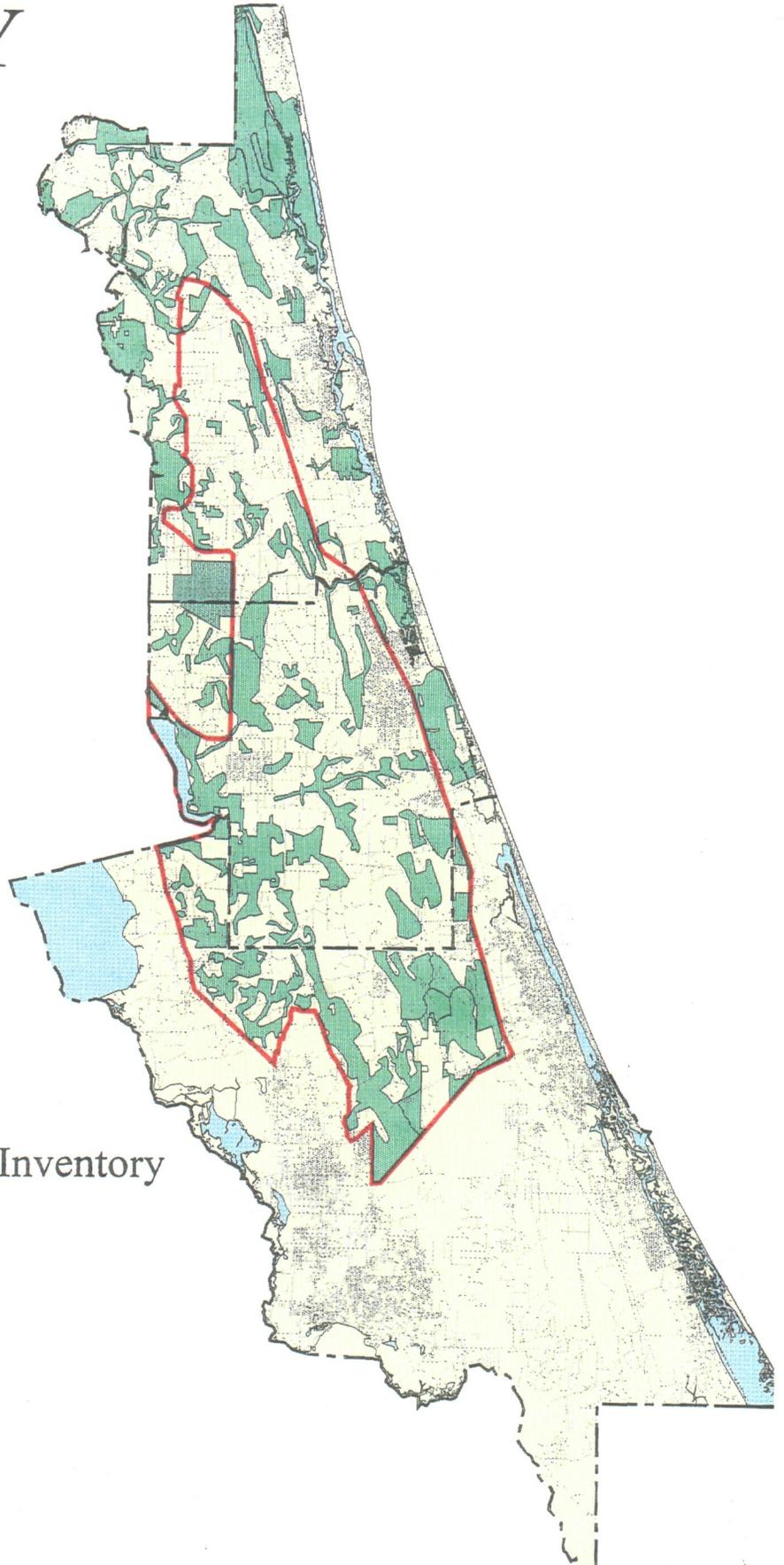


Special Publication SJ95-SP6

A NATURAL AREAS INVENTORY OF THE TIGER BAY AREA

IN FLAGLER,
ST. JOHNS,
AND VOLUSIA
COUNTIES,
FLORIDA



The Florida Natural Areas Inventory
March 1995

A Naturals Areas Inventory of the Tiger Bay Area

In Flagler, St. Johns, and
Volusia Counties, Florida

Gary E. Schultz, Inventory Ecologist

Steve L. Orzell, Project Director

Final Report
March 1995

Contract Agreement Number 93D295

between

St. Johns River Water Management District
and

Florida Natural Areas Inventory
1018 Thomasville Road, Suite 200-C
Tallahassee, Florida 32303
904-224-8207

James W. Muller, Coordinator

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FNAI provided all maps, aerial photographs, data forms, and pertinent background information on element occurrences. FNAI staff supported this project from beginning to end in such tasks as aerial photo interpretation, manual mapping and data entry, GIS mapping, and review of the draft report.

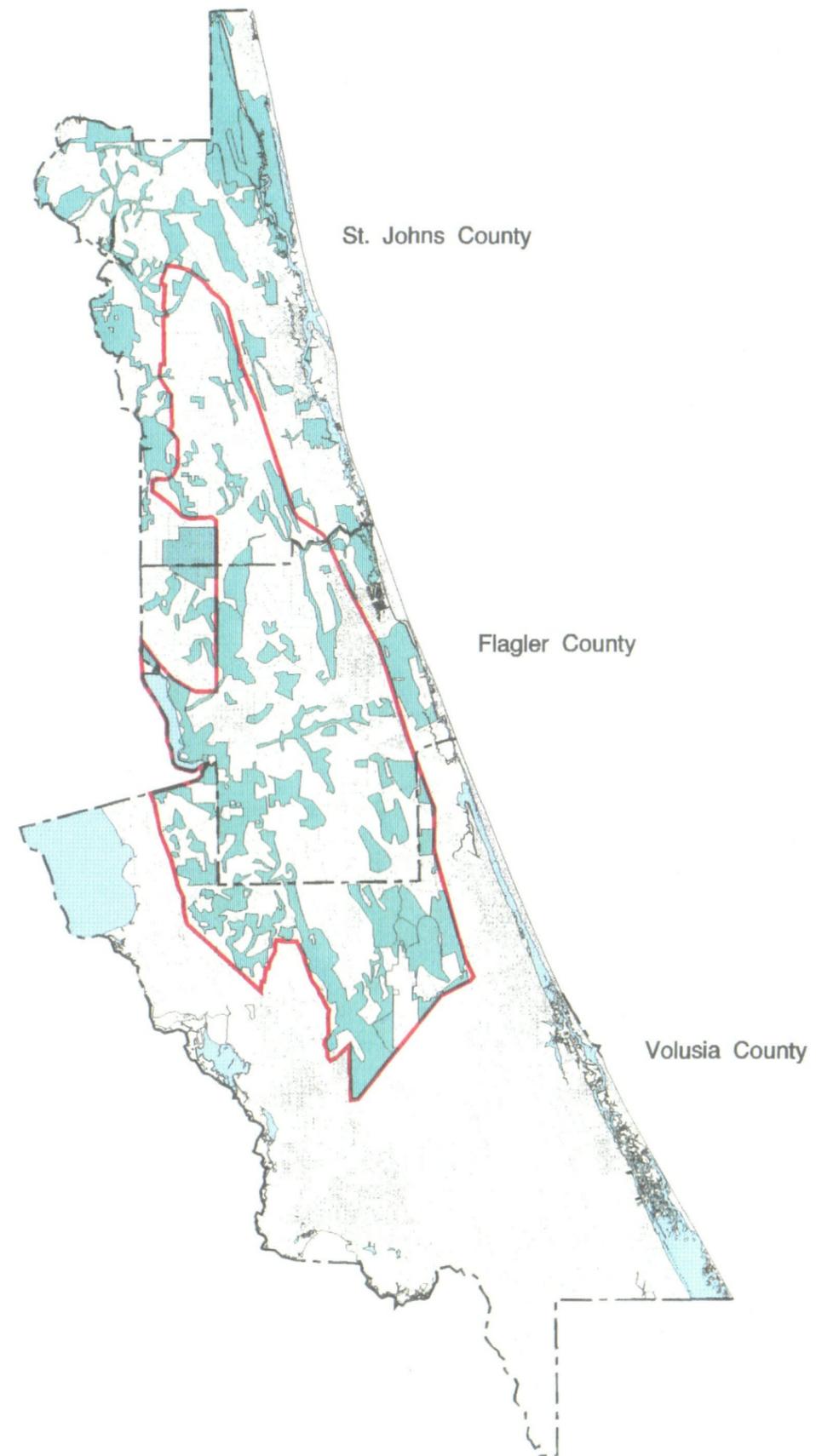
SJRWMD staff provided insights in project scope and direction and allowed access to their aerial photo and map collection. Led by Kenny Downs (SJRWMD Land Acquisition Agent), they were instrumental in obtaining access permission from landowners. Champion International Corporation, Consolidated-Tomoka Land Company, and Georgia Pacific Corporation are commended for allowing access to their lands in the survey area.

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INTRODUCTION

The Florida Natural Areas Inventory (FNAI) prepared this study for the St. Johns River Water Management District (SJRWMD) to provide information and descriptions of the most ecologically significant natural areas of the Tiger Bay Study Area (TBSA). Figure 1 is a GIS map depicting the boundaries of the TBSA in St. Johns, Flagler, and Volusia counties. The study area includes the center portion of St. Johns and Flagler counties, as well as north central Volusia County, and stretches approximately 66 miles on a north-south axis and 20 miles on an east-west axis at its widest point. It is bordered on the north by State Road (SR) 16, the east by Interstate 95, the south by Interstate 4. The more complex west boundary begins at SR 16 in St. Johns County, following County Road (CR) 13A and then SR 13 south through Hastings, continuing southeast along SR 13 to the Range 28-29 border survey line, then south (on the east side of Flagler Estates) into Flagler County to SR 100, along SR 100 west and northwest to the Flagler-Putnam County line, then south along the county line to the Volusia County line, then west along the Volusia-Putnam County line to Highway US 17, then south along this highway past SR 40 to Lake Winona Road, northeast to Clifton Road, east to SR 11, then south along SR 11 about 4.5 miles, then south along Marsh Road to US 92 in Deland, then east to the Range 30-31 border survey line, then south to SR 44, then east to Interstate 4. The three county GIS maps represented in Figures 2-4 show the potential natural areas surveyed during the inventory.

FNAI conducted this natural area survey to locate, evaluate, and describe the natural communities of state-wide and county-wide significance within the TBSA. In addition, information was gathered on FNAI-listed rare plants and animals that were incidentally observed during the survey on qualifying natural area sites (see Appendix IV for copies of the FNAI Special Plant and Animal List and the Element Rank Explanation Sheet). This project did not include a comprehensive survey of the rare species of the area. The FNAI statewide database was utilized to map, store, retrieve, and analyze the natural area data. The survey was conducted from January to December 1994. The results of the inventory can be utilized to evaluate, describe, and develop a plan to protect the most ecologically significant natural communities remaining in the area.



Legend

-  Potential Natural Area (PNA)
-  Tiger Bay Study Area (TBSA)

Scale



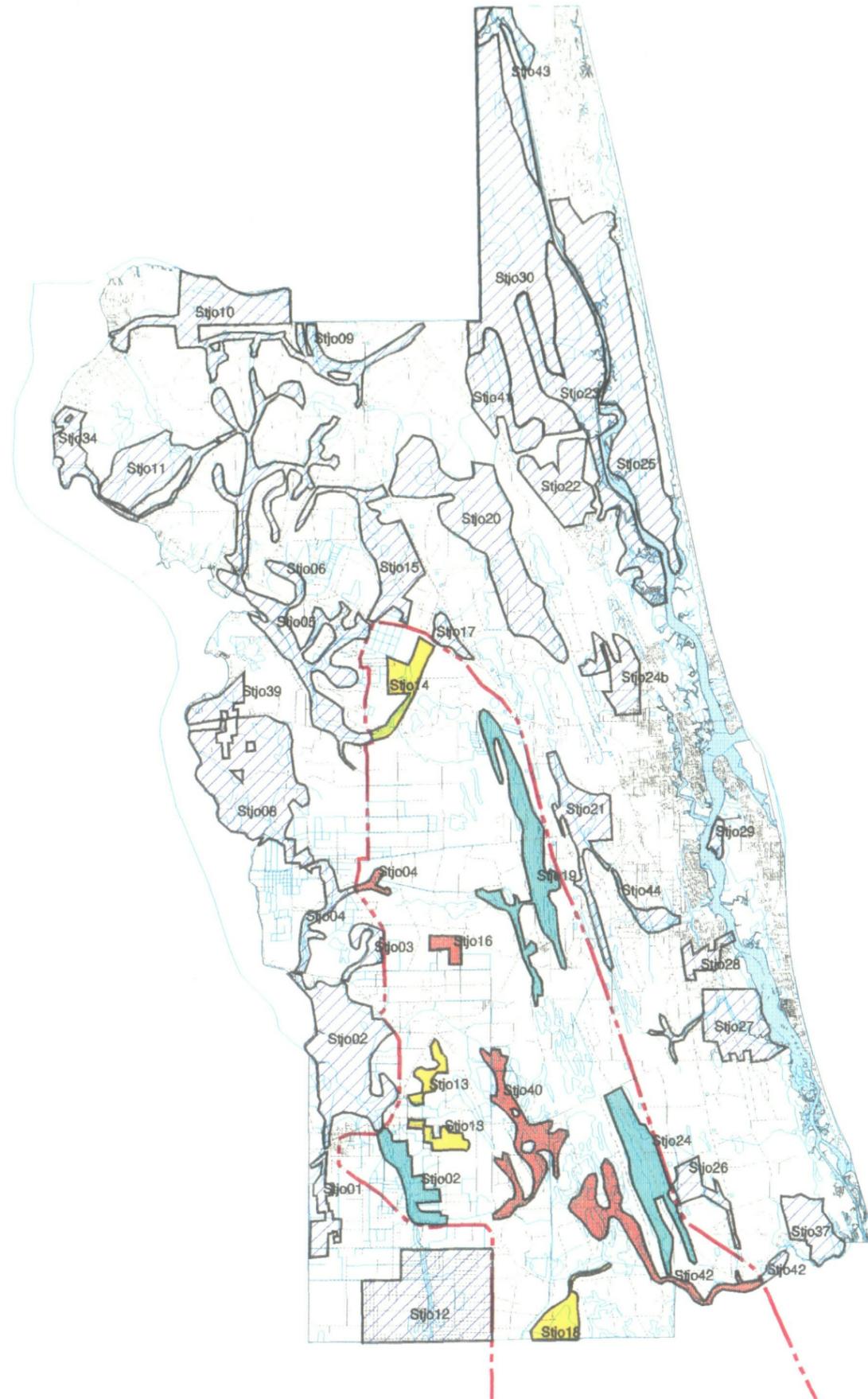
Scale: 1:775000

1 inch = 12.23 Miles



*Florida
Natural
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Inventory*

Figure 1. Location of the Tiger Bay Study Area



Legend

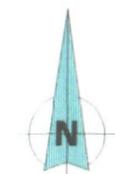
- PNA qualified
- PNA not qualified
- PNA not evaluated
- PNA aerial surveyed only
- Tiger Bay Study Area (TBSA)
- Roads
- Hydrologic Features

Scale

0 4 8 Miles

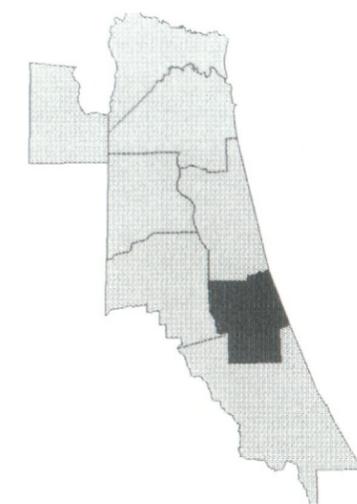
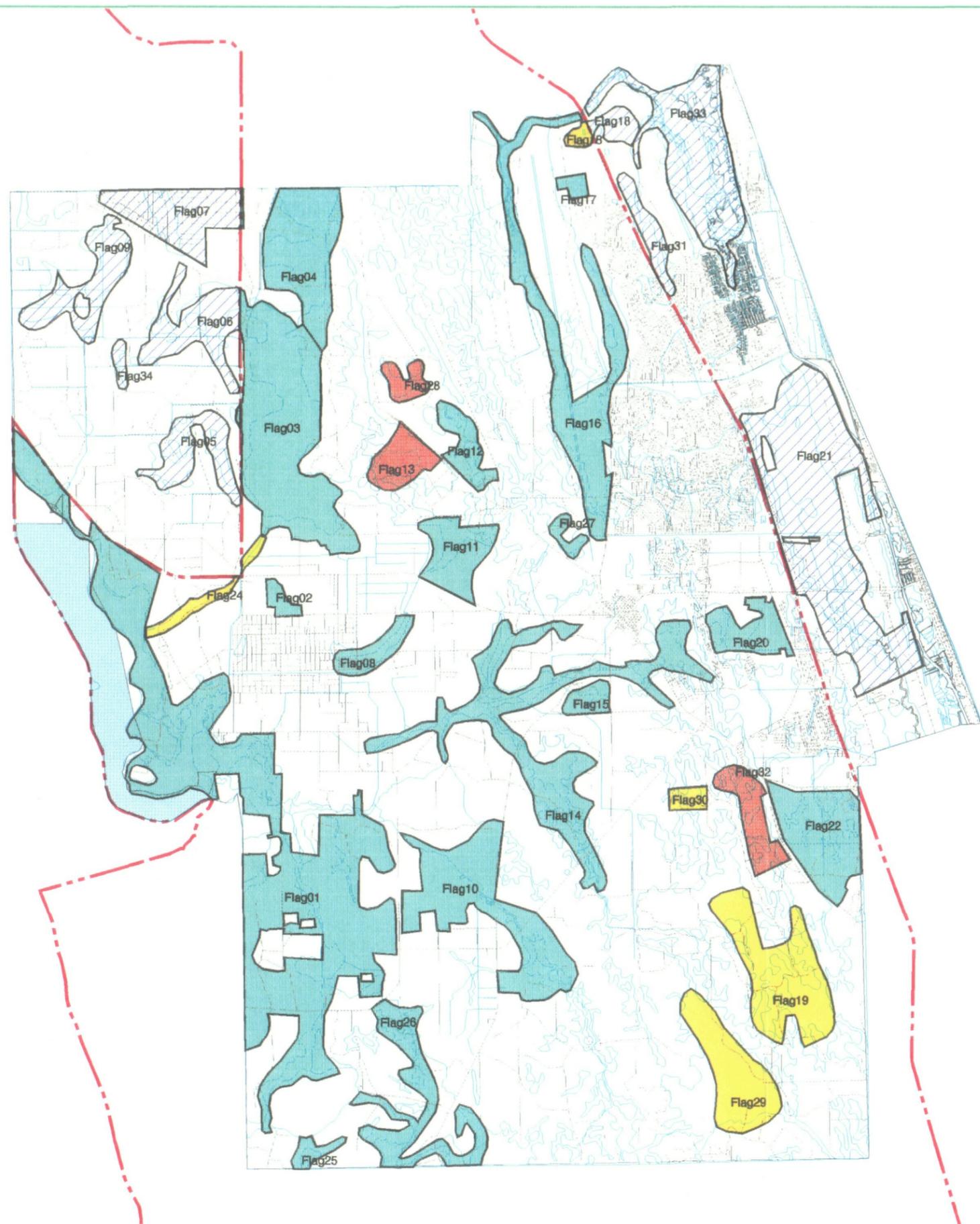
0 4 8 KM

Scale: 1:300000
1 inch = 4.73 Miles



Florida
Natural
Areas
Inventory

Figure 2. Location and Status of PNAs in St Johns County



Legend

- PNA qualified
- PNA not qualified
- PNA not evaluated
- PNA aerial surveyed only
- Tiger Bay Study Area (TBSA)
- Roads
- Hydrologic Features

