as efficient on larger burn units.

Appropriate public notification must always be included in prescribed fire planning and implementation. Notifications allow for the communication of necessary information to anyone who may be impacted by the smoke produced during the prescribed burn. Media, law enforcement and fire and emergency response agencies of local communities must always be notified well in advance of the burn event.

Another component of smoke management is the post-fire mop up phase of the burn. Mop-up standards should be clearly established in the burn prescription and special mop-up considerations may be required for units adjacent to smoke sensitive areas. Snags, unburned fuels such as logs, residual smoke, and smoldering duff or peat generally require more complete and extensive mop-up needs. Mop-up operations are frequently labor intensive and are always a major safety consideration, most often because crewmembers are tired and as afternoon hours move into evening hours vision due to smoke is impaired to vehicles as well as crewmembers. Extreme caution must be exercised during prolonged mop-up operations.

The size of the individual burn unit can also determine the amount of smoke produced. Larger units, adjacent to smoke sensitive areas, should be split into smaller, more manageable burn units during the prescribed fire planning phase. This planned action will reduce the size and acreage of the burn, which ultimately reduces the smoke generated.

Problem fuels can affect the amount of smoke produced during a prescribed fire. Any problem fuels must be identified within the individual units and alternate treatment (e.g., roller chopping, herbicide, hand removal, etc.) methods should be applied to reduce the volume and/or distribution (horizontal or vertical) of the fuel. Ultimately, the planned pre-burn fuel reduction would be expected to reduce the volume of smoke produced.

Based on the fuel types and the management or burn unit size, a smoke sensitive radius of five miles is warranted and required. Depending on the specific burn unit location, the following smoke sensitive areas lie within the five-mile radius: the Panama City Airport and Panama City to the southeast, CR 388 to the north, SR 79 to the west and SR 77 to the east. When the relocated Panama City - Bay County International Airport has been built, it will be located north of CR 388. Other areas of concern include the power plant to the east-southeast and a power line easement that runs though the site. Prescribed fire events adjacent to a charged powerline within an easement will require notification of the power company owner. At no time will smoke be allowed to cross powerlines at ground level. Furthermore, prescriptions for prescribed fire adjacent to powerlines should include smoke monitoring along power easements. Crew briefing must include procedures for safe operations in the area of power transmission line. Considerations for safe crew operations, including safe use of water handling and fire suppression equipment, must be planned and included in the site-specific prescription.

Daytime dispersion indexes between 41 and 60 will be expected to carry smoke to a safe altitude in the atmosphere. Depending of site-specific conditions, some residual fire may continue to burn during nighttime hours if allowable by prescription and permit. When these conditions occur, overnight dispersion indexes should be high, preferably between 4 and 8. Additionally, and as a precaution, smoke warning signs may be placed on appropriate road locations facing both opposing lanes of traffic. If unforeseen smoke conditions occur where smoke is likely to cross roadways during a prescribed fire event or following fire events due to residual smoke, appropriate law enforcement personnel must be advised immediately and kept informed until the smoke problem is no longer of concern.

Due to the high level of planning involved in coordinating prescribed fire resources and personnel, it is problematic and costly for a burn event to be called off on the day of the event. When unforeseen cancellations do occur however, it is likely to be the result of unpredicted weather changes onsite or some unforeseen event or emergency that may prohibit the prescribed fire from being implemented in a safe, responsible way.

Contingency Planning

Contingency plans must be developed and included in each prescribed burn prescription. The plan must address procedures and actions for escaped fire, crew injury or any other unforeseen occurrences which potentially affects the objectives and/or the safe implementation of the prescribed fire event. Contingency plans also address failures to meet prescription criteria, medical emergencies, smoke management problems and equipment breakdowns or loss. The goal of a contingency plan is immediate action to

unforeseen problems. The effectiveness of the contingency plan depends on common sense, training, and good communication which will increase the likelihood that the affected personnel will remain calm during the crisis and that correct and appropriate decisions will be made in a timely manner.