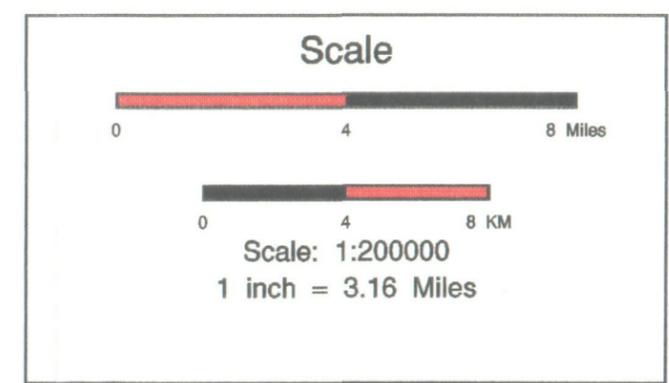
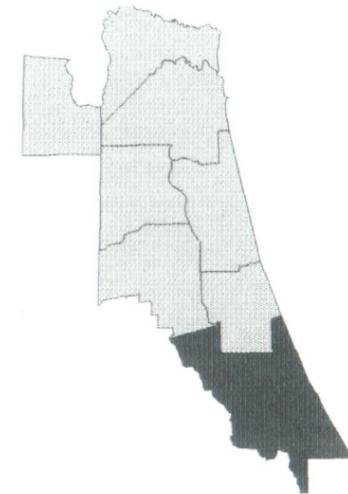
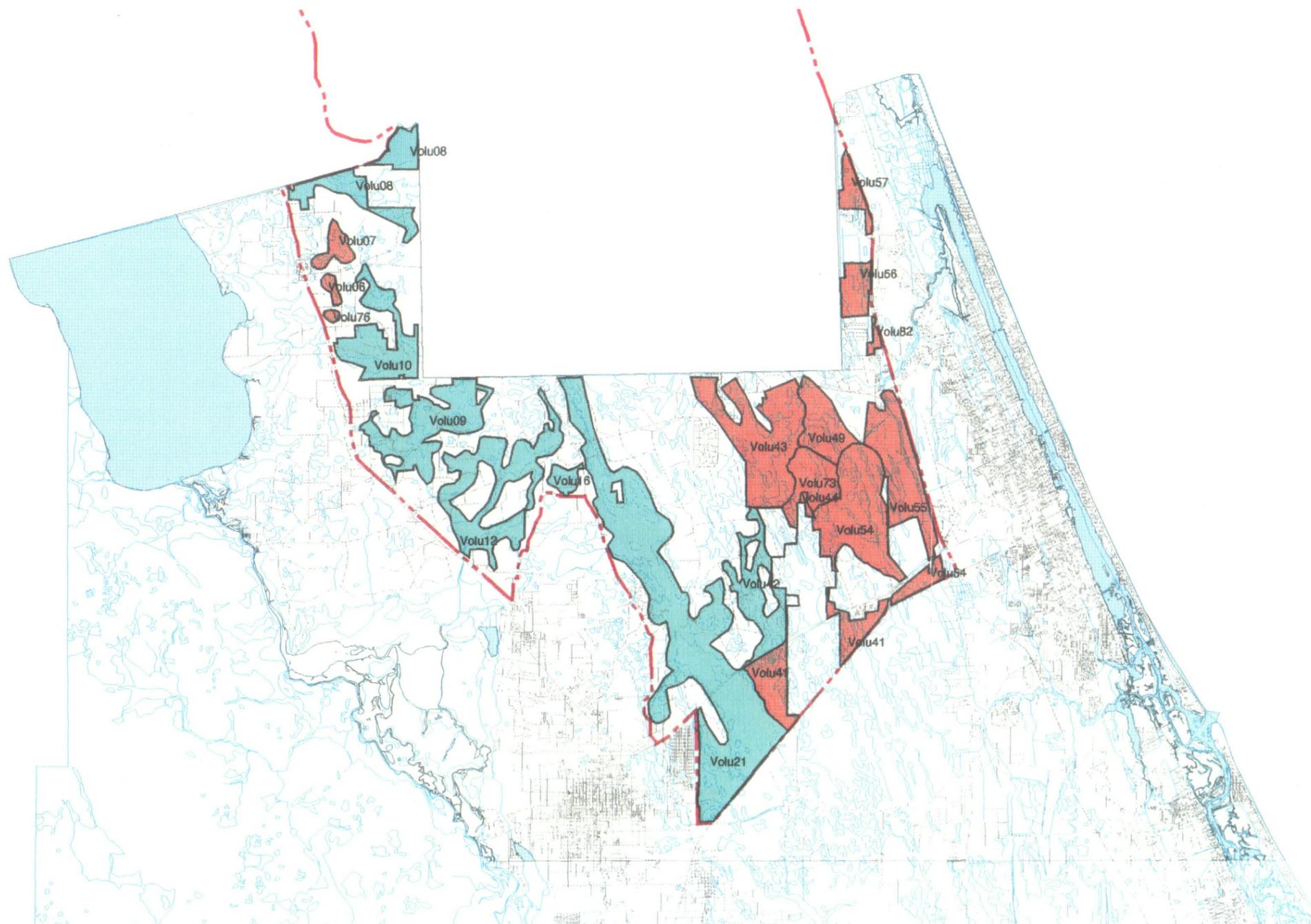


Figure 3. Location and Status of PNAs in Flagler County



Legend

- PNA qualified
- PNA not qualified
- PNA not evaluated
- PNA aerial surveyed only
- Tiger Bay Study Area (TBSA)
- Roads
- Hydrologic Features

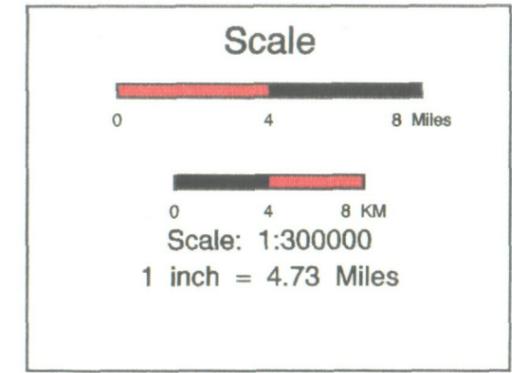


Figure 4. Location and Status of TBSA PNAs in Volusia County

METHODS

The TBSA survey was designed to identify high-quality natural areas through the identification and evaluation of the natural communities. Ideally, the primary interest in a natural area survey is to identify natural communities whose characteristics and functioning are shaped by the processes of evolution and ecological interactions over long periods of time, without the overriding influence of modern human activities. However, because the influence of modern civilization has been so pervasive, no communities in Florida exist in a completely natural state. Direct disturbances such as logging and grazing, and indirect disturbances such as introduction of exotic species, alteration of the natural fire regime, and modification of hydrologic conditions, have reached even the most remote parts of Florida. Nonetheless, there do exist examples of natural communities in which disturbance has been relatively minimal, and others that, though somewhat modified, still approximate many natural characteristics and functions. The level of alteration allowed before a site can no longer be considered a natural area varies with factors such as the nature of the alteration or disturbance and the existence of other examples that are less altered.

For the purposes of this study, a natural area is defined as a tract of land or water with a natural configuration or sufficient buffer land for maintaining its natural quality with proper protection and management. It is a site with relatively undisturbed terrestrial or wetland natural communities, which have a flora and fauna that reflect as nearly as possible the conditions at the time of colonial settlement.

To protect the best viable examples of the natural communities in the TBSA, it was necessary to study them within a framework that will aid in determining protection priorities. The natural community classification framework developed by the FNAI was used in the TBSA survey. The primary emphasis was on the natural community, considered to be a recurring assemblage of biota associated with a particular combination of environmental factors. Further information on the FNAI natural community classification can be found in the Guide to the Natural Communities of Florida prepared by FNAI and the Florida Department of Natural Resources (1990). A list of the Natural Communities recognized by FNAI is provided in Appendix IV.

Determination of Potential Natural Areas

A systematic process, described below, was used to identify potential natural areas (PNAs). Two factors were emphasized and given equal weight: ensuring that sites were not overlooked and investigating the most significant sites. Each step of the survey relies on the previous stage and examines the remaining PNAs in greater detail. Instead of randomly choosing natural areas and then deciding why they were important, the inventory used a systematic approach to develop a list of PNAs and then located significant features on these sites. As each PNA was identified, it was assigned a four letter county code (STJO, FLAG, or VOLU), a site number, and mapped on U.S.G.S. 7.5 minute topographic maps (1:24000). A PNA form was used for each natural area

to track data specific to that site, such as site name, location, listing of topographic and soil maps, aerial photos, aerial and preliminary ground survey assessments, and quality rating.

Compilation of Existing Information

The first step of the inventory included review of literature, courthouse records of land ownership, plant collection site data, and interviews of knowledgeable persons. The FNAI data base was consulted for previously known locations of rare species and natural communities within TBSA. A list of the FNAI elements (Special Plants and Special Animals) currently tracked by FNAI for St. Johns, Flagler, and Volusia counties is presented in Appendix V. The University of Florida Herbarium was visited to aid in identification and recognition of taxonomic characteristics of the rare plant species.

Map and Aerial Photo Interpretation

The primary sources utilized during the identification of PNAs were aerial photographs, U.S.G.S. 7.5 minute topographic maps, and published county soil surveys. Examination of maps and aerial photos assured adequate coverage of the study area. Map and photo interpretation resulted in: (1) selection of PNAs, (2) determination of locations which had no significant potential for natural areas, and (3) general descriptions and initial evaluations of PNAs.

Topographic maps were the most basic and valuable map resource for plotting PNAs. The survey area sites were located on the following sixteen topographic maps: Bakersville, Bunnell, Codys Corner, Daytona Beach NW, Daytona Beach SW, Deland, Dinner Island, Dinner Island NE, Elkton, Espanola, Favoretta, Flagler Beach West, Lake Dias, Pierson, St. Johns Park, and Seville.

Aerial photograph interpretation was completed for all of St. Johns, Flagler, and TBSA portion of Volusia counties using the most recently flown Florida Department of Transportation (FDOT) black and white photographs (1:2083 scale). These aerial photos were taken on 2-18-93 and 2-19-93 for St. Johns County (flight number PD4123), on 2-18-93 and 2-19-93 for Flagler County (flight number PD4116), and on 1-21-92, 3-2-92, and 3-3-92 for Volusia County (flight number PD4038). The photos were instrumental in identification of the natural community types within a given PNA and detecting areas of artificial disturbance.

Soil surveys for St. Johns County (Readle *et al.* 1983) and Volusia County (Baldwin *et al.* 1980) were analyzed to determine locations of soil series with potential for supporting distinctive natural communities (for example, scrub). The soil survey for Flagler County has not yet been published. Soil associations mapped in the county soil surveys were useful in determining the overall landscape diversity of soils mapped in the study area and reflected the diversity of natural community types expected to be in the TBSA. In contrast, the soil series level of taxonomic classification mapped on the aerial photographic sheets at the end of the county soil surveys were invaluable in recognition of natural community types that might occur at a specific location, such as within the boundaries of a PNA.

Aerial Surveys

The purpose of the aerial survey was to review all of the PNAs and determine which had been altered significantly since the date of the most recent aerial photos. Those sites which had been altered were deleted from further consideration as qualifying natural areas. The aerial survey was useful in identifying the specific locations and the overall extent of the least disturbed (highest quality) examples of natural communities at a PNA. This was particularly important in the larger PNAs with fairly homogeneous wetland community types.

During the aerial overview, information was tape recorded and later transcribed onto the PNA forms, including notes that might aid in future field surveys, or the reasons for rejecting sites from future consideration as qualifying natural areas. The aerial survey was conducted from a Bell 47G2 helicopter and covered all of TBSA plus the remainder (excluding coastal areas) of St. Johns and Flagler counties. A total of 78 PNAs were flown during the three flights. Sites that appeared too disturbed to qualify as natural areas were removed from consideration or had their boundaries modified accordingly. (See Table 1 on page 15.)

The following 41 PNAs within TBSA were examined during the flight on May 31, 1994:

St. Johns County (8 total)- 2, 12, 13, 14, 16, 18, 19, 24,

Flagler County (22 total)- 3, 4, 8, 10 (east of SR 11), 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 26 (east of SR 11), 27, 28, 29, 30, 32,

Volusia County (11 total)- 21, 41, 42, 43, 44, 49, 54, 55, 56, 57, and 73.

The remaining 32 (plus the western half of FLAG10 and FLAG26) PNAs in St. Johns and Flagler counties (excluding coastal areas) were flown on June 2, 1994:

St. Johns County (21 total)- 1, 3, 4, 5, 6, 8, 9, 10, 11, 15, 17, 20, 21, 22, 23, 24B, 25, 26, 27, 28, 29,

Flagler County (13 total)- 1, 2, 5, 6, 7, 9, 10 (west of SR 11), 21, 25, 26 (west of SR 11), 31, 33, and 34.

Five PNAs added to the TBSA by the St. Johns River Water Management District were flown on October 18, 1994:

Volusia County- 8, 9, 10, 12, and 16.

The PNAs of Volusia County outside of the TBSA were not aerial surveyed during this study. Additional PNAs and extensions of existing PNAs identified by FNAI staff for another project following the completion of this inventory were not evaluated. These areas are included on the maps depicting the PNAs in Figures 1 through 4 and on the forms in Appendices III and VI. Most of these additions appear to be of low natural quality but still of conservation interest.

Field Surveys

Upon completion of the aerial surveys, ground surveys were conducted of the remaining PNAs within the TBSA to determine whether a PNA was a qualifying natural area. If a PNA was rejected, it was investigated only long enough to record notes on the natural community and the reasons for rejection. (See Table 1). If a PNA qualified as a natural area, the site was surveyed in more detail in order to define the boundaries and locate significant natural features. Information gathered during the ground surveys was recorded on FNAI forms and briefly summarized on the PNA forms. The plant scientific names given throughout this report generally follow Wunderlin (1982). Field surveys were begun in June and completed in October of 1994.

Field surveys were conducted on the following 29 PNAs :

St. Johns County (5 total)- 2, 12, 13, 19, and 24,

Flagler County (17 total)- 1, 2, 3, 4, 8, 10, 11, 12, 14, 15, 16, 17, 20, 22, 25, 26, 27,

Volusia County (7 total)- 8, 9, 10, 12, 16, 21, and 42.

Field surveys were not conducted for the remaining TBSA PNAs due to access or time constraints. The PNAs of St. Johns, Flagler, and Volusia counties outside of the TBSA were not field surveyed during this project.

Natural Quality Ratings

High quality natural community types were identified based on the following characteristics: (1) the presence of characteristic native plant species, (2) the presence of plants that cannot tolerate disturbance or have narrow ecological amplitudes, (3) the absence of species that are increasers with disturbance, and (4) the overall diversity (especially in the groundcover) as indicated by the species richness (number of species) of native plant taxa. The grading system below provides terms for describing the relative amount of change in a community's natural diversity, species composition, and structure due to anthropogenic disturbance. Each natural community surveyed in the field was given a quality rank, with ranks A, B or C necessary to be considered qualified. Some communities were judged to be intermediate between quality ranks and were given a grade such as A-B. The ranks are summarized as follows:

- Grade A: Relatively stable or undisturbed community (excellent quality). Example: old growth forest not previously logged or trees meet or exceed stump size.
- Grade B: Lightly disturbed community (good quality). Example: forest shows evidence of past selective logging, groundcover shows good diversity.
- Grade C: Moderately disturbed community (fair quality). Example: forest logged but recovering, groundcover shows moderate diversity.

Grade D: Heavily to severely disturbed community (low quality - not qualified for further study). Example: forest site prepped for replanting, groundcover shows greatly reduced diversity.

Biodiversity Significance Ratings of Natural Areas

Once a PNA was determined to contain one or more qualifying natural community (-ies), it was considered to be a qualifying natural area. It was then compared to other qualifying sites in the state or region by assigning it a Biodiversity Significance (B) rating based on criteria developed by The Nature Conservancy and Natural Heritage Programs. [See Appendix IV for a more detailed explanation of G (global) and S (state) ranks. S ranks are similar to G ranks but apply to state status, rather than global status. An element is any exemplary or rare component of the natural environment such as species, plant communities, or natural features, and are assigned both G and S ranks.] These criteria evaluate the overall ecological significance of a site on a statewide or regional perspective with each site receiving a rating from B1 through B5 as follows:

- B1 - Outstanding significance, such as the only known occurrence of any element, the best or an excellent (A-ranked) occurrence of a G1 (critically imperiled globally) element, or a concentration (4+) of high-ranked (A- or B-ranked) occurrences of G1 or G2 (globally imperiled) elements. Site should be viable and defensible for targeted elements and ecological processes contained.
- B2 - Very high significance, such as one of the most outstanding occurrences of any community element (regardless of its element rank). Also includes areas containing any other (ranked B-good, C-marginal, or D-poor) occurrence of a G1 element, a good (A- or B- ranked) occurrence of a G2 element, an excellent (A-ranked) occurrence of a G3 (globally rare or restricted) element, or a concentration (4+) of B-ranked G3 or C-ranked G2 elements.
- B3 - High significance, such as other (C- or D- ranked) occurrence of a G2 element, a B-ranked occurrence of a G3 element, an A-ranked occurrence of any community, or a concentration (4+) of A- or B-ranked occurrences of G4 (apparently secure globally) [or G5 (demonstratably secure globally)] S1 elements.
- B4 - Moderate significance, such as a C-ranked occurrence of a G3 element, a B-ranked occurrence of any community, an A- or B-ranked or only state (but at least C-ranked) occurrence of a G4 (or G5) S1 element, an A-ranked occurrence of an S2 element, or a concentration (4+) of good (B-ranked) S2 or excellent (A-ranked) S3 elements.
- B5 - Of general biodiversity interest or open space.

These Biodiversity Significance ratings take into account the quality of each natural community on site, the number and quality of elements recorded, and the state or regional significance of the elements. Sites with the highest biodiversity ratings (B2 and B3 in this inventory) should receive top conservation priority. The **overall ratings** are equated with the Biodiversity Significance ratings for the sites as follows:

High	Biodiversity Significance rating of B1
Medium-High	Biodiversity Significance rating of B2
Medium	Biodiversity Significance rating of B3
Medium-Low	Biodiversity Significance rating of B4
Low	Biodiversity Significance rating of B5.

Additional Evaluation Criteria

Additional data on the qualified natural area sites were evaluated to detail how the sites within each overall rating compare to each other. These criteria were selected by SJRWMD and FNAI staff to assist in decisions on site acquisition and management. Each site was given a high, medium, or low rating for each of the nine criteria defined below.

- Quality-** natural quality of primary natural community(ies) [see Natural Quality Ratings Section on page nine for explanation]

High	Relatively stable or undisturbed (Grade A or A-B)
Medium	Lightly disturbed (Grade B or B-C)
Low	Moderately disturbed (Grade C)
- Rare Elements-** highest FNAI-ranked element found at site [see Appendix IV for an explanation of G (global) ranks]

High	G2 or higher
Medium	G3
Low	G4 or lower
- Size of site in acres**

High	10,000 or more
Medium	Greater than or equal to 1500 and less than 10,000
Low	Less than 1500
- Connectivity-** proximity to protected or natural lands

High	Adjacent to currently protected land (managed area)
Medium	Adjacent to natural areas not yet protected
Low	Isolated or separated from other natural areas

5. **Land Use** of adjacent tracts

- | | |
|--------|---|
| High | Adjacent to undeveloped lands |
| Medium | Adjacent to low intensity development (such as agricultural fields, pine plantations, or four-lane highway) |
| Low | Adjacent to high intensity development (such as residential subdivision or urban area) |

6. **Floodplain-** estimated percent of site in 100-year floodplain

- | | |
|--------|---------------|
| High | More than 50% |
| Medium | 25 to 50% |
| Low | Less than 25% |

7. **Ownership-** number of land owners (followed by ? if unsure)

- | | |
|--------|-----------------------|
| High | One to two owner(s) |
| Medium | Three to six owners |
| Low | More than six owners. |

8. **Restoration Needs-** estimate of the amount of work needed to restore overall site vegetation and/or hydrology to good condition

- | | |
|--------|--|
| High | Much restoration work needs to be done |
| Medium | Moderate restoration work needs to be done |
| Low | Little restoration work needs to be done |

9. **Protection Urgency-** estimate of imperative need to protect site from potential disturbance

- | | |
|--------|--|
| High | Threat immediate |
| Medium | Threat expected within five years |
| Low | Definable threat but not expected in next five years or no threat known for the foreseeable future |

Staff Meetings

Meetings of SJRWMD and FNAI personnel were conducted at regular monthly intervals at SJRWMD offices in Palatka. These provided a forum to review project progress, address site access, refine survey boundaries, and exclude lower priority sites. After the completion of the initial field season, a meeting was held on August 2, 1994, to discuss future priorities of the project. Due to time limitations of the project contract, it was suggested that field visits to selected PNAs in Volusia County be substituted for second field visits to PNAs in the other two counties. Following discussions during the next two weeks, it was mutually agreed to eliminate some field visits to PNAs in St. Johns, Flagler, and Volusia counties due to the PNAs location and/or size and add field visits to additional PNAs west of the original Tiger Bay Study Area boundary in Flagler and Volusia counties. It was agreed to limit future field visits to the following PNAs: St. Johns- 2, 19, 24; Flagler- 1, 3, 4, 10, 25, 26; and Volusia- 8, 9, 10, 12, 21, and 42.

RESULTS

Aerial photo interpretation and aerial surveys were performed for all of the Tiger Bay Study Area (49 PNAs total) plus the remainder (excluding coastal areas) of St. Johns and Flagler counties (32 additional PNAs- see Appendix VI for these PNA forms). During the initial aerial photo and map interpretation phase of the inventory, 41 PNAs were identified within the **original** boundaries of the TBSA, with 8 in St. Johns County, 22 in Flagler County, and 11 in Volusia County (see Figure 1). After all of the TBSA PNAs were surveyed from the air, the following seven PNAs were judged not to be of natural area quality largely due to commercial forestry practices: St. Johns 14, 18, and Flagler 18, 19, 24, 29, and 30. The initial field survey resulted in the elimination of St. Johns 12 and 13 due to past land clearing or logging destroying the integrity of the groundcover.

Once the PNAs were flown and initially field surveyed, it was mutually agreed by both contract parties to exclude 13 PNAs from further study due to their location and/or size: St. Johns 16, Flagler 13, 28, 32, and Volusia 41, 43, 44, 49 54, 55, 56, 57, and 73. The project boundary was then modified to extend the survey area west of State Road 11 to include parts of Flagler and Volusia counties of interest to the SJRWMD. This added eight additional PNAs plus the west half of two previously included PNAs: Flagler 1, 2, 10 (west of SR 11), 25, 26 (west of SR 11), and Volusia 8, 9, 10, 12, and 16 (but not 6, 7, or 76). The remaining 27 PNAs were further field surveyed and a resulting list of 27 qualifying natural areas (NAs) was compiled with 3 in St. Johns County, 17 in Flagler County, and 7 in Volusia County. Table 1 is a composite list of the TBSA PNAs identified for this project and shows their status at each step of the inventory. Six PNAs in St. Johns County (two within the TBSA boundary) identified by FNAI staff following completion of this inventory were not evaluated. These PNAs are depicted on Figure 2 as St. Johns 39, 40, 41, 42, 43, and 44. St. Johns 40 and 42 plus an extension of St. Johns 4 within TBSA appear to be of marginal natural area significance as they have been disturbed by recent commercial forestry operations.

Information collected during field surveys on FNAI-listed elements (Natural Communities, Special Plants, and Special Animals) was transcribed onto FNAI PNA and Element Occurrence Record (EOR) forms. A total of 81 EORs were completed during these surveys:

EOR	New EORs from Tiger Bay Study	Existing FNAI EORs Updated By This Study
Special Plant	7	0
Special Animal	6	0
Natural Community	64	4

These PNA and EOR forms are included in Appendix III. Tables 2 and 3 list all of the documented FNAI elements and their total number occurrences in TBSA qualifying NAs, either found during this survey or preexisting in the FNAI database, plus their FNAI ranks. Table 2

lists seven special plant species and five special animals. Table 3 lists the 86 natural community occurrences, which consisted of 12 xeric and 7 mesic upland EOs and 67 wetland EOs.

The qualifying natural areas were analyzed to see if any should be merged into the same site. This resulted in Dinner Island Big Cypress Swamp (FLAG03) merging with Turkey Island (FLAG04), and Black Branch (FLAG14) merging with Little Black Branch (FLAG15). The Haw Creek (FLAG01 and VOLU08) and Little Haw Creek (VOLU21 and FLAG26) sites included land in both Flagler and Volusia counties but were only counted as sites in Flagler or Volusia County, respectively. The resulting number of qualifying natural area sites inside the TBSA boundaries, by county, were: St. Johns - 3, Flagler - 14, and Volusia - 6. Each of these 23 qualifying sites was then assigned a site name and its data were written up on a Site Basic Record (SBR) form (see Appendix II). Appendix I lists these qualifying sites and the FNAI elements (Natural Communities, Special Plants, and Special Animals) found at each. The natural communities and site (ecological and buffer) boundaries for each of the 23 qualifying sites were then delineated onto topographic maps. These boundaries were determined by aerial photograph interpretation and limited ground truthing. Site boundaries were designed to include the qualifying natural communities plus enough additional buffer lands to allow for long term site management and viability.

Table 1. Tiger Bay Study Area PNAs by County and Their Overall Qualification Status

County/ Site Name	PNA Number	Aerial Survey	Ground Survey	Overall Qualification Status
St. Johns County				
Hastings Deep Creek	02	Yes	Yes	Qualified
Flagler Estates	12	Yes	Not Qualified	Not Qualified
Spuds Flatwoods	13	Yes	Not Qualified	Not Qualified
Turnbull Creek	14	Not Qualified	No	Not Qualified
Squirrel Hill	16	Yes	No Access	Not Evaluated
Turkey Island North	18	Not Qualified	No	Not Qualified
Trestle Bay Swamp	19	Yes	Yes	Qualified
Fish Tail Swamp	24	Yes	Yes	Qualified
Flagler County				
Haw Creek	01	Yes	Yes	Qualified
White Oak Branch Flatwoods	02	Yes	Yes	Qualified
Dinner Island Big Cypress Swamp	03	Yes	Yes	Qualified
Turkey Island	04	Yes	Yes	Qualified
Bimini South Swamp	08	Yes	Yes	Qualified
Middle Haw Creek	10	Yes	Yes	Qualified
Espanola Cemetery	11	Yes	Yes	Qualified
Tank Lake	12	Yes	Yes	Qualified
Neoga	13	Yes	No Access	Not Evaluated
Black Branch	14	Yes	Yes	Qualified
Little Black Branch	15	Yes	Yes	Qualified
Pringle Swamp	16	Yes	Yes	Qualified
Hulett Branch Flatwoods	17	Yes	Yes	Qualified
Old Kings Road North	18	Not Qualified	No	Not Qualified
Lake Swamp	19	Not Qualified	No	Not Qualified
Gore Lake	20	Yes	Yes	Qualified
Eagle Rock Ranch	22	Yes	Yes	Qualified

Table 1. Tiger Bay Study Area PNAs by County and Their Overall Qualification Status

County/ Site Name	PNA Number	Aerial Survey	Ground Survey	Overall Qualification Status
Flagler County (continued)				
White Oak Branch	24	Not Qualified	No	Not Qualified
Lake Disston South	25	Yes	Yes	Qualified
Little Haw Creek North	26	Yes	Yes	Qualified
Espanola East Swamp	27	Yes	Yes	Qualified
Honey Hill	28	Yes	No Access	Not Evaluated
Hull Swamp	29	Not Qualified	No	Not Qualified
Korona West	30	Not Qualified	No	Not Qualified
Korona	32	Yes	No Access	Not Evaluated
Volusia County				
Haw Creek	08	Yes	Yes	Qualified
Shaw Lake	09	Yes	Yes	Qualified
Saw Grass Bay	10	Yes	Yes	Qualified
Barberville Deep Creek	12	Yes	Yes	Qualified
Dan George Lake	16	Yes	Yes	Qualified
Little Haw Creek	21	Yes	Yes	Qualified
Tiger Bay	41	Yes	No	Not Evaluated
Little Tiger Bay	42	Yes	Yes	Qualified
Middle Haw Creek	43	Yes	No	Not Evaluated
Bennett Field West	44	Yes	No	Not Evaluated
Gator Head East	49	Yes	No	Not Evaluated
Bennett Swamp	54	Yes	No	Not Evaluated
Tomoka River	55	Yes	No	Not Evaluated
National Gardens South	56	Yes	No	Not Evaluated
National Gardens North	57	Yes	No	Not Evaluated
Bennett Field North	73	Yes	No	Not Evaluated

Table 2. FNAI-listed Plant and Animal Species Documented from the TBSA Qualifying Natural Areas

Element	FNAI Global (G) and State (S) Ranks*	Federal Status*	State Status*	Total Number of TBSA Element Occurrence Records	
				Preexisting in FNAI Database	New
Plants					
<i>Conradina grandiflora</i> large-flowered rosemary	G3 S3	C2	LE	1	0
<i>Helianthus carnosus</i> lakeside sunflower	G1G2 S1S2	C2	LE	2	2
<i>Ilex arenicola</i> scrub holly	G5 T3 S3	3C	CE	0	2
<i>Lechea cernua</i> nodding pinweed	G3 S3	3C	LE	1	0
<i>Nolina atopocarpa</i> Florida beargrass	G3S3	C2	LE	1	0
<i>Persea humilis</i> scrub bay	G3 S3	3C	N	2	3
<i>Pycnanthemum floridanum</i> Florida mountain mint	G3S3	3C	N	2	0
<i>Rhynchospora decurrens</i> decurent beak-rush	G3G4 S2	C2	N	1	0
Animals					
<i>Crotalus adamanteus</i> eastern diamondback rattlesnake	G5 S?	N	N	0	1
<i>Elanoides forficatus</i> swallow-tailed kite	G5 S2S3	N	N	0	2
<i>Gopherus polyphemus</i> gopher tortoise	G3 S3	C2	LS	1	3
<i>Haliaeetus leucocephalus</i> bald eagle	G3 S2S3	LE	LT	3	0
<i>Ursus americanus floridanus</i> Florida black bear	G5 T2 S2	C2	LT	1	0

*See rank explanation sheet in Appendix IV for descriptions of Global Rank, State Rank, Federal and State Status.

Table 3. FNAI Natural Communities Documented from the TBSA Qualifying Natural Areas

Natural Community	FNAI Global (G) and State (S) Ranks*	Total Number of Tiger Bay Study Area Element Occurrence Records	
		Preexisting in FNAI Database	New
Basin Marsh	G4? S3	1	3
Basin Swamp	G? S4?	1	15
Baygall	G4? S4?	0	8
Blackwater Stream	G4 S2	0	2
Bog	G? S3	0	1
Depression Marsh	G4? S3	0	1
Dome Swamp	G4? S3?	0	1
Floodplain Swamp	G? S4?	1	19
Hydric Hammock	G? S4?	0	7
Marsh Lake	G4 S4	0	1
Mesic Flatwoods	G? S4	0	7
Sandhill	G2G3 S2	2	0
Sandhill Upland Lake	G3 S2	1	0
Scrub	G2 S2	6	3
Swamp Lake	G4 S3	0	1
Wet Flatwoods	G? S4?	0	4
Xeric Hammock	G? S3	0	1

*See Appendix IV for an explanation of G (global) and S (state) ranks.

DISCUSSION

The survey identified 23 qualifying natural area (NA) sites (after merging some NAs) covering approximately 148,000 acres. Not all natural communities within the NA sites were surveyed due to access or time constraints. The majority of the qualifying NA are wetland landscapes surrounded by uplands disturbed by logging, planting of pines, or row crop farming. The upland acreage of qualifying NAs is greatly surpassed by qualifying wetland acreage. The documented TBSA natural community (NC) element occurrences consist of 19 upland (only 22%) versus 67 (78%) wetland. The highest ranked NCs of scrub and sandhill are mainly represented by small remnants of these once more widespread habitats. Basin swamp has the largest documented acreage of any natural community type surveyed, followed by floodplain swamp and baygall. Three major sources of disturbance account for the relatively low number of qualifying upland areas: commercial forestry, agriculture, and residential development. Commercial forestry activities are predominant throughout the survey area. Most of the flatwoods and other upland natural communities have been adversely affected by practices of logging and planting of pine plantations (often infringing on the edge of the wetlands). Fire suppression is causing a reduction in species diversity in fire-adapted natural communities such as flatwoods and scrub. Agricultural land use is most intense in southwest St. Johns County where row crops predominate and in northwest Volusia County where numerous large fern nurseries are centered around the city of Pierson. Residential development is most prominent along the I-95 corridor which borders the east side of the study area. Since so few remain, any qualifying upland natural area should be considered a top priority in protection planning.

Suitable habitat for rare species was identified on numerous sites although relatively few new special plant or animal records were observed. This may be partially explained by each site visit covering a limited amount of land area during only one or two seasons and the lack of burning in fire-adapted natural communities. Sites identified as having suitable habitat for rare species should be evaluated more thoroughly in the future. This would be most successful in the scrub, sandhill, and flatwoods communities if surveys followed prescribed burning.

The most notable records for rare species are the occurrences of *Helianthus carnosus* (lakeside sunflower- globally imperiled and state endangered - FNAI ranked G1G2/S1S2) in the **White Oak Branch Flatwoods** (FLAG02) and **Pringle Swamp** (FLAG16) sites. Both of these small *Helianthus* populations occur near the mowed roadside where the plants are exposed to more sunlight. Additional scattered populations of this *Helianthus* are known to grow in the mowed State Road 100 R/W from the Putnam/Flagler county line on the west to Bunnell on the east. However, no *Helianthus* were found beyond the highway right-of-way (R/W) during the field surveys of the **Haw Creek** (FLAG01), **Espanola Cemetery** (FLAG11), and **Black Branch** (FLAG14) sites which all border this stretch of highway. Although their flatwoods are overgrown from the lack of fire, these sites should be more thoroughly searched for this rare species.

The Biodiversity Significance/ Overall Ratings and nine Additional Evaluation Criteria Ratings (as defined in the Methods Section) for each of the 23 qualifying natural area sites are summarized in Table 4 and detailed in the Site Summary Section of this report (see pages 27-72). Figure 5 shows the location and biodiversity significance ratings of the sites. These assigned

ratings are based on information gathered during this inventory. Some of the criteria ratings (such as floodplain percentage, restoration needs, and protection urgency) are subjective estimates made by the author and should be considered only as field assessments. A particular site's ratings are not static and could change in the future. Modifying factors could include site disturbances such as logging and additional field surveys that discover occurrences of highly ranked species, especially on some of the larger sites where only a limited amount of the total area was ground-surveyed. Additional descriptive information for these 23 sites is included on the Site Basic Records (see Appendix II).

Table 4. Tiger Bay Study Area Qualifying Natural Areas: Biodiversity Significance and Additional Evaluation Criteria Ratings*

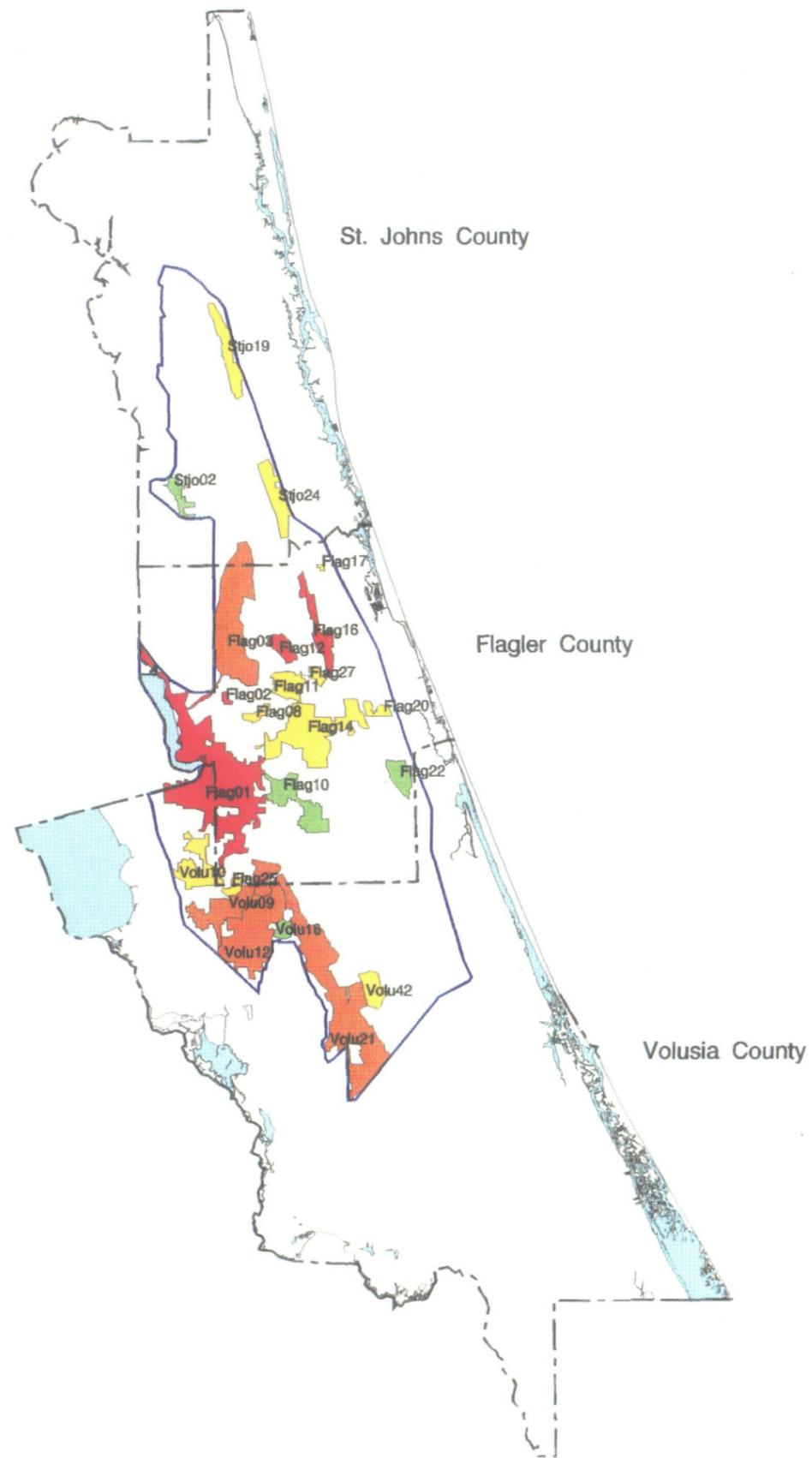
Site Name	County/ PNA Number	Natural Quality	Rare Ele- ment	Size	Con- nect- ivity	Land Use	Flood- plain	Owner- ship	Restora- tion	Protec- tion	Biodiversity Significance = Overall Rating
Flagler Co.											
Bimini South Swamp	8	M	L	L	L	L	H	H	M	L	B4= Medium-Low
Black Branch	14, 15	M	L	H	M	M	H	L?	H	M	B4= Medium-Low
Dinner Island Big Cypress Swamp	03, 04	H	L	H	M	M	H	M	M	M	B3= Medium
Eagle Rock Ranch	22	L	L	M	L	L	L	H	H	M	B5=Low
Espanola Cemetery	11	M	L	M	L	M	M	M	M	M	B4= Medium-Low
Espanola East Swamp	27	M	L	L	M	M	M	H	M	M	B4=Medium-Low
Gore Lake	20	M	L	L	L	L	M	H	M	L	B4= Medium-Low
Haw Creek	01/ Volusia08	H	M	H	H	H	H	L?	M	M	B2=Medium-High
Hulett Branch	17	M	L	L	L	L	L	H	L	H	B4= Medium-Low
Lake Disston	25	H	L	L	H	M	H	H	M	L	B4= Medium-Low
Middle Haw Creek	10	L	L	M	H	M	H	L?	H	M	B5= Low
Pringle Swamp	16	M	H	M	M	M	M	M	M	M	B2= Medium-High
Tank Lake	12	M	H	M	M	M	M	H	M	H	B2= Medium-High
White Oak Branch Flatwoods	02	M	H	L	L	M	L	H	M	M	B2= Medium-High

Table 4. Tiger Bay Study Area Qualified Natural Areas: Their Biodiversity Significance and Additional Evaluation Criteria Ratings*

Site Name	County/ PNA Number	Natural Quality	Rare Ele- ment	Size	Con- nect- ivity	Land Use	Flood- plain	Owner- ship	Restora- tion	Protec- tion	Biodiversity Significance = Overall Rating
St. Johns Co.											
Fish Tail Swamp	24	H	M	M	M	M	H	H	L	M	B4= Medium-Low
Hastings Deep Creek- SE of SR 207	2	L	M	M	H	M	H	L?	H	L	B5= Low
Trestle Bay Swamp	19	H	L	M	L	M	H	M	M	H	B4= Medium-Low
Volusia Co.											
Barberville Deep Creek	12	M	H	H	H	M	H	H	M	M	B3= Medium
Dan George Lake	16	M	L	L	H	M	M	H	M	L	B5=Low
Little Haw Creek	21/Flagler 26	M	H	H	H	M	H	L	H	H	B3= Medium
Little Tiger Bay	42	M	L	M	H	M	H	H	M	L	B4= Medium-Low
Saw Grass Bay	10	M	M	M	M	M	M	M?	H	M	B4=Medium-Low
Shaw Lake	9	M	H	M	H	M	M	M	M	H	B3=Medium

*Definitions of the rating criteria can be found in the Methods Section of this report.