If a spot fire occurs outside the burn unit's control lines, the PBM must be notified immediately. All ignitions must cease and the spot fire aggressively attacked by on scene crewmembers. Any and all escaped fires must be reported by the PBM to FDOF or other appropriate wildland firefighting organizations. During fires that can not be extinguished by on site suppression forces and require assistance from others, the PBM will direct all suppression activities until a qualified incident command system professional is briefed and assumes command of the situation. The PBM must be prepared to turn an escaped fire over to FDOF, or their designee, upon their arrival. The prescribed burn crew should remain on site performing suppression duties consistent with their training and skill level as directed by the Incident Commander. **There will always be mop-up after spot fires and escaped fires.**

During the course of the prescribed fire event, changes in predicted weather may occur; when these conditions occur, especially as they relate to dispersion of smoke from the site, all fuel ignition will cease and any existing fire will be completely extinguished. Smoke warning signs, if not already in place along appropriate roads, must be erected and appropriate law enforcement authorities notified.

Equipment failure or loss is an additional concern when implementing a prescribed fire. A variety of situations may constitute equipment failure including anything from vehicles, pumps or tools breaking down to vehicles getting stuck in muddy conditions. When these situations arise, the PBM will determine if the failure results, or is likely to result, in a compromise of safety or jeopardizes the continued execution of the prescription. The PBM will determine what steps are needed to return the burn to safe, pre-failure parameters. This process may include ceasing ignition and suppressing active fire, until the equipment failure issues are resolved or determined to be of no consequence.

Safety

The prescribed fire prescription, must address the crew's equipment and training requirement necessary to safely perform the prescribed fire. The burn prescription must outline the types of tools (e.g., drip torches, weather kit, hand tools, chainsaw, first aid kit, etc.), personal protective equipment, and vehicles (e.g., ATV, brush trucks, DOF tractor, pumps, etc.) needed, as well as the depth of back up's required. Responsibility for the safe execution of the prescribed fire event rests with the PBM. It is the PBM's obligation to make sure that all requirement needs are met and to ensure that all equipment is in working order prior to the implementation of the burn. However, it is the responsibility of every crew position to advise the PBM anytime equipment or conditions change leading to unsafe conditions.

The PBM must also ensure that all crewmembers participating in the prescribed burn event are appropriately trained (as previously stated) and possess the proper Personal Protective Equipment (PPE). The recommended PPE consists of Nomex fire clothing, a fire shelter, leather gloves, hardhat with Nomex neck protector, a radio with extra batteries, goggles, leather work boots and canteens or water bottles with plenty of drinking water.

Clear communications is an important factor to ensure a prescribed fire event is conducted safely and efficiently. Two key components of prescribed fire specific communication that takes place before, during and after a burn; include:

- Communications via crew briefings

A thorough crew briefing given before the prescribed fire event is a requirement and is of extreme importance. During the crew briefing, the PBM will clearly describe the burn objectives, discuss specific crew assignments, firing/ignition and contingency plans, first aid and medical response procedures, mop-up and smoke screening, as well as the placement of vehicles or additional personnel. The PBM must insure that the crew is thoroughly familiar with the burn unit's site map and the sites boundaries, including safety zones for escape and evasion, and all available water sources for drafting and drinking. Chain of command and crew responsibilities during suppression actions must also be discussed.

- Communications via portable and vehicle radio transmission

Any time crewmembers cannot maintain visual contact with other crew members, it is imperative they maintain voice contact via radio. It is recommended that all personnel assigned to the prescribed fire event be provided with a radio or have access to radio communications. Since radio communication is important to the passing and receiving of instructions and information, transmissions occasionally get longer than necessary. Efforts must be made to keep transmissions as brief as possible. Typically, all radios have two or more channels, and during the crew briefing the PBM or designee will designate the appropriate channel for use during the prescribed fire event and subsequent mop-up.