H= high, M= medium, L= low.



Legend

- Biodiversity Significance = Medium-High
- Biodiversity Significance = Medium
- Biodiversity Significance = Medium-Low
- Biodiversity Significance = Low
- Tiger Bay Study Area (TBSA)

Scale



Scale: 1:775000
1 inch = 12.23 Miles



Florida
Natural
Areas
Inventory

Figure 5. Location and Biodiversity Significance Ratings of the TBSA Qualifying Natural Areas Sites

Conservation Priorities

The conservation priority of natural area sites within the TBSA should be considered in the perspective of state or regional biodiversity significance. Since no TBSA site attained a B1 (or high overall) rating, other sites within the SJRWMD may hold a higher conservation priority than any within TBSA. When the TBSA is examined by itself, sites with a medium-high overall rating should receive top conservation priority, followed by medium overall, then medium-low overall, and finally low overall rated sites. Brief summaries of the qualifying sites are given below. Detailed site descriptions and maps are in the site summaries section which follows.

Four qualifying sites rated **medium-high** overall (B2 in biodiversity significance as explained in the methods section).

Haw Creek (PNAs FLAG01 and VOLU08) is of regional ecological significance in northeast Florida as a large wetland landscape which includes several areas of excellent quality floodplain swamp and basin marsh. It represents the largest block of relatively undisturbed habitat surveyed during this inventory. The site has at least two bald eagle nests in the floodplain swamp along the east side of Crescent Lake. The central portion of the site is protected as the Haw Creek State Preserve and the SJRWMD has acquired adjacent lands as the Haw Creek Conservation Area. Emphasis should be placed on the protection of the remaining portions of the excellent quality floodplain swamp and basin marsh along the east side of Crescent Lake.

Tank Lake (FLAG12) has about 240 acres of good quality scrub (the best example of this imperiled natural community observed in the TBSA) harboring the FNAI-listed gopher tortoise, scrub bay, and nodding pinweed. It also has good quality baygall and three swamp lakes. Some of the mesic flatwoods around the lakes have been recently logged but the groundcover appears to remain intact.

The globally imperiled and state endangered *Helianthus carnosus* (lakeside sunflower) is known to occur in the mowed right-of-way along public roads. Two small populations of this species were found in the TBSA growing adjacent to mowed roadsides. **Pringle Swamp** (FLAG16) has *Helianthus* growing at the edge of fair quality flatwoods. The core of the site has a good quality basin swamp with a canopy of large trees. The swamp drains north and is part of the headwaters of Pellicer Creek. **White Oak Branch Flatwoods** (FLAG02) is a smaller site that has *Helianthus* continuing from the roadside into the edge of fair quality flatwoods. The overgrown flatwoods appear to have been selectively cutover in the past. These two sites need a program of prescribed burning to enhance the lakeside sunflower populations and the quality of the natural communities.

The following four **medium** (B3 in biodiversity significance) rated sites were identified during the study. **Barberville Deep Creek** (VOLU12) is a very diverse wetland system draining to the southwest where it becomes Deep Creek. The core of the site consists of two basin swamps, a basin marsh, and a baygall, all of large size and good to excellent quality. The interspersed flatwoods and scrub have been impacted by logging and planting of pines. However, some of the small or remnant scrubs are of fair quality and harbor gopher tortoise. Most of this site has

been purchased in the past year by the SJRWMD. The remainder of the excellent quality floodplain swamp and basin marsh at the south end of the site should be a priority for protection. **Dinner Island Big Cypress Swamp** (FLAG03 and 04) is a good to excellent quality basin swamp (one of the largest in the TBSA) covering more than six square miles. The swamp has high species diversity in its dense cover of mature trees. Unconfirmed sightings of Florida black bear have been reported from the suitable habitat on site. The non-qualifying White Oak Branch (FLAG24) PNA connecting the southwest corner of the site to Crescent Lake has been logged right up to its narrow floodplain. **Little Haw Creek** (VOLU21 and FLAG26) is a very long corridor extending along Little Haw Creek from Lake Disston south to Interstate-4. It has areas of good to excellent quality floodplain and basin swamps with large trees. The listed plant decurrent beakrush was seen here in 1981. Florida black bear are thought to range over the site. About 70 acres of fair quality scrub with gopher tortoise and scrub bay are located in the extreme southwest corner of the site. Conservation should emphasize the areas of excellent quality floodplain swamp east of Lake Dias and basin swamp south of US 92. **Shaw Lake** (VOLU09), adjacent to the west side of **Barberville Deep Creek**, is a diverse mosaic of scrub and sandhill ridges, baygalls, small depression marshes, swamp lakes, and flatwoods. Listed species known to occur in the fair quality scrub are gopher tortoise, scrub holly, scrub bay, and large-flowered rosemary. Part of the good to excellent quality baygall located in the northeast corner of the site has been purchased by the SJRWMD in the past year. The remainder of this diverse site should be a conservation priority.

The following five **medium-low** (B4 in biodiversity significance) rated sites were identified during the study. **Fish Tail Swamp** (STJO24) is a four mile long landscape dominated by good to excellent quality basin swamp, baygall, and hydric hammock. The dense canopy over these communities consists of numerous large trees of many species. Swallow-tailed kites are known to occur in the area. The listed plant Florida bear-grass was collected here in 1985. **Lake Disston** (FLAG25) has good to excellent quality floodplain swamp and baygall which drain into the south end of Lake Disston. **Little Tiger Bay** (VOLU42) is a large, irregular shaped, good quality basin swamp. This site was purchased in 1994 by the State of Florida as an addition to the adjacent Tiger Bay State Forest. **Saw Grass Bay** (VOLU10) has three large wetland areas of floodplain swamp and baygall which connect to the west side of Lake Disston. A bald eagle nest is near the southwest corner of the lake. **Trestle Bay Swamp** (STJO19) contains a good quality basin swamp about six miles long north-south and up to one mile wide east-west.

The ten **low** (biodiversity significance of B5) rated sites are summarized below. **Bimini South Swamp** (FLAG08) has a good quality basin swamp with high species diversity and trees up to 24" DBH. Large agricultural fields isolate this site from other natural areas and impact the swamp with runoff. **Black Branch** (FLAG14 and 15) is a widespread site also forming part of the Haw Creek headwaters. The floodplain swamp corridors along the creeks are narrow, fair quality connections between the wider, fair to good quality areas in Black Point Swamp, Sweetwater Swamp, and Black Branch Swamp. Cattle grazing disturbs the groundcover in some areas and pine plantations dominate surrounding land use. **Dan George Lake** (VOLU16) has an undeveloped swamp lake of about 125 acres with fair to good quality baygall surrounding it. Uplands north and west of the lake are covered with planted pines and several fern nurseries

border the baygall south of the lake. This site is adjacent to the medium rated Barberville Deep Creek (VOLUME12) and they were purchased together in the past year by the SJRWMD. **Eagle Rock Ranch** (FLAG22) is an isolated natural area dominated by areas of fair quality flatwoods with little open ground for herbaceous species. Several canals drain the site and intensive residential development is on the north, east, and south sides. **Espanola Cemetery** (FLAG11) has a good quality baygall bounded on the west by a long narrow basin swamp and large agricultural fields. The remainder of the site is mainly flatwoods impacted by logging and pine plantations. **Espanola East Swamp** (FLAG27) has two small, good quality basin swamps with dense canopies of numerous tree species. Planted pines separate the swamps and dominate the surrounding area. The **Gore Lake** (FLAG20) site surrounds the Flagler County Airport. Gore Lake proper is a fair to good quality marsh lake with about 85 acres of open water and an undeveloped shoreline except for two sandy boat-launch areas. The north and south ends of the lake are good quality basin marsh being invaded by woody vegetation. A residential subdivision is on the west and south sides of the site. **Hastings Deep Creek** (STJO02) east of SR 207 contains part of the headwaters of Deep Creek. Its fair quality floodplain swamp is disturbed by exotic plant species such as the widespread wild taro and runoff from surrounding large agricultural fields. The FNAI-listed Florida mountain mint was collected at this site in 1979. **Hulett Branch** (FLAG17) is a small site divided by the four-lane highway U.S. 1. It has mesic flatwoods of fair to good quality but the lack of fire has reduced the herbaceous plant species diversity. **Middle Haw Creek** is a narrow corridor forming part of the Haw Creek headwaters. It encompasses fair quality floodplain swamp for several miles as well as adjacent low quality hydric hammock and wet flatwoods. It is impacted by land clearing, cattle grazing, creek channelization, and pine plantations.

Site Summaries

Each of the following Site Summaries for the 23 qualifying sites includes the site name and corresponding PNA numbers, topographic maps with boundaries outlined, the location (county, quadrangle map names, and legal location), approximate size in acres, site summary, and ratings in the Biodiversity Significance/ Overall Rating category and each of the nine Site Criteria (as explained in the Methods Section).

The site boundaries are based on aerial photograph interpretation and limited ground truthing. They are designed to include the qualified natural communities plus sufficient buffer land to allow for long term site viability and management. These boundaries are drawn to exclude disturbed areas whenever possible (such as pine plantations and improved pastures) except where these disturbed areas are needed as buffer. Figure 5 shows the location and biodiversity significance ratings of the 23 qualifying natural area sites.

Bimini South Swamp- FLAG08

County: Flagler

Quadrangle: Bunnell, St. Johns Park

Township	Range	Section
12S	29E	14-16, 21-22

Size in Acres: 935

Site Summary: This good quality basin swamp has 100% canopy cover with high diversity of trees up to 24" DBH. The area west of County Road 305 is divided into small compartments by canals and high road beds. Large agricultural fields isolate this site from other natural areas.

Quality: Medium

Rare Elements: Low

Size: Low

Connectivity: Low

Adjacent Land Use: Low

Floodplain: High

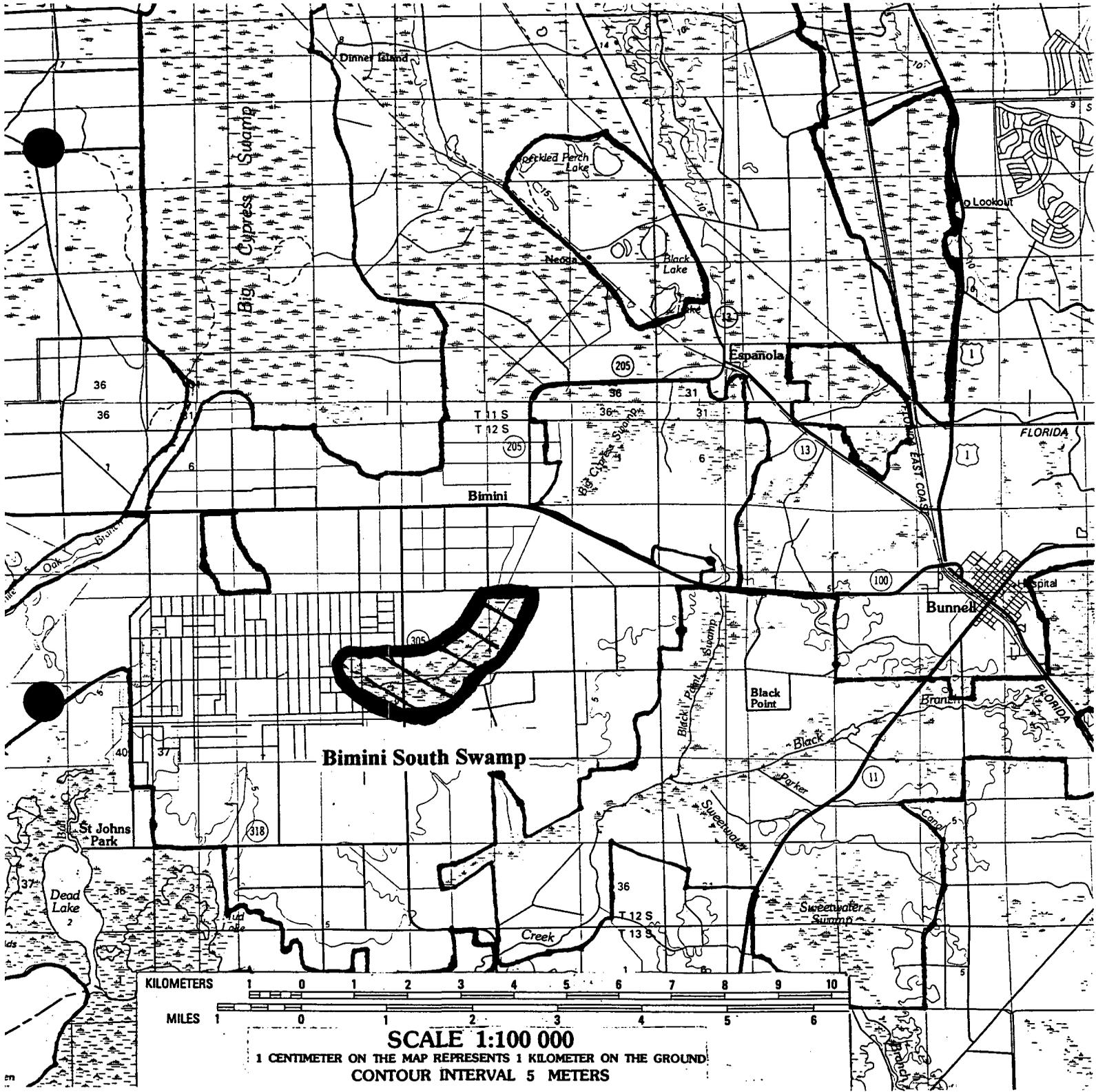
Ownership: High

Restoration Needs: Medium

Protection Urgency: Low

Biodiversity Significance: B4

Overall Rating: Medium-Low



Bimini South Swamp Site- PNA FLAG08
Bunnell, St. Johns Park Quads
January, 1995

SITE BOUNDARY



NORTH

Black Branch- FLAG14, FLAG15

County: Flagler

Quadrangle: Bunnell, Flagler Beach West

Township	Range	Section
12S	29E	24-26, 34-36
12S	30E	11-14, 16-34
12S	31E	18-19
13S	29E	1-2
13S	30E	4-5

Size in Acres: 13,085

Site Summary: This widespread site forms part of Haw Creek's headwaters. The fair quality floodplain swamp along the creek corridor is a narrow connection between the wider, fair to good quality areas in Black Point Swamp, Sweetwater Swamp, and Black Branch Swamp. Numerous old stumps from historic logging are present. Cattle grazing disturbs the groundcover in some areas and pine plantations dominate surrounding uplands. Several 10 acre or less basin marshes (dominated by sawgrass) are located near State Road 11. These appear to be of good quality but are in the middle of planted pines with grazing cattle.

Quality: Medium

Rare Elements: Low

Size: High

Connectivity: Medium

Adjacent Land Use: Medium

Floodplain: High

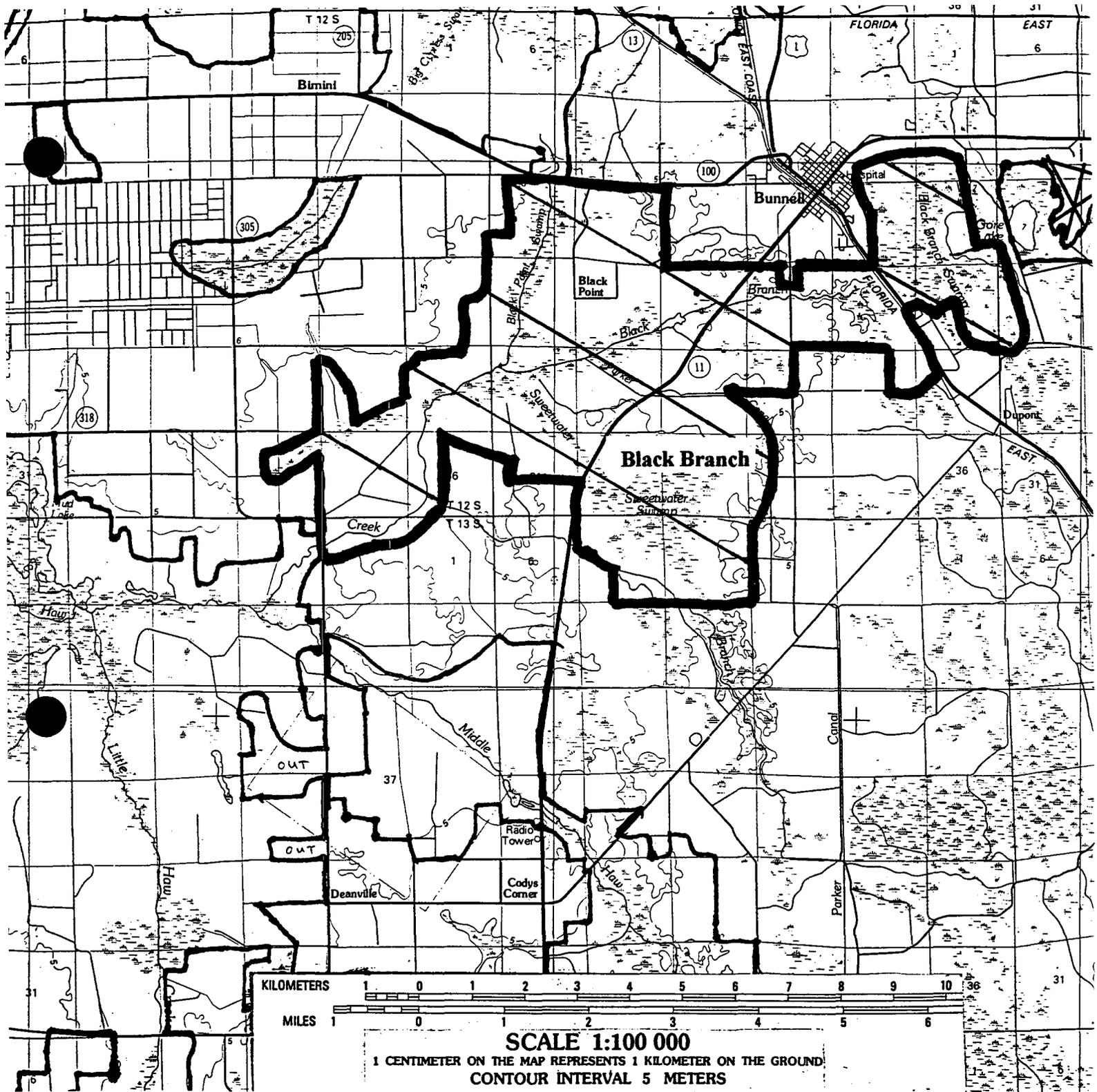
Ownership: Low?

Restoration Needs: High

Protection Urgency: Medium

Biodiversity Significance: B4

Overall Rating: Medium-Low



Black Branch Site- PNA FLAG14/ FLAG15
Bunnell, Flagler Beach West Quads
January, 1995

SITE BOUNDARY



NORTH

Dinner Island Big Cypress Swamp- FLAG03, FLAG04

County: Flagler

Quadrangle: Bunnell, Dinner Island, Dinner Island NE, Espanola, St. Johns Park, Spuds

Township	Range	Section
10S	29E	8-10, 15-22, 27-34
11S	29E	4-9, 16-21, 27-34
12S	29E	3-4

Size in Acres: 16,465

Site Summary: This site has a good to excellent quality basin swamp covering more than six square miles. The swamp has high species diversity in its 100% canopy cover of mature timber. Some of the drier areas around the swamp edges were recently logged for pines. Unconfirmed sightings of *Ursus americanus floridanus* (Florida black bear- G5/T2/S2) have been reported from this suitable habitat. The White Oak Branch creek connecting the southwest corner of the site to Crescent Lake has been logged right up to the narrow floodplain. Surrounding land use was predominately large tracts of planted pines.

Quality: High

Rare Elements: Low

Size: High

Connectivity: Medium

Adjacent Land Use: Medium

Floodplain: High

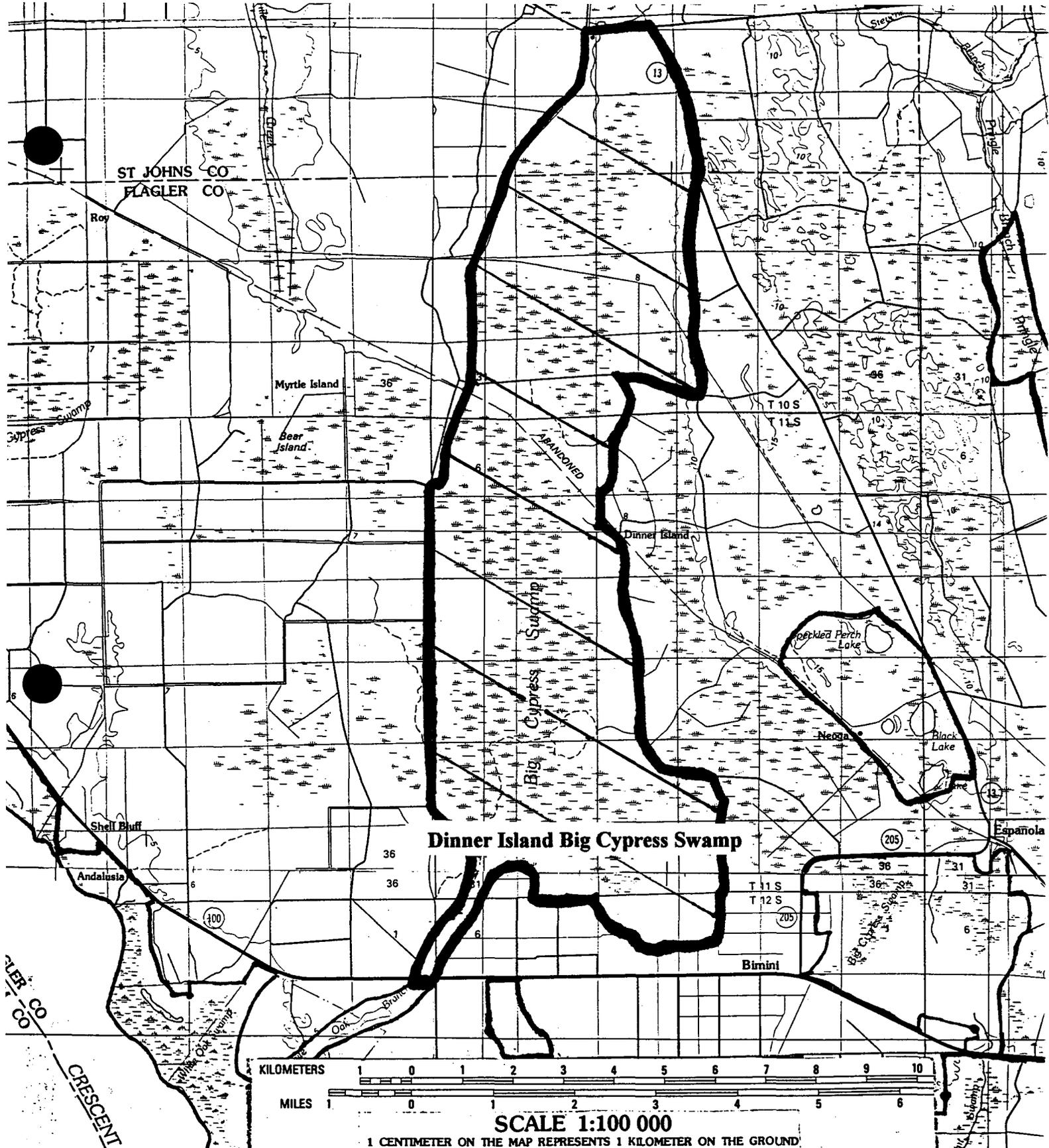
Ownership: Medium

Restoration Needs: Medium

Protection Urgency: Medium

Biodiversity Significance: B3

Overall Rating: Medium



Dinner Island Big Cypress Swamp Site- PNA FLAG03/04
Bunnell, Dinner Island, Dinner Island NE, Espanola,
St. Johns Park, Spuds Quads

January, 1995

SITE BOUNDARY

NORTH



Eagle Rock Ranch- FLAG22

County: Flagler

Quadrangle: Favoretta, Flagler Beach West

Township	Range	Section
13S	31E	3-5, 8-10, 15-16, 21-22

Size in Acres: 2427

Site Summary: This site is an isolated three square mile natural area dominated by fair quality mesic flatwoods. Small dome swamps and mesic hammocks are scattered throughout the site. The flatwoods have abundant slash pines of many ages (up to 15" DBH) and overgrown saw palmetto. The site's quality is low due to the lack of fire and drainage by several canals. Surrounding land use includes residential development on the north, east, and south sides and a new golf course to the east. US 1 bounds the west side of the site and Interstate 95 is about 0.5 mile to the east.

Quality: Low

Rare Elements: Low

Size: Medium

Connectivity: Low

Adjacent Land Use: Low

Floodplain: Low

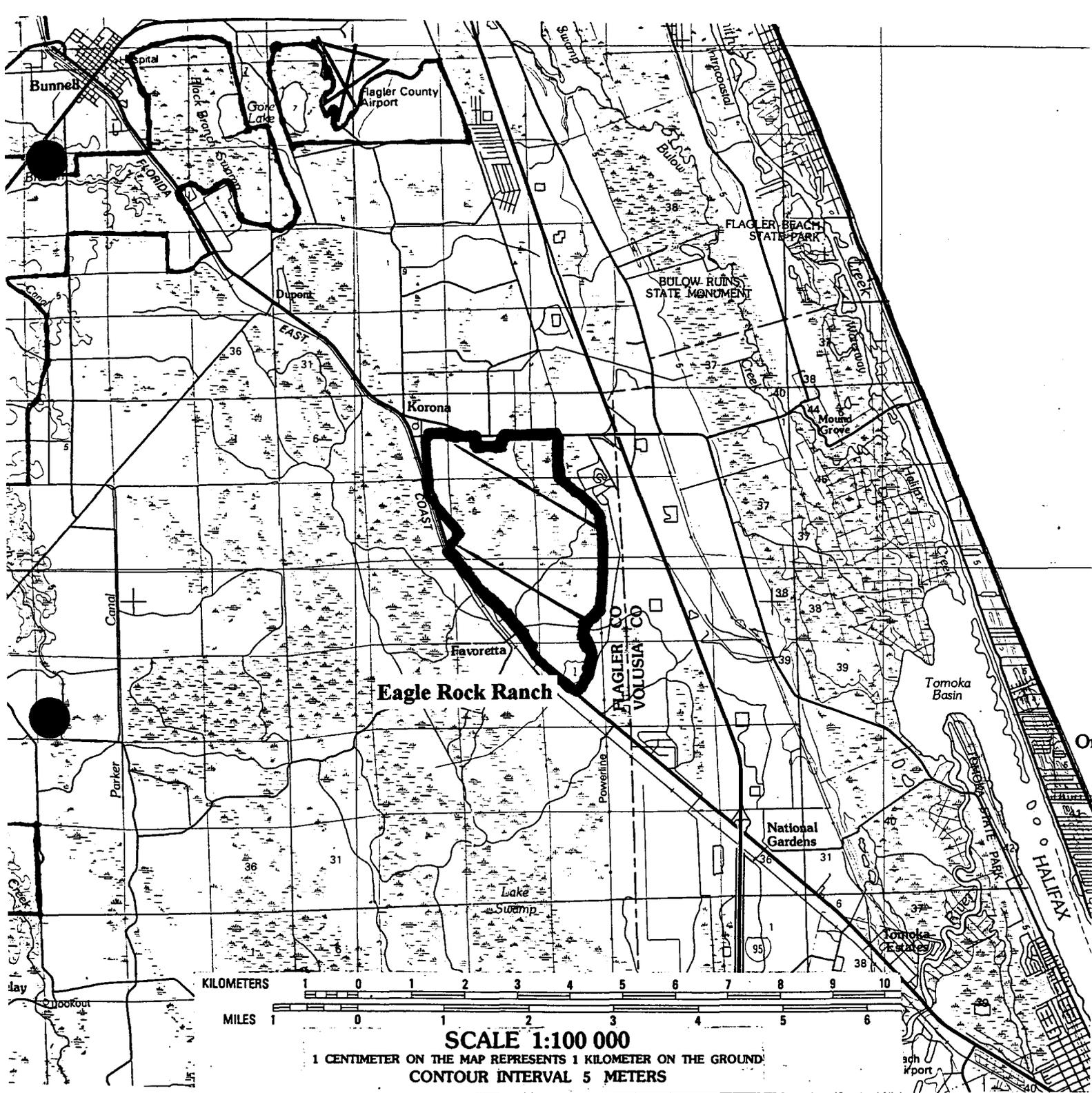
Ownership: High

Restoration Needs: High

Protection Urgency: Medium

Biodiversity Significance: B5

Overall Rating: Low



**Eagle Rock Ranch Site- PNA FLAG22
 Favoretta, Flagler Beach West Quads
 January, 1995**

SITE BOUNDARY



NORTH

Espanola Cemetery- FLAG11

County: Flagler

Quadrangle: Bunnell, Espanola

Township	Range	Section
11S	29E	35-36
11S	30E	31
12S	29E	1-2, 11-12
12S	30E	5-7

Size in Acres: 3069

Site Summary: A good quality baygall covers about 0.5 square mile in the center of the site and is bounded on the west by a long narrow basin swamp. The remainder of the site is mainly flatwoods, smaller baygalls, and pine plantations. Active logging was occurring here on 1994-07-15. Pine plantations and agricultural fields dominate surrounding land use. *Helianthus carnosus* (lakeside sunflower- G1G2/S1S2) grows in the mowed State Road 100 right-of-way adjacent to the south edge of the site. It was not observed in the overgrown flatwoods on site during this survey but a more thorough search may reveal its presence here.

Quality: Medium

Rare Elements: Low

Size: Medium

Connectivity: Low

Adjacent Land Use: Medium

Floodplain: Medium

Ownership: Medium

Restoration Needs: Medium

Protection Urgency: Medium

Biodiversity Significance: B4

Overall Rating: Medium-Low

Espanola East Swamp- FLAG27

County: Flagler

Quadrangle: Bunnell, Espanola

Township	Range	Section
11S	30E	32-33
12S	30E	4

Size in Acres: 894

Site Summary: This site has two good quality basin swamps with dense canopies of numerous tree species. The swamps are about 0.4 mile apart and connected by a very narrow strand. Planted pines dominate adjacent drier ground and the areas surrounding the site. Old cypress stumps are present in the swamp. The site is bounded by railroad tracks to the east and a cypress sawmill and a Flagler County recreational park to the southeast.

Quality: Medium

Rare Elements: Low

Size: Low

Connectivity: Medium

Adjacent Land Use: Medium

Floodplain: Medium

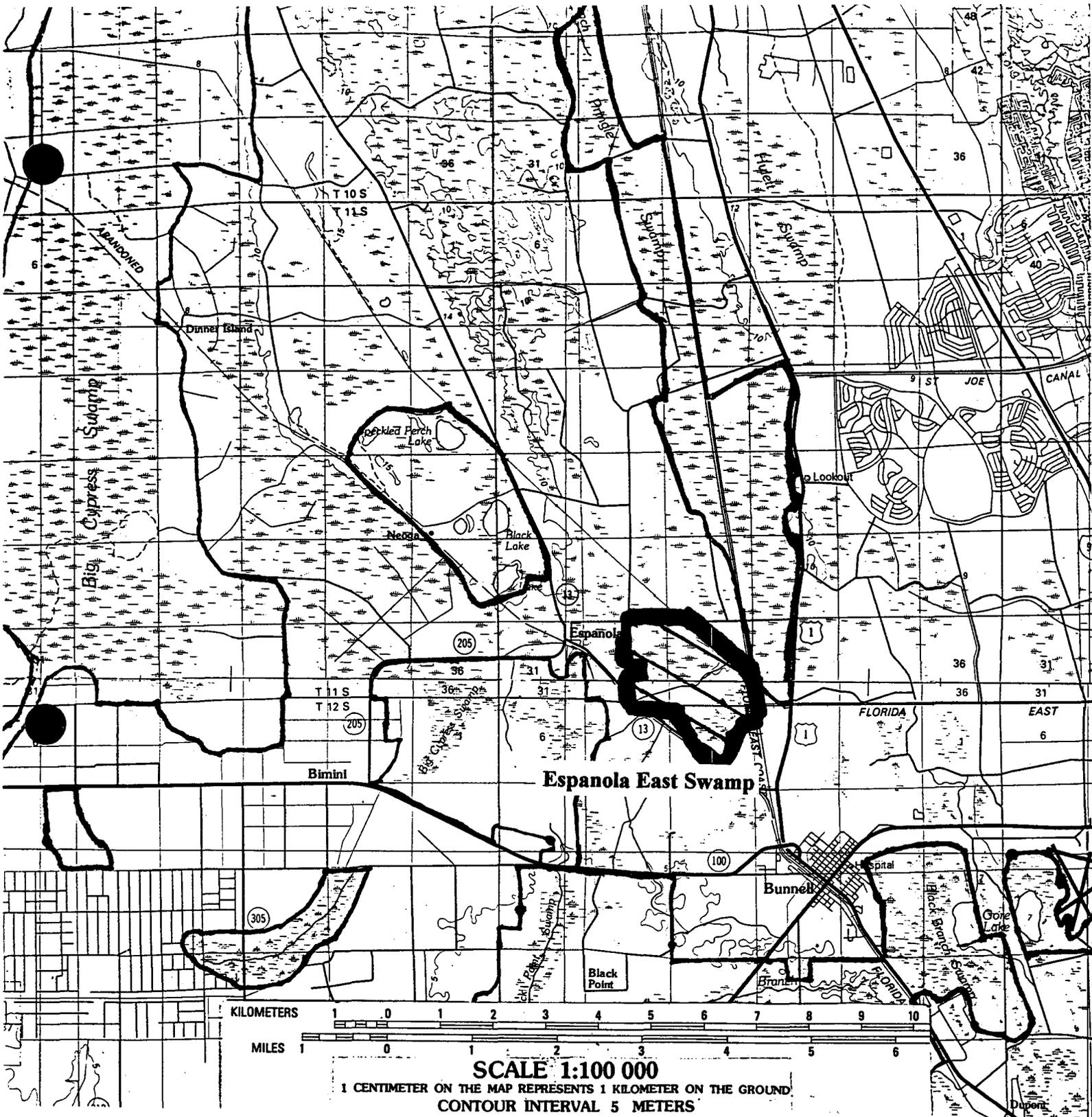
Ownership: High

Restoration Needs: Medium

Protection Urgency: Medium

Biodiversity Significance: B4

Overall Rating: Medium-Low



Espanola East Swamp Site- PNA FLAG27
Bunnell, Espanola Quads
January, 1995

SITE BOUNDARY

NORIH

Gore Lake- FLAG20

County: Flagler

Quadrangle: Flagler Beach West

Township	Range	Section
12S	31E	7, 16-18

Size in Acres: 1140

Site Summary: This site surrounds the Flagler County Airport. On the west side, Gore Lake (a fair to good quality marsh lake) has open water covering about 85 acres. Its shoreline is undisturbed except for two sandy boat-launch areas. Dense woody vegetation occurs along the lake shore. The north and south ends of the lake are good quality sawgrass basin marsh being invaded by woody vegetation. On the east side of the site, the dominant flatwoods are overgrown due to the lack of fire and some areas have been converted to pine plantations. Several canals drain the area. Residential subdivisions are located on the west and south sides of the site.