First-aid kits, used to treat non-life threatening or serious injuries (e.g., sprains, minor scratches/cuts, etc.), should be located on each vehicle used prior to the prescribed fire event. All medical emergencies requiring a more immediate degree of attention, but non-life threatening, will be evaluated and transported to the appropriate medical facility by the PBM designee. However, emergency medical responders via 911 must be immediately called if and when any serious or life threatening injuries occur. If possible without increasing injury, the affected personnel may be moved to a more accessible location along C.R. 388. If the individual cannot be safely moved, a crewmember will meet the 911 response team at the entrance of the prescribed fire unit, and escort them to the scene of the accident. The closest hospitals to the mitigation area are:

- Bay Medical Center 850.769.1511
- Columbia Gulf Coast Medical Center 850.769.8341

In addition to the above numbers, the Bay County Sheriff can be reached at 850.758.8477.

Panama City – Bay County International Airport Mitigation Area

EXAMPLE PRESCRIBED BURN PLAN & CHECKLIST

LANDOWNER #: St. Joe Timberland Company
Unit #: 1B
LOCATION: Section 13, Township 2 south, Range 16 west
TOTAL BURN AREA: 248.2 acres
PREFERRED BURN DATE: December – March

BACKGROUND AND SITE HISTORY

SITE LOCATION: Management Unit 1B is located in Parcel 1. Parcel is adjacent to and south of CR 388 and lies between Burnt Mill Creek to the east and Crooked Creek to the west. This mitigation parcel sets inland approximately one-half mile from West Bay and encompasses approximately 1735 acres. Parcel has been separated into 9 management units that are generally separated by existing roads. Planted pine stands (primarily slash pine) in MP1 vary in age, with some management units established in 1979 and others as recent as 1999.

UNIT DESCRIPTION:

Last Burn Date: Unknown

Fuel Model(s): Fuel Model # 4, 7

Community Type:

Overstory: *Pinus elliottii, Quercus spp., Magnolia spp.*

Understory: *Cliftonia spp, Ilex spp., Serenoa repens*

Groundcover: *Andropogon spp., Serenoa repens, Aristida spp., Cyrilla spp.*

Topography: Primarily flat.

Natural and Man-made Fire Barriers: Interior parcel roads will serve as firebreaks.

Smoke Sensitive Areas: CR 388 to the north and west, Homes along Burnt Mill Creek to the east (relocated airport location to the north)

Objectives: Enhancement of the native plant communities and fuel reduction.

Narrative: Management Unit 1B is approximately 248.2 acres adjacent to and south of CR 388. The unit has been previously fourth row thinned and is under contract for a final selective thinning in 2004-2005. There will be two target communities for this unit. The eastern portion of the unit will be planted pine areas with a target community of wet pine savanna. The western portion of the unit has a target community of wet pine flatwoods. There is a large stream system dominated by titi that flows through the middle of the unit. There is a shrub bog, a flatwoods marsh and a mixed forested wetland that also occur within this unit.

WEATHER, FUEL AND FIRE BEHAVIOR PARAMETERS:

Parameter	Min	Max	Preferred
Temperature (*F)	45	85	70
% Relative Humidity	35	65	45
Wind (mph) – 20 ft.	4	15	10
Wind (mph) - Midflame	4	8	6
Wind Direction	N	N	N
Mixing Height (ft.)	1800	6500	> 1700
Transport Wind Speed (mph)	9	15	≥ 9
Fuel Moisture (1 hr.) (%)	7	20	8
Rate of Spread (chain/hr.)	20	75	45
Backfire Flame Length (ft.)	1	6	3
Headfire Flame Length (ft.)	5	12	7
Scorch Height (ft.)	2	12	6
Dispersion	41	60	50

SITE PREPARATION: Prescribed fire cannot be applied to this unit until final thinning has been completed. It may be necessary to conduct pile burns if there is a considerable amount of litter and slash remaining following the thinning.

Due to both the height and density of titi (*Cyrilla racemiflora, Cliftonia monophylla*), it is recommended that all, or portions, of this unit undergo a mechanical treatment, like roller-chopping, prior to prescribed fire application.

Mowing/bush-hogging along roadsides, fire lanes, and trails surrounding the unit will be completed at least one week in advance of the burn. This will not only allow for the mown vegetation to dry, but also widen firebreaks without extensive soil disturbance.

Snags near the edge of the burn unit can be common sources for spot fires. Therefore, all snags within "1 ½ times the snag height" of the unit boundary will be felled before the burn.

Early burns should use the wetland systems as natural fire breaks. However during subsequent burns, it may be permissible to allow for fire to burn into the wetland systems, after seasonality and drought indices are factored into the prescription.

If it is deemed necessary, the unit may be subdivided into smaller units, via bush-hogging or mowing, in order to achieve safer, more effective burn results.

NOTIFICATION: There are no landowners directly adjacent to the unit that will need notification. Any smoke sensitive areas within a five mile radius of the unit will be notified by mailing or telephone prior to the day of the burn. Media, law enforcement and fire agencies of local communities will be notified at least two days prior to the burn. The Florida Division of Forestry (FDOF) will have notification when they issue the burn permit.

MINIMUM EQUIPMENT AND PERSONNEL REQUIREMENTS: 2 - FWD Type VI brush truck engine, 4 drip torches with fuel, hand tools, AP pump with necessary hoses, 3-ATV, weather kit, first aid kits, PPE and radios. **Crew (10)**: 1-Burn boss, 2-lighter/holding/mop-up boss, 3-lighter/holding/mop-up crewmembers, 4 -engine crewmember/weather manager/observer, 1-FDOF Tractor with Plow on standby.

PROPOSED FIRING PLAN: Every prescribed burn should begin with a test fire to evaluate burning behavior of representative fuels within the burn unit. The test fire should be located near the downwind side of the burn unit, near the anchor point and is the final check to verify that fire behavior falls within the acceptable limits outlined in the prescription.

If fire behavior is deemed acceptable, then based on wind direction, all downwind control lines will be secured by widening using black-lining or backfiring techniques. When these lines are secure, short flanking fire will be pulled into the wind along appropriate control lines. Only after downwind lines are secure will head fire be used. Ignition will be accomplished by ignition personnel assigned to each crew.

HOLDING PLAN: Each crew assigned to respective control line divisions will have holding responsibilities. Two, or more, crewmembers will be assigned to each engine unit. Holding will be executed by each engine crew. An engine crew, if available, may be assigned outside the unit on the downwind side when the upwind line of fire is ignited.

SMOKE MANAGEMENT: To insure that smoke will rise and dissipate properly, the mixing height is to be $\geq$ 1,800 feet, transport winds are to be $\geq$ 9 mph, and the dispersion index is to be between 41 and 60 on the day of the burn. The direction of smoke was plotted for north transport winds to determine smoke sensitive areas down drainage, see attached smoke maps.

Based on fuel type and burn unit area, a smoke sensitive radius of five miles is warranted. In the plotted 5-mile smoke sensitive radius, the areas of concern are:

- CR 388
- SR 79
- Homes along Burnt Mill Creek
- (Relocated airport location)

MOP UP PLAN: Post burn, all active fire, snags and smolders within 20 feet of control lines will be thoroughly extinguished. The burn unit will be checked for smoldering areas on the morning following the burn.

RESEARCH AND MONITORING: There are several monitoring stations established throughout the burn unit. A pre-burn evaluation will be done at least six months preceding the burn to ensure that the prescription can be written both thoroughly and properly. A post burn evaluation will also be conducted within the two weeks after the date of the burn. Post burn criteria to be evaluated include:

- Percentage scorch
- Bowl scorch height
- Percentage of unit burned

- Were burn objectives met
- Measurement of residual duff
- Percentage of woody debris consumed

The post burn evaluation is a critical task that is essential in the planning and writing of future prescriptions.