Quality: Medium

Rare Elements: Low

Size: Low

Connectivity: Low

Adjacent Land Use: Low

Floodplain: Medium

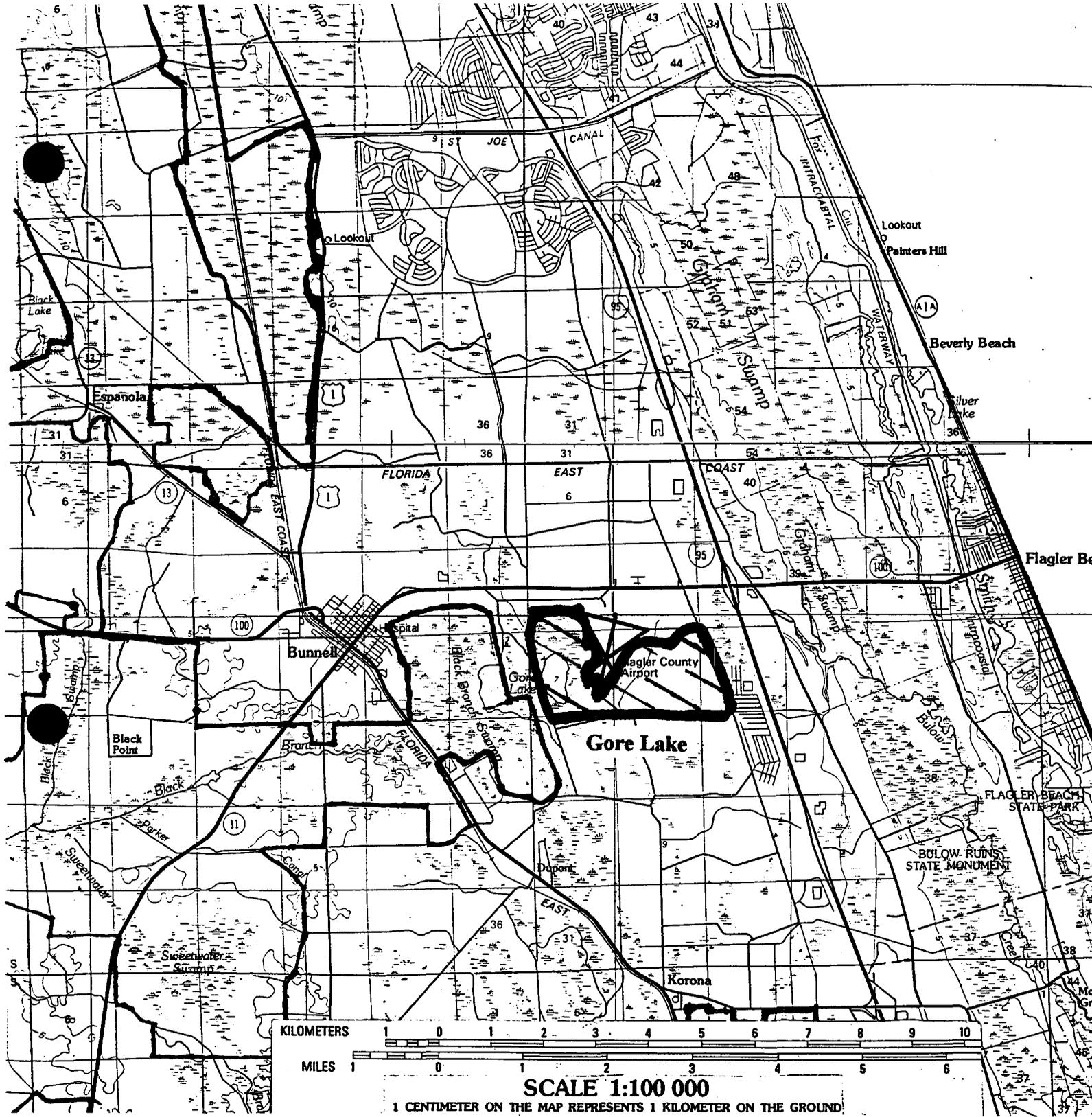
Ownership: High

Restoration Needs: Medium

Protection Urgency: Low

Biodiversity Significance: B4

Overall Rating: Medium-Low



**Gore Lake Site- PNA FLAG20
 Flagler Beach West Quad
 January, 1995**

SITE BOUNDARY

NORTH

Haw Creek- FLAG01, VOLU08

County: Flagler, Volusia, Putnam

Quadrangle: Bunnell, Codys Corner, Dinner Island, St. Johns Park, San Mateo, Seville

Township	Range	Section
11S	28E	18-19, 29-30, 32-33
12S	28E	3-4, 9-13, 16, 22-27, 36-42, 45
12S	29E	31-32
13S	28E	1, 9-17, 21-26, 35-36
13S	29E	3-10, 15-22, 27-34
14S	29E	4-9, 18

Size in Acres: 31,531

Site Summary: This site has regional ecological significance in northeast Florida as a very large wetland landscape which includes excellent quality floodplain swamp and basin marsh. It represents the largest block of relatively unspoiled habitat surveyed during this inventory. The site covers land along the east side of Crescent Lake in Flagler County from the Putnam County line near State Road 100 to the Volusia County line. Also included are the large floodplain swamp and basin marsh system at the south end of the lake in Volusia County, the floodplain along Haw Creek east to County Road 305, and the floodplain and nearby flatwoods along Little Haw Creek south to the north and west sides of Lake Disston. Two *Haliaeetus leucocephalus* (bald eagle- G3/S2S3) nests have been reported near the southeast end of Crescent Lake. An active *Gopherus polyphemus* (gopher tortoise- G3/S3) burrow was seen during this survey in the xeric habitat south of Crescent Lake. The listed plant *Pycnanthemum floridanum* (Florida mountain mint- G3/S3) was collected from near St. Johns Park in 1942. A portion of the site is protected as the Haw Creek State Preserve and the SJRWMD has acquired additional adjacent lands.

Quality: High

Rare Elements: Medium

Size: High

Connectivity: High

Adjacent Land Use: High

Floodplain: High

Ownership: Low?

Restoration Needs: Medium

Protection Urgency: Medium

Biodiversity Significance: B2

Overall Rating: Medium-High

Hulett Branch- FLAG17

County: Flagler

Quadrangle: Dinner Island NE, Espanola

Township	Range	Section
10S	30E	21

Size in Acres: 152

Site Summary: This site has mesic flatwoods of fair to good quality but the lack of fire limits its herbaceous diversity. An even mixture of slash and longleaf pines of various ages (with the largest about 18" DBH) dominate the canopy. Dense saw palmetto with scattered openings grows beneath the pines. The four lane US Highway 1 divides the site into similar east and west parts. West Palm Coast residential development with scattered houses borders the south end of the site. Pine plantations dominate other surrounding areas.

Quality: Medium

Rare Elements: Low

Size: Low

Connectivity: Low

Adjacent Land Use: Low

Floodplain: Low

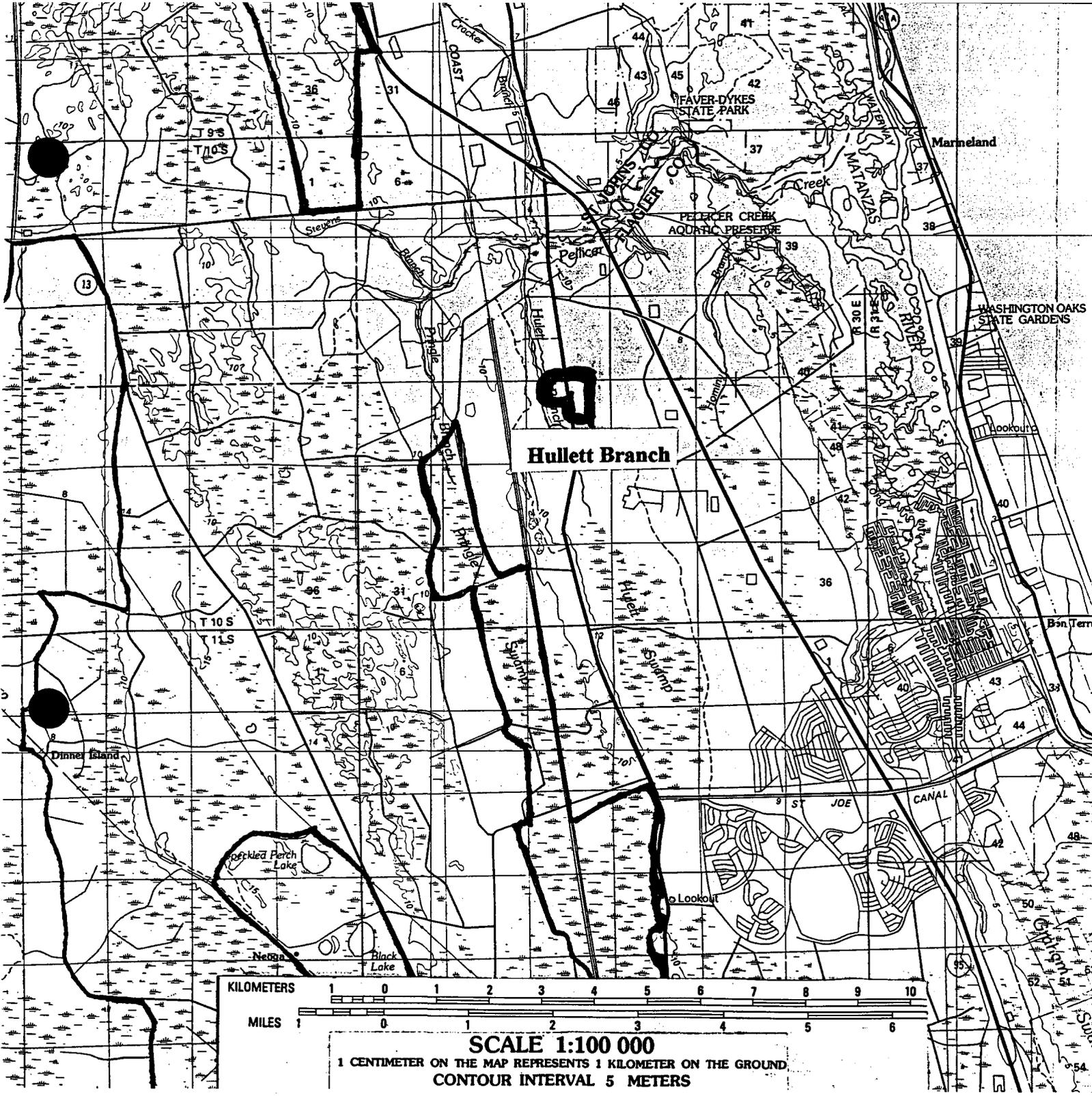
Ownership: High

Restoration Needs: Low

Protection Urgency: High

Biodiversity Significance: B4

Overall Rating: Medium-Low



Hulett Branch Site- PNA FLAG17
Dinner Island NE, Espanola Quads
January, 1995

SITE BOUNDARY

NORTH

Lake Disston- FLAG25

County: Flagler

Quadrangle: Pierson, Seville

Township	Range	Section
14S	29E	20-21, 29-30

Size in Acres: 1086

Site Summary: The site contains good quality floodplain swamp and baygall which drain into the south end of Lake Disston. The swamp has high plant species diversity with many trees up to 20" DBH. It has few old stumps and no signs of recent disturbance. Cattle pasture and planted pines border the swamp. Fern nurseries are to the southwest and southeast of the site.

Quality: High

Rare Elements: Low

Size: Low

Connectivity: High

Adjacent Land Use: Medium

Floodplain: High

Ownership: High

Restoration Needs: Medium

Protection Urgency: Low

Biodiversity Significance: B4

Overall Rating: Medium-Low

Middle Haw Creek- FLAG10

County: Flagler

Quadrangle: Bunnell, Codys Corner

Township	Range	Section
13S	29E	11-14, 24, 37
13S	30E	7, 18-21, 28-33

Size in Acres: 5921

Site Summary: This site forms part of Haw Creek's headwaters. It encompasses a fair quality floodplain swamp for several miles as well as the adjacent low quality hydric hammock and wet flatwoods. Parts of the narrow floodplain swamp between County Road 305 and just southeast of County Road 304 have been cleared and are utilized as cattle pasture. The creek is channelized and deepened by the highway bridges. The center of Section 29 appeared to be of good quality during the aerial survey but was not ground checked. Timber cutting operations, pine plantations, and cattle pastures dominate surrounding land use.

Quality: Low

Rare Elements: Low

Size: Medium

Connectivity: High

Adjacent Land Use: Medium

Floodplain: High

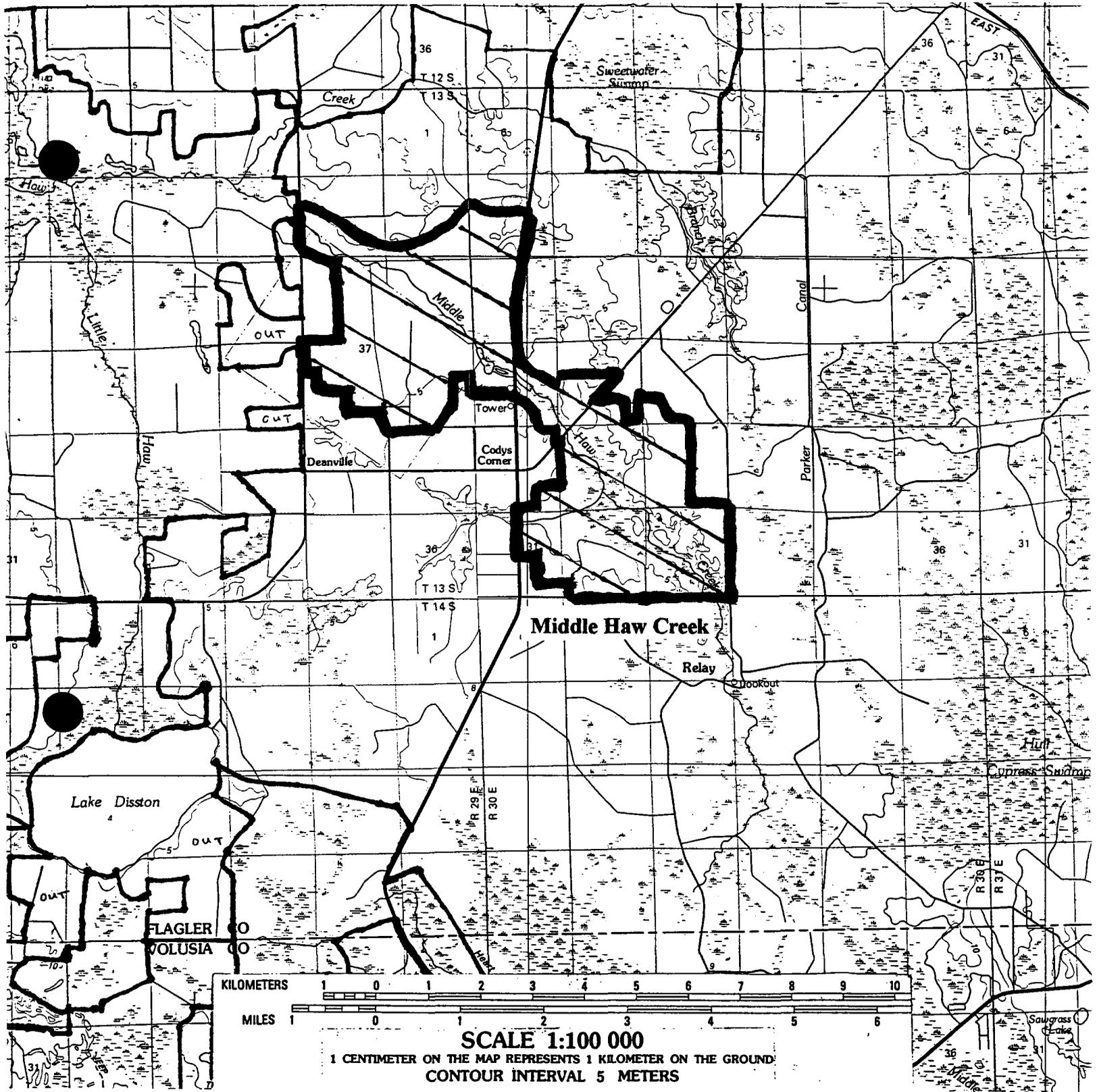
Ownership: Low?

Restoration Needs: High

Protection Urgency: Medium

Biodiversity Significance: B5

Overall Rating: Low



Middle Haw Creek Site- PNA FLAG10
Bunnell, Codys Corner Quads
January, 1995.

SITE BOUNDARY

NORTH

Pringle Swamp- FLAG16

County: Flagler

Quadrangle: Bunnell, Espanola

Township	Range	Section
10S	30E	19-20, 29-33
11S	30E	4-5, 8-10, 15-17, 21-22, 27-28, 33-34

Size in Acres: 4140

Site Summary: The core of this site is a good quality basin swamp with a canopy cover of large trees. The swamp is seven miles long north-south and one mile or less wide east-west. It drains north and is part of Pellicer Creek's headwaters. Surrounding the swamp are areas of flatwoods and planted pines. Wet flatwoods in fair condition are intermixed with mesic flatwoods and pine plantations at the south end of the site. A small population of *Helianthus carnosus* (lakeside sunflower- G1G2/S1S2) is located in the flatwoods at the west edge of the US 1 roadside swale. The site is impacted by a railroad and an industrial park near its center and bordered by US 1 on most of its east side. Planted pines dominate surrounding land use and some areas are clearcut.

Quality: Medium

Rare Elements: High

Size: Medium

Connectivity: Medium

Adjacent Land Use: Medium

Floodplain: Medium

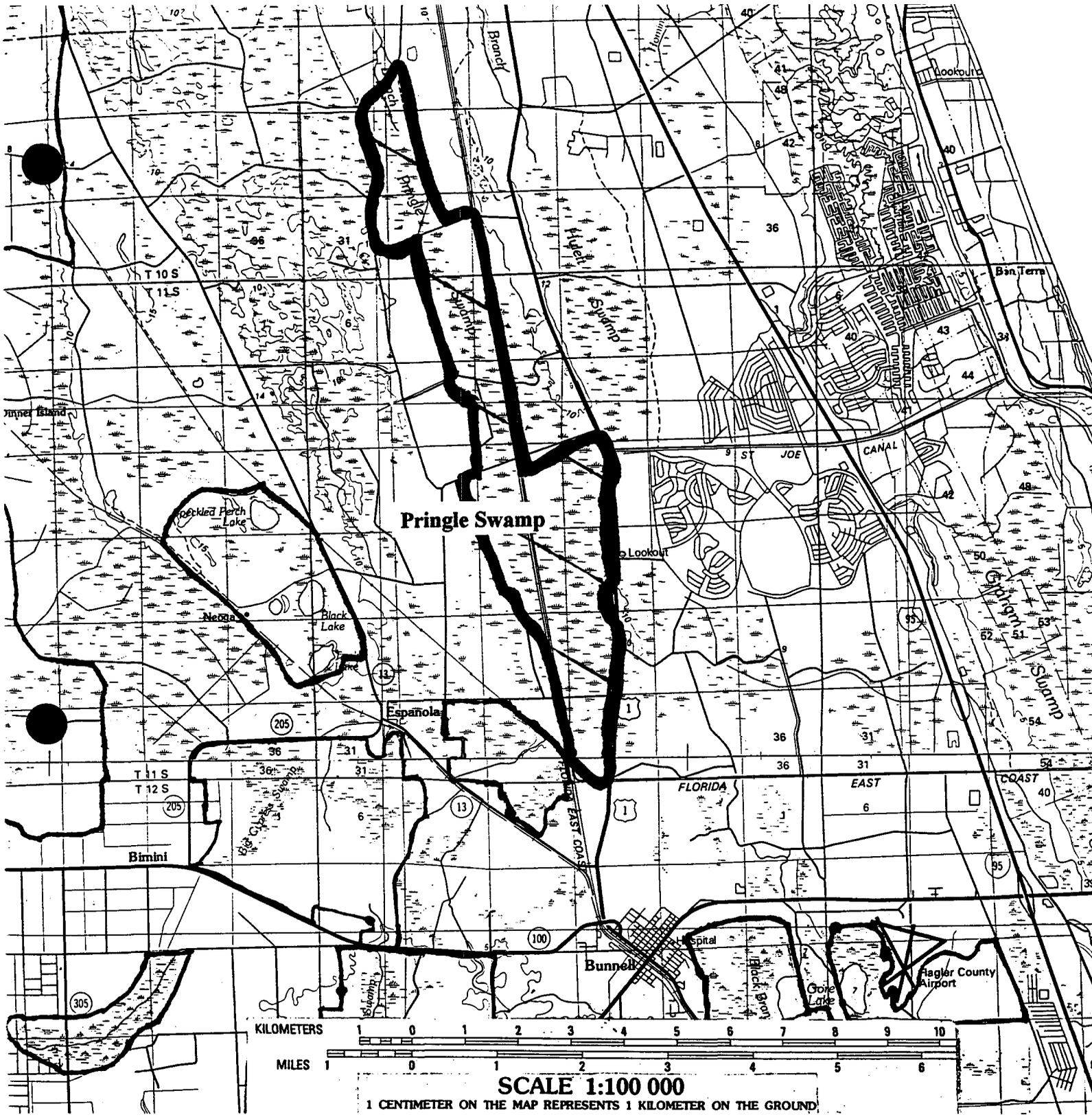
Ownership: Medium

Restoration Needs: Medium

Protection Urgency: Medium

Biodiversity Significance: B2

Overall Rating: Medium-High



Pringle Swamp Site- PNA FLAG16
Bunnell, Espanola Quads
January, 1995

SITE BOUNDARY **NORTH**

Tank Lake- FLAG12

County: Flagler

Quadrangle: Espanola

Township	Range	Section
11S	29E	13-14, 23-25
11S	30E	19, 30

Size in Acres: 1941

Site Summary: This site is a diverse mosaic of mature scrub, large baygall, and three swamp lakes (all of good quality) plus cutover mesic flatwoods and planted pines. The scrub (G2/S2) of approximately 240 acres is located west and south of the lakes. The rare species *Gopherus polyphemus* (gopher tortoise- G3/S3), *Persea humilis* (scrub bay- G3/S3), and *Lechea cernua* (nodding pinweed- G3/S3) have been reported from this scrub. The baygall surrounds two of the lakes and part of the third. The site is in a remote area away from urban development. Large tracts of planted pines dominate surrounding land use.