DAY OF BURN

Area: **Landowner #:** _____ **DATE:** _____

TOTAL BURN AREA: _____**acres** **POTENTIALLY BURNABLE:** _____ **acres**

CONTACT FOR AUTHORIZATION: Florida Division of Forestry

Section(s):_____**Township(s):**_____ **Range(s):**_____

TYPE OF BURN: Ecological/Fuel reduction

BURN AUTHORIZATION: Number _____ **Name** _____**Certification** _____

WEATHER FORECAST Daytime (Day of Burn):
National Weather Service:
NOAA: 800-638-8972
FDOF:

WEATHER

PARAMETER	TODAY	TONIGHT
Cloud Amount	_____	_____
Chance Precipitation (%)	_____	_____
Precipitation Type	_____	_____
Maximum / Minimum Temperatures	_____	_____
Wind Direction	_____	_____
Wind Speed (mph)	_____	_____

Precipitation Amount	_____	_____
Precipitation Begins	_____	_____
Precipitation Ends	_____	_____
Precipitation Duration	_____	_____
Lightning Frequency	_____	_____
Relative Humidity (%)	_____	_____
Mixing Height	_____	_____
Ceiling Height	_____	_____
Transport Wind Direction	_____	_____
Transport Wind Speed	_____	_____
Dispersion Index	_____	_____

Rain Days (at least .5 in.) in previous 30 days:_____

Days since last .5 in. rain: _____

Amount of rain in last 7 days: _____

Does the Weather Forecast **MATCH** the prescription? _____

Does the predicted wind direction **MATCH** the needed wind for

Smoke management concerns? _____

NOTIFICATION:

CREW BRIEFING:

Objectives of Burn: (Determined in pre-fire planning)

Area of Burn: Review maps, notice fire line placement.

Hazards in or close to unit: Vehicles, hand tools, heat stress, smoke/fire, wildlife (snakes), trips and cut vegetation, ignorance of specific instructions.

Safety Zones: CR 388, Unit 1G to the east of Unit 1B

Crew Assignments: See attached assignment sheet

Firing Plan (show plans and map with explanation): Backing fire

Location of Equipment (Identify on map):

Equipment Check (Radios, pumps, saws, etc.): Authority and Communication: Burn boss, Crew boss, team members. Radio call sign: Use first name of person you are calling to your first name. Use last names when more than one crew has the same first name. When transmission is acknowledged, proceed with a clear –short message. Use the universal term "Roger" or key the mic twice to acknowledge a message.

Contingency Plans: Contain all fire onsite; in case of escape, suppression will be by direct attack with assistance for the primary engine. All ignition will be terminated until escape is contained and safe. If direct attack is unsuccessful indirect attack will involve falling back and counter-firing off natural barriers. Report dangerous conditions and evacuate to safe zone. Be prepared to offer assistance upon command or as required.

Sources of Fire Assistance:

Special Instructions: Identify, report and aggressively extinguish all spotovers/spotfires. Watch the weather and report observed changes ASAP.

Safety-First Aid and Evacuation:

Buddy First Aid 1st priority: First Aid Trained Personnel Priority 1

First Aid Kits Located in each vehicle

Treatment Levels: **1.** Treatment onsite of non-life threatening or serious injury; evaluated by senior trained individual. **2.** Transport to Emergency medical facility; non-life threatening injuries, transported by PBS&J. **3.** 911 Response: any injury evaluated as potentially serious or life threatening. Staff member will meet 911 Response Team at the front entrance of site and escort to the accident scene.