Quality: Medium

Rare Elements: High

Size: Medium

Connectivity: Medium

Adjacent Land Use: Medium

Floodplain: Medium

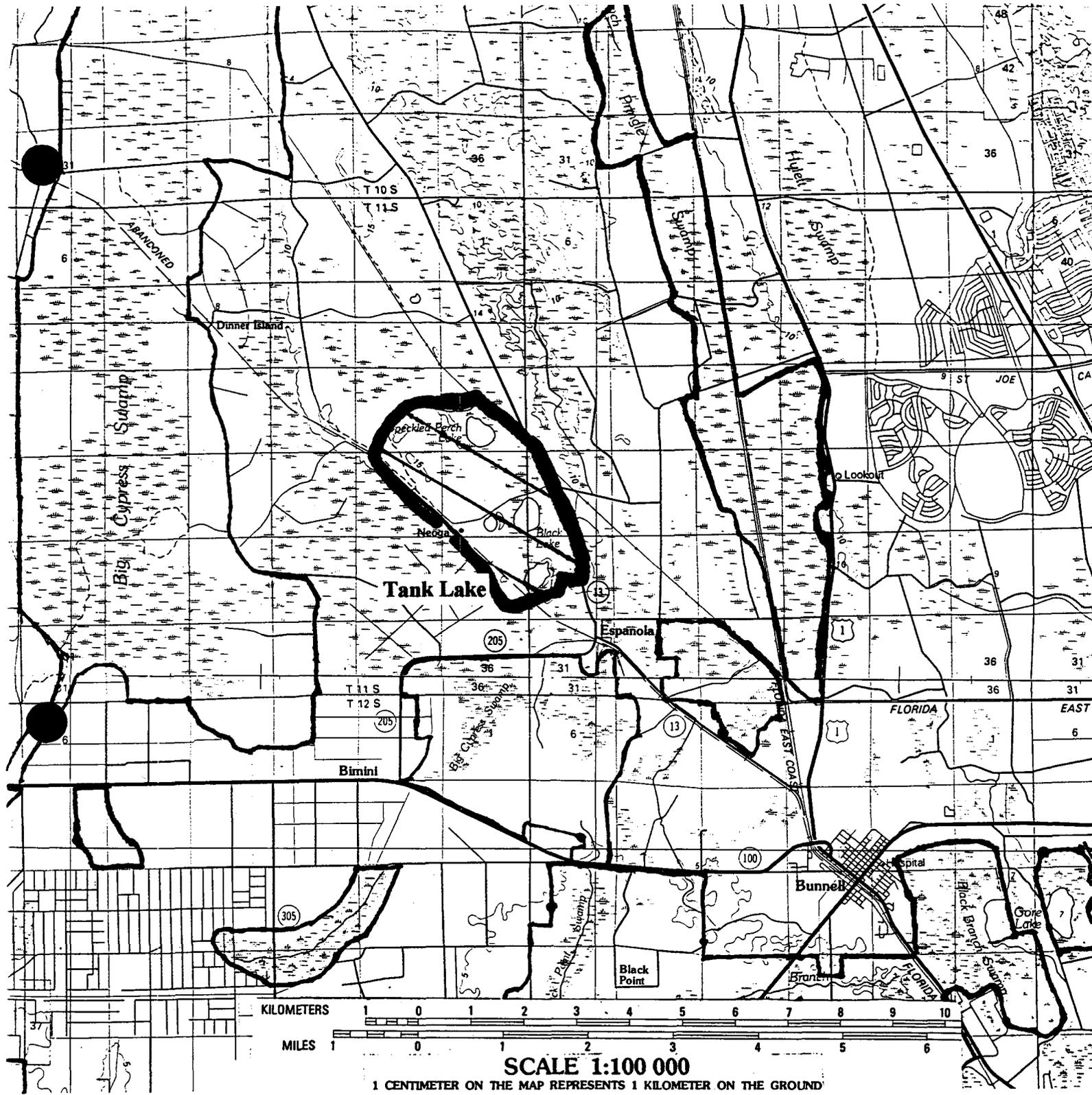
Ownership: High

Restoration Needs: Medium

Protection Urgency: High

Biodiversity Significance: B2

Overall Rating: Medium-High



White Oak Branch Flatwoods- FLAG02

County: Flagler

Quadrangle: St. Johns Park

Township	Range	Section
12S	29E	7-8

Size In Acres: 338

Site Summary: The site has fair quality wet and mesic flatwoods and dome swamps. The somewhat overgrown flatwoods appear to have been selectively cutover in the past. A small population of the state endangered *Helianthus carnosus* (lakeside sunflower- G1G2/S1S2) grows at the edge of wet flatwoods at the north end of the site and in the adjacent mowed State Road 100 right-of-way. One 5' long *Crotalus adamanteus* (eastern diamondback rattlesnake- G5/S?) was observed here on 1994-7-5. The site is isolated from other natural areas by large agricultural fields on three sides and a sparsely settled subdivision on the south.

Quality: Medium

Rare Elements: High

Size: Low

Connectivity: Low

Adjacent Land Use: Medium

Floodplain: Low

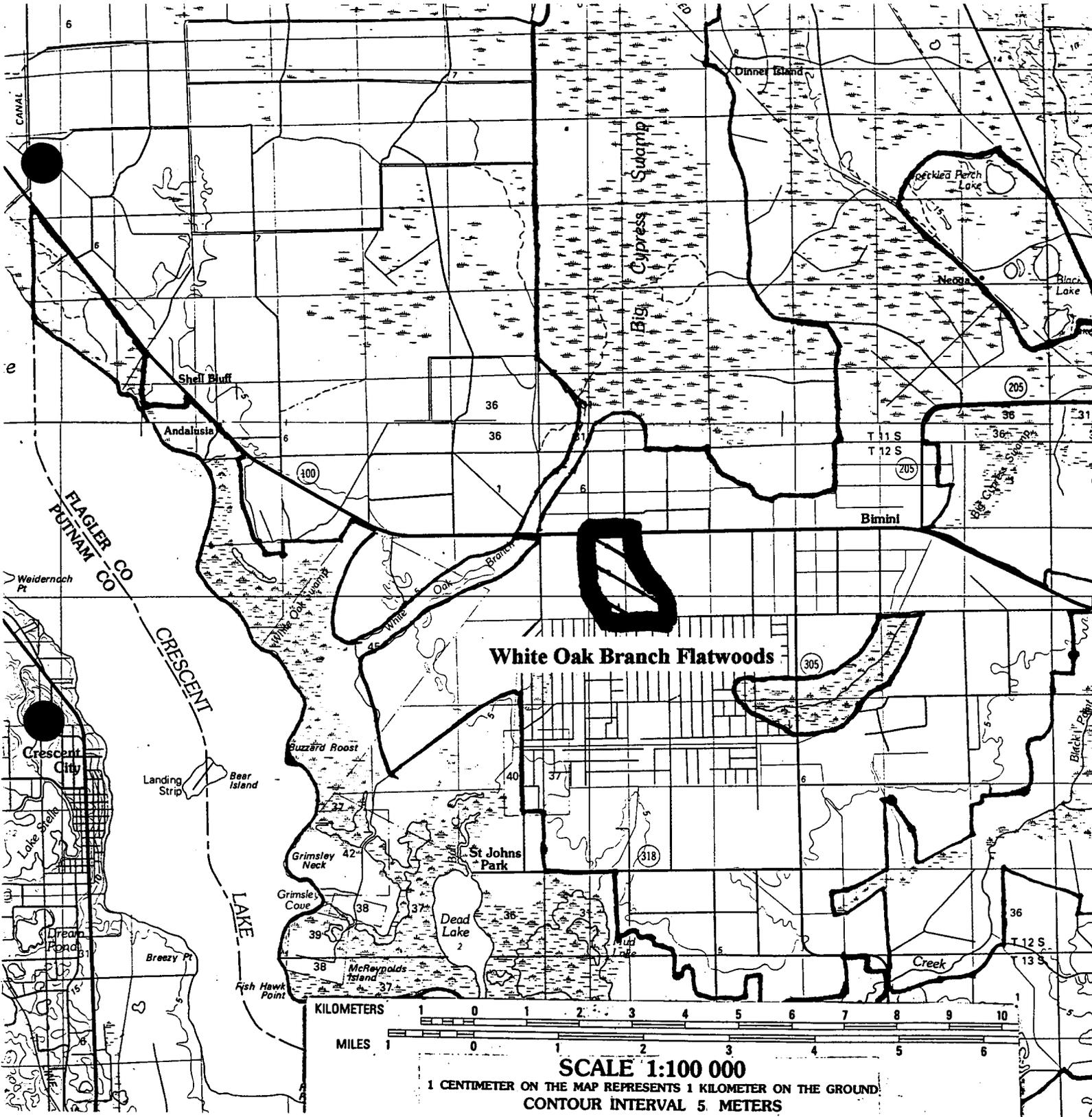
Ownership: High

Restoration Needs: Medium

Protection Urgency: Medium

Biodiversity Significance: B2

Overall Rating: Medium-High



White Oak Branch Flatwoods Site- PNA FLAG02
St. Johns Park Quad
January, 1995

▲
SITE BOUNDARY **NORTH**

Fish Tail Swamp- STJO24

County: St. Johns

Quadrangle: Dinner Island NE

Township	Range	Section
09S	29E	2-3, 10-11, 13-15, 23-26, 35-36
09S	30E	30-31
10S	29E	1

Size in Acres: 4205

Site Summary: A basin swamp measuring about 0.5 mile east-west and 4 miles north-south dominates this site. Hydric hammock occurs on slightly elevated areas in the basin. A narrow baygall strand separates the swamp from disturbed upland ridges. These wetland natural communities are of good to excellent quality and have dense canopies formed by numerous species of large trees. The wetland landscape drains south and is part of Pellicer Creek's headwaters. The scrubby upland ridges are covered with planted pine (some areas planted with young longleaf pine) or were recently clearcut. Six *Elanoides forficatus* (swallow-tailed kite-G5/S2S3) were observed soaring above the swamp on 1994-6-19. The rare plant *Nolina atopocarpa* (Florida bear-grass- G3/S3) was collected from the north end of this site in 1985.

Quality: High

Rare Elements: Medium

Size: Medium

Connectivity: Medium

Adjacent Land Use: Medium

Floodplain: High

Ownership: High

Restoration Needs: Low

Protection Urgency: Medium

Biodiversity Significance: B4

Overall Rating: Medium-Low

Hastings Deep Creek- Southeast of SR 207- STJO02

County: St. Johns

Quadrangle: Spuds

Township	Range	Section
9S	28E	15-16, 21-22, 26-27, 34-35, 37-38

Size in Acres: 1787

Site Summary: This site contains the part of the Deep Creek headwaters located southeast of State Road 207. The fair quality floodplain swamp has good plant species diversity but lacks many large trees. The exotic species *Colocasia esculentum* (wild taro) is widespread as is trash and litter. The rare plant *Pycnanthemum floridanum* (Florida mountain mint- G3/S3) was collected at this site in 1979. Large agricultural fields with ditches draining into the swamp dominate surrounding land use.

Quality: Low

Rare Elements: Medium

Size: Medium

Connectivity: High

Adjacent Land Use: Medium

Floodplain: High

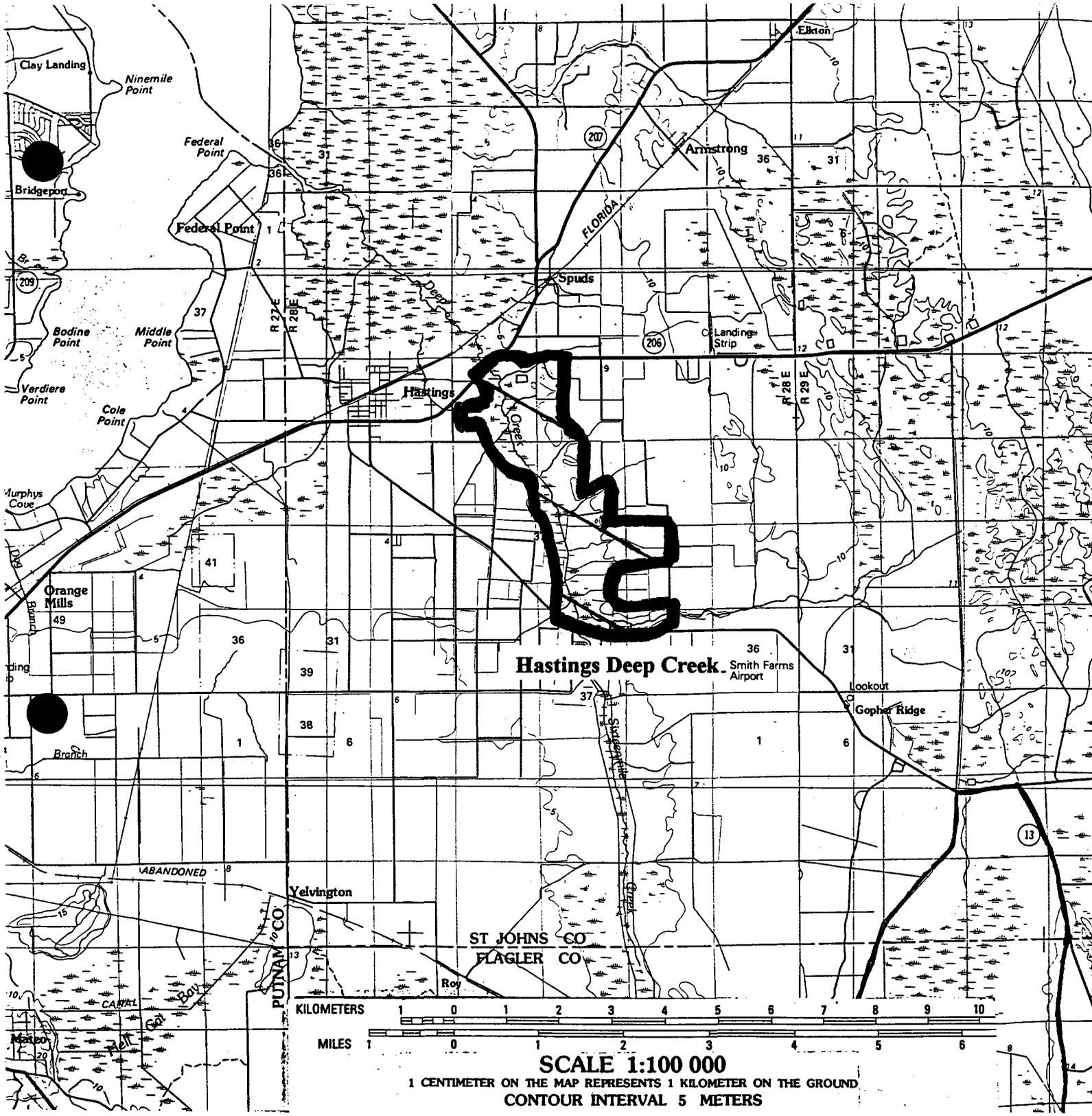
Ownership: Low?

Restoration Needs: High

Protection Urgency: Low

Biodiversity Significance: B5

Overall Rating: Low



Hastings Deep Creek (SE of SR 207) Site- PNA STJO02
Spuds Quad
January, 1995

SITE BOUNDARY

NORTH

Trestle Bay Swamp- STJO19

County: St. Johns

Quadrangle: Bakersville, Elkton

Township	Range	Section
07S	28E	1, 12
07S	29E	6-7, 17-20, 29-33
08S	29E	4-5, 8-9, 16

Size in Acres: 4349

Site Summary: This site contains a good quality basin swamp about six miles long north-south and up to one mile wide east-west. Wet to mesic flatwoods, much of which has been cutover and converted to pine plantations, surround the swamp. Fair to good quality flatwoods in need of burning straddle the inactive railroad tracks near the south end of the site. Four *Elanoides forficatus* (swallow-tail kite- G5/S2S3) were observed soaring over the swamp on 1994-6-28.

Quality: High

Rare Elements: Low

Size: Medium

Connectivity: Low

Adjacent Land Use: Medium

Floodplain: High

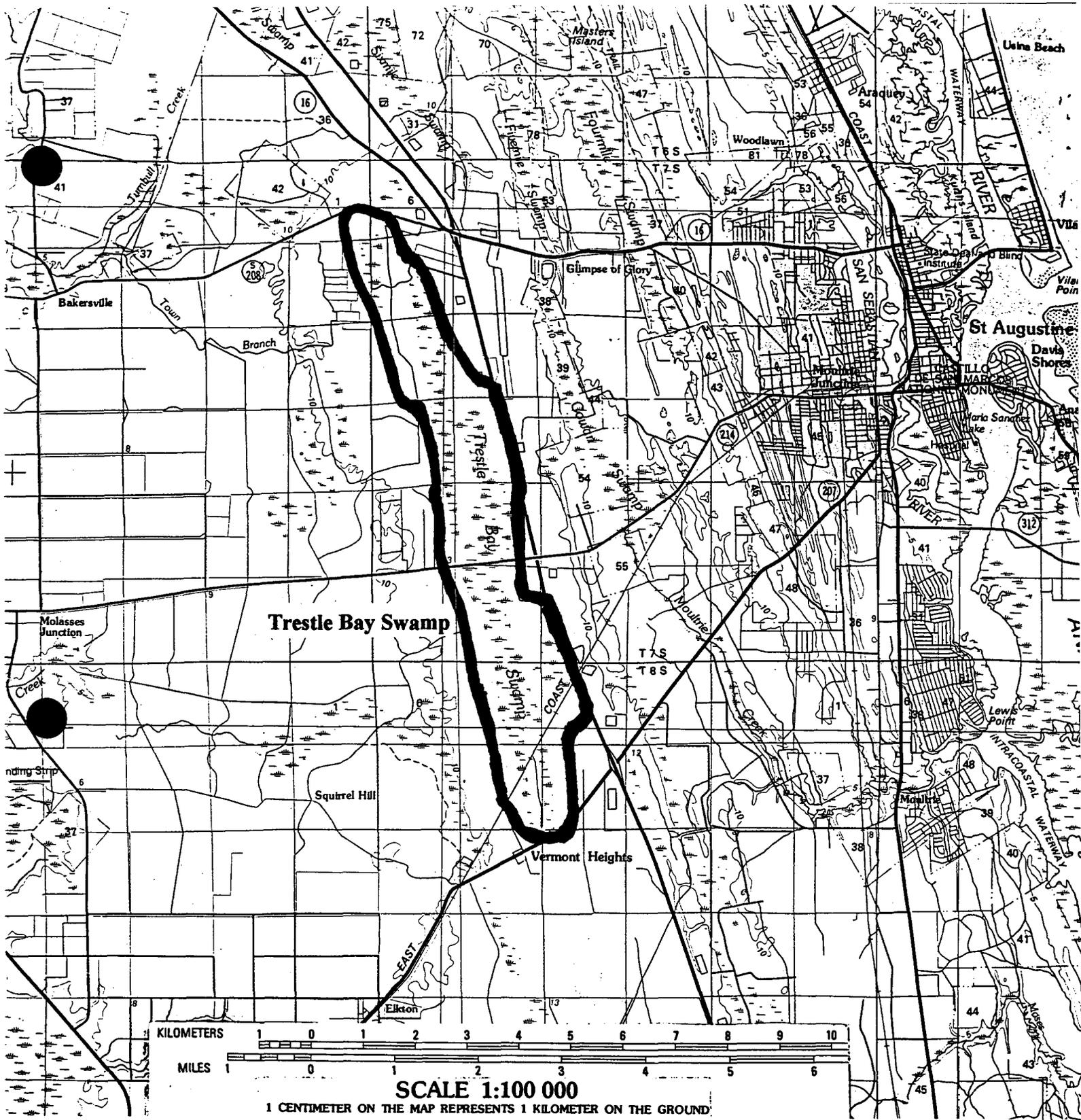
Ownership: Medium

Restoration Needs: Medium

Protection Urgency: High

Biodiversity Significance: B4

Overall Rating: Medium-Low



Trestle Bay Swamp Site- PNA STJO19
Bakersville, Elkton Quads
January, 1995

SITE BOUNDARY

NORTH

Barberville Deep Creek- VOLU12

County: Volusia

Quadrangle: Codys Corner, Lake Dias, Pierson

Township	Range	Section
14S	29E	23, 24-28, 33-36
15S	29E	1-4, 9-17, 20-27, 35
15S	30E	6-7, 18-19

Size in Acres: 13,399

Site Summary: This site is a diverse mosaic of basin swamps, basin marsh, baygalls, floodplain swamp, hydric hammock, scrub, bog, blackwater stream, and flatwoods. The wetland system drains southwest to become Deep Creek. The core of the site consists of two basin swamps, a basin marsh, and a baygall, all of large size and good to excellent quality. The interspersed flatwoods and scrubs have been impacted by past and recent logging and planting of pines. Some of the small remnant scrubs (G2/S2) are of fair quality and harbor *Gopherus polyphemus* (gopher tortoise- G3/S3). Pine plantations of various ages cover most of the uplands. Fern nurseries covering more than 100 acres are on the north and east sides of the site. Most of this site was purchased by the SJRWMD in the past year.