In the event of and emergency evacuation or requirement for transport to an emergency facility, the following route is suggested:

Sources of Emergency Assistance:
Medical: 911
Hospitals:

- Bay Medical Center 850.769.1511
- Columbia Gulf Coast Medical Center 850.769.8341

Law Enforcement: 911
Bay County Sheriff: 850.758.8477
Fire: 911

AUTHORIZED PRESCRIBED BURN MANAGER:

_____

Certification Number: _____

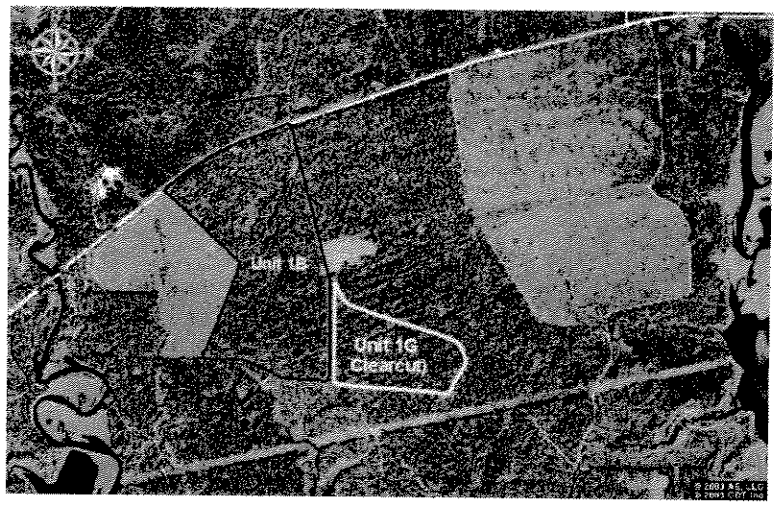
Prescribed Burn Plan Prepared by: _____

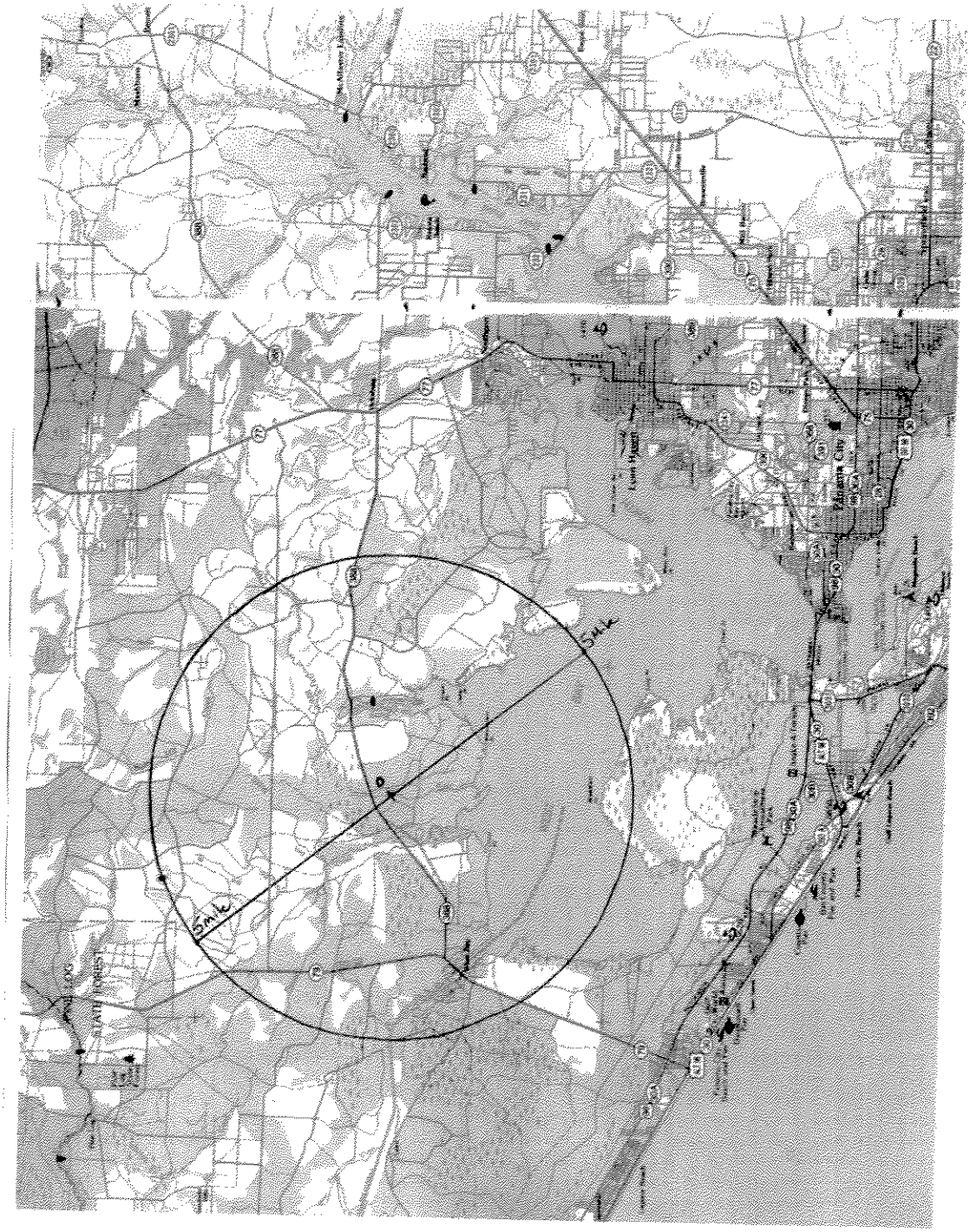
NOAA Phone:800.638.8972
FDOF

FIRE WEATHER OBSERVATIONS

Time	Temp (°F)	Wet Bulb (°F)	Dry Bulb (°F)	Relative Humidity (%)	Wind Direct \ speed (mph)	Comments

Unit 1B Aerials





5-MILE RADIUS SMOKE SCREENING MAP

Appendix F

USACOE MULTI-AGENCY COMPENSATORY MITIGATION PLAN CHECKLIST

- **Mitigation Goals and Objectives**
  See Section 2.0.
  - **Describe functions lost at impact site**
    Functions lost include wildlife habitat, and water quality protection. See Sections 2.0, 3.0, and **Tables 3-1** and **3-3**.
  - **Describe functions to be gained at mitigation site**
    Water quality will be protected and wildlife habitat will be greatly enhanced. See Sections 3.0, 6.0, and **Table 3-2** and **Table 3-3**.
  - **Describe overall watershed improvements to be gained**
    See Section 3.0.

- **Baseline Information for Impact and Proposed Mitigation Sites**
  See Sections 4 and 5.
  - **Provide data on physical attributes of sites (soil, vegetation, hydrology)**
    See Sections 4.1, 4.2, 4.3, 4.4, 4.5, and 4.6; See **Figures 4-1** through **4-15**.
  - **Describe historic and existing land uses and resources impacted**
    See Sections 5.0 5.1, 5.2, and 5.3 and **Figures 5-1** through **5-4** for historic data, Section 4.1 for existing land use
  - **Describe reference site attributes if available**
    No reference sites were chosen, as the objective of mitigation is to restore the mitigation area to historical conditions, circa the late 1940s and early 1950s. See Sections 5.0 and 6.0.

- **Mitigation Site Selection and Justification**
  See Section 3.0
  - **Describe process of selecting proposed site**
    The mitigation site was selected from proposed conservation lands within the West Bay Preservation Area. Coordination with regulatory agencies (FDEP, USACE, USFWS) and the St. Joe Company was conducted during the Ecosystem Team Permitting process. The site was chosen to provide large contiguous tracts of land with access to West Bay.
  - **Likelihood of success, future land use compatibility, etc.**
    Mitigation activities are relatively low risk activities and success is anticipated. The West Bay Sector Overlay Plan provides for future land use as conservation for many of the areas adjacent to the mitigation site. See Section 4.1 and **Figure 3-1**.