Quality: Medium

Rare Elements: High

Size: High

Connectivity: High

Adjacent Land Use: Medium

Floodplain: High

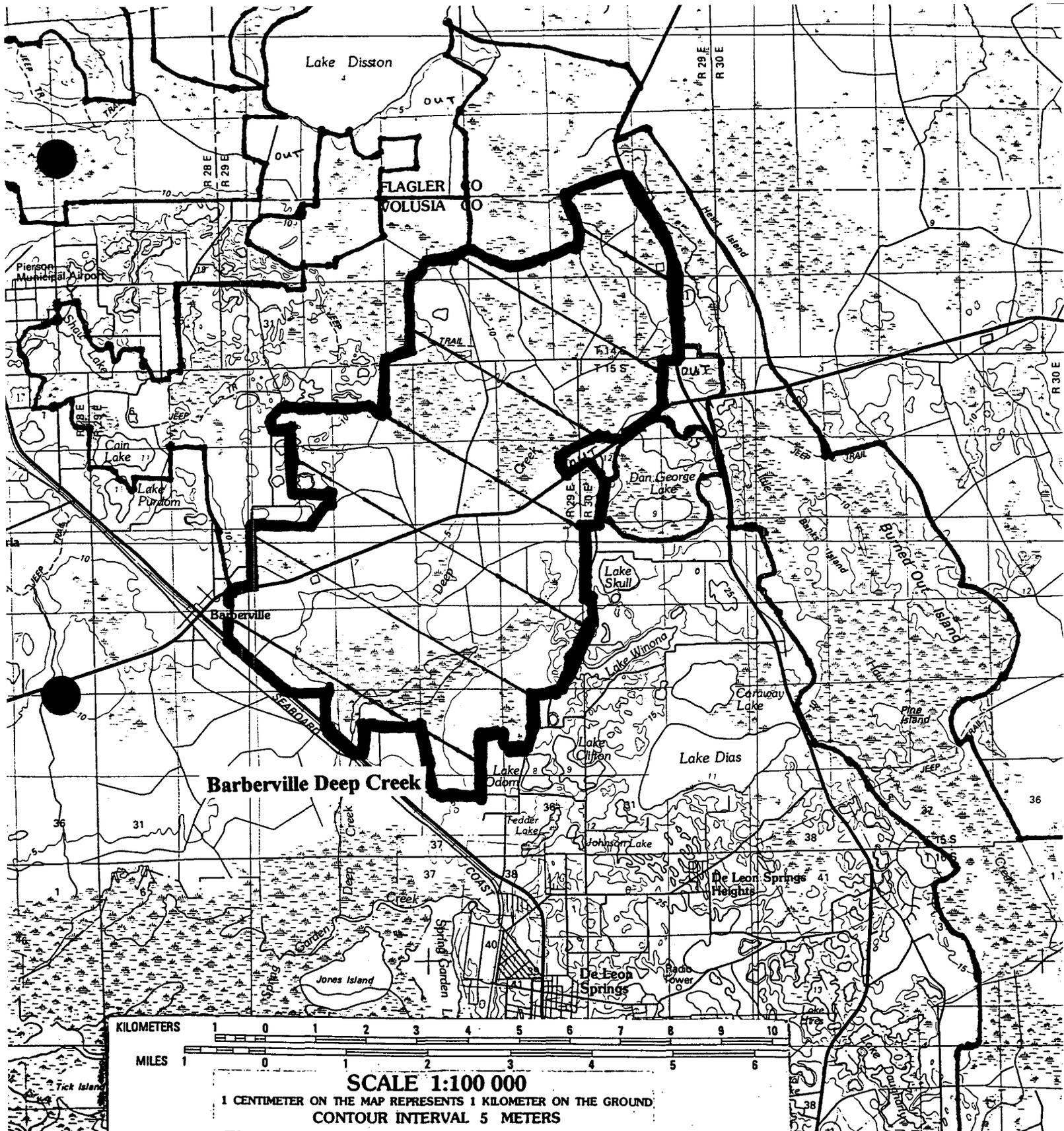
Ownership: High

Restoration Needs: Medium

Protection Urgency: Medium

Biodiversity Significance: B3

Overall Rating: Medium



Barberville Deep Creek Site- PNA VOLU12
Cody's Corner, Lake Dias, Pierson Quads
January, 1995

SITE BOUNDARY  **NORTH** 

Dan George Lake- VOLU16

County: Volusia

Quadrangle: Lake Dias

Township	Range	Section
15S	30E	5-8, 17-18

Size in Acres: 1078

Site Summary: An undeveloped swamp lake (Dan George Lake) of about 125 acres lies in the center of the site. A fair to good quality baygall extends around this lake, with many large trees on the west, south, and east sides. Old stumps and logs are also present here. The uplands north and west of the lake are covered with planted pines. Several fern nurseries border the baygall south of the lake.

Quality: Medium

Rare Elements: Low

Size: Low

Connectivity: High

Adjacent Land Use: Medium

Floodplain: Medium

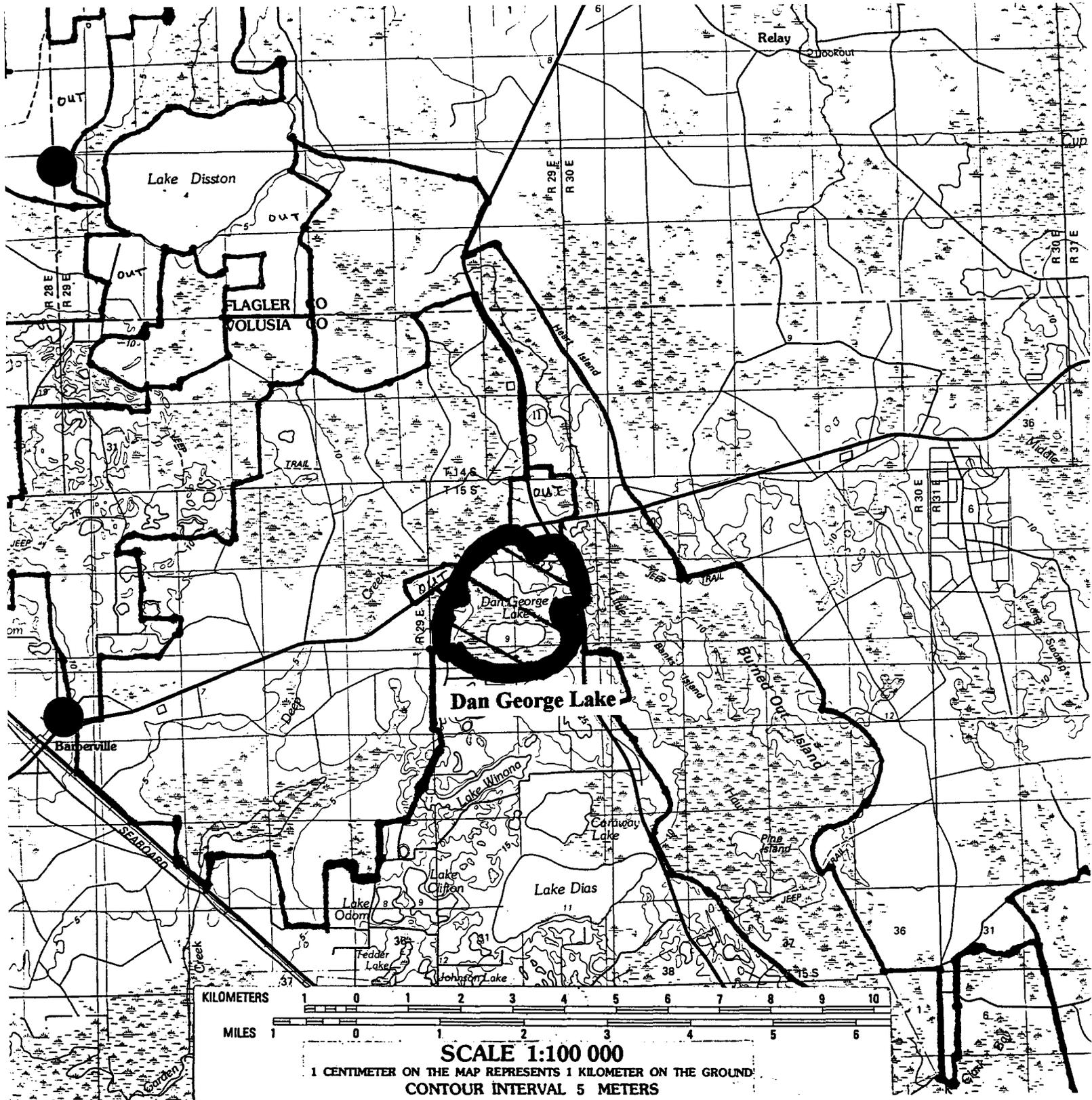
Ownership: High

Restoration Needs: Medium

Protection Urgency: Low

Biodiversity Significance: B5

Overall Rating: Low



Dan George Lake Site- PNA VOLU16
Lake Dias Quad
January, 1995


SITE BOUNDARY



NORTH

Little Haw Creek- VOLU21, FLAG26

County: Flagler, Volusia

Quadrangle: Codys Corner, Daytona Beach NW, Daytona Beach SW, Deland, Lake Dias

Township	Range	Section
14S	29E	13-16, 21-25, 36
14S	30E	30-31
15S	30E	4-5, 8-11, 14-16, 21-28, 34, 37
15S	31E	31-32
16S	30E	1, 11-14, 23-26, 37
16S	31E	5-8, 17-21, 28-34
17S	31E	4-8, 18

Size in Acres: 26,076

Site Summary: This site contains a good to excellent quality floodplain swamp along Little Haw Creek. The floodplain swamp extends over 10 miles north-south and averages about 1 mile wide from US 92 to State Road 40. It narrows north of SR 40 as the creek flows north and west into the southeast corner of Lake Disston. The listed plant *Rhynchospora decurrens* (decurent beakrush- G3G4/S2) was seen here in 1981. A large, excellent quality basin swamp (part of the creek's headwaters) is located between Interstate-4 and US 92. Lands surrounding these swamps are predominantly pine plantations with some areas recently clearcut. *Ursus americanus floridanus* (Florida black bear- G5/T2/S2) are thought to range over this area. About 70 acres of fair quality scrub (G2/S2) with *Gopherus polyphemus* (gopher tortoise- G3/S3) and *Persea humilis* (scrub bay- G3/S3) are located in the extreme southwest corner of the site. Part of the swamp at the south end by US 92 and Interstate-4 has been platted into the unmarked University Highlands Subdivision with numerous lots and landowners.

Quality: Medium

Rare Elements: High

Size: High

Connectivity: High

Adjacent Land Use: Medium

Floodplain: High

Ownership: Low

Restoration Needs: High

Protection Urgency: High

Biodiversity Significance: B3

Overall Rating: Medium

Little Tiger Bay- VOLU42

County: Volusia

Quadrangle: Daytona Beach NW, Daytona Beach SW

Township	Range	Section
15S	31E	28-29, 31-33
16S	31E	3-5, 8-9

Size in Acres: 2671

Site Summary: This site is a mosaic of a large basin swamp with baygalls, dome swamps, flatwoods (now pine plantations) and depression marshes. The irregular-shaped good quality basin swamp extends over 2.5 miles north-south and 0.5 mile east-west. No recent logging was evident in the swamp. *Ursus americanus floridanus* (Florida black bear- G5/T2/S2) have been reported from nearby areas and may range over this site. The flatwoods have been converted to pine plantations (of differing ages) with some areas recently clearcut up to the swamp edge. This site was purchased in 1994 by the State of Florida as an addition to the west side of Tiger Bay State Forest.

Quality: Medium

Rare Elements: Low

Size: Medium

Connectivity: High

Adjacent Land Use: Medium

Floodplain: High

Ownership: High

Restoration Needs: Medium

Protection Urgency: Low

Biodiversity Significance: B4

Overall Rating: Medium-Low

Saw Grass Bay- VOLU10

County: Volusia

Quadrangle: Seville

Township	Range	Section
13S	28E	34-35
14S	28E	1-3, 10-16, 21-24, 26-27
14S	29E	18-19

Size in Acres: 5516

Site Summary: This site contains three large wetland areas with very narrow connections. The southeast area (Saw Grass Bay) is a floodplain swamp and baygall which connects to the west side of Lake Disston. One *Haliaeetus leucocephalus* (bald eagle- G3/S2S3) nest has been reported from this area near the southwest corner of the lake. The north area is a good quality baygall with no recent disturbance except at its west edge. The southwest area is a baygall and basin swamp. The uplands (flatwoods and scrub) separating these areas are disturbed by logging and clearing. Cattle pasture, pine plantations, and large fern nurseries dominate surrounding land use.

Quality: Medium

Rare Elements: Medium

Size: Medium

Connectivity: Medium

Adjacent Land Use: Medium

Floodplain: Medium

Ownership: Medium?

Restoration Needs: High

Protection Urgency: Medium

Biodiversity Significance: B4

Overall Rating: Medium-Low

Shaw Lake- VOLU09

County: Volusia

Quadrangle: Codys Corner, Lake Dias, Pierson, Seville

Township	Range	Section
14S	28E	34-36
14S	29E	28-29, 31-33
15S	28E	1
15S	29E	3-8, 17

Size in Acres: 6099

Site Summary: This site is a diverse mosaic of scrub and sandhill ridges, baygalls, small depression marshes, swamp lakes, and flatwoods. The fair quality scrub (G2/S2) appears to be unburned for many years and harbors *Gopherus polyphemus* (gopher tortoise- G3/S3), *Ilex arenicola* (scrub holly- G5/T3/S3), *Persea humilis* (scrub bay- G3/S3), and *Conradina grandiflora* (large-flowered rosemary- G3/S3). A large, good to excellent quality baygall is located in the northeast corner of the site. Part of this baygall has been purchased by the SJRWMD in the past year, along with the adjacent Barberville Deep Creek site. The uplands have been impacted by logging and planting of pines. Most of the surrounding land use is pine plantations and large fern nurseries.

Quality: Medium

Rare Elements: High

Size: Medium

Connectivity: High

Adjacent Land Use: Medium

Floodplain: Medium

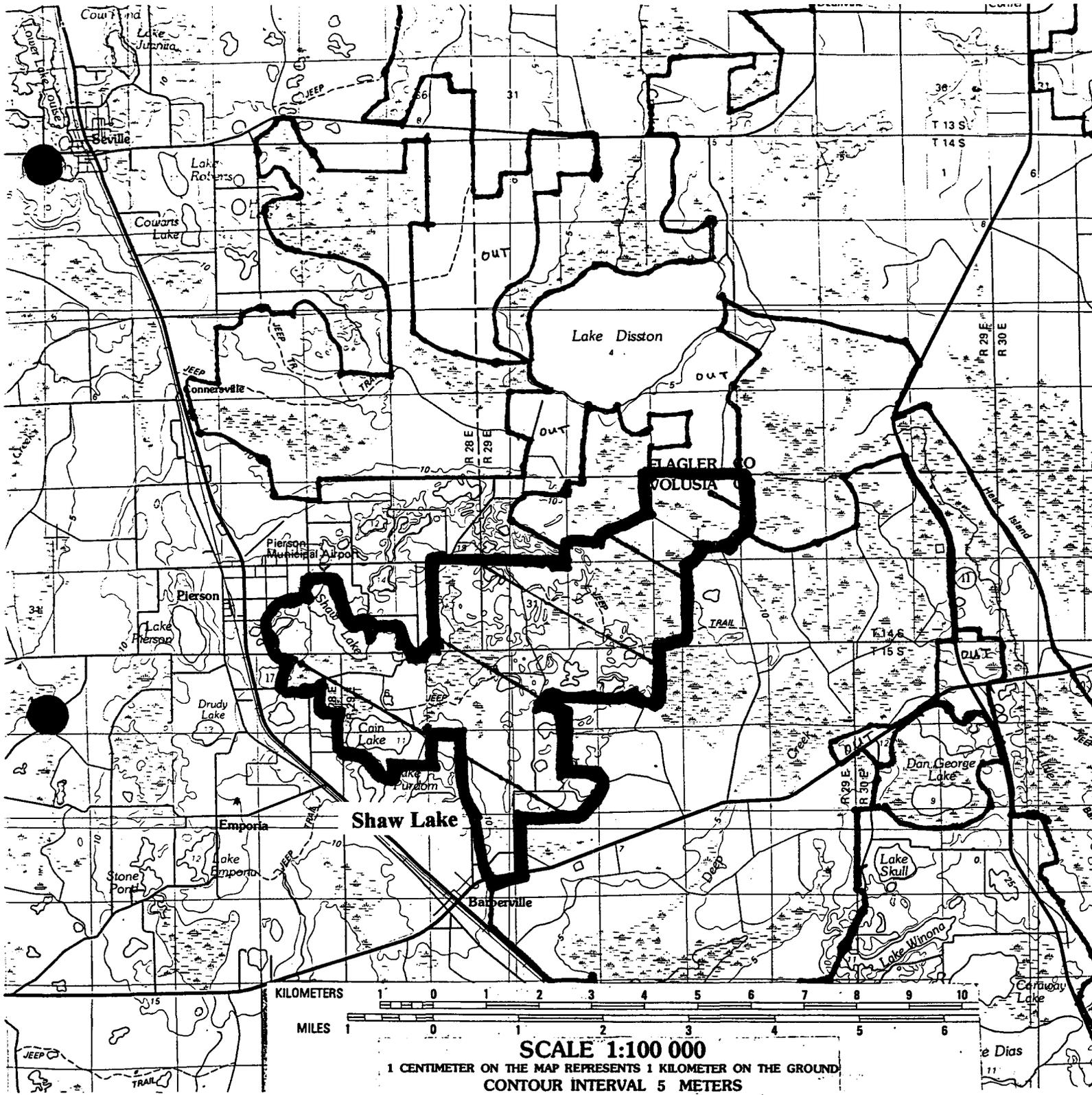
Ownership: Medium

Restoration Needs: Medium

Protection Urgency: High

Biodiversity Significance: B3

Overall Rating: Medium



Shaw Lake Site- PNA VOLU09
Codys Corner, Lake Dias, Pierson, Seville Quads
January, 1995

SITE BOUNDARY

NORTH

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