- **Mitigation Work Plan**
  See Section 7.
  - **Location**
    West Bay area, Bay County. See Section 4.1 and **Figure 2-1**.
  - **Construction Plan**
    No serious construction will occur. See individual plans for pine thinning (Section 7.2), longleaf planting (Section 7.3), hydrological restoration (Section 7.4), prescribed fire (Section 7.5).
  - **Describe planned hydrology, vegetation , soils, buffers, etc.**
    See Section 6 on Proposed Conditions and Section 7 for the Work Plan.
  - **Indicate what entity, if any, controls water flow to and/or from the site**
    Water control is not an issue for the mitigation area.
  - **Who maintains the water control structures?**
    No water control structures exist on the mitigation area or control access to or from the site.
  - **What arrangements have been made to guarantee appropriate water flow in the mitigation area during and after the establishment of the mitigation project?**
    Water control is not an issue for the mitigation area.

- **Performance Standards**
  - **Identify success criteria**
    See Section 8.
  - **Compare functions lost and gained at impact and mitigation sites**
    See Section 3 and **Tables 3-1**, **3-2**, and **3-3**.
  - **Describe soils, vegetation and hydrology parameter changes**
    See Sections 4 and 6.

- **Site Protection and Maintenance**
  See Section 9.
  - **List parties and responsibilities**
    Site protection and maintenance will be the responsibility of the permittee.
  - **Indicate who presently owns the mitigation site.**
    The St. Joe Company currently owns the mitigation site.
  - **If different from the permit applicant(s), what is the availability of the property?**
    The landowner has agreed to provide the land for the mitigation area and place it under a conservation easement.
  - **Does the property carry any encumbrances on the title?**
    There are no known encumbrances. This will be verified during the process of placing the site under conservation easement.
  - **If on public land, what arrangements, if any, have been discussed with the managing agency?**
    The mitigation site is not on public land.
  - **Provide evidence of legal protective measures**
    Copies of the conservation easement will be provided to the Corps for review prior to recordation. Copies of the recorded conservation easement will be provided to the Corps within 30 days of recordation.
  - **Indicate the expected ownership of the mitigation area following completion of the mitigation project**
    The mitigation area will be owned by The St. Joe Company, and the site will be placed under a conservation easement to the State of Florida.
  - **Who will be responsible for long-term management and protection of the area?**
    Long-term management and protection of the mitigation area will be the responsibility of the permittee.
  - **If an entity other than the applicant will assume management responsibilities following completion of the mitigation project, is there an executed written agreement with the entity to manage the area in the conformance with the goals of the mitigation?**
    At the present time, there is no specific entity (other than the applicant) identified to assume management responsibilities following the completion of mitigation implementation.
  - **Maintenance plan and schedule**
    See Section 9.3.
  - **Include a statement giving the Corps access to the mitigation site subsequent to the issuance of the Department of Army permit**
    A statement giving the Corps permission to access the mitigation site subsequent to the issuance of the Department of Army permit will be provided.

- **Monitoring Plan**
  - **Provide monitoring schedule, identify party(ies) and responsibilities**
    See Section 10.
  - **Specify data to be collected, including assessment tools and methodologies**
    See Section 10.

- **Adaptive Management Plan**
  - **Identify party (ies) and responsibilities**
    Adaptive management will be the responsibility of the permittee.
  - **Remedial measures (financial assurances, management plan, etc.)**
    See Section 11.

- **Financial Assurance**
  - **Identify party (ies) responsible for assurances**
    The permittee will be responsible for financial assurance of the mitigation project.
  - **Specify type of assurance, contents and schedules**
    The type of financial assurance will be specified in the ETP permit.
  - **Copies of all proposed legal documentation shall be submitted to the Corps of Engineers for approval prior to recordation**
    Will be provided when available for the Corps review.
  - **Copies of the recorded documents must be provided to the Corps no later than 30 days subsequent to recordation**
    Copies of all recorded documents will be provided to the Corps within 30 days of recordation.